

# Street Railway Journal

VOL. XXVI.

NEW YORK, SATURDAY, JULY 1, 1905.

No. 1.

PUBLISHED EVERY SATURDAY BY THE  
**McGraw Publishing Company**

**MAIN OFFICE:**

NEW YORK, ENGINEERING BUILDING, 114 LIBERTY STREET.

**BRANCH OFFICES:**

Chicago: Monadnock Block.

Philadelphia: 929 Chestnut Street.

Cleveland: Cuyahoga Building.

London: Hastings House, Norfolk Street, Strand.

Cable Address, "Stryjourn, New York"; "Stryjourn, London"—Lieber's Code used.

Copyright, 1905, McGraw Publishing Co.

## TERMS OF SUBSCRIPTION

In the United States, Hawaii, Puerto Rico, Philippines, Cuba, Canada, Mexico and the Canal Zone.

Street Railway Journal (52 issues).....\$3.00 per annum  
 Combination Rate, with Electric Railway Directory and  
 Buyer's Manual (3 issues—February, August and November) \$4.00 per annum  
 Both of the above, in connection with American Street Railway  
 Investments (The "Red Book"—Published annually in May;  
 regular price, \$5.00 per copy).....\$6.50 per annum  
 Single copies, Street Railway Journal, first issue of each month, 20 cents;  
 other issues, 10 cents.

*To All Countries Other Than Those Mentioned Above:*

Street Railway Journal (52 issues), postage prepaid..... \$6.00  
 25 shillings. 25 marks. 31 francs.  
 Single copies, first issue of each month, 40 cents; other issues, 15 cents.  
 Remittances for foreign subscriptions may be made through our European  
 office.

## NOTICE TO SUBSCRIBERS

REMITTANCES.—Remittances should be made by check, New York draft, or money order, in favor of the STREET RAILWAY JOURNAL.

Change of Address.—The old address should be given, as well as the new, and notice should be received a week in advance of the desired change.

Back Copies.—After July 1, 1905, no copies will be kept on sale beyond fifteen months prior to date of issue, except in bound volumes.

## NOTICE TO ADVERTISERS

Changes of advertising copy should reach this office by 10 a. m. Monday preceding the date of publication, except the first issue of the month, for which changes of copy should be received two weeks prior to publication date. New advertisements for any issue will be accepted up to noon of Tuesday for the paper dated the following Saturday.

*Of this issue of the Street Railway Journal 8250 copies are printed. Total circulation for 1905, to date, 213,350 copies, an average of 8206 copies per week.*

## Interurban Roads and the Lighting Business

The interurban electric railway that employs alternating-current transmission and is looking for all possible sources of revenue will do well to investigate the chances for furnishing electric light and power to the small towns along the lines. This is a matter which has never received the attention that it

should from interurban railway companies or from the small electric lighting companies in the towns through which interurban roads run. This may be due in part to supposed engineering difficulties in the way of successful lighting and railway service from the same transmission lines. In most cases it is probably caused by the fact that no one concerned realizes the advantages to be gained. An interurban road of sufficient size to require alternating-current transmission usually has a power house of such size and equipment as to be able to generate power for very much less per kw-hour than the small country lighting station. The interurban road also very likely has sub-stations, in which lighting apparatus can be placed, in or near a number of towns along the line. Even where such sub-stations are not already in existence, it is easy to establish small sub-stations in which lighting apparatus supplied from the high-tension transmission line furnishes current to village lighting systems. There would in most cases be little doubt but that with an interurban power station of good design and the transmission line already in existence, a small town could be lighted with more profit than with a small steam plant of the size the town might require. It would probably also be possible to do electric lighting in towns too small to support an independent lighting station. Sometimes the lighting distribution system of the town could be owned by the railway company. In other cases the existing lighting companies could buy their power by the wholesale from the railway, and retail it to private consumers in the town.

The engineering features of such work are simple. The high-tension transmission line of the railway will usually be 25-cycle, three-phase. To furnish incandescent lighting current from the railway transmission line nothing beyond the usual transformer will be necessary. If 60-cycle, single-phase current is required for arc lighting, either a frequency changer or motor-generator set must be installed.

The business of furnishing light and power to small communities, like many another, requires good management to make it pay, but many well managed small companies are doing well in spite of the handicap of an uneconomical power station. Railway companies with their economical plants and with the talent at their command should be able to do as well or better.

## Handling Crowds at Parks

An important feature of electric railway service at parks is the proper handling of large crowds. There are a few points in this connection which must not be overlooked, if congestion of traffic is to be avoided. While a great deal depends upon the number of persons to be handled in a given time, two features of the problem are of special weight: the cars must be kept close to their schedules and the movement of foot passengers must not be impeded.

In nearly all park work the problem is in handling the

crowds on their return, as people come to the park all through the evening, but all want to return about the same time. All arrangements should, therefore, be made for the rapid despatching of cars on the return trip, and this can usually be done better by a system of loops than by stub tracks, unless the latter are very extensive. The double stop entailed on a loop by separating the inbound from the outgoing travel is a small matter in comparison with the delays which generally occur when large numbers of people attempt to enter and leave the cars simultaneously; and, in addition, the trouble of switching is practically eliminated in a well-designed loop scheme. In cases where space permits, stub tracks can often be employed with profit for the storage of extra cars before the homeward rush hour, but as a general rule it is better to load and unload upon loop tracks than upon spurs. The crux of the whole matter is to keep things moving in the right direction, and this can only be accomplished by diverting the traffic into the channels of least resistance, always taking care to separate incoming from outgoing travel.

While many street railway summer resorts are open grounds, without fencing or special trackage, it would seem wise to study the problem very carefully before deciding that nothing need be done to avoid congestion. In very small centers of population there is, of course, little occasion to worry about overcrowding and possible accidents, but as the population begins to run upward into the ten thousands it does not require especially abnormal conditions to create almost intolerable overcrowding, if precautions are neglected. Then, too, the manner in which the people are handled has a very real influence upon their patronage of a given resort; if one can leave his car comfortably at the park entrance, pass into the grounds without encountering a stream of outgoing traffic through which the way must be contested, and finally leave the premises in decent order, reasonably certain of a seat on the homeward trip, he is much more likely to come again than as though everything at the entrances and exits were in a hurly-burly of every man for himself and the rest of the aphorism. It is better to invest in passageways than policemen for diverting traffic, and, after all, the separation need not be carried far into the grounds. All that is needed is organization, and if the crowds are handled in a systematic way the probabilities are that everything will move like clockwork. The sign feature must not be forgotten, but even these arrangements can be of the simplest character. As a matter of detail, the question deserves consideration from managers who are trying to bring their service up to the best modern standards.

### The Labor Vote and Municipal Ownership

The effect of introducing street railway employees into politics, as would be the case if the policy advocated by Mayors Dunne and Johnson should be adopted, is occasionally mentioned in discussions on the subject of municipal ownership, but the opportunities which such a large and trained body of men would offer to the professional politician are not generally realized. The labor employed in street railway service is of necessity exclusively, or almost exclusively, male, and as the work requires strength and intelligence every employee is of voting age. A tabulation of the employees on the street and elevated railways in Greater New York, according to the last report of the New York State Railroad Commissioners, shows that they amounted to 29,400 men. This number was 7 per cent of the total vote cast for the last successful candidate for Mayor, and nearly 50 per cent of his plurality. We all know what an enormous in-

fluence in politics even a small body of organized voters can and does exert, and with the support which such a body would have in a political contest from trade unions and other allied socialistic bodies their influence would be well-nigh irresistible. The average citizen would be reduced to a thralldom comparable only to that in Russia, with no voice in the administration of affairs, except at rare intervals, when a cataclysm would occur to bring about a temporary relief.

The situation is entirely different in European cities where municipal ownership is in vogue to some extent, and where a restricted suffrage is the rule. In some cities in Germany, for instance, 2 per cent of the people cast one-third of the vote, and in all German cities the extent to which the residents participate in the selection of their municipal officers varies with the extent of the contributions of the voter to the public revenue. Even in Great Britain suffrage is by no means universal among the male inhabitants, and that for municipal elections is much more restricted than that for national elections. In the former no one can vote who is not a householder as well as a taxpayer up to a certain amount. Compare this with New York city, where less than one-twentieth of the voters are owners of real estate and actual direct taxpayers to the city government!

It may be largely owing to this condition, but at all events it is undeniably true, that tenure in office is very much greater in the average municipality abroad than in this country, and cities are more careful about the men who are put in charge of these responsible positions. For example, in Germany the cities are not confined to residents within their boundaries for candidates to the office. Thus, when the city of Magdeburg recently required a new Mayor, a canvas was made among the possible candidates, and the selection fell on the Mayor of Erfurt, who had distinguished himself in handling the affairs of that city and who previously had been Mayor of a still smaller city. In fact, it is the recognized policy of the largest German cities, in selecting a Mayor, to canvass carefully the records made by the incumbents of that office who had demonstrated the greatest capacity for such duties.

Although exactly the same policy in regard to choosing Mayors is not followed in Great Britain, the conditions are such in that country as to attract the best men in the community into the administrative councils and to keep them there. Mr. C. R. Bellamy, general manager of the municipal tramways of Liverpool, describes this condition, in a paper on municipal ownership, in the following words: "In England men of the keenest business acumen and of the highest standing are associated with municipal politics through long periods of years—ten, twenty, thirty and even forty years. They are expert in all that pertains to municipal ownership. Patriotic regard for everything that operates to the well being of their town and a desire to secure equally good results with those obtained in other towns lead them to devote a large amount of time, care and energy to the discharge of their duties."

It is differences like these which vitally affect the question of municipal ownership. There are other considerations as well, but the ability and permanency of policy of the city administration is certainly a vital one. Whether municipal or private roads abroad have shown the better results is immaterial in this connection. With only the fraction of a cent in each fare difference between a profit and a deficit, street railway operation requires the ablest administration, and this is not possible when politics is the chief concern of our municipal officers.

### New York State Question Box

The value of the Question Box idea as a means for collecting and presenting suggestions, opinions and results of experience on practical electric railway subjects has been demonstrated at several street railway conventions recently, and also in the columns of this paper. The chief advantage, of course, lies in the facility with which discussion can be concentrated on any one particular and definite topic. The Question Box as prepared for the Lake George convention of the Street Railway Association of the State of New York contained about fifty practical questions on practical subjects, and all of these questions brought out some interesting and valuable answers, both in the preliminary canvass and in the discussion at the meeting.

The question relating to advertising received special attention, and some dozen different methods of securing publicity for the road and its attractions were suggested. As to the relative merits of the various methods of advertising, the opinions differed widely. From the tone of the answers, it may be assumed that no one medium of advertising can be called the most effective for all localities, but some or all of the various methods suggested must be used in combination, depending upon the sort of people to be reached and what the road has to advertise. The illustrated folder or pamphlet, more or less elaborate, as the case may be, is mentioned favorably in most of the answers, and this medium perhaps stands in highest favor. It has the commendable feature that the number printed, size and make-up, and therefore the general expense of producing it, can be closely regulated to fit the needs of the particular road and locality.

Other methods of advertising which received favorable comment included newspapers, display cards inside cars, banners and display cards on outside of cars, small posters for shop windows, billboard posters, periodicals published by the company, souvenir postal cards, handbills, popular contests of various kinds, illustrated lectures, etc.

The snow-fighting and snow-removing problem also came in for considerable attention, and four valuable aids in fighting snow were mentioned, namely, scrapers, sweepers, shear and nose plows and rotaries. It was emphasized, however, that, after all, the best snow-fighting equipment must be rated as secondary to the method and organization employed for handling the equipment. The descriptions of methods of fighting snow, many of which have already been published in the columns of this paper, make interesting reading.

Under the heading Claims, a number of methods of handling the "accident account" are described. The amounts charged to this account vary from less than 1 per cent to 5 and 6 per cent, with 3 per cent a good average.

The pros and cons with respect to the advisability and economy of running trail cars are well brought out in the Question Box, but the diversified character of the roads reporting on this question makes it difficult to arrive at a consensus of opinion with respect to the advisability of running trail cars. Certain of the answers expressed the opinion that trail cars increase the number of accidents, while others state it to be the experience that trailers not only do not introduce an added hazard, but that in fact they decrease the liability to accidents. The deciding factor is probably the combination of grades and curves on the road. For comparatively straight, level lines, especially if there are loops at the terminals, it is probably safe to say that the running of ordinary trail cars presents a convenient and economical method of handling extra heavy

traffic. Just where the line should be drawn with respect to topographical conditions is still a matter for discussion. Practically all the answers agree that for suburban and interurban roads two or three-car trains equipped with some form of multiple-unit control are entirely feasible and desirable if traffic requires the additional carrying capacity.

On the question of rates of fares, the consensus of opinion seems to be that fares on suburban lines should be based on mileage, but opinions differ as to the proper rate per mile, this ranging from less than 1 cent to 2½ cents per mile, with the majority in favor of 1½ cents. Competition undoubtedly enters into the question, although several electric roads report that their fare is higher between stated points than the steam road rate, and yet the trolley road is getting most of the business.

Several methods of despatching cars were presented, and interest in this matter centers chiefly in methods of ensuring that conductors and motormen understand the orders correctly and then proceed to carry them out carefully. The answers contain several good suggestions along this line.

In regard to giving special rewards or prizes to employees for meritorious services, the experience and opinion of the New York State roads seem to be against giving special recompense to employees for doing their duty.

Under the heading Safety Precautions were described several means and devices for securing greater safety in electric railway operation.

Questions in the mechanical department included topics such as fireproofing cars, oil vs. grease lubrication, cast iron vs. steel wheels, brake shoes, shop devices, etc. Interesting discussions took place on all these topics. The answers of interest to power-house men included treatment of feed water, methods for increasing power to carry the peak of the load, lighting, precaution against lightning, etc.

All of the answers pertaining to the line department topics make excellent reading to those having to deal with line problems, and a number of suggestions for cheapening and expediting the work of this department were given.

With reference to the track department, the topics discussed included the best methods of testing bonds and the experience with soldered bonds. The use of concrete foundations under rails or roadbed also received attention, and it is believed the answers dealing with this topic present a very comprehensive review of this subject. The gist of the matter with regard to concrete foundations seems to be that if the concrete beam is made deep enough and wide enough, good results will be obtained with concrete construction under track. A number of suggestions were also made for expediting and cheapening the work of the track department.

While the very noticeable diversity of opinion in the answers to most of the queries may at first thought seem to detract from the practical value of the "Question Box" yet this diversity is in many cases not without a certain advantage, though indicating that a problem may have many solutions depending upon local and other circumstances. Moreover, in most instances, solutions are asked to special cases without a statement of all the factors involved, and naturally the answers will vary in accordance with the way in which the missing factors are supplied. That the "Question Box" is held in high esteem is indicated by the extent of collaboration accorded by members in its preparation, which also reveals the spirit that gives to the New York body such a leading position among the State railway associations.

## IMPROVEMENTS IN METROPOLITAN ELEVATED SHOPS, CHICAGO

As described in the STREET RAILWAY JOURNAL of April 22, 1905, the Metropolitan West Side Elevated Railway Company, of Chicago, has made important changes in its rolling stock during the past year. By way of preparation for these changes, and to provide better repair facilities for the future, the company completely overhauled its repair shops and introduced a number of improvements in them. The shops as they now stand are well up to date, and, as will be mentioned later in

of repair pits, one 20 ins. deep, others 4½ ft. deep. There are no third rails inside this building. When cars are to be moved inside of the building an attendant takes a flexible cable with a handle on the end and makes contact with a third-rail shoe on the car, walking alongside the car as it moves. Cars are therefore always dead when in the shop, except when this employee makes this temporary connection with his flexible cable. Before making a connection, two warnings are given, so that anyone who may be working on the equipment can get clear or make his presence known.

The appearance of a car, when over the elevator shaft, is

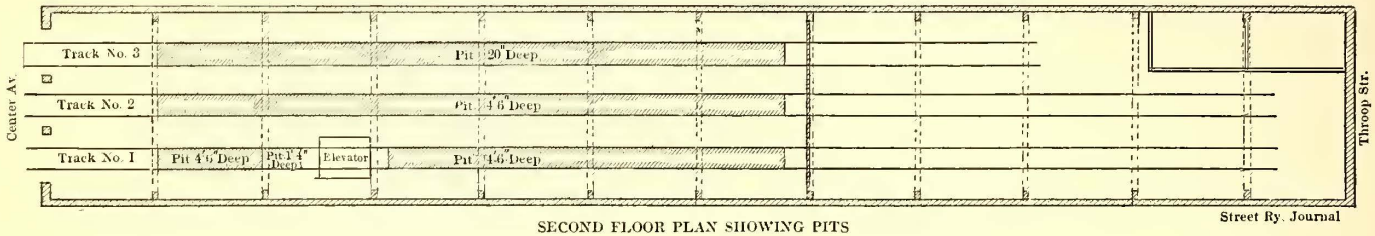


FIG. 1.—PLAN OF SECOND FLOOR OF THROOP STREET REPAIR SHOP

this article, the changes in the equipment were made with a surprisingly small number of men in addition to the regular repair force, and in a remarkably small area of shop space.

The main repair shop is located at Throop Street on the company's right of way. The shops occupy an island position, with the two elevated main line tracks on each side. The cars to be repaired are run into the second floor of the building, which is on a level with the tracks on the elevated structure. All the car body repairs are carried out on this second floor. Truck

seen in Figs. 3 and 4. When the truck is lowered from under the car, the car lays on a dog. This dog folds back into the column on each side of the elevator when not in use. It comes out just far enough to engage the I-beam side sills of the car. The cars never have to be left over the elevator long, because a truck in good order is at once placed on the elevator and put under the car. Or, if the car is not to be put back in service, a shop truck can be placed under it.

Fig. 5 is from a photograph taken on the first floor of the

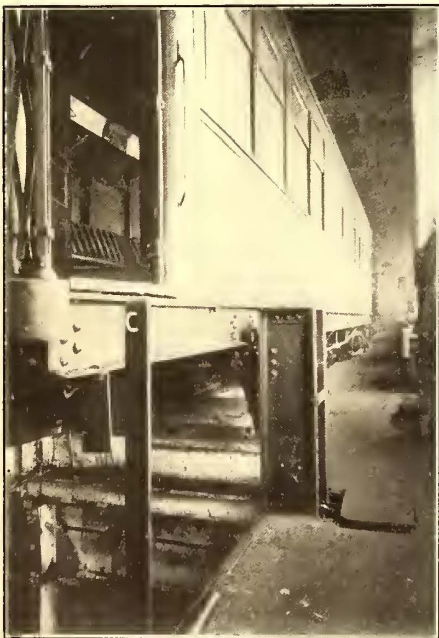


FIG. 3.—CAR OVER ELEVATOR, SHOWING POST AND DOG FOR SUPPORTING CAR BODY

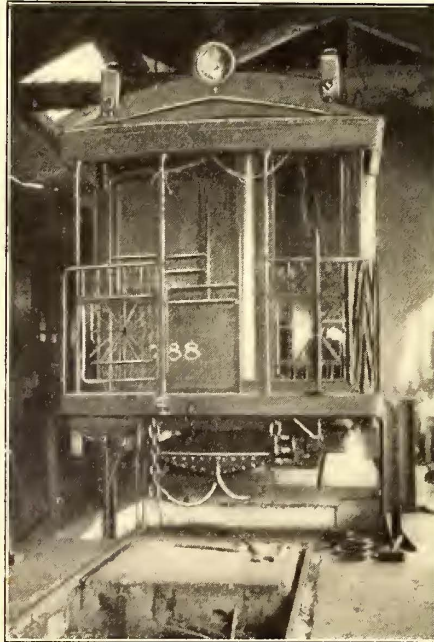


FIG. 4.—CAR OVER ELEVATOR, WITH TRUCKS REMOVED



FIG. 5.—ELEVATOR AND GALLERY STORAGE TRACK FOR SHOP TRUCKS

and motor repairs are made on the floor below. The trucks are lowered from under the car bodies by an elevator.

The second floor plan of the building is shown in Fig. 1, and the first floor plan in Fig. 2. Fig. 1 indicates the location and depth of the pits under the repair tracks, and also shows the position of the elevator by which trucks are removed from the car bodies and new trucks are substituted. The pits for motor and truck work are in the end of the building nearest the entrance. At the rear end of the building are the tracks where painting and carpenter work are done. There are two kinds

shop, and shows the elevator. Fig. 5 illustrates the elevator raised to its full height, and also shows an interesting feature of the shop, which is a gallery track for shop trucks, located midway between the first and second floors. On this gallery track are placed old trucks, which are used simply for moving cars around the shop. When required they can be instantly run on to the elevator, raised to the second floor and placed under cars that may need them. The elevator, as can be seen from the illustration, is of the direct-acting hydraulic-piston type, and is built for a capacity of 50 tons. It is very massive in its



and four 1-ton barrel hoists for use in the shop. Overhead travelers are provided for carrying heavy parts whenever the traveling crane is not available. For removing the armatures from GE 55 motors, which are of the box type, the armature

of the shop is interconnected with that of the power house across the street, which also has a compressor, so that one acts as a reserve for the other.

Interesting details of building construction are shown in Figs. 13, 14 and 15. Fig. 13 is the sectional elevation of the repair shop, showing the location of the girders supporting the tracks of the traveling crane and the concrete floor construction. Fig. 14 shows the details of the guard rail track construction on the first floor, while Fig. 15 illustrates the method of supporting the rails on the edges of the pits on the second floor.

Fig. 16 shows a detail of car equipment practice which may be of value to other companies. This is the method of supporting the platform carrying the compressors under the cars so that the platform will be insulated from the car framing.

#### TESTING ARMATURES AND FIELDS FOR FAULTS

All rewound armatures are tested for faults before they leave the racks in the winding room. This is done by passing heavy alternating current through the armature. To make such a test, brush holders are bolted to the armature rack, as shown in Fig. 17. The brushes bear on the commutator 90 degs. apart, just as when the armature is in a motor, but the armature is, of course, without fields. The armature is rotated by hand. For testing GE 55 and GE 2000 motor armatures, 300 amps.



FIG. 8.—GENERAL VIEW OF TRACKS UNDER TRAVELING CRANE

shaft is supported in a special machine on centers and the motor casing slid along until the armature is exposed.

Several wings of one story have been added to the main shop. Two of these wings are provided with tracks. Fig. 10 is a view looking into them from the main shop. They are principally used for the storage of wheels and axles.

The practice of this company as regards wheels and gears is somewhat peculiar. Fig. 11 is a sectional drawing, showing the company's standard practice for motor-driven axles. Several years ago the company had an excessive amount of trouble with the cracking of axles between the wheel and gear. The plan of relief which was then adopted and has been followed since is to have the wheel made with an extended hub. On to this hub the gear is shrunk. Special gas torches are provided at the shop for heating gears preparatory to shrinking them on hubs.

The company also makes it a practice to shrink pinions on to motor axles. Fig. 12 shows a group of these wheels and axles in the shop.

The shop is supplied with compressed air for operating the compressed air hoists mentioned, and also six air drills and two air hammers. Air is supplied from a Christensen compressor and automatic governor, and the compressed air system

brushes bear on the commutator 90 degs. apart, just as when the armature is in a motor, but the armature is, of course, without fields. The armature is rotated by hand. For testing GE 55 and GE 2000 motor armatures, 300 amps.

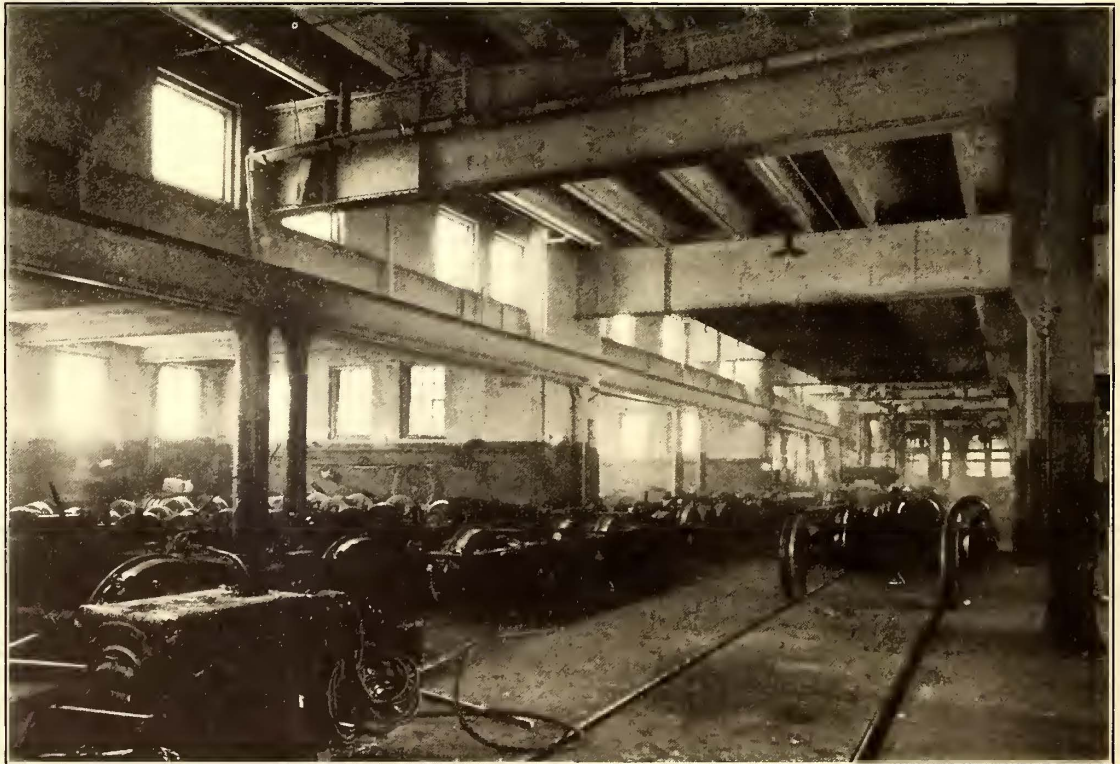


FIG. 10.—LOOKING INTO ONE OF THE WINGS FROM THE MAIN SHOP

alternating current is passed through the armature. To obtain this current about 80 volts pressure is required. In testing Walker motors of 150 hp, 200 amps. at 110 volts is necessary. The alternating current has a frequency of  $37\frac{1}{2}$  cycles per second. This method of testing armatures is not commonly known or used, but has several advantages over others which are followed. It is not quite as simple in its application as the

transformer method of testing armatures for short-circuits which is coming into favor for the testing of smaller motor armatures. It has the important advantage, however, that, as the armature is revolved in the rack during the test, any open circuit in the armature will make itself manifest by severe flashing at the brushes. Any slight commutator defect like a burr of copper or piece of solder causing a short-circuit between two segments will be burned out with a snap by the testing current without injury to the armature. The method therefore gives a quick and thorough test both for short-circuits and open circuits at the same time.

Besides testing for short-circuits and open circuits, all armatures are tested with 1800 volts between windings and core. Field coils are given similar tests. Current is supplied by a 30-kw generator driven by a 24-kw motor, the generator giving alternating current at 90 volts. Fig. 18 shows the corner of the armature room devoted to the switchboard and motor-generator set.

Another interesting feature in the armature department is a

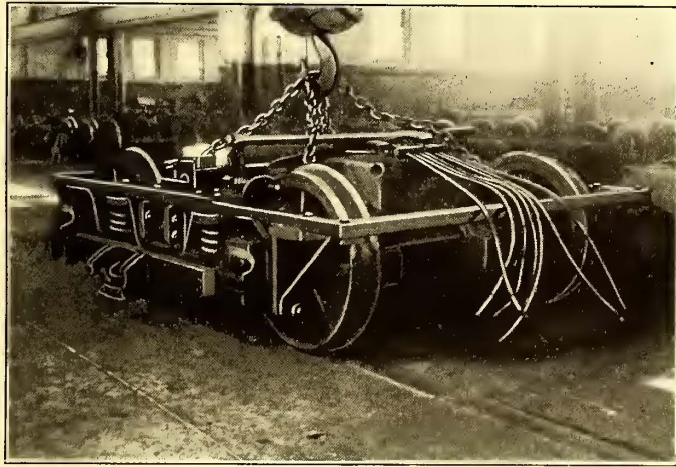


FIG. 9.—LIFTING TRUCKS BY HOOKS IN MOTOR CASINGS

home-made transformer for burning insulation loose from old armature coils which it is desired to rewind. It was found

very difficult to get the insulation off these coils until the present machine was devised. It is nothing more nor less than a transformer supplying a low-voltage current which is passed through the armature coil to heat it sufficiently so that the in-

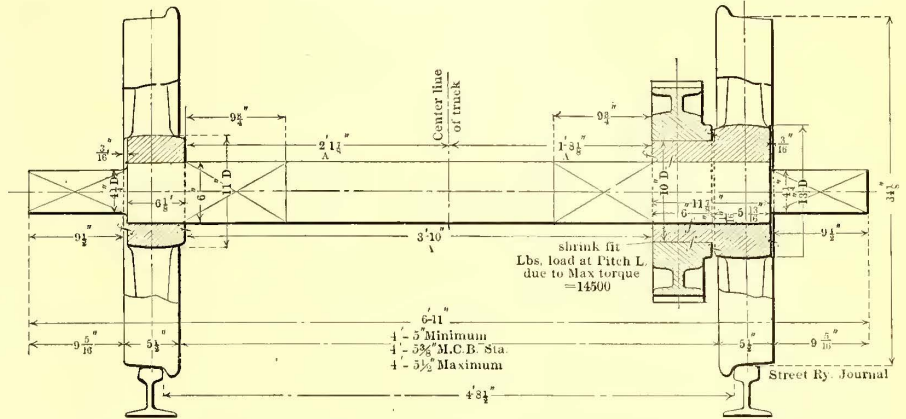


FIG. 11.—MOTOR AXLE, WHEELS AND GEAR—METROPOLITAN RAILWAY

insulation comes off easily. The transformer has as a core the core of an old compressor motor, Fig. 19. The primary coils which are on this core are connected to a source of alternating-current supply, and the secondary coils, of which there are a number in multiple, are connected to the terminal clamping plates on a bench. In Fig. 19 an armature coil is seen with its terminal clamped ready for the operation. Ordinarily, two boys work at the same time, one taking one-half of the arma-

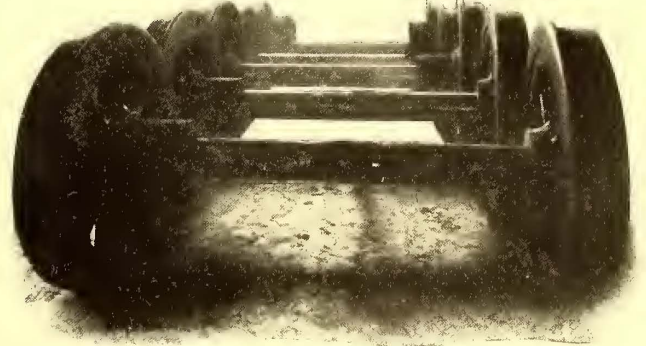


FIG. 12.—WHEELS WITH HUBS FOR RECEIVING GEARS

ture coil and the other the other half. The secondary of the transformer gives about 1000 amps. at 6 volts. The current

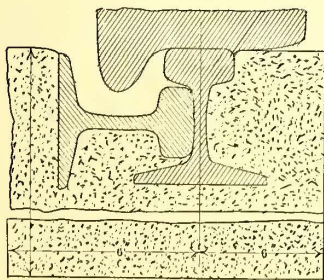


FIG. 14

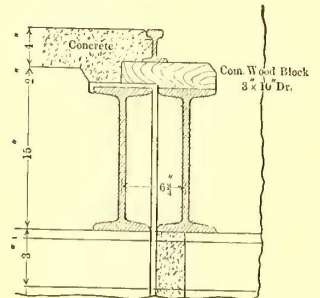


FIG. 15

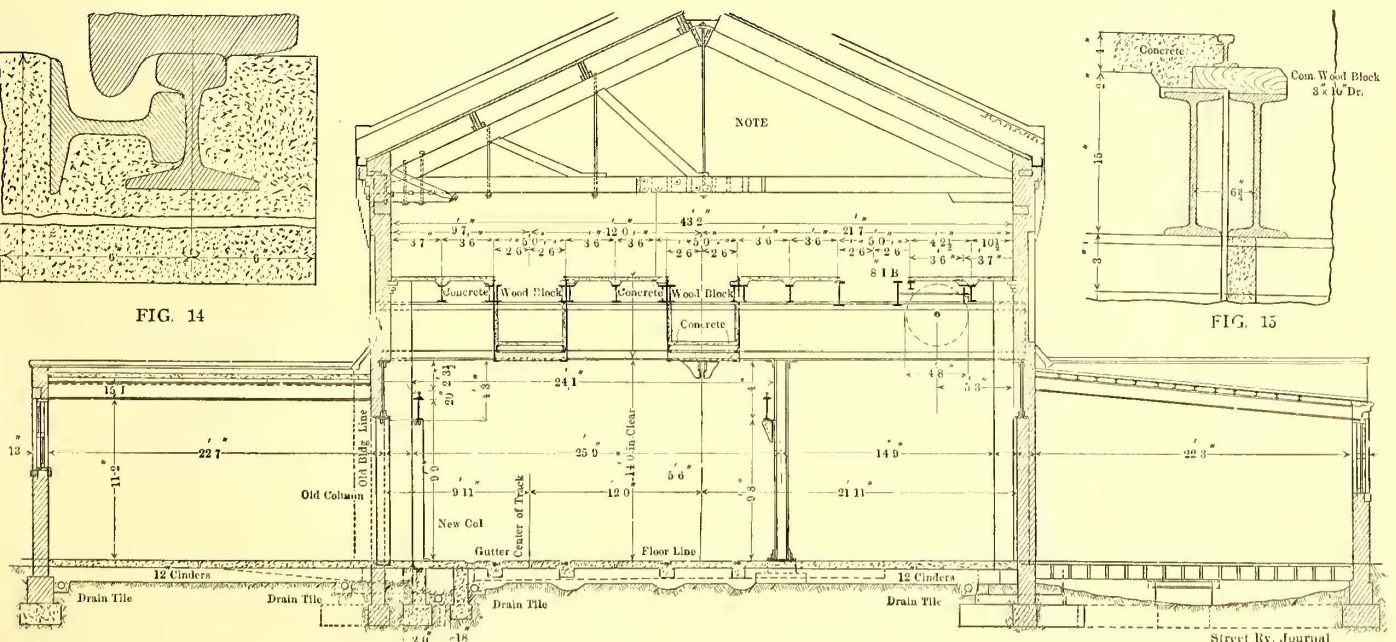


FIG. 13.—SECTION THROUGH REPAIR SHOPS





ing was done at this rate during the progress of the work with the addition of about fifty men to the regular repair and inspection force.

For the information contained in this and in the previous

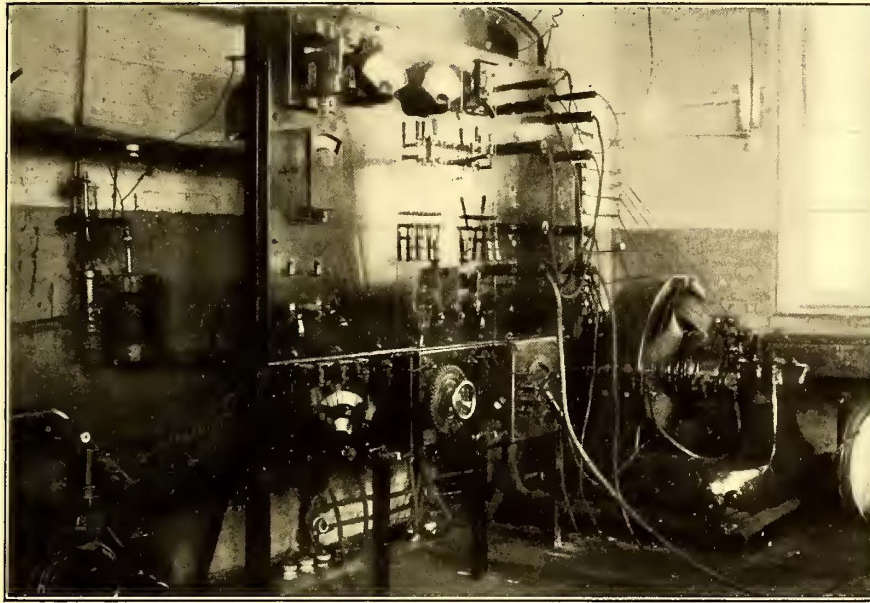


FIG. 18.—SWITCHBOARD OF COIL-TESTING APPARATUS

article describing the changes in this company's equipment, and for many courtesies extended, acknowledgement is due to H. M. Brinckerhoff, general manager, and E. T. Munger, master mechanic.

### THE COLLECTION OF FARES IN THE CITY OF MEXICO

The system of collecting fares in the city of Mexico differs radically from that employed in this country, as a slip is handed by the conductor to each passenger as a fare receipt. This receipt shows the date, amount of fare and direction of trip, bears a serial number, and must be retained by the passenger until the end of his ride as proof that he has paid his fare.

The company has seventeen different rates of fare, varying from 3 cents to 30 cents (Mexican), and being divided between first and second class. On the city lines there are no second-class cars or fares, the city rate being 6 cents, which at the present rate of exchange amounts to a little less than 3 cents gold. The colors of the paper upon which the tickets are printed are changed each month, and this fact, together with the practice of varying the progressive enumeration of the tickets among the seventeen different rates of fare, makes counterfeiting practically impossible. No transfers are given.

The day card which is issued to each conductor when he begins work shows on its back the commencing and closing numbers of all tickets issued to him, and should he draw additional tickets during the day they are also listed on the day card. This work is done by the ticket clerks and receivers, who prepare the day cards and issue the tickets. The company's records, therefore, show the precise enumeration of tickets issued to each conductor, with the corresponding price and their total value. The conductor, at the close of his day's work, must pay for all tickets not returned to the receivers.

Each line has a starter or despatcher at its terminal who must take an account and render to the auditor a report showing the closing numbers of the tickets held by all conductors at the end of each trip; this gives the auditor the exact enumeration and value of the tickets issued to the passengers on each trip. This information must, of course, check exactly with the conductor's day card.

Each line has one or more inspectors whose principal duty

it is to go through each car passing a given point and see if all passengers are provided with tickets. The inspector is familiar with the colors of the tickets representing the rate or rates of fare on his line, and does not have to inspect the tickets closely.

It is also the inspector's duty to occasionally inspect the conductor's day card, and his pad or pads of tickets, to determine whether the tickets are being issued in the order of their progressive enumeration as shown on the back of the day card.

The tickets are put up in pads gummed on two sides, the purpose being to prevent conductors taking tickets from any other part of the pad than the top. Conductors are required to tear the tickets from the pads in the presence of the passenger, which prevents the use of loose tickets that may have been picked up from the floor or otherwise secured. The receivers are instructed not to accept from conductors, at the time of liquidation, any tickets that have been detached from the pads. Each pad of tickets when issued to conductors is punched by the ticket clerk or receiver to show the date of issue and the line. The conductors are only required to make one punch, which is to show the "up" or "down" trip. The work of the conductor is therefore exceedingly simple, and his day's card when completed tells the true story of every ticket issued on each half trip. The auditor is therefore able to tabulate the exact earnings of each car for each half trip, and the total tickets sold on all the runs on each line represents the total cash earnings.

As an additional precaution and incentive to each passenger to retain his fare receipt the company has just announced the establishment of a lottery, the tickets for which will be the fare receipts issued by the conductors. Lotteries, as is well known, are exceedingly popular in Mexico, as in all other Latin countries, and in this case the sanction of the Government has been secured. The official circular of the company announcing the plan has just been issued in Spanish, French and English, to meet the requirements of the cosmopolitan population resident in Mexico. The English notice, somewhat abstracted, follows:

#### NOTICE TO THE PUBLIC:

Commencing with July 1, 1905, a new system of tickets or checks will be inaugurated on all the lines of the Mexico Electric Tramways, Ltd. The essential feature of the new system is that each check issued to passengers by conductors will participate in a monthly drawing and may draw a valuable cash prize. The prizes will range in value from \$2.50 to \$1,000, and each check will participate in the drawing in accordance with its value.

There will be 209 cash prizes each month, representing a minimum total value of \$2,000 and a maximum total value of \$10,000, the exact amount depending upon the respective values of the checks drawing the prizes. The numbers of the winning checks will be announced in the cars and in various other ways immediately after the drawings, which will take place under Government supervision at the company's offices at Indianilla within the first five days of the month following that during which the tickets are issued.

In view of the benefits offered to its patrons under the new plan, the company requests their co-operation in carrying out its regulations.

The details of the plan are as follows:

Checks representing the values of the different rates of fare will be printed upon distinctive colors of paper, and each check will show on its face in large figures the rate of fare paid by the passengers, the colors of the respective checks being changed each month.

These checks will be consecutively numbered for each month, and will be issued to conductors in pads. In order to prevent the irregular use of the same, or the use of counterfeited checks, passengers are requested, for their own protection, as well as that of the company, to see that checks given them are torn by the conductor from his pad in their presence, as conductors are prohibited from tearing them from the pads in any other manner. Loose checks should, under no circumstances, be accepted by passengers, as they are likely to be counterfeited or otherwise irregular.

Mutilated or disfigured checks should not be accepted. Passengers are therefore requested to see that their checks, when received from conductors, are in proper order and are punched to show the date of issue and the direction (subida or bajada) in which the car is moving, as otherwise they will not be accepted by the company as participating in the drawings. The word

"subida" is intended to indicate that the car is moving outward from the center of the city, and the word "bajada" that the car is moving inward toward the center of the city. Checks for suburban lines must also be punched to show the name of the line.

Conductors' checks issued for one line will not be accepted upon another line, and checks issued on one trip will not be good for another trip.

The check issued by the conductor is not good for passage, but is intended solely as a receipt for the amount paid by the passenger, and will only be honored as such for a single trip on the car upon which it is issued. Failure on the part of the passenger to preserve the check and show it to the inspector upon demand will result in his being obliged to pay his fare a second time. For their own protection, and to insure prompt payment of prizes in the drawing, passengers should carefully examine their checks and preserve them in good order.

The basic unit of each of the prizes will be the check representing a \$0.06 fare, and the corresponding prizes are shown in the following table:

Total No.	Prizes	Total
1	prize of \$200.00 .....	\$200.00
2	prizes of 100.00 .....	200.00
6	" 50.00 .....	300.00
10	" 20.00 .....	200.00
30	" 10.00 .....	300.00
160	" 5.00 .....	800.00
209 prizes aggregating .....		\$2,000.00

When the winning checks are of other values, the prizes will be correspondingly greater or less, in accordance with the value of the check, for example:

Should a Mexico to Tlalpam first-class check, the value of which is \$0.30, draw one of the prizes, the holder of that check will be entitled to five times the amount of the prize, for the reason that the value of his check is five times the basic unit of \$0.06.

Should a Mexico to San Angel first-class check, the value of which is \$0.20, draw one of the prizes, the holder of that check will be entitled to three and one-third times the amount of the prize.

Should any check, the value of which is seven cents, draw a prize, the holder will be entitled to one and one-sixth times the amount of the prize.

Should any check, the value of which is six cents, draw a prize, the holder will be entitled to the exact amount of the prize.

Should any check, the value of which is three cents, draw a prize, the holder will be entitled to one-half the amount of the prize.

It is therefore very important to each passenger that the check handed to him by the conductor shall show the full amount of the fare paid.

As will be seen, if a thirty-cent check should draw the first prize of \$200, the holder thereof would be entitled to a prize of \$1,000, while if the first prize of \$200 should be drawn by a \$0.03 check, the holder thereof would be entitled to a prize of \$100, etc.

The company guarantees the prompt payment at its offices at the Kiosko, located at the "zocalo," or Plaza de la Constitución, of all prizes upon presentation of the checks drawing the same. Furthermore, the company guarantees that it will not take advantage, for its own account, of any prizes which may be drawn by checks remaining in its possession. Should it happen that any unissued or mutilated checks in the company's possession draw a prize or prizes, the value of the same will be added to subsequent monthly drawings as special prizes in addition to the regular schedule of prizes. Checks drawing prizes which are not claimed within a period of three months after the date of the drawing will be considered as forfeited or canceled, and the prize corresponding to such checks will be added to subsequent monthly drawings as special prizes.

Free passes, monthly tickets (abonos), and special forms of tickets issued at reduced rates are not included in the new plan, and conductors' checks will not be issued for them.

Passengers using the cars regularly two or more times per day will be able to accumulate a large number of checks each month which will greatly increase their chance of drawing a valuable prize. It should be understood that the checks are given free in order to secure the cooperation of the passenger in carrying out the company's rules and regulations. The winner of a \$200 prize will have received, without cost to himself, a sufficient amount to enable him to pay his car fares at the rate of 55 cents per day for one year, or at the rate of 27½ cents per day for two years. The fortunate winner of a \$1,000 prize will have received, without cost to himself, the price of his car fares for a period of several years, or an amount sufficient to pay for one first-class passage to Europe and return.

The schedule of rates of fare between different points on this company's lines is printed herewith for the information of the public.

MEXICO ELECTRIC TRAMWAYS, LTD.

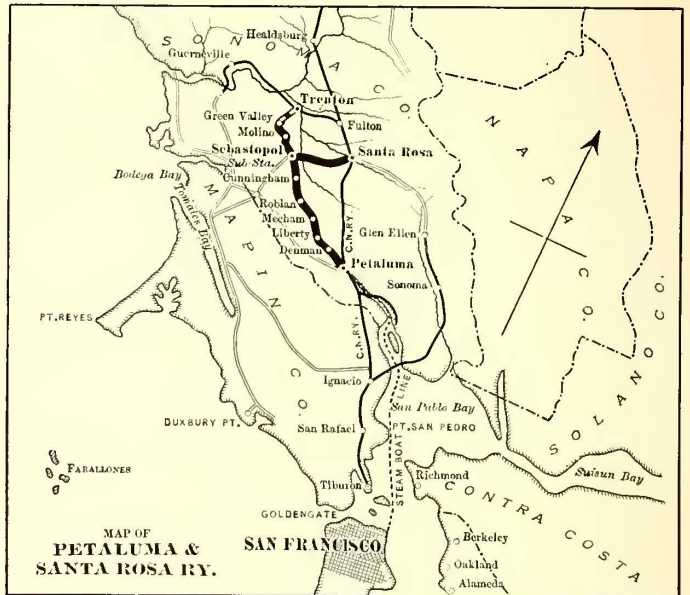
(Signed) W. W. WHEATLY,  
General Manager.

In addition to the plan outlined the company is making other improvements. Among them the company proposes to inaugurate an express business the latter part of this year. It is already doing quite a profitable freight business, which is rapidly increasing. Thirty-five 20-ton trailer freight cars have already been built in the company's own shops during the past year, and they are inadequate to do the business offered. The company is consequently now building twenty-five additional 20-ton trailer freight cars, and has just purchased four large heavy motor cars (with four G.E. 57 equipments) from the J.G. Brill Company. These motor cars are intended to draw

six fully loaded 20-ton trailers, and the motor cars will also carry a full load. The company now has on hand four specially constructed express cars and twelve standard wagons for express service. It is now waiting the approval of its express tariffs by the Government and the completion of other necessary details before starting its express business.

### THE PETALUMA & SANTA ROSA RAILWAY

The completion of the Petaluma & Santa Rosa Railway marks the beginning of a new era in interurban road building in California. The State has a number of interurban railways connecting the larger cities with their suburban communities,



MAP SHOWING THE TERRITORY OF THE PETALUMA & SANTA ROSA RAILWAY

with outlying towns and resorts, but these cater almost exclusively to a passenger business. Some of the systems are characterized by very interesting engineering and operating features, and many of them have been described in these columns during the past year. Differing somewhat from other

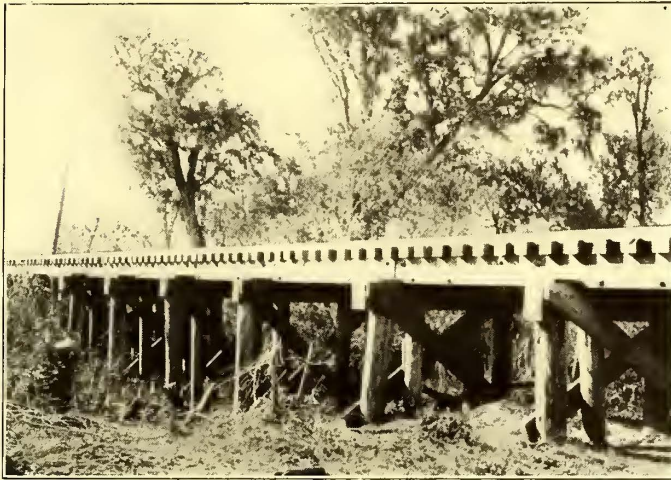


PETALUMA'S ORIGINAL RAPID TRANSIT

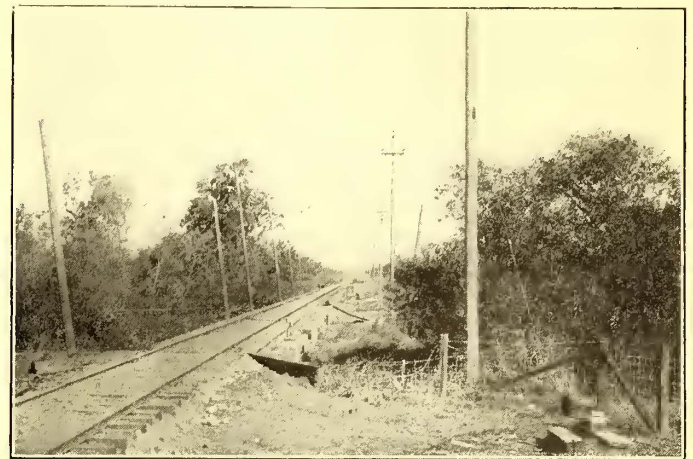
systems, the Petaluma & Santa Rosa Railway is built primarily for the handling of all kinds of express and freight, and, with the possible exception of the Watsonville system, it is the first electric railway in California to take up the freight question so comprehensively at the start. The railway will also develop its passenger business to the fullest extent possible, and it will be interesting to observe the combined growth of its two sources of revenue.

The Petaluma & Santa Rosa Railway extends north from Petaluma 17 miles to Sebastopol, where it divides, one branch going 7 miles east to Santa Rosa, the other continuing in a generally northern direction 8 miles to the town of Forestville. Petaluma is situated on Petaluma Creek, an estuary of the

poses. From Stoney Point the road continues on to Sebastopol through chicken ranches and fruit and berry farms. Between Sebastopol and Green Valley the line passes through the Gold Ridge Belt, a very productive strip of land, 15 miles long and 5 miles to 10 miles wide, whose chief products are hops and



AN EXAMPLE OF BRIDGE CONSTRUCTION ON THE PETALUMA & SANTA ROSA RAILWAY



A FINE STRETCH OF TRACK ON THE LINE TO SANTA ROSA

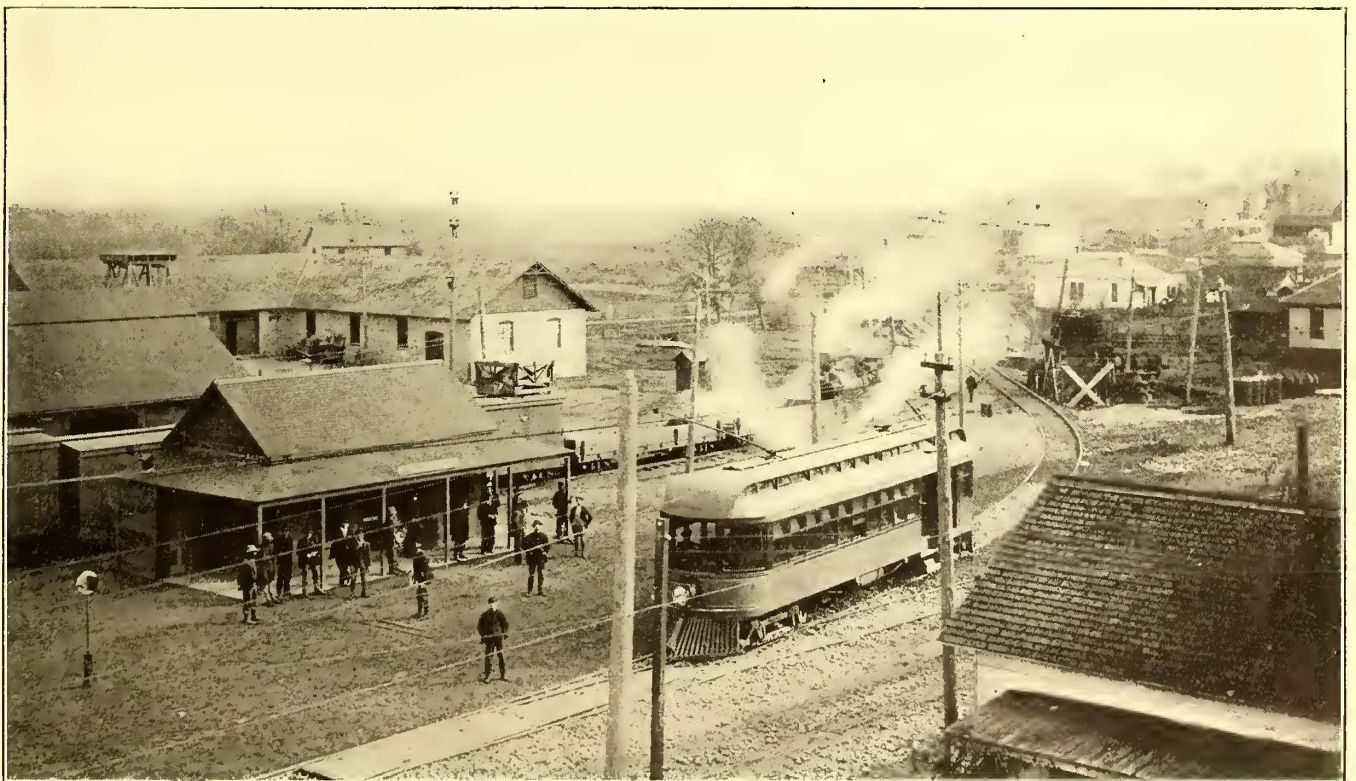
north end of San Francisco Bay, with which it has tide water connection. The company has at this point a large warehouse and terminal yards on the water front, and every facility for handling large quantities of freight. It owns the steamer "Gold," and charters another steamer of equal capacity. Both make daily trips to San Francisco, a distance of 40 miles.

Leaving Petaluma the track of the company parallels the

fruit and berries of all kinds. At Green Valley a new town site has been laid out.

The branch from Sebastopol to Santa Rosa parallels a spur from the California & Northwestern Railroad's main line and passes through a rich, level country.

The district served by the Petaluma & Santa Rosa Railway is the richest, most thickly populated and the most rapidly grow-



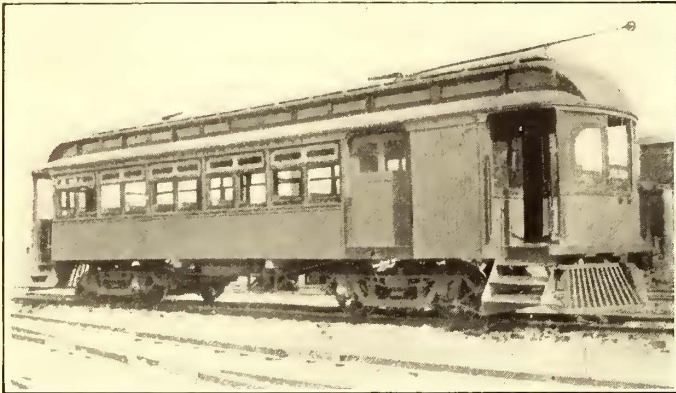
THE SEBASTOPOL STATION OF THE PETALUMA & SANTA ROSA RAILWAY, SHOWING FREIGHT STATION ON THE LEFT AND STONE SUB-STATION IN THE LEFT BACKGROUND

steam railroad track of the California & Northwestern Railway for about a mile, and then turns to the left on a 3-mile tangent through a level stretch. The road passes between low foothills, and 10 miles from Petaluma reaches Stoney Point quarry. This quarry is owned by the company, and contains the only rock tributary to the line. The stone is used for ballasting the track and is also sold for building and paving pur-

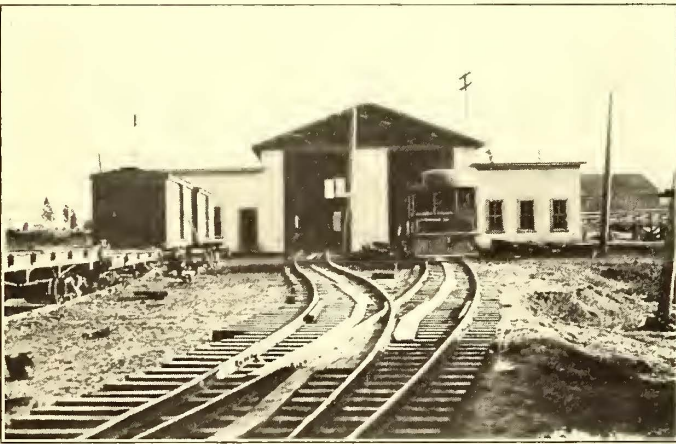
ing portion of Sonoma County. It lies west of the steam road, and until the opening of the electric road was reached only by the former's spur mentioned above. In 1900 the population of the district was 21,996, and the increase since that date has been considerable. The country in Sonoma County and other coast counties to the north is attractive to the Eastern fruit grower and farmer, since the rainfall is ample to insure excel-

lent crops without the expense of irrigation. Proximity to the market of San Francisco also makes the district attractive.

Petaluma, the tide-water port of the county and the southern terminus of the electric railway, is a city of 5000 people, and is enjoying a good, steady growth. It is known as the largest poultry center of the United States, about \$100,000 worth of

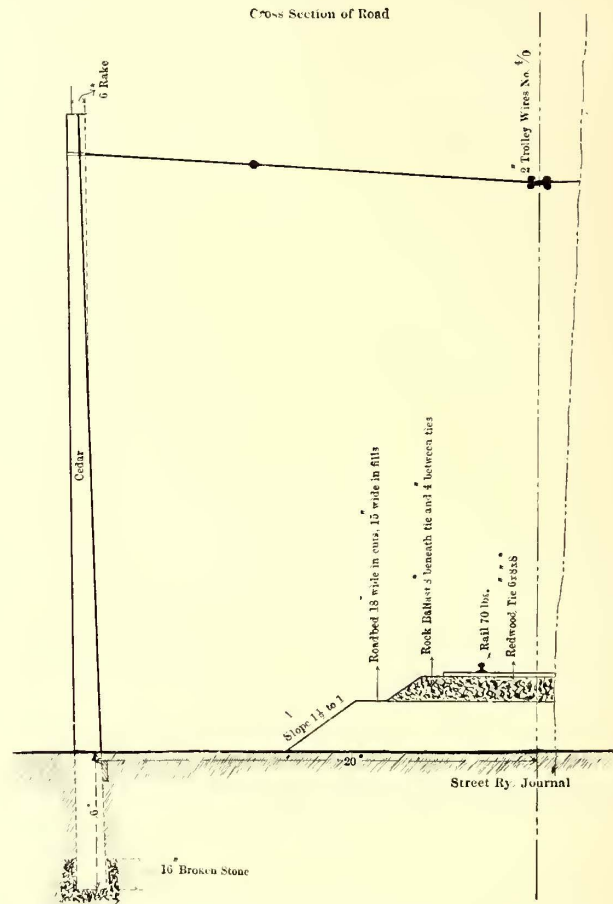


COMBINATION PASSENGER AND BAGGAGE CAR ON THE PETALUMA & SANTA ROSA RAILWAY



SHOPS AND CAR HOUSE AT THE PETALUMA TERMINAL

water. The record rainfall in this section, set last year, was between 8 ins. and 9 ins. in twenty-four hours, so that suitable precautions against washouts are quite necessary. All the road crossings of the railway are protected with steel cattle guards. The right of way is fenced in with American field fence, a barbed wire being fastened along the top and on the opposite sides of the posts from the fencing.



HALF CROSS SECTION OF LINE, SHOWING TRACK AND OVERHEAD STANDARDS

poultry and eggs being shipped monthly to San Francisco and other points in California. Petaluma also has a number of mills and manufacturing establishments. Santa Rosa, the county seat and the largest city of Sonoma County, has a population of about 10,000. It contains a number of manufacturing industries and is the distributing center of the northern part of the county.

Of the total 30½ miles of track at present completed by the company, 26 miles is on private right of way, which, in most instances, is 60 ft. wide. The track consists of 70-lb. standard A. S. C. E. section T-rail, laid in 30-ft. lengths to standard gage on 6-in. x 8-in. x 8-ft. redwood ties. The maximum curvature is 10 degs., and the maximum grade 2 per cent. The main line is thoroughly ballasted with broken rock obtained from the Stoney Point quarry, as mentioned above, while the ballast on the Sebastopol-Santa Rosa branch consists of river-bed gravel. Ample drains are installed in the road-bed at cuts and at other points requiring drainage, and, as an additional precaution against washouts in times of heavy rainfall, ditches have been constructed along the right of way to carry off the surface



THE STEAMER "GOLD" DOCKING AT THE PETALUMA WAREHOUSE OF THE PETALUMA & SANTA ROSA RAILWAY

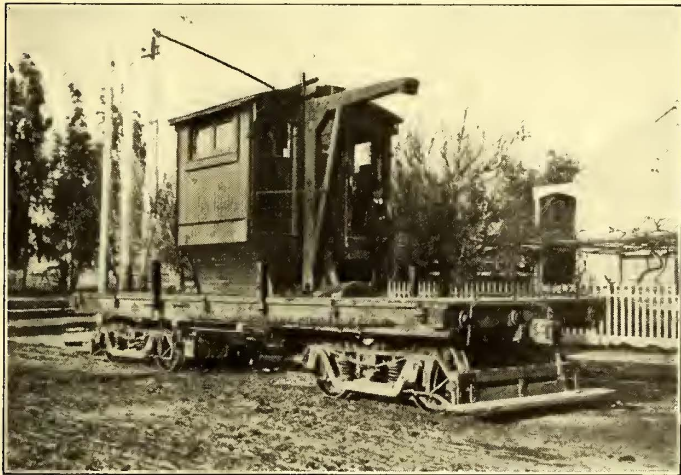
The overhead construction of the line is supported from 30-ft. Washington cedar poles set at the sides of the right of way and spaced 100 ft. apart. The poles are set 6 ft. in the ground, and before setting the butts were treated with crude oil as a preservative. The overhead conductor consists of two No. 0000 grooved trolley wires, spaced 6 ins. apart, and hung with twin hangers. Jumpers, consisting of copper strips and located every 600 ft., cross-connect the two wires.

Anderson overhead material is used, with the exception of a special trolley ear which has been developed by the officers of the railroad. The two trolley wires are supplied with current at Petaluma and Sebastopol, and at first were sufficient to operate the road without feeders. Recently a 500,000-circ. mil feeder has been installed, in order to provide for the increased capacity demanded by the growth in traffic.

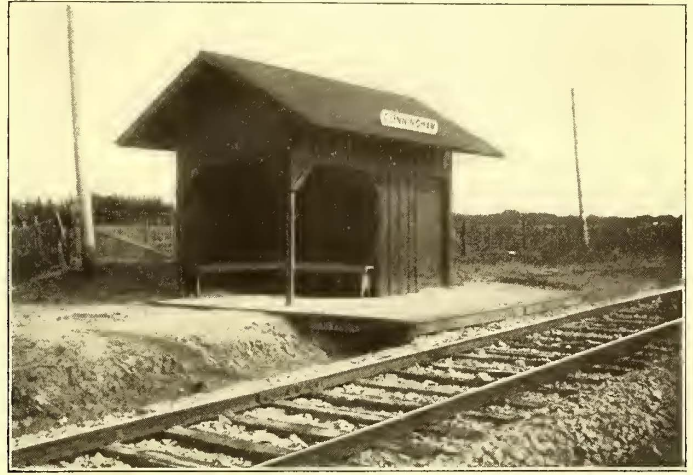
On the Sebastopol-Santa Rosa branch the track follows the

synchronous motor is driven by a 500-volt motor off a storage battery.

The current is controlled from a switchboard of blue Vermont marble, consisting of standard a. c., d. c. output, exciter, feeder and storage battery panels. The storage battery, which floats on the feeder system, is formed of 264 type-G cells, the tanks each having a capacity for twenty-one plates, with thirteen plates installed. At a one-hour rate of discharge the



MOTOR CAR USED AS A FREIGHT LOCOMOTIVE AND FOR CONSTRUCTION PURPOSES



A TYPE OF SMALL STATION WAITING ROOM ON THE PETALUMA & SANTA ROSA RAILWAY

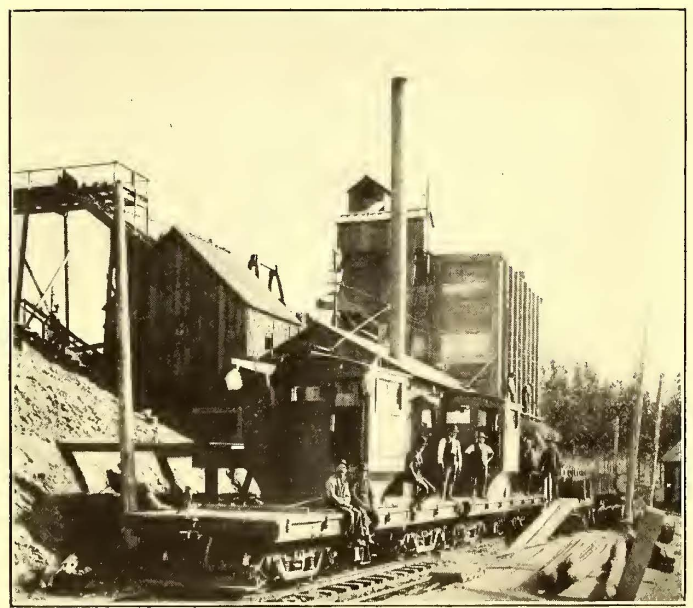
county highway most of the distance, and the poles that carry a 55,000-volt transmission line of the California Gas & Electric Corporation are used to support the trolley wires on one side. As the transmission poles are spaced 200 ft. apart, ordinary 30-ft. poles are alternated with them on that side.

The railway is operated by power purchased from the California Gas & Electric Corporation under a ten-year contract.

battery has a capacity of 480 amps. A General Electric booster is used in connection with a carbon regulator to regulate momentary fluctuations in load on the battery. The battery room was specially built, and has a concrete floor painted with P. & B. paint. The tanks are of a new type, having flat lead tops, which permit them to be filled higher and with less danger of slopping over. The tanks are doubly insulated from the



A VIEW OF APPLE ORCHARDS ALONG THE LINE OF THE PETALUMA & SANTA ROSA RAILWAY



THE PETALUMA & SANTA ROSA RAILWAY COMPANY'S QUARRY, SHOWING TWO MOTOR CARS COUPLED TO CRUSHED ROCK TRAIN

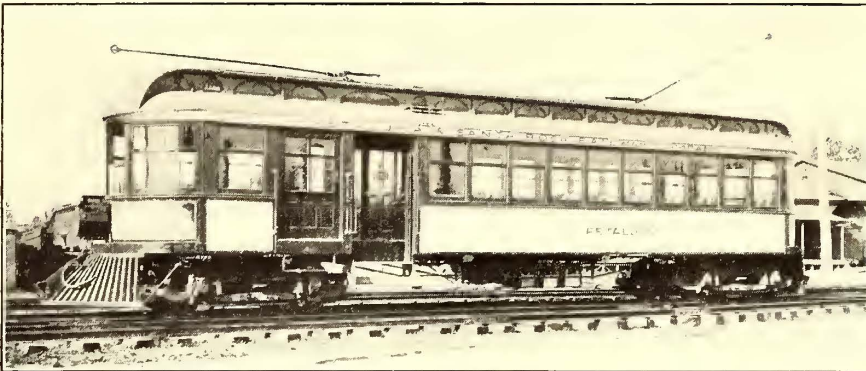
The main sub-station is located at Sebastopol, in a substantial stone building designed by the power corporation, but built by the railway company. Here the 55,000-volt current is transformed to 2300 volts by means of three 250-kw transformers, and is then used to operate a 400-kw General Electric motor generator set. The latter consists of a 2300-volt synchronous motor, driving a direct-current 575-volt generator, the speed of the unit being 450 r.p.m. Foundations have been installed for a duplicate motor generator set. A 15-kw exciter for the

floor by porcelain and glass. The battery was installed by the Electric Storage Battery Company.

At Petaluma an additional current is supplied to the railway by the California Gas & Electric Corporation from a motor-generator set. This set consists of a 440-hp Stanley synchronous motor, driving a 350-kw Bullock generator at 360 r.p.m. The motor connections at Petaluma are 4000 volts star, while those at Sebastopol are 2300 volts delta.

The passenger service of the Petaluma & Santa Rosa Rail-

way is handled by ten 45-ft. semi-convertible cars, manufactured by the American Car Company, of St. Louis, and W. H. Holman & Company, of San Francisco. These cars are able to maintain a speed of 35 m.p.h. on the level, and contain baggage and smoking compartments. Each is equipped with four General Electric 70-motors and two 28-A controllers. Westinghouse straight air-brakes are installed with Nichols-Lintern pneumatic sanding devices. Wagenhals arc headlights

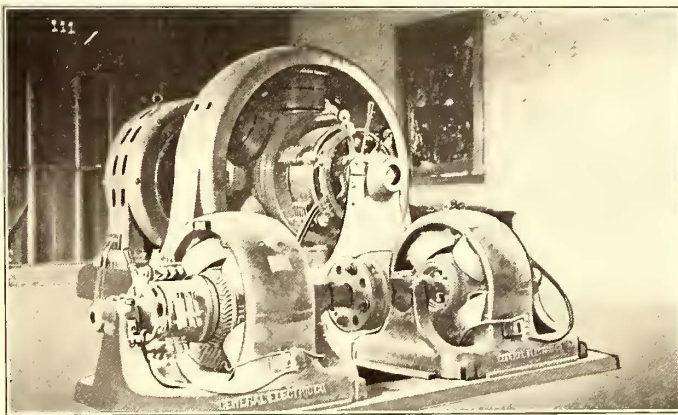


STANDARD PASSENGER CAR ON THE PETALUMA & SANTA ROSA RAILWAY

with roller-canvas screens are used, and all cars have standard pilots. A half-hour passenger service is operated at present, the cars being despatched by telephone with duplicate train orders. The passenger rate charged is 2 cents a mile, with a minimum of 5 cents.

The company's freight service is handled by an equipment consisting of fifty flat and ten box cars, three motor freight cars and one baggage express car. Each of the motor freight cars is equipped with four General Electric No. 70 motors, and consists of a flat car with cab in the center. At each end of the cab is mounted a swinging jib crane, by the aid of which the car may be quickly loaded and unloaded. This type of car is used for construction work, and in regular freight service hauls a train of box cars or flats.

At Petaluma the railway company controls a valuable water front property, as before stated. Soon after the railroad service was begun the freight traffic increased to such an extent



THE MOTOR-GENERATOR SET AND BATTERY BOOSTER IN THE SEBASTOPOL SUB-STATION

that the steamer "Gold," with a net tonnage of about 300 tons, was inadequate, and an additional boat was secured by the company. The two are now hardly able to keep up with the business. The steamers have their own wharf at the foot of Market Street in San Francisco.

Plans are now being prepared for an extension of the electric railway from Petaluma to Point Pedro, about 20 miles south, where better shipping and dock facilities may be secured. This will also reduce the boat distance to San Francisco, and will thus increase the passenger facilities of the system. Active steps are also being taken for an extension of the railroad

north from Forestville through the Dry Creek Valley to Healdsburg and other prosperous towns on the Russian River. A branch westward through Sonoma County, with the possibility of eventually reaching the ocean, is also talked of.

The present officers of the Petaluma & Santa Rosa Railway Company are: President, John A. McNear, of Petaluma; vice-president, W. F. Kelly, of Oakland; secretary, Thos. Archer; treasurer, Burke Corbett; general manager, E. E. Downs. Much credit for the successful construction is due to Alfred D. Bowen, who also supervised the early operation of the road.

## FIELDS VERSUS ARMATURES NEAREST TROLLEY

BY JOSEPH ANDREWS

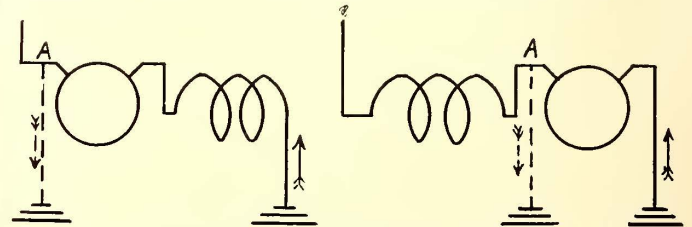
It has become standard practice in railway motor work to place the armature in circuit nearer the trolley side of the line, and the fields nearest the ground side. The practice has become so universal that no question is raised concerning it, and the reason for

so connecting the motors has probably not occurred to many.

It is often explained as being indirectly due to the fact that reversal of current to obtain reversal of rotation of the motor should occur in the armature rather than in the field. To retain the reversal in the armature, were it connected in the circuit last, would necessitate the return of all of No. 2 motor leads to the controller, where now one of them is carried direct to the shell of the motor. This would require more complicated controller wiring, which is always to be avoided as far as possible.

The more important reason for the present method of connection, however, becomes clear when inquiry is made into the behavior of the motor when a brushholder or the armature becomes grounded.

Fig. 1 is a diagram of the motor circuit with the armature in nearer the trolley, as in present practice. Fig. 2 shows the fields next to the trolley. The motors are assumed to be in multiple. In both diagrams a brushholder is supposed to have become grounded at "A." In Fig. 1 such a ground shunts both fields and armature, and weakens the field. The armature and fields are also in series with each other through the short circuit. Grounding usually occurs when the car is in motion. The counter-electromotive force of the motor, due to the residual magnetism of the fields, will then tend to set up a cur-



FIGS. 1 AND 2—DIAGRAMS OF MOTOR CIRCUIT WITH ARMATURE NEARER TROLLEY, AND WITH FIELD NEARER TROLLEY

rent through the fields and armature in a reverse direction to that of the original line current. This generated current, however, being in the reverse direction to the former current, at once destroys the residual magnetism and consequently the counter-electromotive force of the armature. This stops the generation of any more current, and no bad effects are noticeable.

The results when the fields are in circuit first is quite different. The increased current due to the short circuit passes through the fields, strengthening them greatly. The armature alone is short-circuited by the grounding path. The counter-

electromotive force instantly generates abnormal currents in the armature, causing it to cease rotating. Even after the circuit-breaker has acted or the fuse blown the residual magnetism of the fields is sufficiently strong to cause the same action. The car is then brought to a standstill by a series of jerks, as when an emergency stop is made by throwing the reverse handle and putting the motors in multiple.

Under such circumstances the motor may be regarded as a separately excited generator on a short circuit, the armature being driven by the momentum of the car instead of by an engine.

In case of a grounded armature coil the effects would be practically the same as with a grounded brushholder. When the grounded coil is near the negative brushholder a motor action will be obtained so long as the breaker does not fly out. With the armature in circuit first, the motor will have very little torque, due to the weakened fields. With connections as in Fig. 2 there will be a strong torque, due to the strengthened fields. As the grounded coil approaches the positive holder, the action becomes more than obtained with a ground at "A," as previously described.

Were it not for the undesirable effects as explained above, it would probably be better to connect the motor with the fields in the circuit nearer the trolley. The advantages gained would be due to the better opportunity of insulating the fields. Were the fields in circuit first their high inductance would in most cases prevent lightning reaching the armature. Their better insulation would force through the lightning arrester many discharges which now reach ground through the armature. However, in many cases, the fields would suffer, where, with the present connections, the armature receives the discharge. So far as the question of cost of maintenance of armatures and fields is concerned, this would be preferable, as it is much cheaper to repair a grounded field than an armature.

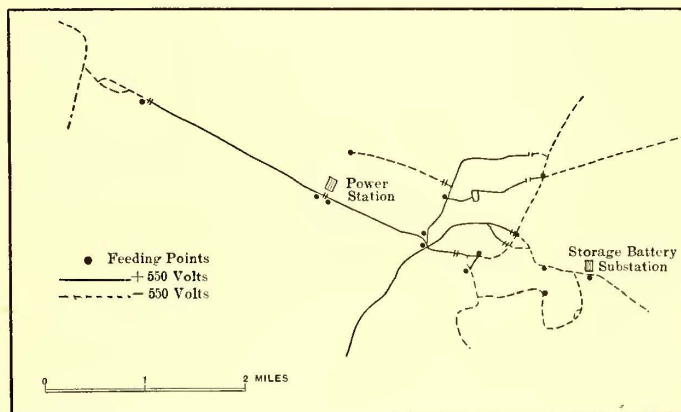
Another protection offered the armature by putting the fields in circuit first is that due to the drop of voltage in the fields. This is a rather important consideration in air-compressor motors, and others where the resistance of the fields is considerable, and the fields of these machines are usually found between the armature and the trolley. In the railway motor, however, the drop through the fields is a comparatively small fraction of the total, but nevertheless the protection offered the armature by the lowered voltage between it and the ground would be worthy of consideration.

With the fields so connected that reversal of the current took place in them it would be a simple task to remove doubt as to a grounded field. A grounded field near one of the leads would permit the motor to operate in one direction about in the usual manner. But if the reverse lever were thrown, the ground near the lead would shunt all the fields beyond it, which would be at once noticeable in the operation of the motor.

### THREE-WIRE SYSTEM IN NUREMBERG

The three-wire system of direct-current distribution has been in use on the tramway system of Nuremberg, Germany, since October, 1903, with satisfactory results. According to an article on the installation by P. H. Scholtes, manager of the company, and appearing in a recent issue of the "Electrotechnische Zeitschrift," the line is divided into two approximately equal parts, one supplied from the positive bus-bar, the other from the negative bar. The rails are neutral, and at 550 volts difference of potential from either bar. Certain short sections of overhead wire are so arranged that they can be cut into one or the other side of the circuit. The sections nearest the power station, as shown in the accompanying map, are supplied with positive current, while the more distant lines are of negative

potential. One object of dividing the line in this way is the ability to get a higher voltage, and consequently higher speed, in the suburbs than in the center of the city. Two generators, each of 550 kw, are connected in series, and are driven by one engine. A storage battery of 270 cells and 360 kw-hours is installed in the main station, and one of 245 cells and 330 kw-hours at the end of one line. The station battery is charged with a booster, the battery at the end of the line without a booster. The latter battery is charged at the time of low load



DISTRIBUTION DIAGRAM OF THE NUREMBERG THREE-WIRE SYSTEM

with a slow charge, to avoid excessive current in the rails which carry the return current.

Mr. Scholtes states that no difficulty has been experienced in keeping the load balanced or in keeping up the insulation. A comparison of the first year's operation shows that although the car mileage increased from 3,269,125 to 3,706,925, or 13.4 per cent, the cost of fuel rose only 1.8 per cent. This the writer attributes to the smaller loss on the line and in the track.

### IMPROVED SIGNAL SYSTEM ON HUNTINGTON LINES

With a view to reducing its fatalities to a minimum on its electric railway lines, the Pacific Electric Railway Company is ever alive to the necessity of providing safeguards to eliminate as far as possible all collisions. Recently the Los Angeles Railway Company provided signals at every crossing. These are red crosses painted on a white background and suspended from overhead wires. At night, however, they are practically useless. Now the Pacific Electric Railway has in contemplation a signal system superior to these. Instead of painted signs there will be green electric globes suspended over the crossing. These will flash automatically the signal that a car is approaching. Before the globes will be a vane painted green, which will point the direction of the approaching car and will be moved by the same power that lights the globe.

A consular report states that a contract has been entered into between the Ferrocarril Urbano de Lima (Peru) and the Provincial Council substituting overhead trolley for horse traction on all the street railways of Lima (about 16 miles in extent). The new system is required to be in operation within two years from the signing of the contract, and 5 kilometers (3.1 miles) of new road between the specified points in the city must be in operation within the following five years. A new company, representing American and local capital, succeeds the old one, and the electric and other new material required has been ordered from the United States, as happened in the case of Lima's two suburban lines now in successful operation.

## CAR DESIGNS AND CARRYING CAPACITY

BY JOHN P. FOX

Since the publication of an article on the above subject in the *STREET RAILWAY JOURNAL* for April 1, 1905, some interesting points have come up. The most important question raised has been the practicability of the side-door car for the most congested city service with frequent stops, and the most serious faults suggested for this type have been the difficulty of cutting off a stream of boarding passengers with so many doors, and the increased liability of real or pretended accidents from the multiplication of entrances and their distance from the guards. It has been suggested that, to start a side-door train where people were continually trying to board, it would be necessary to fence off the platform next to the train, close all gateways at the proper time, and allow no late comers near the train, as on the City & South London Railway and at some railroad terminals. The service of the Illinois Central seems hardly severe enough to throw light on this point, and it may be that actual experiment under the worst conditions alone can settle the question. But further observations of the experience of the Boston Elevated Company, with pneumatically-operated middle and end doors, afford some interesting and important light on the matter. Continuous streams of people trying to board trains can always be found at the elevated terminals and some other stations, especially at the rush hour. It will be remembered that the latest Boston cars have three wide sliding doors on each side, all of which are now operated by compressed air from the car ends; and besides this, the middle doors of the older cars are being operated more and more by air by the trainmen, without any platform men to assist most of the day. The forward guard on all these trains has to open and close four entrances at way stations, and eight at terminals. In other words, the Boston Elevated Company appears to be operating under conditions quite similar to what would be met with side-door cars, conditions in some ways more unfavorable, and yet the results have been most satisfactory.

The forward guards at terminals have to shut off from one position as many as twelve or even sixteen lines of people, a maximum then as great as with a side-door car, as the latter would have only eight doors on each side. And it must be remembered that the Boston guards have to look half a car length to the middle doors, and often through several panes of glass, or else lean way out over the folding gates between cars to see along the station platforms. These difficulties are wholly obviated in the Illinois Central type, where a guard has only one or two door valves to operate instead of a maximum of eight, in addition to four unlocking pedals. The success of this very ingenious Boston Elevated equipment would seem to predict the success of regular side-door cars under similar conditions.

As to the danger of multiplying doors, the Boston experience again seems to furnish a satisfactory answer. The perfection of door details seems an important factor, and the pneumatic tubes or "strickers" on the Boston door ends, as described in the *JOURNAL* for Aug. 6, 1904, seem to have met with every requirement for safety and made impossible the holding of clothing in the doorway or injury to any part of a person struck. People seem to tend to keep away from an automatic door, the power of which they do not know, the movement of which can instantly be checked or reversed, as is often done in practice. As to cutting off people from entering, the writer has failed to notice any difficulty. Where a car has an unusual number of entrances, it allows time to close these slowly, and with slow closing there seems to be no reason why side doors cannot cut off streams of people, especially as by spreading people out to twice or four times as much as now, pressure and crowding should be much reduced. On the possible dangers from multi-

plying side doors, A. W. Sullivan, the originator of the Illinois Central type, sends the following to the writer:

Accidents to passengers and claims arising therefrom, do not result from the working of the doors, but from the attempt of passengers to get on and off trains in motion. No serious accident can occur to a passenger in entering and leaving a train while it is standing still, and this statement holds good whether there are one or ten doors in use. The trouble arises from passengers trying to get on or off before a train has stopped, or after it has started. As the sliding side-door in my design of car cannot be opened until unlocked, after the train has come to a full stop, it is apparent that no accident can result from passengers getting off such trains while in motion; and, as the train cannot start until all the doors are closed and locked (and when this is done there is no possible means of a passenger getting on or attaching himself to a train), it is clear that no accident can occur from passengers attempting to get on such trains while in motion. Therefore, the two most prolific causes of personal injuries are eliminated by the use of these sliding side-door cars; and, as the multiplicity of side-doors does not in any way increase the hazard of personal injuries, while it greatly facilitates the rapidity of movement in entering and leaving cars, it must follow that the multi-side-door car is the best one for the rapid handling of a dense traffic.

The operation of the middle Boston doors from the center of the car platforms does not appear as difficult as might be expected. This is partly because the guard, looking through the car, can see over the heads of people on the longitudinal seats, which thus keep an unobstructed space to the middle door. If necessary to look along the station platform, the guard, in leaning out, has his side-door valve placed to allow easy operation from any position. Of course, with the side-door car the guard is close to one side, has only to look in one direction, and can look along the car wall, inside and out, with greater ease; only, to see best, it might be well for guards to stand on some box, so as to look better over the heads of passengers within and without.

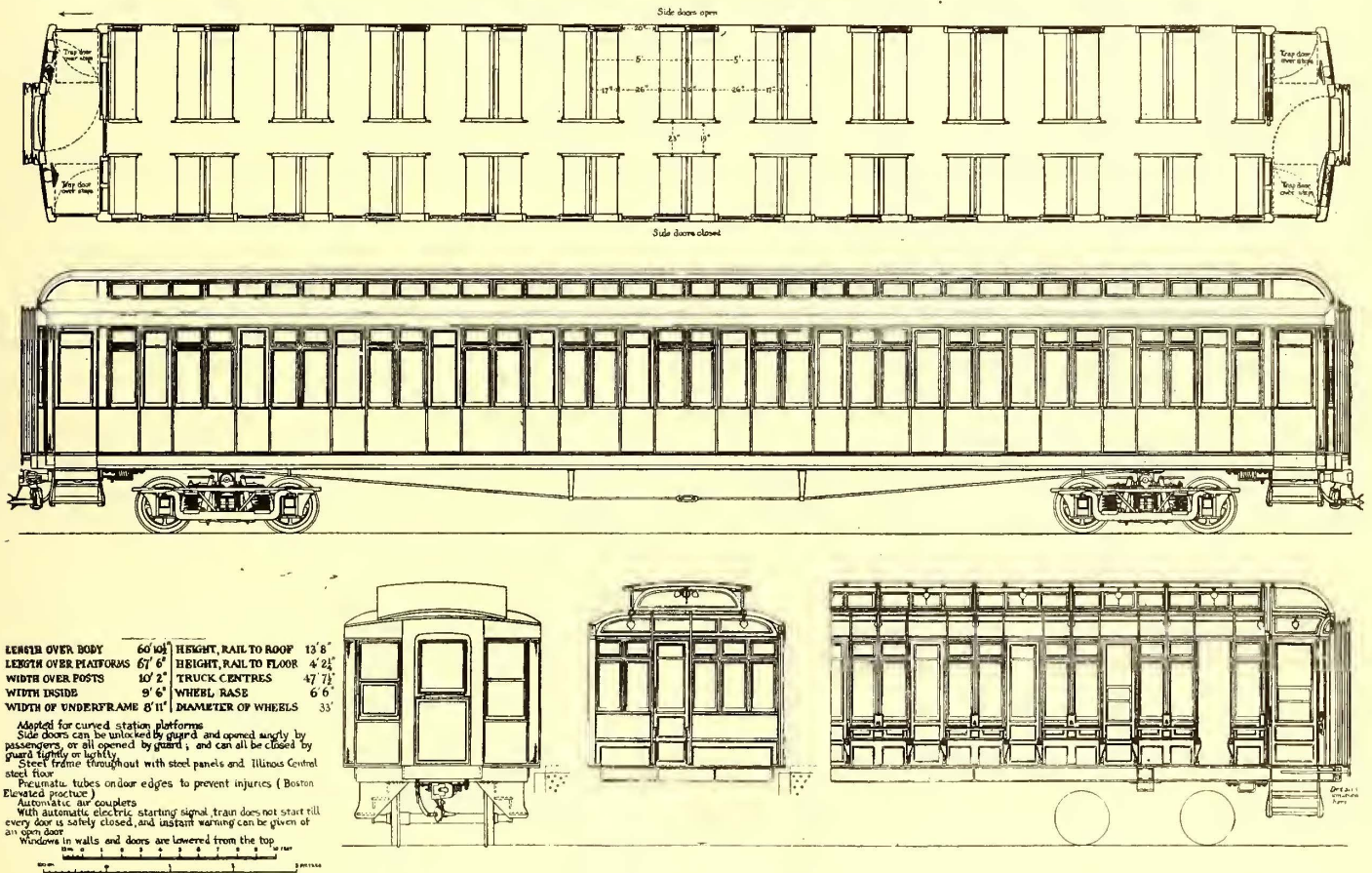
To the writer's own designs in the former article, he would now add these features: Besides making the doors in the end partitions sliding instead of swinging, it also seems best to regularly vestibule the cars, like the Illinois Central, so as to allow easy passing through the train, except perhaps when on the worst curves. While car construction in Europe has formerly been such as to allow only emergency passing between cars, and while recent Boston and Chicago cars embody a similar idea, vestibuling, of course, has great advantages in allowing passengers to spread out from crowded cars. It is not uncommon in Boston to see numerous seats in one or two cars of a train, and other cars too full for quick and economical operation. With the curves and grades of the Boston Subway, satisfactory vestibuling would at least be very difficult, and even then passing between cars would hardly be safe on some curves. But as trains grow longer, the need of vestibuling becomes greater, for late arriving passengers do not have time, nor others the inclination, to walk to the ends of the station platforms. To meet this difficulty the side-door car is again the best, for, with eight or nine doors to a car, passengers can quickly board, even if many are concentrated at the center of a train, and they can then walk through and find seats out of the way after the train has started. This suggests a well-known important principle which should have been considered in the previous article on car design, viz., that where people must do things in a hurry, the possibility of choosing between different ways of acting should be reduced to a minimum. The open car and the non-vestibuled European steam car illustrate this point best, as people delay, not only to look for the first available seat, but often to choose further between different locations. A vestibuled train encourages people to enter the nearest doors at once, but when passengers are inside, further care must be taken not to have a choice of direction too near the entrance, as otherwise there will be delay there and blocking others entering. Perhaps the "quarter-door" cars fail most in this respect; but a side aisle next the doors, as previously



pointed out, might, with very heavy traffic, also be a cause of delay from passengers passing back and forth directly in front of the doors to find seats, a difficulty not so likely with a center aisle further into the car. With end entrances only there need be no choice of doors, of course, if a train is vestibuled, but if no passing between cars is allowed, there is the tendency either to seriously overcrowd certain cars or else to hunt for the one with the most room. A regular direction of circulation through end-door cars is a great advantage, but some passengers, as in Boston, insist on going out the wrong way, continually upsetting the circulation, sometimes quite forcibly. While a middle door does have the disadvantage of causing delay from choosing which way to go in or out, its large increase of the entrance width must more than make up for this. But far from causing delay from choosing, the vestibuled side-door car with center aisle seems to offer the most advantages.

seat 75 passengers, this one 120, a gain in seats of 60 per cent for the same length of car. The writer is still in doubt as to whether this plan of car and arrangement of seats is the best for a moderate amount of suburban business, but will not discuss the question again, referring for the pros and cons to the JOURNAL for April 1, 1905, pages 385-386. But this type of side-door car does offer the greatest economies in the way of compact seating arrangement, reducing the cost of rolling stock needed and wages, the latter being further reduced somewhat by the possibility of short stops. A five-car train would have as many seats as eight ordinary steam cars.

The new car is, of course, vestibuled, having George Gibbs' ingenious door for closing off the front and rear platforms and enclosing apparatus elsewhere. The platforms differ from ordinary wide vestibule practice in having the swinging doors shorter than usual, so as to allow their opening without lift-



LENSIS OVER BODY 60 1/2" HEIGHT, RAIL TO ROOF 13' 8"  
 LENGTH OVER PLATFORMS 67' 6" HEIGHT, RAIL TO FLOOR 4' 2 1/2"  
 WIDTH OVER POSTS 10' 2" TRUCK CENTRES 47' 7 1/2"  
 WIDTH INSIDE 9' 6" WHEEL RISE 6' 6"  
 WIDTH OF UNDERFRAME 8' 11" DIAMETER OF WHEELS 33"

Adapted for curved station platforms  
 Side doors can be unlocked by guard and opened singly by passengers, or all opened by guard, and can all be closed by guard lightly or lightly.  
 Steel frame throughout with steel panels and Illinois Central steel floor.  
 Pneumatic tubes on door edges to prevent injuries (Boston Elevated practice).  
 Automatic air couplers.  
 With automatic electric starting signal train does not start till every door is safely closed, and instant warning can be given of an open door.  
 Windows in walls and doors are lowered from the top.

VESTIBULED CAR SUGGESTED AS SUITABLE FOR SUBURBAN SERVICE ON AN ELECTRIFIED RAILROAD; TOTAL SEATING CAPACITY, 120

To review again the advantages of this type there is but one door valve or other operating device for a guard to handle in place of two or more with other types. The guard has to look in but one direction and is situated at the side of the car where he can see best along station platforms. Passengers are not concentrated at two or more points to enter or leave cars, but are spread along at eight or nine points. This last raises the question, when it comes to cutting off a stream of people, which is easier, to shove a door through a mass of people crowding in at two points, or to shut doors slowly at a number of points where there is no such concentration? With the side-door type there is plenty of time to shut the doors slowly and carefully, and to empty station platforms more quickly and easily than with other cars.

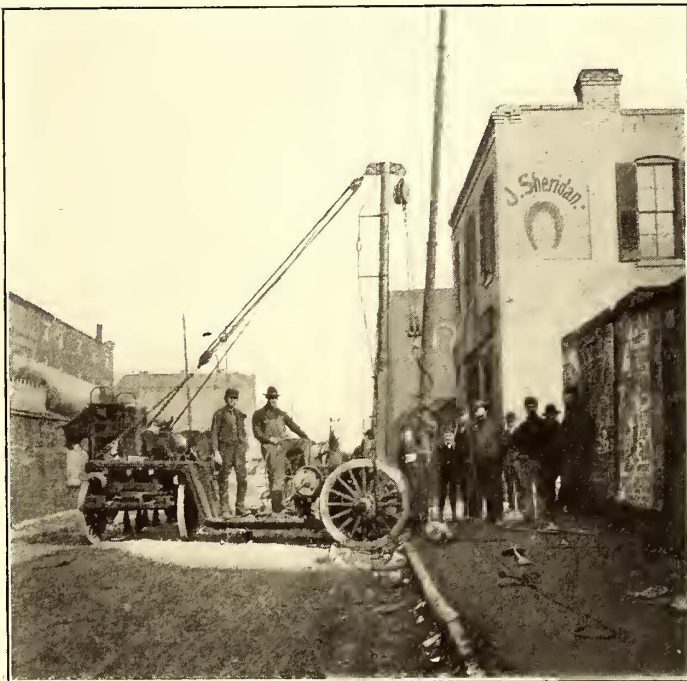
To illustrate the writer's latest ideas as to a side-door car, the accompanying illustration is given, representing not an elevated or subway car, but a suburban car suitable for electrified steam railroad service, following some of the dimensions of the latest cars of a well-known railroad. The original cars

ing the trap doors, which makes it possible to enter at the car ends, either by the steps from a low station platform or upon the trap doors at a high platform, an advantage when rain or snow would blow too much into the side doors. As in a previous design, the steel posts are carried on an 8-in. angle fastened to the 9-in. channels of the underframe, for the purpose of allowing the station platform, when on curve, to project under the car floor in places and so fill up gaps elsewhere. The end of the car may be criticised for its heavy appearance, but the position of the apparatus and the avoiding of a transom in the motorman's window will explain any unattractiveness. The side elevation has been criticised in two respects—first, that the window sills were too low, but in this the original steam road height of 28 ins. has merely been kept, and secondly, that the doors were not made distinct enough, which last could be remedied by breaking the horizontal lines at the doors and painting panels on the bottom of the latter. The writer purposely tried to give the car side a somewhat unbroken appearance, thinking thus to please the steam railroad man, but the

doors can easily be emphasized more if considered desirable.

Should toilet rooms be omitted on suburban cars? They seem to have been on the Illinois Central, and are on all the English electrified lines. The original standard car, followed here, had two toilet rooms, but they do seem unnecessary with fast and frequent suburban service. Baggage racks have also been omitted, but could be easily placed over the seats between the two center grab posts and the car walls, as in the Paris-Metropolitan, the St. Gotthard and other European cars. To prevent water from dripping over the side doors, European arrangements might be used.

The side doors would, of course, be operated by guards from the end platforms, either by air or mechanically, as desired. To look along the station platform the guard could open his door or lower the window in it. There he could stand in full



DERRICK WAGON OF THE UNITED RAILWAYS, ST. LOUIS, USED FOR PULLING OUT TROLLEY POLES

view of the station as the train pulls out, in the best possible position to see any accident. For the door mechanism, the writer would try to add to Mr. Sullivan's ingenious features certain others, which would make it possible either to simply unlock all doors at a station, leaving passengers to open any themselves, or to open all the doors at once, this last being a thing not attempted on the Illinois Central cars, and yet quite important for terminals or other large stations. The doors could all be closed at once, but there might be two ways of keeping them closed—first, rigidly, as needed on the outside of the train; secondly, lightly, so that each door might be opened slightly to release any one caught, without any too great effort and without disturbing other doors. The mechanism for effecting these different operations does not seem too complicated and may be illustrated later. While the Boston Elevated door details seem to reduce to a minimum all dangers at entrances, it might be useful some time if a red emergency cord were run along outside the car just over the doors, as found on some English trains, only opening an air-brake valve directly. For door handles the Illinois Central idea seems the best, viz., hand holes with a piece of glass set in the center of the thickness of the door. This leaves no projection, and at night the inside light shining through the little glass pane shows outside passengers where the hole is. The few passengers who wish to stand on steam lines can stand out of the way in the vestibules, where they do not block the entrances, a great advantage of this side-door type.

### DERRICK WAGON EQUIPMENT FOR PULLING UP IRON POLES IN ST. LOUIS

The United Railways Company, of St. Louis, has occasion to move overhead lines and tracks from several streets where they are no longer needed, the necessity for these lines having disappeared upon the consolidation of the St. Louis lines. For pulling up iron poles the derrick wagon illustrated is used, which is capable of pulling up these poles without delay, even where set in concrete. The main mast of the derrick is the lower 16 ft. of a steel pole, which, before it was cut, weighed 900 lbs., and was 30 ft. long. This mast is supported by a jack screw placed under its base and by braces of 1-in. x 4¾-in. bar steel. To prevent the mast bending, a truss of 1¼-in. round iron with a turn-buckle is placed on the side opposite the pole to be lifted. Additional bracing is afforded by a block and tackle passing to the front end of the wagon. Of course, the supporting of the weight on the wheels while the derrick is at work is out of the question. The wagon bed is of such a height as to come just above the curb. It is then possible to quickly block up under the end of the wagon bed so that it rests solidly on the ground. The wagon bed has three longitudinal sills, each consisting of a 3-in. x 4-in. timber, reinforced on each side by a ½-in. x 3-in. bar of steel. The block and tackle which does the lifting is operated from a winding drum, which can be turned either by hand or by a 15-hp

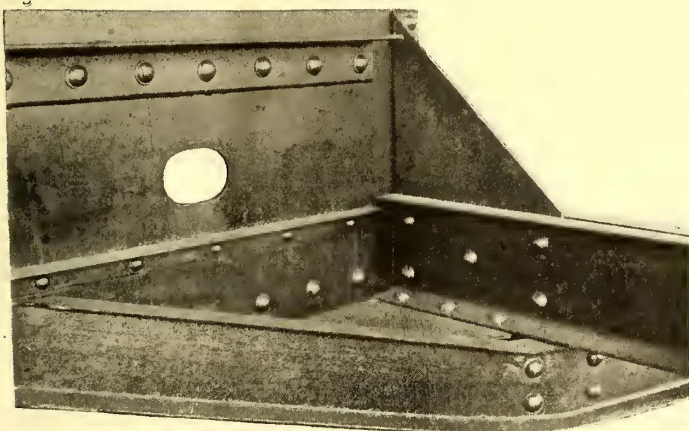


DERRICK WAGON IN ACTION, SHOWING ALSO CHAIN AND TACKLE AND THE USE OF CROWBARS TO LOOSEN THE CONCRETE AROUND THE POLE

Sprague motor. The use of the latter is only possible, of course, where there is a supply of current. To loosen the concrete around the pole, crowbars are driven down alongside the pole, as shown in one of the illustrations. In spite of this, there is likely to be bulging of the ground around the pole when the pole is lifted. It is perhaps remarkable that the poles come up at all without bringing some of the concrete with them.

**A NEW STEEL CAR FLOOR FRAMING**

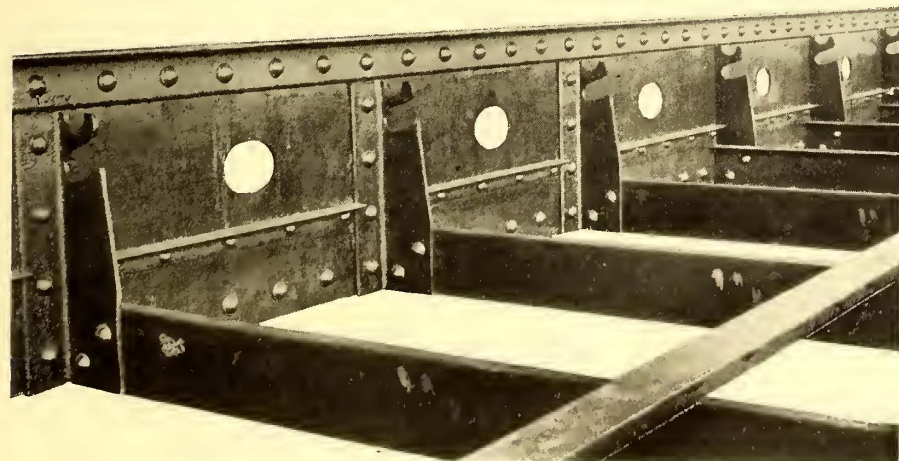
The Twin City Rapid Transit Company, of Minneapolis and St. Paul, will make several extensions to its lines during the coming season. One of these definitely decided upon will con-



CONSTRUCTION AT THE CORNERS

nect Exceelsior and Lake Minnetonka with Minneapolis. The extension will be about 20 miles long. Half of this will be covered by double track, which will be laid on the right of way of the old steam road known as the Minneapolis, Lindale & Minnetonka Railway. Special ears, which will be equipped with four GE 73 motors, are being built for the new line.

The accompanying engravings show the steel bottom framing to be used in their construction. These frames, which were constructed by the American Bridge Company, present many novel features. The side truss or web forms the interior finish of the ear, the windows sliding down between the web and the outer sheathing, which will be secured to wood fillers. This arrangement permits the arm rest of the windows to be placed 6 ins. or 7 ins. lower than usual, as the window, when down, drops as low as the bottom of the side sill of a car of the usual construction. The angle iron, riveted on the inner side of the



BRACKETS FOR THE SUPPORT OF THE HEATER PIPES

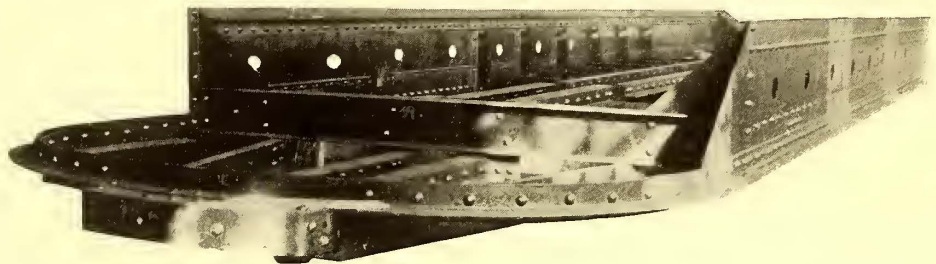
web, serves as a foot rest. Side brackets of steel, which are plainly shown in the illustrations, support the heater pipes. The rigid construction at the corners is well illustrated in the reproductions. Hand holes in the vertical web permit cleaning of the window pockets. Cast-steel bolsters will be used. The remaining portion of the car will be of the usual wood construction.

**LEAKAGE FROM WOODEN POLES CARRYING HIGH-TENSION WIRES**

A recent issue of "Electrotechnische Zeitschrift" publishes the results of a series of tests conducted by the Kristiana Elektricitetsvaerk of Norway in 1903 to determine the leakage from high-tension circuits on wooden poles. A metal band was placed at heights of 1, 2 and 3 meters around a pole carrying a 7000-volt circuit. The differences in voltage between the band and the earth, and the current flow in milliamperes in the pole were determined. The tests indicated that it was highly improbable, though not impossible, for a pole under these conditions to carry a dangerous current. A remedy was suggested of wrapping lightly a metal band around the pole, about 6 ft. above the ground, and it was stated that the protection has been prescribed by law in Norway for about two years.

**THE LAKE SHORE & MICHIGAN SOUTHERN RAILWAY EXPERIMENTING WITH GASOLINE CARS**

The Lake Shore & Michigan Southern Railway, at its Collinwood shops near Cleveland, is making some experiments with a gasoline car designed by the General Electric Company. While this particular car is not designed exactly for passenger service, it indicates that there is much truth in the report that



STEEL UNDER-FRAMING OF CAR FOR THE TWIN CITY RAPID TRANSIT COMPANY

this well-known steam road is investigating the gasoline type of ear with a view to determining its possibilities for inter-urban service. The ear now used was designed for service in the yards for transferring the train crews who handle the distribution of freight ears in the yards at Collinwood. It is fitted

with a vertical four-cylinder gasoline engine, which is direct-connected to a G.E. generator supplying current to motors driving the car axles. The ear seats about twenty-five men, and it is said to save four or five minutes on each shift, as compared with the locomotive and ear heretofore used in this service.

The Jamestown, Chautauqua Lake & Lake Erie Railway, a small steam line which is closely affiliated with the Lake Shore & Michigan Southern, has for some months been making experiments with a gasoline ear for interurban passenger service. It is understood that the company is so well pleased with the results that it will build four or six ears and use them with an hourly headway between

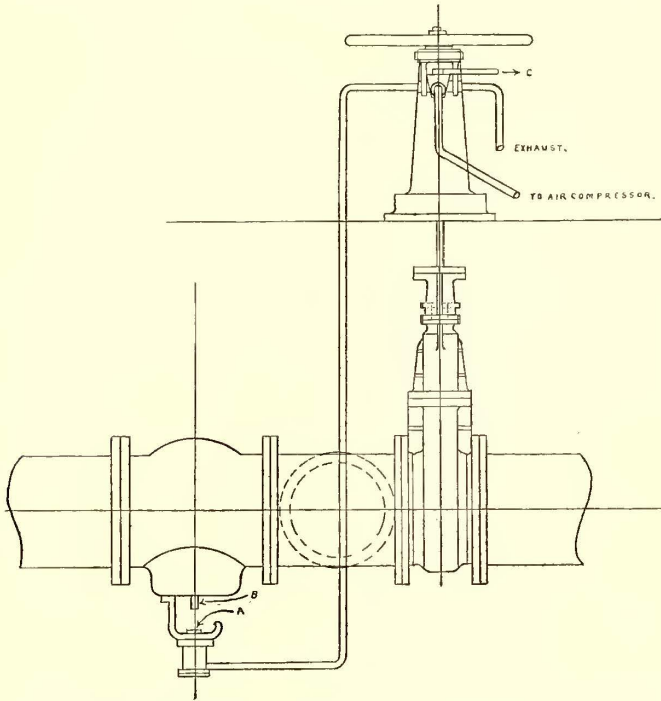
Jamestown and Westfield, N. Y. The ears will be 46 ft. long and will seat 60 passengers. They will be fitted with eight-cylinder gasoline engines with no electrical equipment.

It is estimated that on Sunday, June 18, the Brooklyn Rapid Transit Company carried a total of 1,780,000 passengers. Of these 1,480,000 were cash fares and 300,000 transfers.

**ATMOSPHERIC VALVE**

BY JOHN TREGONING

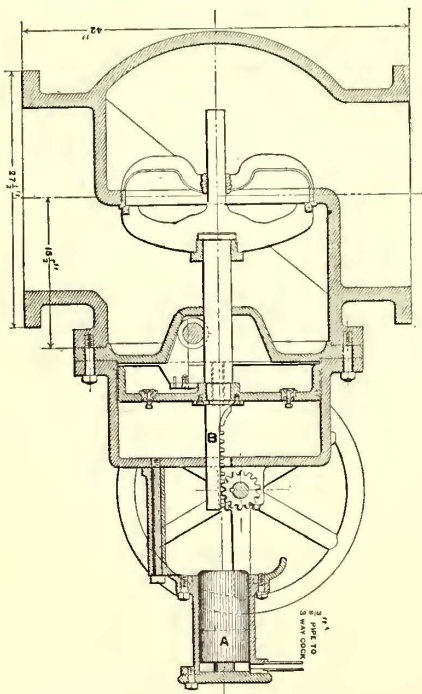
A simple and practical device for closing an atmospheric valve is shown in the accompanying drawing, and was designed by the writer for the 20-in. exhaust leading to the condenser at the power house of the Hartford Street Railway Company.



SKETCH SHOWING OUTLINE OF ATMOSPHERIC VALVE

It has been in operation for two and one-half years and has never been removed from its present position for any cause whatever since it was installed.

The device is composed of a cylinder mounted on a tripod, which is bolted to the under side of the valve chamber, and is fitted with a solid plunger, as shown. When the valve is open the valve stem rests on the plunger *A*. To the upper end of the floor stand, under the hand wheel, is a three-way cock that controls the pressure that raises the plunger and closes the valve. When the engineer is ready to put the engine on the condenser, he opens the gate valve with the hand wheel, and at the same time he closes the atmospheric valve by opening the three-way cock with the handle *C*, by which the valve is under perfect control.

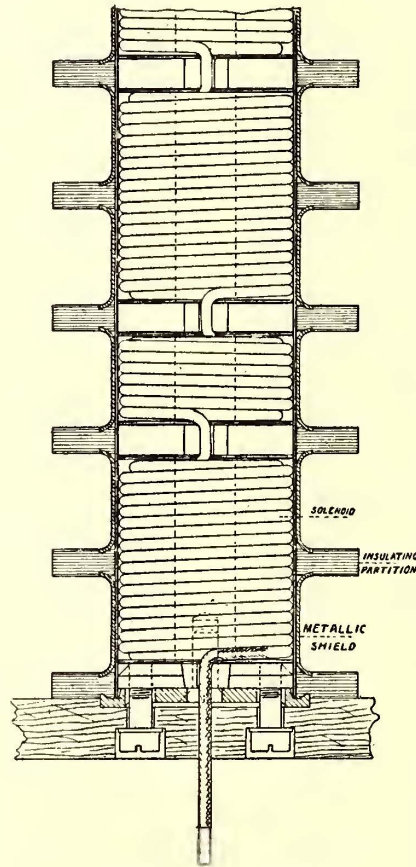


CROSS-SECTION OF VALVE

At the proper moment the valve closes with the familiar "thud," and by relieving the pressure in the cylinder the plunger drops to the bottom of the cylinder, ready for the next trip.

**IMPROVED DIRECT-CURRENT CONTROLLERS**

In addition to other improvements, Dick, Kerr & Company, Ltd., of London, have embodied in their controller a metallic shield blow-out of the solenoid type. The old series parallel controller with the ordinary magnetic blow-out required the poles of the electro-magnet to be superimposed above the points where the contact was broken, the effect depending upon one electro-magnet. In the original solenoid type developed by this company, the most obvious improvement over the magnetic blow-out was that the contact fingers and cylinder segments were not covered by the pole pieces, but left entirely open for inspection. Aside from this feature its main advantage was that the effectiveness of the solenoid increased in direct proportion to the current, whereas the old magnetic blow-out type could not have its blow-out effect increased above the saturation point of the magnet.



SECTION OF SOLENOID

Another important advantage of the solenoid blow-out was that the solenoid was never in circuit except at the moment of the formation of the arc, whereas the coils of the ordinary magnetic blow-out were of necessity kept in circuit all the time, otherwise their function would have been entirely destroyed, because the magnets and pole pieces could not have been magnetized quickly enough to blow out the arc before it had burnt the contacts.

Though the solenoid form of blow-out in principle possesses notable advantages over other types, it has passed through various evolutionary stages, each development having been the result of careful observation

made under widely varying conditions. The chief improvement arises in the method of protecting the solenoid. The vulcanite envelope was fairly satisfactory, but it was liable to be injured by the arc, and the next step was to place the solenoid in a metallic shield (Fig. 1); this in fact now forms the main feature of this controller.

The coil is placed in a casing of copper or other non-magnetic material, and it can be then brought directly into the sweep of the arc. The external magnetic field created round the shield of non-magnetic metal, attracts the arc to the shield and divides it in two, one arc going from the contact finger to the shield and the other from the shield to the contact segment. These two arcs travel rapidly in opposite directions on the copper shield, and finally become united again in the air, but around the coil and shield; the arc at this stage has become attenuated to such an extent as to rupture, and may be in fact ruptured long before it has actually encircled the blow-out device. As shown in the upper left hand diagram of Fig. 2, the arc has just started between the electrodes and a deflection of the arc towards the shield is visible. Then the arc strikes the shield and commences to encircle the section;

the first of the two lower views shows the shield partially enclosed, and the second that the arc has united in the air and has left the shield. Generally speaking, the arc is literally swept over the shield with great rapidity and does not affect the metal in the slightest degree. It is interesting to note the tendency of the arc to travel on the center of the copper shield, and this is of great advantage, as the insulating partitions are not subject to injury.

That the copper ring suffers to no extent from the discharge may be gathered from the fact that on examination after two years continual use no material depreciation could be detected either on the metal ring or on the partitions. It is stated that of some two thousand controllers put in operation since the introduction of this type, not one blow-out has failed either on the metallic shield or insulating partition. The blow-out is hinged on the pivots and can be swung back and lifted out for inspection and cleaning. In swinging it back, the trolley connection is broken and therefore the current can be applied only when the blow-out is closed. This arrangement renders the controller foolproof so far as mishandling is concerned. The winding of the blow-out is in one continuous wire without any joints whatever and the metallic shields as well as the insulating partitions are simply strung on the blow-out, and are therefore easy to remove and assemble. It has been demonstrated on an ordinary service controller, that 60 amperes or more on an inductive load may be broken time after time by slowly separating the finger and contact by barely 1-16 of an inch without the slightest trouble.

The notching gear is made as clear and positive as is pos-

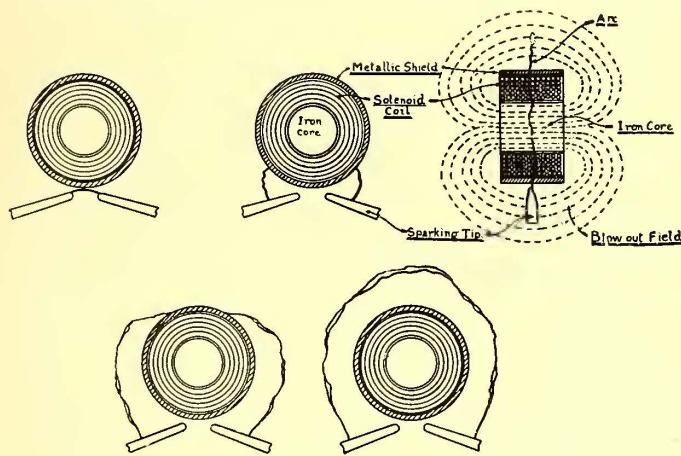


FIG. 2.—DIAGRAM INDICATING THE PRINCIPLE OF THE METALLIC SHIELD MAGNETIC BLOW-OUT DEVICE

sible and consistent with absolute freedom of motion, but even if an inexperienced motorman failed to keep good contact between barrel and finger, it would be impossible for an arc to be maintained in the controller.

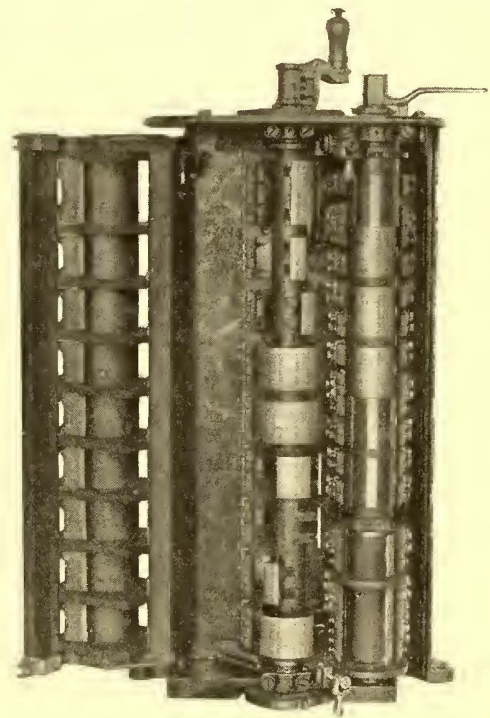
There are other features of the controller to which attention should be drawn, one of the most important being in its application to the electrical rheostatic brake. It is, however, necessary to provide a sufficient number of notches on the brake side of the controller to regulate the braking effect in a satisfactory manner, while there must be a proper gradation of power notches to give smooth acceleration.

In most types of controllers it has been usual to divide the space on the top of the controller into the requisite number of power and brake notches with adequate spacing between the "off" position and the first power and first brake notches. The total number of notches on brake controllers varies approximately from 11 to 14, which means that in order to get the requisite length of break between finger and contact it is necessary in many types to increase the size and weight of the controller. This is avoided in the Dick-Kerr controller, by an ingenious arrangement of the connections of the resistances which allows the brake notches to coincide with certain of the

power notches, and in consequence reduces the total number of actual notches, though retaining the original number of functions.

The controllers under notice are provided with from seven to nine power and five braking notches, variations being arranged for special purposes. If the controlling handle is swung from the "off" position clock-wise the power circuit is in operation on the notches which are common to both power and brake sides, whilst if the controller handle be brought from the "off" position counter clock-wise to the common notches the brake is in operation. Locking steps are provided to prevent over-running either the last power or the last brake notch, and to make a transition from the brake to power side, or vice versa, it is necessary to bring the controlling handle through the "off" position, ensuring perfect safety.

Another novel feature is the connection of the motors into generators for the brake action without reversing any motor leads or even disturbing any contacts of the motor leads by throwing the motors in the parallel notches of the power cyl-



CONTROLLER WITH METALLIC SHIELD BLOW-OUT

inder, and inserting a bridge or equalizer across the two motors between their respective armatures and fields, the motors being arranged so that one armature will lead the field in one motor while the field will lead the armature in the other. This will not only bring the motors into brake action, but will also equalize them. This operation requires only two additional contacts, which simplifies the apparatus considering that ten contacts would otherwise have to come into operation. The regulation is accomplished by inserting or withdrawing the resistance in the bridge of the equalizer.

The D. B. 1, form C and D, types of controllers are almost identical with the exception of such structural changes rendered necessary in the case of the latter, which is designed for use on systems where an insulated return is employed, such as open conduit and double trolley construction. These latter controllers have been furnished for the London County Council representing conduit construction, and Tokyo Street Tramways representing double trolley construction. The necessity of adopting some means by which it is impossible for a car to run backwards down hill is met with in controller D. B. 1, form E, which is provided with additional contacts. The movement of the handle to the "off" position short circuits the

motors, in consequence of which there could be only a slow reverse movement of the car. Q. B. 1, form A, is designed for quadruple equipments on tramcars, a number having been supplied in this country.

Controller Q. 4, form D, is designed for four 100-hp motors, and is also built on the metallic shield principle. A feature of this controller lies in the copper shields opposite each contact finger to prevent the arc from traveling on the segments. The idea is simply to let the shield, which consists of a piece of bent copper plate, press lightly on each segment directly in front of and in close proximity to each contact finger. The arc, instead of sweeping over the segment and carbonizing or blackening the lubrication, will travel on the shield and round the protected coil when ruptured.

The reversing cylinder has, besides the usual ahead and reverse positions, also positions for cutting out any pair of motors, the remaining pair being controlled in series and parallel by the power cylinder, as before. The principle of the controller has been successfully applied, even in cases demanding heavy currents—an instance of this is the Lancashire & Yorkshire Railway, where one of the most interesting features of the equipment is the method of control, which may be termed the direct multiple control system, in contradistinction to the multiple unit, the main difference in the systems being that in the case of the former it is possible to control the whole equipment of the train by means of two main cables. This method was described in detail on page 510 of the *STREET RAILWAY JOURNAL* for April 2, 1904.

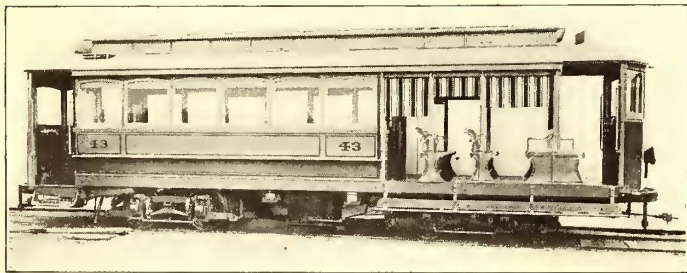
The metallic shield blow-out has also been applied to controllers for crane, stationary motors, etc.

### COMBINATION CARS FOR BUTTE, MONTANA

The Butte Electric Railway Company, of Butte, Montana, has purchased from the American Car Company two interesting combination open and closed cars mounted on double trucks.

Butte is known principally as a great mining center, although it is also the second city in the State in manufactures and is an important railway center. Its population is 30,500. It is the commercial center of a large district, and the traffic since the comparatively recent installation of the railway lines has rapidly increased, so the new cars are greatly needed. The attractive park, Columbia Gardens, is reached by the lines of the company.

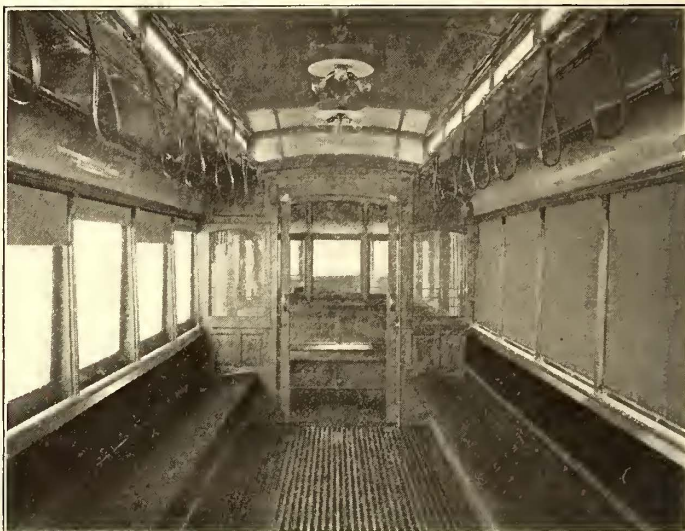
Instead of the usual division of the compartments at the cen-



COMBINATION OPEN AND CLOSED CAR OPERATED BY THE BUTTE ELECTRIC RAILWAY COMPANY

ter of the car, the larger portion is given to the closed compartment, which has longitudinal seats. The seats in the open compartment extend across the car—two have reversible backs and two are at either side of the bulkhead. The car seats forty-four, besides affording large standing space. The sashes of the closed compartment and the vestibules are arranged to drop into pockets. The curtains of the upper part may be drawn to the floor, as the seat ends are of the Brill round-corner style. Guard rails, which slide behind grab-handles and

are secured under the water boards by gravity catches, are provided for the open compartment. Cars of this type have acquired much popularity, and are usually run through the entire year. The open compartment is used by smokers in winter, thereby meeting a demand which all managers of city systems recognize. The use of the vestibule in addition to the bulkhead in the open part affords ample protection to passengers in stormy weather. The interiors are finished in ash, and the ceilings of both compartments are of three-ply birch-



VIEW SHOWING SEATING ARRANGEMENT IN CLOSED AND OPEN COMPARTMENTS OF BUTTE CAR

vener, handsomely decorated. The seats of the closed compartment are of perforated veneer, covered with Wilton carpet. The seats in the open part are composed of ash slats.

The cars are 18 ft. over the end panels and 36 ft. over the crown pieces. The platforms of the closed compartment ends are 4 ft. 6½ ins. The width over the sills, including the panels, is 7 ft. 7½ ins., and over the posts at the belt, 8 ft. 2 ins. The sweep of the posts is 3½ ins. The distance between the centers of the posts is 2 ft. 11 ins. and 2 ft. 7 ins. The side sills are 4¾ ins. x 7 ins., and the end sills are the same. The sill plates are 7 ins. x 5⁄8 in. The thickness of the corner posts is 3¾ ins. in the closed compartment and 3⅝ ins. in the open compartment. The thickness of the side posts is 1¾ ins. in the closed compartment and 2¾ ins. in the open compartment. The Brill No. 27-G trucks are used, having a 4-ft. wheel base and 30-in. wheels.

### DISINFECTING CAR-WASHING COMPOUND

The ordinary car carrying from day to day large numbers of people of all sorts and conditions necessarily requires frequent cleansing to be kept in healthful condition. The objectionable feature of the soaps or other washes generally used is that the alkali in them eats away the paint and varnish work, and that they do not possess sufficient disinfecting power. For some years past a number of British railways have been using for a car-wash a disinfecting washing compound made by Robert Young & Company, of Glasgow, and known as "Sacarbolate." Owing to the good results achieved in England, the Frank S. De Ronde Company, of New York, recently undertook the introduction of this compound to American electric railways, and at the present time it is already in use on such important electric lines as the Chicago City Railway Company, the International Railway Company, of Buffalo, N. Y.; the Cleveland City Railway Company, the Utica & Mohawk Valley Railway Company, the Connecticut Railway and Lighting Company, and the Syracuse Rapid-Transit Company.

Sacarbolate is a washing and disinfecting fluid soap, pos-

sessing all the qualities of a good washing soap, while it is also a disinfectant quite equal to the standard of the average disinfectant fluid and, unlike the latter, does not stain and ruin paint or varnish work; in fact, it is claimed that if sacarbolate is used as directed it will even improve the luster of the surfaces.

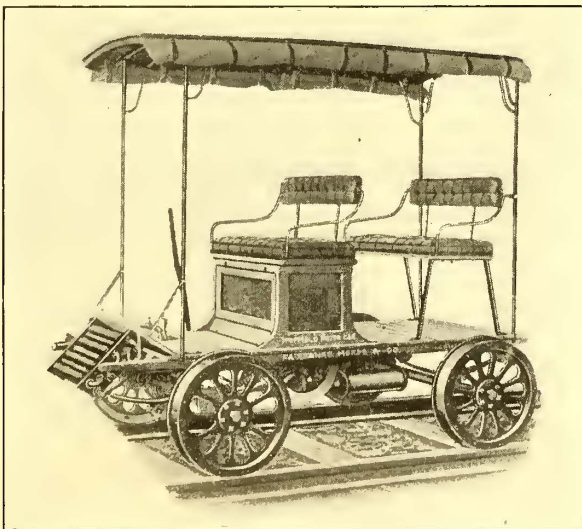
This fluid has been found to be practically non-poisonous and harmless to the skin. If the slight carbolic odor left after its use is objectionable, as in high-class passenger service, other compositions can be furnished of lesser disinfecting power, but more pleasant as deodorizers.

Sacarbolate is equally efficient in both outside and inside work. For outside use a combination of one-half pint and three gallons of tepid water is recommended, and for inside one-half pint of the fluid to one and one-half gallons of tepid water. The outsides should be thoroughly washed each month, and sponged daily on the lower parts. When the weather is wet the exteriors should be washed daily. The seats are kept in good condition by saturating them daily with a sponge saturated in sacarbolate, and floors should be sprinkled daily after brushing. Weekly treatment is considered enough for the floors and the woodwork under the seats. The luster of the varnish and paint work is greatly benefited by being sponged down with cold water after the fluid has been used.

**GASOLINE INSPECTION CAR**

The Interurban Railway Company, of Des Moines, Ia., has placed in service the gasoline inspection car shown in the accompanying illustration. This car, which is of the automobile type, is the product of the Fairbanks-Morse Company, of Chicago. Exact figures as to cost of maintenance are not yet available, but it is stated that a gallon of gasoline on the car is good for 30 miles.

The power is supplied by a single-cylinder, four-cycle type, improved automobile gasoline engine of 6-hp, having a water-

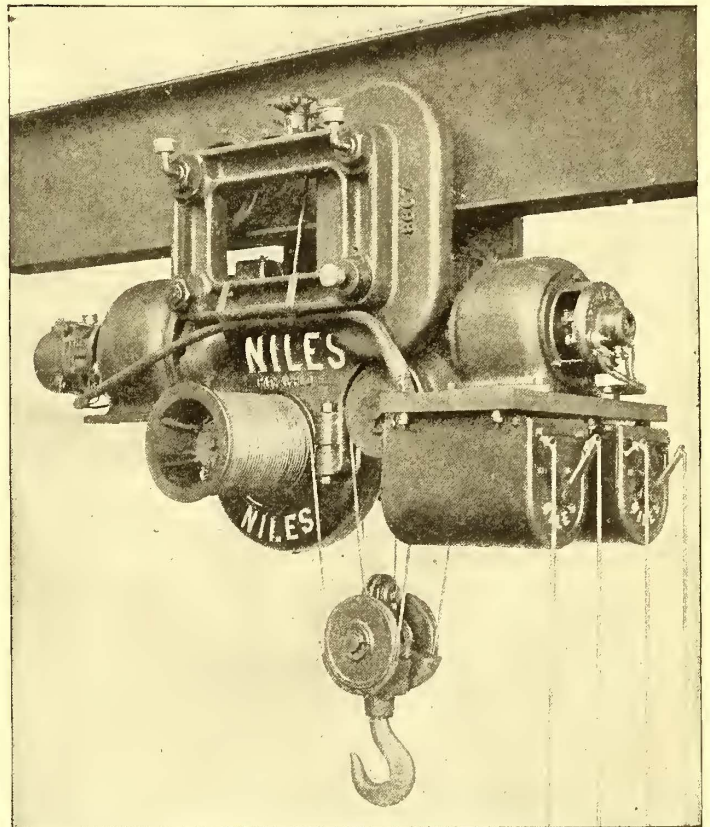


THE INTERURBAN RAILWAY COMPANY'S GASOLINE INSPECTION CAR

cooled cylinder and the force-feed type of lubrication. The transmission is of the planetary type, liberally constructed, enclosed in oil-tight case. The axles are of nickel-steel, enclosed in steel tubing and equipped with roller bearings. The frame is of steel, mounted on springs, and the seats are nicely upholstered. There is a wide range of speed, which allows car to be run at any desired speed from 2 or 3 miles up to maximum speed of 30 miles per hour, with 10 miles an hour on the reverse. All parts are easily accessible and everything about the car is strong and substantial. The weight is 950 lbs.

**A NEW ELECTRIC TRAVELING HOIST AND SMALL CAPACITY CRANE FOR ELECTRIC RAILWAY SHOP SERVICE**

Now that electric traveling hoists have passed the experimental stage and their use is extending so rapidly, greater care has been given in their design to the question of durability. The new Niles electric traveling hoist is made for hard, continuous service, and as may be seen in the accompanying illustration the hoist is of compact design and is self-contained in one heavy cast-iron frame to which the motors are attached end on. The power is transmitted directly from the armature shaft to the drum shaft through one train of worm and worm-wheel gears. The traversing mechanism is also driven through



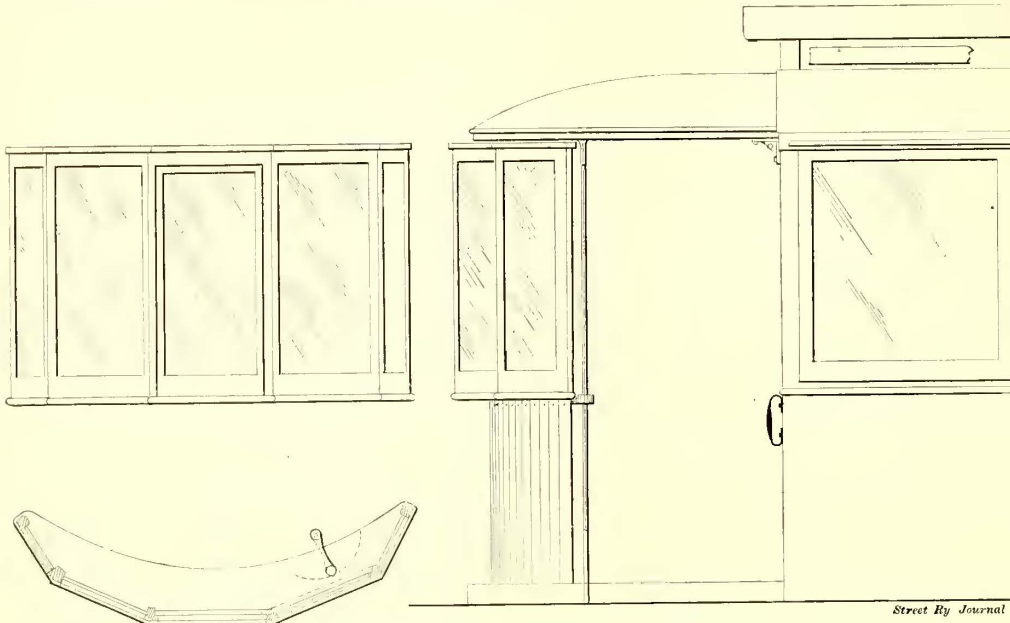
TYPE OF ELECTRIC TRAVELING HOIST, BUILT IN CAPACITIES UP TO 6 TONS

one train of worm and worm-wheel gears, similar to the hoisting mechanism, except that, when the trolley is arranged to run on a single I-beam, a double set of transmission gears are used. All the mechanism is enclosed in oil and dust-proof casings, and is absolutely noiseless in operation. In addition to the braking effect obtained by the use of the worm and worm-wheel, a powerful electric brake is attached to the hoist motor.

These hoists when mounted on a traveling bridge may be used as small capacity cranes. When used as cranes, the hoists are arranged to run between the two I-beams or channels of the bridge, and the controllers for raising and lowering the hook and operating the traversing mechanism may be placed either on the hoist, on the bridge, and operated by cords from the floor, or in an operator's cage attached to the bridge. The hoists are built in capacities of 3/4 to 6 tons, and are usually arranged to run on an I-beam track. They will run on straight and curved tracks, and are generally provided with a separate motor for traversing, but if desired, hand traverse may be furnished, or all the traversing mechanism may be omitted and the trolley moved along the track by pushing on the load. The increased service of the electric traverse, however, much more than compensates for the slight additional cost.

**PORTABLE VESTIBULES FOR RAILWAY CARS**

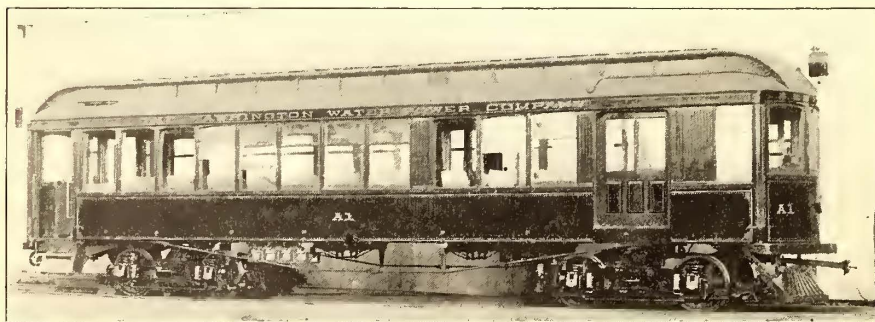
On many city and suburban electric railways the operating speeds are not high enough to require permanent vestibules, but as the colder months approach the necessity arises for providing some form of vestibule that can be conveniently applied at low cost. The accompanying illustration shows a popular type designed by J. P. Sjoberg & Company, of New York, who



TWO VIEWS SHOWING THE CONSTRUCTION AND APPLICATION OF A PORTABLE VESTIBULE FOR RAILWAY SERVICE

recently furnished over 600 vestibules to the Washington railway companies and nearly 300 to the Union Railway Company, of New York.

These vestibules present a very neat appearance, and are made to combine lightness in weight and strength in construction. Each vestibule has six pillars and five lights. The center section has a sliding sash, which works on an overhead track, connected by swivel sheaves, so that it operates on any style and shape of vestibule. When open or closed it is held in position by a special sash-fast, which acts as a handle as well as a lock. Suitable guides are provided at the bottom, with a sash spring to keep the center sash from rattling when open or closed. The vestibules are fastened to the cars very easily by connecting the dash iron rails to the bonnet overhead.



ONE OF THE NEW COMBINATION HIGH-SPEED, SEMI-CONVERTIBLE CARS BUILT FOR THE WASHINGTON WATER POWER COMPANY

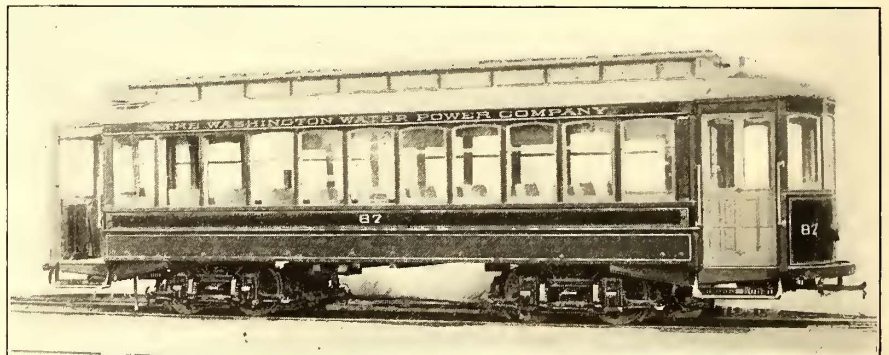
They are generally made to allow the controller handle to swing free and clear, but the brake staff must be moved back unless a ratchet brake handle is employed. Another type of portable vestibule made by this firm has three lights instead of five.

Besides making portable vestibules adapted to any type of car, this firm is also a large manufacturer of stationary vestibules with folding doors, and all other kinds of car woodwork, whether for building or renewals.

**SEMI-CONVERTIBLE CARS FOR HIGH-SPEED SERVICE**

Thirteen large semi-convertible cars built for high-speed service have lately been delivered to the Washington Water Power Company, Spokane, Wash., by the J. G. Brill Company, three of the cars being divided into passenger, smoking and baggage compartments. The semi-convertible window system is thoroughly understood by the railway company, as the builder's full convertible type has been satisfactorily operated on the lines since 1898.

The combination cars are 39 ft. 6 ins. over the end panels, and are seated for forty-four passengers. They are mounted on No. 27-E-1½ trucks with 75-hp motors. The seats are of spring cane, 38 ins. long, and aisles are 24 ins. wide. The passenger compartment is 22 ft. 6 ins. long, the smoking com-



DOUBLE-VESTIBULE STRAIGHT PASSENGER CAR FOR THE WASHINGTON WATER POWER COMPANY

partment 9 ft., and the baggage compartment 8 ft. On each side of the baggage compartment is a sliding door 3 ft. 6 ins. wide. Space is economized by having the forward end of the car solidly paneled. Decorated quartered oak constitutes the interior finish of the cars.

The passenger cars are 30 ft. 8 ins. over the end panels, and are seated for forty-four passengers. The seats are also of spring cane, being 36 ins. long, and the aisles are 26 ins. wide. The interior finish is of ash, with decorated birch ceilings. Armrests are provided on the window sills of both types. The builder's specialties used include "Dumpit" sand boxes, angle iron bumpers, "Dedenda" gongs, "Retriever" bells, etc.

The general dimensions of the combination cars are as follows: Length over the crown pieces and the vestibules, 44 ft. 6 ins., and from the panel over the crown piece and the vestibules, 5 ft.; the width over the posts at the belt is 8 ft. 8 ins.; the side sills are 4 ins. x 8¾ ins., and the end sills are 5¼ ins. x 6⅞ ins.; the sill plates are 12 ins. x ¾ in.; the thickness of



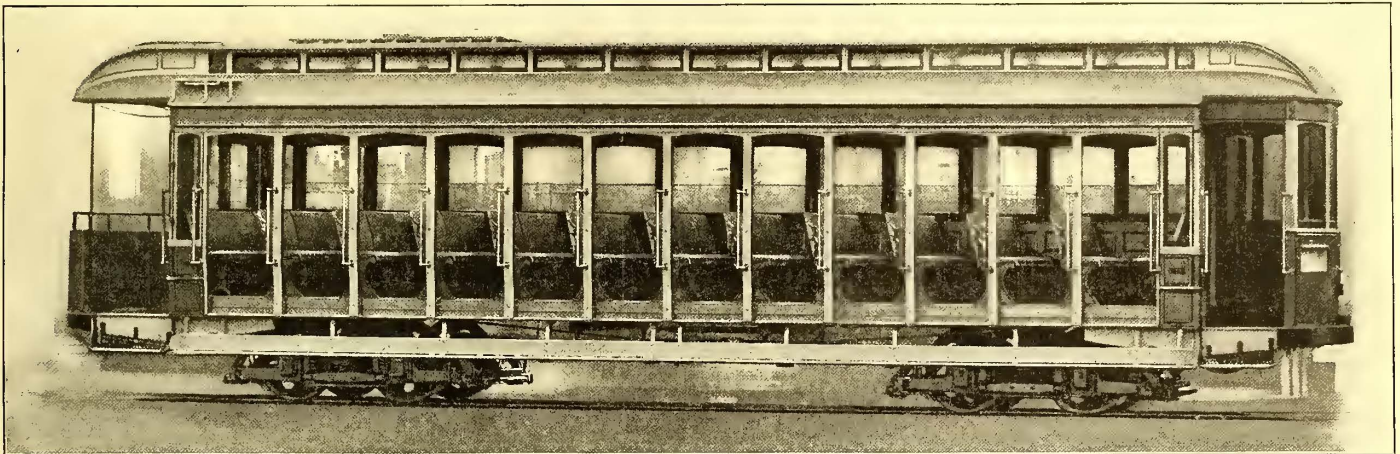
the corner posts is  $3\frac{3}{4}$  ins., and of the side posts  $3\frac{1}{4}$  ins. The passenger cars are 41 ins. over the crown pieces and vestibules, and the platforms are 5 ft. 2 ins. The width over the sills is 8 ft.  $2\frac{1}{2}$  ins., and over the posts at the belt, 8 ft. 6 ins. The sweep of the posts is  $1\frac{3}{4}$  ins. The side sill size is 4 ins. x  $7\frac{3}{4}$  ins., and the end sill size  $5\frac{1}{4}$  ins. x  $6\frac{7}{8}$  ins. The sill plates are 12 ins. x  $\frac{3}{8}$  in. The thickness of the corner posts is  $3\frac{3}{4}$  ins., and of the side posts  $3\frac{1}{4}$  ins. The trucks are of the No. 27-F-1 type, with a 4-ft. wheel base and 33-in. wheels.

**FIFTY CARS OF A NEW TYPE FOR CLEVELAND**

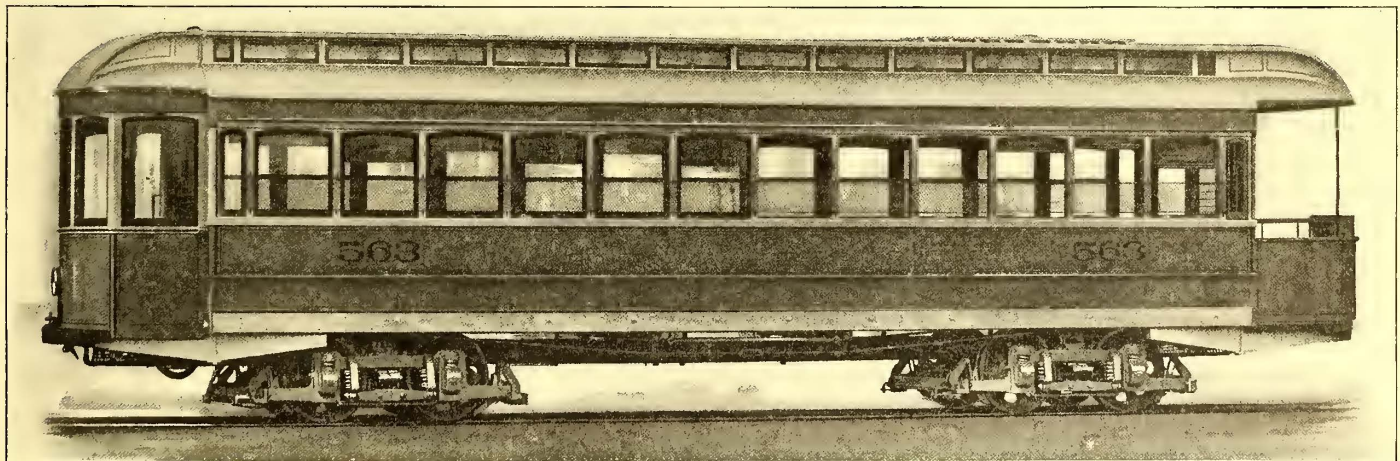
The G. C. Kuhlman Car Company, of Cleveland, Ohio, has recently completed an order for fifty cars for the Cleveland Electric Railway Company which are of an unusually interesting type. The railway system is laid out in such a manner

An interesting feature of the new type is the unique seating plan, which consists of transverse seats on the convertible side and movable longitudinal seats on the other, probably the most practical of all the plans which were ever conceived to make an aisle car convertible to one with continuous transverse seats and still be self-contained. The longitudinal seats are arranged in sections of a length suitable to be brought around to a transverse position and connected with those on the opposite side to form continuous seats for five passengers each. The movable seats are simply lifted around when it is desirable to change the car from one type to the other, and are held rigidly in a transverse position by strong catches. The cricket legs and back supports of the movable seats correspond to those of the seats on the convertible side of the car.

The Brill No. 27-F truck, upon which the cars are mounted, is the standard type of the Cleveland lines and is a short-base



CONVERTIBLE SIDE OF THE NEW CAR FOR THE CLEVELAND ELECTRIC RAILWAY COMPANY



CLOSED SIDE OF THE NEW CAR FOR THE CLEVELAND ELECTRIC RAILWAY COMPANY

as to enable the cars to run in one direction and thus have the entrances on one side only. This condition permits the use of a type of car which is convertible on the entrance side and has fixed panels on the opposite side. This arrangement of a car has the advantage of not requiring a running board on one side, thereby increasing the space between passing cars, a most valuable feature on lines which traverse narrow streets. It also prevents passengers from entering or leaving on the wrong side of the car, which many are prone to do when there is only a guard rail. The J. G. Brill Company's convertible system is used, and on the closed side the ordinary drop sash arrangement has been adopted. A type similar to this, but for trailer service, was built for this railway by the Brill Company a year ago, and after thoroughly demonstrating the value of having one side convertible, the present order was placed for fifty cars like that illustrated herewith.

double truck with equal size wheels. Like all other trucks of its class, it carries the car body too high to be used under open cars with a single step or running board at the side. Therefore, to adapt the style of car shown in the illustrations to this type of truck and make the same division of height from the track to the car floor at the side entrances as at the platforms, a double step is used which is a modification of the Naragansett type—an angle iron is used for the sill with the upper step on the outwardly extending lower flange. This arrangement prevents the upper step from projecting beyond the posts and keeps the width over all within the limits required in city service. The sliding panels and sashes of the convertible side are the regular style used with this well-known style of convertible car, and are stored in pockets in the side roofs when the car is opened by a simple arrangement of trunnions and runways. The sliding panels are brought down to

rest upon the steps of the angle iron sill when the car is closed, and the step openings in the car floor are covered by metal plates or covers which fold against the back of the steps when the car is opened. Trunnions at the corners of these covers move vertically in slats in the sides of the post brackets, and horizontal flanges on the brackets form a secure resting place for them when they cover the steps. The covered plates can be opened or closed from the outside of the car when the panels are raised, or from the inside when the panels are lowered.

The appropriateness of the semi-accelerator doors, which are used with this car, is apparent at a glance at the illustration of the interior. This arrangement brings the door close to the platform steps, so that persons standing on the platform are not likely to obstruct the passenger from step to door. It also enables the conductor to assist passengers to better advantage, as he will stand near the step instead of at the center of the platform. The motorman's cab, formed by a longitudinal partition at the center of the front platform, is an excellent feature, and made possible by the use of the semi-accelerator door. Another valuable feature, which will be seen in the illustration, is the backward-turned position of the grab-handles of the posts on the convertible side of the car. The handles are so placed that a passenger leaving the car will only see the one at the left, and, therefore, by using it is made to face toward the forward end of the car.

The dimensions are as follows: Length over the end panels, 35 ft. 6 ins., and over the vestibules, 45 ft.; from the end panels over the vestibule (front end), 4 ft., and at rear end, 5 ft.; width over the sills, including the plates, 7 ft. 11¼ ins. The width over the posts at the belt is 8 ft. 2¾ ins. The height from the floor to the ceiling is 8 ft. 6¼ ins.; from the under side of the side sills over the trolley board is 9 ft. 6¼ ins., and from the track over the trolley board, 12 ft. The sweep of the posts is 1¾ ins., and the distance between the centers of the posts 2 ft. 9 ins. The thickness of the corner posts is 3⅝ ins., and of the side posts 2¾ ins. on the closed side and 3⅝ ins. on the convertible side. The side sills are 4¾ ins. x 7¾ ins. on the closed side, and 2½ ins. x 7¾ ins. on the convertible side. The end sills are 4¾ ins. x 7¾ ins. The sill plates on the closed side are 8 ins. x ⅝ in. on the sill angle iron; on the convertible side, 8 ins. x 6 ins. x ⅞ in. The length of the seats on the convertible side is 36 ins., and of the movable seats 53 ins. The width of the aisle is 33 ins. The weight of the car body is 21,664 lbs., and of the car and trucks, without the motors, 33,564 lbs.

### A NEW MOVABLE HEADLIGHT

O. E. Mitchell, a Los Angeles Railway Company conductor, has invented a movable headlight which he hopes will be put into use on all of the cars of the various Huntington systems of the city. The light used is the same as those with which the cars are now equipped. By Mitchell's apparatus they are attached to the front cars that, by pressing a lever with his foot, the motorman can throw a shaft of light in any direction he chooses. One is now being used experimentally on a Glendale car. It is being tried upon this line because the route is exceptionally dark at night and has many curves.

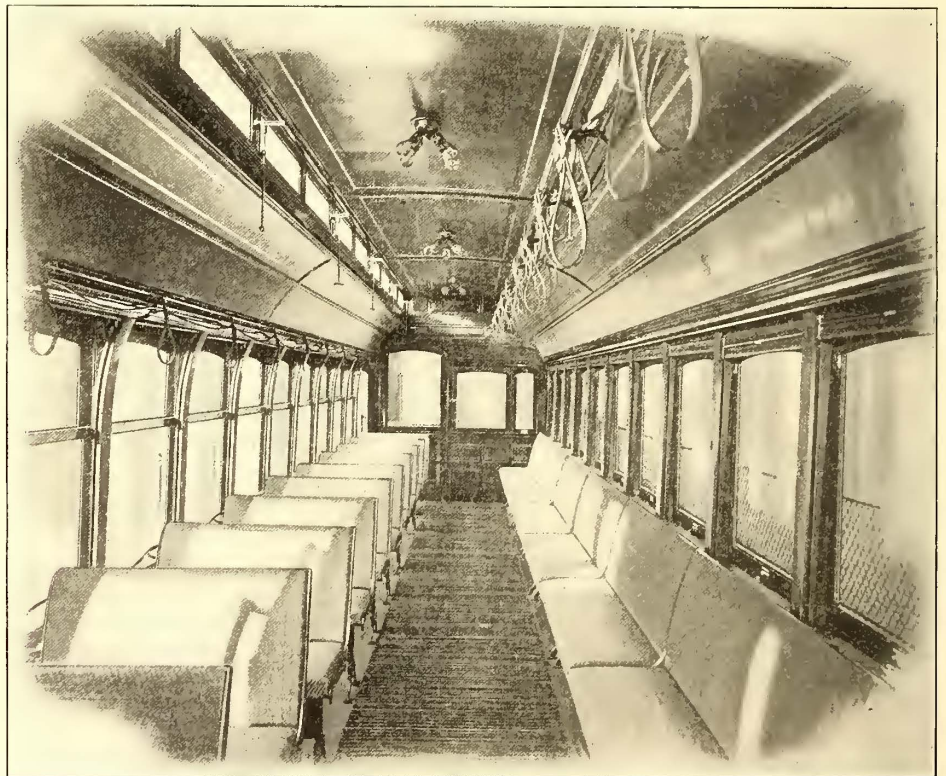
### A NEW ITALIAN SINGLE-PHASE RAILWAY

The French Westinghouse Company has recently secured the contract for the installation of the Westinghouse single-phase railway system on the Bergama, Valle Brembana Railway, Italy. This is the second single-phase railway contract secured by this company in that country, the first being the Rome-Civita-Castellana Railway. The length of the line is 30 kilometers, and it will be served by five 30-ton locomotives, equipped with four 75-hp single-phase motors, with multiple unit control, and pneumatically-operated bow trolleys. The gage of the track will be 1.44 m.

The power station is to be situated about 1 km. out of Valle Brembana, and will be equipped with three single-phase, 500-kw alternators, running at a speed of 500 r.p.m. There are to be no transforming substations, and the line will be fed at the above pressure direct from the power house.

### NEW YORK STATE CONVENTION

As a result of the active efforts of the president and executive committee, the twenty-third annual convention of the Street Railway Association of the State of New York, held at Fort William Henry Hotel, Lake George, N. Y., on June 27 and 28,



INTERIOR OF NEW CLEVELAND CAR, SHOWING LONGITUDINAL AND CROSS SEATS

was in many respects the most successful in the history of the association. All the sessions were well attended, and the papers presented brought out much interesting and valuable discussion. The entertainment features were well planned and were thoroughly enjoyed and appreciated by all of the visitors. While the Fort William Henry Hotel was used by a large number of delegates, others made their headquarters at either The Worden or The Carpenter.

The exhibit feature was one of the best given in connection with any of the conventions of the association. The casino proved a most desirable exhibit place, and, thanks to the careful planning and energetic efforts of Messrs. Nostrand, Green, Evans and Ransom, the booths were all constructed and decorated and ready for the exhibitors the day before the meeting. The date of going to press with this issue precludes more extended reference to the meeting at this time, but a full report will be published next week.

## QUESTION BOX OF THE AMERICAN RAILWAY MECHANICAL AND ELECTRICAL ASSOCIATION

The secretary of the American Railway Mechanical and Electrical Association has issued a list of forty-seven questions which will be discussed at the September convention. These queries have been received from different members of the association in response to the circular issued in February, and all members are requested to reply to at least six of those in which he is particularly interested. The plan is to incorporate the answers received, in the pamphlet containing the advance papers, which will be published and distributed at the earliest possible date. Answers are requested before July 10, and should be sent to the secretary, S. W. Mower, at 12 Woodward Avenue, Detroit.

### QUESTION BOX

1. What is the best composition to use in setting an engine bed on its foundation?
2. What are the arguments for and against a solid spider in large generators?
3. What is the best kind and grade of carbon brush for a 550-volt d.c. generator, and what has been the experience with the various grades?
4. Which is the better form of brush holder for a generator; one in which the carbon is free to move up and down, necessitating the current passing the entire length of the brush and being taken from the tip; or a holder which firmly grips the brush, and is designed with elasticity enough to allow of the brush following the commutator?
5. Does a storage battery working in conjunction with a power house with moderately fluctuating loads show an ultimate economy?
6. What is a good cleaner for slate switchboards, where burned around the circuit breakers?
7. What economies are shown by buying coal on specification of high B. T. W. contracts?
8. Does the advantage obtained from the use of phono-electric trolley wire outweigh the disadvantage experienced on account of its reduced conductivity?
9. What style of "trolley ear" do you recommend? What are the points of advantage of the "clinch," "semi-clinch," soldered ear, etc.?
10. What is the most common cause of flash-overs on small, four-pole motors?
11. What is the best method of inspecting motors for low bearings?
12. How often should motors be overhauled; if on a mileage basis, how many miles?
13. What should be the composition of babbitt metal for motor bearings?
14. Do you use felt wicking or waste packing with oil in your car journal boxes?
15. What should be the chemical composition of a good car oil?
16. What is an economical figure for lubrication (per mile) of a 20-ton car equipped with four 40-hp motors?
17. Is there a satisfactory oil cup for use on old-style motors with gravity grease cups?
18. How shall we do away with the breaking of motor leads where they leave the iron conduit recommended by the board of underwriters?
19. Do you consider it good practice to depend entirely upon car circuit breakers, or do you use a fuse box also?
20. What is the best composition for trolley wheels?
21. What can be done to increase the life and prevent the wearing out of trolley-wheel bearings?
22. How large a trolley wheel can be used to advantage on high-speed interurban lines?
23. What mileage should a trolley wheel run? How often can it be economically turned down?
24. What methods of trolley-wheel lubrication can be employed which will prevent oil from dropping on the car roofs?
25. What tension (in pounds) should a trolley wheel have against the wire?
26. How shall the interurban car of the future be designed, with or without platform; and where shall the entrance be, in the center or at the ends?  
How shall they be operated, in trains or singly?  
If in trains, shall all be equipped with motors, or will one be a motor car and the balance trailers?
27. On a city, suburban and interurban service, can cars weighing 26 tons complete, equipped with four 50-hp motors, maintain an average speed of 20 miles per hour, making a daily mileage of 300 miles without seriously impairing the electrical equipment?
28. Providing cars are fairly standardized and in fairly good shape, how many men per car should there be employed in shops and car houses on an electric street railway system operating, say, 400 to 1000 cars, in order to keep cars in first-class condition?
29. How can cars be given a thorough weekly washing, without injuring the varnish or causing the woodwork to rot?  
Is it injurious to the varnish to wash a car with warm water in an unheated building?
30. In building new paint shops, what is the best form of painters' scaffold to provide for use at the sides of cars?
31. What is the best type of construction for car body hoists; shall they be operated below or above the car house floor?
32. Which is the more economical for the general lighting of shops and car houses, arc or incandescent lamps?
33. What is the best method of pit lighting?
34. What is the best system for heating car shops and pits?
35. Do automatic sprinkler equipments in car houses afford sufficient protection from spread of fire to pay for installation?
36. What difference between wheel and track gage do you use, and where measured on your wheels?
37. Which is the more economical arrangement for getting cars to and from car houses, transfer tables or turn outs?
38. Does high carbon rail for street railway work give better results than rail with less than 55 per cent of carbon?
39. What is the best method for the eradication of weeds along the roadbed?
40. What has been the experience of the members of the association as to the permanency of soldered copper rail bond?
41. What character of sand is best to use for sanding tracks? By what methods can it be dried? Which is most economical?
42. What is the best form of concrete beam construction as evidenced by actual experience?
43. Has experience shown that Portland cement concrete under the tracks in city streets has given results such as to warrant its use in preference to domestic concrete, when the cost of the latter was less than one-half?
44. What character of pavement next to street railway rails gives the best results?
45. Why, in a city where the streets are of ordinary width, cannot a pavement be laid abutting a "T" rail with equal facility and with ultimately as good results, as where some type of grooved or tram girder rail is used?
46. Does the treatment of ties, poles, fence posts, etc., with a preservative fluid sufficiently increase their life to warrant the expense?  
What methods are pursued? What do they cost?
47. Has anyone seen an indicator for steam turbines?

Work is progressing rapidly on the new shops of the Oakland Traction Consolidated at Emeryville. It is expected that the first building will be completed within a month, although it will be late in the year before the whole plant will be in running order. When all the buildings are finished the company will have one of the most elaborate electric railway repair and construction plants in the United States. The new shops include a complete car-building plant, as the company, in planning its repair shops, determined to make the plant complete by adding enough buildings and machinery to permit of construction work as well. The buildings are constructed of heavy timber, with galvanized iron covering. With the completion of the plant the present repair shops at Piedmont, Elmhurst, Telegraph Ave., Emeryville and the pier will be abandoned.

The Long Island Railroad, part of whose lines is being equipped with electricity, will introduce an innovation in inspection service by putting in a line of telephone stations and installing two gasoline motor cars. The telephones will be 2000 ft. apart. The motor cars will be in constant service and immediate touch with headquarters by means of the telephones. They will carry crews of workmen and necessary tools and will make 30 miles an hour.

# PAPERS READ AT THE LAKE GEORGE CONVENTION OF THE STREET RAILWAY ASSOCIATION OF THE STATE OF NEW YORK, JUNE 27 AND 28

## CONTRASTS BETWEEN COMPANY AND MUNICIPAL OWNERSHIP AND MANAGEMENT OF PUBLIC UTILITIES

BY H. W. BLAKE

Public utilities exist because of public demand. Their value to the public is proportionate to the service they render. They should be gaged by this standard alone. The extent of their adoption in any country or locality is the best evidence whether or not those who are responsible for furnishing them have done their duty to the public and met its requirements.

Where American street railway companies stand in this regard is demonstrated by the fact that the track mileage of street railways in the United States is greater than that of all the other countries in the world combined.

Fundamentally, the responsibility for the existence of public utilities is with the people themselves, through the governments which they have created or under which they live, for it is a well-defined legal theory that the power to grant rights and privileges for creating and conducting public utilities comes from the public as personified by State or municipality.

Four general plans, with many variations in their details, have been adopted the world over for the introduction and maintenance of public utilities.

(1)—Governmental or municipal ownership and operation.

(2)—Governmental or municipal ownership, with private operation.

(3)—Perpetual concessions of franchises to private companies or individuals.

(4)—Concessions to private companies or individuals, limited to a term of years, at the expiration of which the property is usually taken over by the government or municipality, sometimes on a favorable basis to the concessionaire, sometimes on a basis of virtual confiscation of the tangible property.

While, as stated, the power for authorizing public utilities rests with the State, unless the ultra socialistic theory of government and social existence is conceded and adopted, there should be a divisional line somewhere between the proper functions of government and what can be best accomplished by private enterprise. As to where this line should be drawn in a country depends greatly on the form and character of its government. But experience in all countries has demonstrated that the division that is most advantageous for the public is that between what our British friends designate as non-productive undertakings, i. e., those things which are essential to government and of universal public benefit, such as the maintenance of police, fire, street, health, charity and similar departments of public service, and reproductive undertakings, so-called, such as gas, electric lighting, telephone, street railways, etc.

Nevertheless, it must be conceded that if the latter class of enterprises are to be undertaken by the State or municipalities, comparatively better results can be obtained in countries like Great Britain, where politics play but a small part in municipal affairs, where there is permanency in public office and where practically every individual who is permitted to vote at municipal elections must be a local taxpayer, than would be the case under our political system. This difference would exist to a still greater extent in a comparison with Germany, where municipal officials who have demonstrated efficiency and ability in certain positions are promoted to more important ones of the same character in larger cities. Yet even in these countries municipal ownership and operation is by no means an unqualified success, enthusiastic theorists to the contrary.

Existing statistics will prove the truth of this statement and could the accounts of the public utilities owned by European municipalities be rearranged in accordance with the standard systems of accounting adopted by public utility companies in this country, the results from a comparison with what has been accomplished in this country would be disheartening to the advocates of municipal ownership and operation.

Present comparisons of results are generally made between those obtained by the best governed municipalities in the world and those of European companies whose spirit is less progressive, whose methods are more expensive and cumbersome than those of American companies, and whose development and prog-

ress has been seriously restricted by onerous and almost impossible franchise and similar conditions.

The American theory of government, up to the present at least, has been "that a people which is the least governed is the best governed," and under this theory America has progressed and prospered beyond all other nations. Where least success has been secured here is where our governments, National, State and municipal, have too closely approached or crossed the line of proper governmental functions. Illustrations of this are before us on every hand.

Fortunately, the American plan of treating with public utilities has generally been for the States directly, or through the municipalities to whom they have delegated such authority, to issue franchises to semi-public companies, authorizing them to conduct the development. True, these franchises are of widely different provisions and character; some crude and defective, others almost ideal; all are inharmonious in their provisions and in the sources from which they have originated. *Yet the work done under them stands unequalled in the world in what has been accomplished for the public good, both in the extent of development and service rendered.*

With all of this there is not an absolute incurable monopoly connected with any public utility company in the United States. American courts have held that exclusive franchises were against public policy and are consequently invalid. American State and municipal governments are to-day receiving from the public utilities as taxes and similar payments, a larger total than is similarly contributed by all of the public utilities of Europe, whether these are owned by municipalities or by companies.

In America, vested rights and expenditures of those who have pioneered the way on public utilities have been respected and paid for by the larger companies which have followed the pioneer work to the advantage of the public. Those, therefore, who have participated in the development of American public utilities, can justly be proud of what they have accomplished, yet no matter how excellent the record may be, there are always theorists and others who will claim that it could have been improved upon, and still others who desire to change and interfere with anything which has been successful in which they themselves have not participated; and these mislead others.

The great public, however, which, under our American system, is the State and municipality, is sincere and zealous for good government and the best results and generally gets what is the best to meet its conditions, but in ways which are almost incomprehensible to the European mind. It is rarely misled, when a full honest statement of facts on any great question is properly laid before it, but without such a presentation of truths, it will temporarily listen to, and be influenced by, whatever is submitted to it through sensational newspapers or by public utterances which may not be in accordance with the facts.

The effect of this last tendency is now apparent in that a serious wave of agitation, in favor of municipal ownership, so-called, is sweeping over the country, but the principle is un-American and contrary to our theories of government which have so far proved so successful.

What has been or can be accomplished in this direction under autocratic, bureaucratic or socialistic governments, is not the question in America unless we adopt one or the other of these forms of government. The question is, can or cannot municipal ownership and management be more successful under our present forms of State and municipal government, than the system which has operated so successfully in this country? So far, the education of the American people upon the subject of municipal ownership has principally been academic, theoretical, haphazard and unbusinesslike, generally conducted by those who have no practical familiarity with the subject.

Referring more especially to that public utility in which you play so prominent a part, and which you and your associates in our other States have conducted more successfully than has been done in any other country:

Are not you and they most competent to conduct the proper educational campaign on this great subject? Who knows so much concerning local transportation and the public requirements in connection therewith?

You are public servants as well as representatives of large private investments; that you have not been unmindful of your duty

as public servants is evidenced by all that you have accomplished for the public good. It is not exaggeration to state that a comparison of returns from American street railway investments with the public service rendered, demonstrates that the public interest has been the better cared for of the two.

But you are public servants to perhaps a greater extent than is included in simply well meeting local transportation requirements within your day and generation, for it is seemingly incumbent on you to see that this is well provided for in the future. To accomplish this, it is your duty to educate the public aright in connection with the present great agitation. Your motives may be misconstrued, although, as you are aware, looking at the situation in a purely selfish way, it might be better for your stockholders to let the municipalities acquire your properties if they wish to do so.

Few would dare to suggest that American street railway properties should be confiscated, and were it attempted to carry out such a suggestion, the Constitution of the United States remains to prevent it. So it is reasonable to suppose that if municipalization of American street railways should be accomplished, their present owners must first be fully compensated therefor. This done, the investors in your properties would have little to complain of in a financial way. The question consequently becomes entirely one of public policy as to whether or not a better and cheaper service would be rendered under such a system than now obtains; whether the policy of constantly extending facilities could and would be continued, and whether or not the financial burdens involved would be more equitably distributed than now; and above all else, whether there would not be introduced into our American political system a corrupting influence and power far greater than any encountered in past American history.

You practically stand in the position of public advisors with a grave responsibility on your shoulders, as you have demonstrated that you are the most successful local transportation experts of the world.

Much has been said on the question of municipal ownership abroad, where it has made its greatest progress, so we must naturally look there for all the important experience that is available thereon. Distance lends enchantment to the view, but how much is really known in this country, or in fact elsewhere, as to the actual results that have been secured?

In the United Kingdom, where the greatest experience has been had, two special Parliamentary commissions who have investigated the subject, and these commissions, as well as the Local Government Board, have apparently been unable to ascertain all the facts definitely. This is shown in their reports, which are lacking in recommendations other than that greater care should be exercised in the auditing of the accounts relating to municipal productive undertakings and that a more uniform system of accounting should be adopted.

While there is a superfluity of literature in existence on the subject, and while reports of municipally owned public utilities are available from Great Britain and elsewhere in Europe, this material is of little value in forming conclusions here, either as to the actual net results that have been accomplished from municipal ownership and management in Europe, or on the feasibility of introducing the system here to advantage. To permit of proper comparisons being made and correct conclusions reached, two most important things must be done:

(1)—The account of those European municipalities which have made the most favorable showing for their reproductive undertakings (so-called) should be rearranged by expert American accountants in accordance with standard American practice, to the end that definite comparisons may be made with results obtained in this country by public utility companies.

(2)—A definite setting forth of differences in conditions between Europe and America should be made, showing those of every name or nature which have either a direct or indirect bearing on public utility service, such as suffrage, tenure of office, municipal methods, density of population, rates of wages, character of population, its use of public utilities, service rendered, etc.

With this material available and properly presented, it would be easy for the American public to form opinions and act in accordance with the best interests.

If our present system of caring for public utilities is wrong, the sooner such a situation is realized the better; *if it is right*, every good citizen should be placed in a position to conscientiously uphold it. In demonstrating the truth, the responsibility for ascertaining and promulgating it may rest upon you and your kindred associations.

Returning to the definition given early in this paper, as to the general methods adopted throughout the world for the creation and maintenance of public utilities, certain facts should be stated which have seemingly been demonstrated by experience everywhere.

The best of service for the present cannot be had, unless the future is anticipated, so far as financial investments are concerned. These necessary investments cannot and will not be made unless there is a permanent franchise for the investor, or its equivalent in the form of an agreement to take his investment off his hands at a stipulated time, for its value. Franchises for public utilities which are limited as to time, without provision for the purchase of the property involved at its full value, always and naturally mean poor service in the later years of the existence of the franchise. These facts should be constantly borne in mind on considering British tramway conditions of the past and present, and in contrasting them with similar conditions here.

British tramway companies have, and have had, very limited franchises. Britain is a country where the theory of vested rights, and due compensation therefor, has been carried to the furthest degree on everything excepting tramways. A few years since British owners were awakened with a shock to a realization of the fact that, in addition to the severe restrictions under which they had labored, at the expiration of the franchises they were at the mercy of the respective municipalities where their properties were located in regard to their disposal, and that values which they had created were to be practically ignored. What but poor service and neglect of repairs and maintenance could result on a property whose franchise had nearly expired? At the expiration of the franchise the municipality slipped in, with the equivalent of an exclusive perpetual franchise, taking the existing property, or so much as it wished, at a nominal valuation; with its municipal credit available to raise capital so far as Parliament approved, with the results of a tax rate to make good deficiencies, with very few restrictions, and with the experience of America in electric traction, which had cost us here hundreds of millions of dollars to develop, as a guide in the construction of an up-to-date street railway system.

Under these conditions, it is not strange that municipal ownership and management of street railways in Great Britain is able to make a somewhat favorable showing as contrasted with company ownership and management there in the past. What American street railway management could not have accomplished wonders under like conditions?

While the municipalities of the United Kingdom enjoy exclusive perpetual franchises, and the other advantages recited for conducting a successful street railway business, with few exceptions they are prohibited from constructing lines beyond their municipal boundaries. In consequence, the essential is lacking for constructing systems radiating out through the surrounding districts, and thus affording the public the facilities and services which it requires and which would tend to redistribute the population, as has been done about every American city. With very few exceptions, the British municipalities have opposed the construction of suburban and interurban lines to connect with their municipal street railway systems, and in only two or three cases in the entire United Kingdom have trackage rights for such systems been granted over municipal lines, or have they been permitted to enter municipalities where the tramways were under municipal control.

Not only has the great essential to a most important public utility, *i. e.*, the best possible service, been prevented, but in the method of adjusting fares the fact has apparently been lost sight of that one of the greatest advantages which can arise to a community from its street railway system, is in encouraging its poorer classes to reside in its suburbs under more healthful conditions than is possible in crowded tenements within the city; because, while charging lower fares for shorter distances than the universal American fare, for greater distances the British rate is higher than in this country, and no transfers are given in Great Britain.

The accompanying maps, all of which have been reproduced to the same scale (8 miles to the inch), give a better idea than any figures of the small size of a number of the principal European systems as compared with those of American cities of the same population. The maps of the American cities do not represent, of course, the entire extent of the interurban lines, because in the case of Boston and Milwaukee the interurban connecting lines extend beyond the confines of the State, and in the case of Buffalo far beyond the limits of the map. They show, however, that the American policy of a 5-cent fare encourages the development of the suburbs, while the European policy of a zone system of fares congests the population into tenement districts. The population figures given under the several maps are those of the 1900 census for the American cities, and for 1901 in the case of the British cities.

So far as the British municipal tramways are concerned, it is safe to say that an American syndicate could be organized which would give each and all British municipalities a better service than they now have, providing the syndicate were simply permitted to enjoy the same franchise privileges, and this without calling for a dollar of public funds to accomplish such results. It would seem, there-

fore, as if the one argument in favor of municipal ownership of street railways would be the profit which the municipalities may derive from operation. Let us glance at what the results have so far been in this respect.

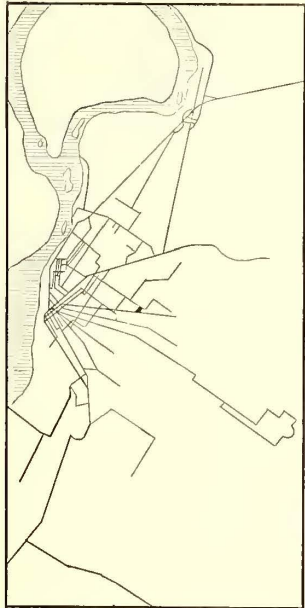
In 1904 there was invested in all the tramways, municipal and company, of the United Kingdom, practically \$232,000,000, of which about \$140,000,000 was the direct investment of the municipalities.

Upon the above investment practically \$1,438,000 was directly paid as taxes by the municipalities and tramway companies. Of this presumably, however, about \$790,000 was paid as national income tax, leaving the amount paid for municipal taxation about \$538,000. To this should be added not over \$150,000 paid as municipal

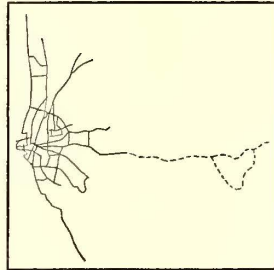
excluding taxes, were approximately \$25,510,000, leaving net earnings from operation \$15,180,000; from which it will be seen that the percentage of operating expenses to gross earnings was 62.7.

The street railways of New York earned from operation \$51,964,744, and their operating expenses were \$31,397,623, leaving net earnings from operation \$20,567,122, such operating expenses being 60.42 per cent of gross earnings from operation.

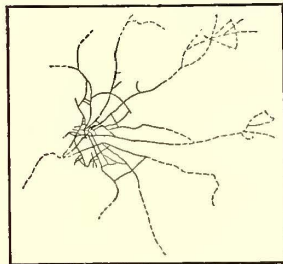
In the operating expenses for the street railways of New York



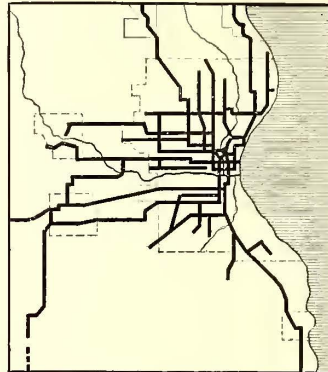
Electric Railway System of Buffalo. (Pop. 352,387)



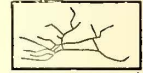
Electric Railway System of Liverpool. (Pop. 634,947)



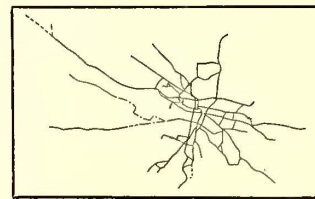
Electric Railway System of Manchester. (Pop. 543,939)



Electric Railway System of Milwaukee. (Pop. 285,315)



Electric Railway System of Newcastle-on-Tyne. (Pop. 215,900)



Electric Railway System of Glasgow. (Pop. 735,906)

taxes by the holders of tramway companies' securities; also \$1,035,000 contributed to the respective public treasuries by municipal tramways as earnings.

So the total financial benefits which British municipalities derived as taxes from the operation of all street railways in Great Britain, and in which their funds to the amount of \$140,000,000 were invested, was \$1,723,000.

For the same fiscal year the street railways of the State of New York paid directly as State and municipal taxes \$2,656,233.74. Considering that the individual holders of street railway securities issued in this State contributed as personal taxes thereon at the low rate of three-fourths of 1 per cent on the face value of their securities, they turned into our public treasuries \$3,516,000. That is, the total financial benefits which the people of the State of New York have derived from street railway taxation for this year was \$6,172,233, and this without the investment of a dollar of public fund in the properties.

Under the British system, on the 1st of July, 1904, there were in operation but 2900 miles of street railway track in the entire United Kingdom. At the same time in the United States there were in operation over 31,000 miles of track.

In Great Britain alone there were but 2529 miles for a population of over 37,000,000. In this Empire State, with a population of, say, 7,500,000, there were at the same time 3062 miles of track.

In Great Britain the average population per mile of track was approximately 14,630; in this State it was approximately 2375.

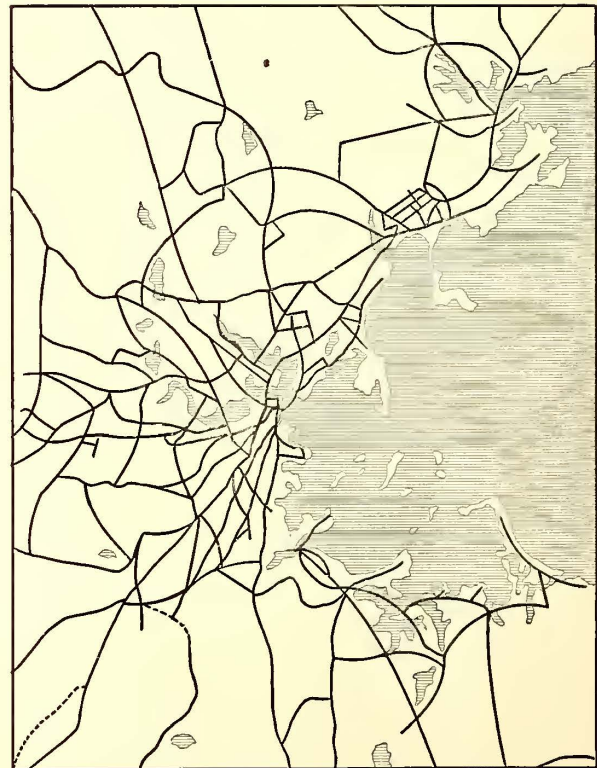
In Great Britain 183,352,706 car-miles were run and 1,712,424,198 passengers carried; in New York State 199,767,097 car-miles were run and 1,341,766,931 passengers carried. From this it is seen that the average passengers carried per car-mile were 9.34 in Great Britain, and in New York State 6.71. In this connection it should not be forgotten that the average American street car is 50 per cent longer and much heavier than the corresponding English car.

The above facts tell their own story as regards facilities and service afforded the public.

Now for a glimpse of results from operation, which may demonstrate the comparative ability shown by British street railway managers and those of the Empire State.

As is well known, the rates of salaries and wages paid on British municipal tramways is not over one-half those paid in this State.

In the fiscal year of 1904 the tramways in Great Britain earned from operation \$40,690,000 in round figures; the operating expenses,



Electric Railway System of Boston. (Pop. 560,892)

State are included \$19,812,227 paid for salaries and wages. If the rates were the same here as those paid in Great Britain, and the present efficiency of employees maintained, it is clearly apparent that New York street railways could afford to give still greater facilities to the public than is now possible, or could pay much larger dividends.

Let us look at another most important feature of operating expenses:

The British tramways, in the fiscal year of 1904, paid less than \$575,000 on account of accidents, or, say, a little above 2.26 per cent of their operating expenses. The street railways of New York for that year paid approximately \$2,615,000 on account of their accidents, or, say, 8.32 per cent of their operating expenses.

It is to be regretted that statistics are not available which will show the average distance ridden by passengers in Great Britain and in this State, but it is safe to say that the average ride per passenger in New York State is more than twice as long as in Great Britain. Here the average fare paid per passenger for his longer ride is 3.83 cents; in Great Britain it is an average of 2.3 cents for the shorter ride.

In view of what has been stated as regards comparative rates of wages and accident accounts, it will be seen at a glance that the passenger in New York State is receiving greater value for the fare which he pays than does the passenger in Great Britain. This would only be possible under our superior American management, which is best demonstrated by some comparisons on the more important features of operating expense.

While fuel is cheap in Great Britain, and although light cars are used, the cost of tractive power, as it is officially designated there, averages over 3.3 cents per car-mile. In New York State, with much heavier cars and higher speeds, the expense averages about 2.42 cents.

This fact, of course, demonstrates that either greater engineering skill and business judgment have been displayed in constructing power stations here than in Great Britain, or that they are much more economically operated than in Great Britain, despite the lower rate of wages prevailing there.

For traffic expense, as it is termed there, or operation of cars, as it is designated by our railroad commissioners, the average expense in Great Britain is about 6.28 cents per car-mile. In this State this average expense is approximately 7.35 cents, or a difference against us of 1.7 cents; but as approximately 70 per cent of this particular expense in America is represented by wages, it is seen at a glance how much more efficiently American managers utilize their high-priced transportation labor.

It is obvious that on the recently reconstructed tramway lines of Great Britain present repairs and maintenance are less than they will be a few years hence, and it is to be questioned if this has been duly considered by their management.

The expenditures in 1904 for track line and car repairs and maintenance there were approximately \$4,150,000, averaging \$1,645 per mile of track and 2.26 cents per car-mile. In New York State the total expenditure for similar repairs and maintenance was \$6,049,054, averaging \$1,975 per mile of track and 3.03 cents per car-mile.

In all probability we have not yet reached our maximum expense for repairs and maintenance. Naturally Great Britain must go through this same experience, and as these expenses increase one of three things must happen in Great Britain: either fares must be increased, payments to sinking funds that have been created to pay indebtedness incurred for tramway development cannot be made, or the deficits paid out of public funds raised from taxation.

As to how serious the question of local indebtedness and consequent taxation is at present in the United Kingdom, it should be stated that the total local indebtedness at the present time is practically \$1,800,000,000, an increase of about \$1,000,000,000 in thirty years.

In England and Wales alone, from 1884 to 1900, the population had increased but approximately 18 per cent; taxable valuation had increased but 21 per cent; local indebtedness, however, had increased about 78 per cent, and the rate of local taxation had increased about 73 per cent. Over half the increase of local indebtedness has resulted from the embarkation of municipalities in what is there known as municipal trading, i. e., purchase and operation of public utilities and similar enterprises.

The present financial condition of certain British municipalities on such matters is seemingly not unlike that which existed two or three decades ago in the United States, where municipalities, counties and States pledged their credit to aid in the construction of railroads and other similar enterprises, which eventually resulted in financial disaster. It would not be strange if, in many instances, time would show a like final result in Great Britain.

Do we here in America wish to profit by our past experience, or return to one of the most unfortunate episodes in our local financial history through a little different channel? At the same time, do we wish also to add to the strength of local political machines by transforming independent, self-respecting American workmen into an army of municipal employees, which must follow the dictation of some local boss? This should not come unless there be some great compensating advantage not yet apparent from European experience with municipal ownership and management of public utilities.

## PUBLICITY

BY J. HARVEY WHITE,

Boston Elevated Railway Company

How to obtain fair treatment from the local press is a problem that puzzles a great many railway managers. A persistently hostile press not only exasperates and embarrasses, but tends to create an unfriendly public sentiment that might in an extreme case jeopardize the success and even threaten the existence of a company. Many street railway men seem to think that it is the deliberate policy of most, if not all, newspapers to attack and misrepresent all public service corporations. They treat and talk about a spirit of fairness on the part of the public press as the silly imaginings of an impractical and inexperienced theorist.

It is not in the nature of things that all newspaper stories and editorials, written in the rush of newspaper life and necessity, can ever be made as judiciously fair as court decisions or as accurate as mathematical calculations, but it does not follow that because there are some grounds for criticism, that either the inaccuracy or injustice necessarily springs from a desire on the part of publishers to either misrepresent or injure. On the contrary, newspaper men as a class are both fair-minded and honorable, and whoever holds a contrary opinion has either been peculiarly unfortunate in his experience or has been blinded in his observation.

Every street railway manager desires the good will of the newspapers toward his corporation and, ordinarily, it is not a difficult thing to obtain. The most effective means of securing it are persistent courtesy, good temper and frankness. The battle is more than half won if the newspapers understand that a company is ready at all times to supply them with any information that may be desired, unless there are serious reasons for not doing so. An occasional refusal of news, particularly if an explanation is made as to why the information is withheld, does not create ill will, but when reporters and city editors find themselves thwarted in every effort to obtain news, the result is quite certain to be that the columns of the papers will not furnish much reading matter that will delight the corporation management.

When the Boston Elevated Railway Company began operation in 1897, it was decided to assign to some person the special duty of looking after the needs of ten daily and forty odd weekly newspapers published in the territory in which the company operates. The writer of this article was selected for that purpose, and for the past seven years has devoted much of his time to dealing with newspapers and newspaper men. The experiment has proved sufficiently successful to warrant its continuance, and it is hoped and expected that as time goes on a larger measure of success will be brought about.

It would be pleasant to be able to state that nothing ever appears in the papers to which the company can find valid grounds for objecting, but the lamentable truth is that no such Utopian state has ever been brought about. This much, however, has been accomplished. The newspapers generally recognize that the management of the company is endeavoring conscientiously to please the public and to provide a good service, and, what is of more importance, they are willing to say so. Furthermore, the reporters and news editors, as a rule, make an honest effort to be perfectly just to the company in the presentation of news. The occasional misrepresentations usually spring not from malice, but either from inaccurate information from outside sources, or too great zeal to make a story interesting. In brief, it may be said that the policy of the company has contributed materially toward the creation of an atmosphere of good will between the press and the corporation, although it has not resulted in the entire elimination of newspaper comment to which objection can fairly be made.

The president of your association has seen fit to ask for a description of how the press department, if it can be dignified by the name of department, of the Boston Elevated Railway Company is conducted. It is all so simple, and the details follow so much as a matter of course, that it is a discouraging undertaking to attempt to find items of sufficient importance to justify an encroachment upon the time and attention of such a body as will assemble at your convention. But as the request has been made, and made under circumstances that precluded a refusal, the task will be essayed without apology or further justification.

The work of the press agent of this company differs from that of most men occupying corresponding positions in that there is practically no advertising to be handled. The only regular advertising, if it can be so termed, is the publication of time tables in the suburban papers. These are paid for in cash and not in transportation, as is customary with many companies. The company is-

sues no passes or other free transportation to anybody, except that during the summer months it places in the hands of certain charitable institutions and associations upwards of 50,000 free tickets to be distributed among the sick and children of the poor who cannot afford even a nickel for a fresh-air outing away from the tenement districts.

Practically the only other advertising is the occasional publication of statements or facts that the company wishes to place before the public. When it is desired to insure the publication in full in every edition of a paper, or when the company wishes to secure the publication of a certain matter at greater length than its strict news value calls for, then the company pays for the space that is required. Such occasions are, however, very rare and practically all of the work of the department is confined strictly to supplying news which the papers use in their own way.

Success in dealing with newspapers along the lines indicated requires some general understanding of the purposes, practices and ethics of the newspaper business. The aim of all publishers is to attract readers, for upon the number and character of the readers depends the value of the paper as an advertising medium, and upon the advertising receipts depends the prosperity of the paper. Most newspapers are ambitious for a larger circulation. This they aim to secure by meeting the demands of the public for news. Therefore, all newspapers try to print the news their readers desire, try to present it in an interesting way, and try to make their news columns reliable sources of information.

The recital of these elementary principles of newspaper practice and policy may appear unnecessary and not germane to the subject matter under discussion, but the writer considers an understanding of them of much consequence. When dealing with another person it is often useful to know in advance what the other fellow wants. Many persons who have seen little of the inside of newspaper management imagine that newspapers strive more for sensation than they do for accuracy. This idea is fallacious. To be sure, newspapers delight in sensational facts, but no paper can afford to gain a reputation for being unreliable. Nothing piques the pride of a reporter or editor more than to have an "esteemed contemporary" show that a write-up is a fake.

The aim of newspapers to secure accuracy has been thus emphasized in order to give point to the assertion that if a street railway management finds itself constantly misrepresented as to facts, the chances are that the company itself is at fault. If public service corporations generally would adopt the policy of giving as much, instead of as little, news to the papers as possible, it is quite certain that the papers would not only print the facts with reasonable accuracy but would welcome such action.

Some men are timid or over-cautious in dealing with newspaper men for fear that they are not to be trusted. In an experience of seven years the writer has had a confidence abused but once, and that was in a matter of no vital importance. As a class, reporters and editors have a sense of professional honor that may be relied upon implicitly. In fact, it reaches a point that the outside public would scarcely credit. The greenest cub reporter learns among his first lessons that the violation of a confidence is sufficient grounds for discharge. If a person desired to keep something out of a paper his best course in many cases would be to tell the whole story in confidence to a reporter or the city editor and trust to the honor of the newspaper not to abuse the confidence. It may appear that the writer entertains a too exalted opinion of the men who are engaged in the profession of journalism, as the business is usually termed by those who are not engaged in it, but it is founded on an experience that makes it impossible to hold any other opinion.

When a reporter enters the office he is given immediate attention. He is offered a chair, usually given a cigar and made to feel that he is welcome. He states his business and is given the information he desires as fully and explicitly as possible. If the subject appears difficult for him to fully grasp, as technical subjects are apt to prove, he is supplied with a memorandum of the principal points. Oftentimes it happens that a reporter does not really know what is wanted, as assignments are frequently given to reporters in very vague terms. In such cases every possible assistance is given to help him out of his dilemma.

It sometimes happens that it is unwise, improper or impossible to supply the information. In such cases, especially if the reporter is a new man who is trying to establish himself with his paper, the city or managing editor is called up and the situation explained to him. Ordinarily a city editor will promptly relieve a reporter from his assignment under such circumstances. The reporter then goes away contented, for he feels that although he has not obtained his story he will not be held accountable for a failure. This is an illustration of the many little things that per-

sons not familiar with newspaper methods seldom think of. When a reporter is assigned to secure a particular story he is expected to get it. If he is unsuccessful, it injures his standing with his paper. Under such circumstances there is always a temptation to exercise the imagination a little and fake up some kind of a story, which would not be written in a spirit of especial friendliness toward the person or corporation that refused the material. It is therefore a good rule, if one desires to win the heart of a newsgatherer, to either give a reporter what he asks or ask his superior to relieve him of the obligation of getting it.

One very important policy that must be strictly adhered to if one wishes to have any influence with newspapers is to be strictly truthful and sincere. If the confidence of newsgatherers is ever shaken in the good faith of a press agent he will forever stand discredited. He must have an unimpeachable reputation for truth-telling, or his statement will be neither sought nor valued.

A press department such as is being described is, in a sense, a bureau of information of unusual scope. The head of the department is called upon to answer a range of questions that is almost beyond imagination, for it must be understood that one of the principal aims of city editors in general and Sunday editors in particular is to discover subjects for stories that no one else has ever thought of. In order to meet these demands, that are often strange and whimsical, the press agent must have access at all times to information in every department.

The questions that are asked deal not only with the routine of the service, operation of the system and allied technical subjects; such as engineering, electricity and mechanics, but they also include legal questions, relations between the public and public service corporations, labor matters, finance, political economy, sociology and a multiplicity of other topics of popular and academic discussion. The range is wide and does not lack variety.

If a press agent has any doubts as to the propriety of answering the questions asked, he should seek instruction from the management, but he ought to be able to decide upon the expediency of giving out news matter in most cases without bothering his superior officer, whose time is so fully occupied that it should be trespassed upon only in cases of real necessity. The rule is, consult the management in case of doubt, but do not be in doubt too often.

Another fairly important work of the department is the preparation of complete articles for use in newspapers and magazines. There is considerable demand for authoritative and popular articles of this kind, not only in this country, but in Canada, England and Germany. Some of these articles are often "syndicated," that is to say, they are sent to a considerable number of papers for simultaneous publication, if they are believed to be of general interest. Sometimes fifty or more papers use a single story of this kind. This service can be supplied to the newspapers at small cost. The greatest care must be exercised to keep these articles strictly within the field of legitimate news and not permit them to encroach upon the advertising field. Such stories deal with subjects of considerable magnitude and general interest, such as the construction of a tunnel or the installation of important and novel equipment.

A corporation that takes the position that what it is doing is its own business and not the public's, is apt to find itself in hot water a large portion of the time. The public insists not only in being well treated, but upon having the means of judging for itself as to whether or not it is being well used. A company that is giving good service cannot to-day afford to hide its light under a bushel, but should do all in its power to demonstrate to the public that the service is good. A company that is unable to supply a really satisfactory service will usually find that it has much to gain and little to lose by frankness with the press and the public. If the public is convinced that the management is really doing its best, the amount of fault-finding will be reduced to a minimum, and some sympathy will be given to a management that is battling against adverse conditions and difficulties. It is quite as important to explain the faults as it is to extol the virtues of a company, for it is a trait of human nature to regard with reasonable complaisance many things that have to be endured if a sufficiently good reason is given for their existence.

The press affords the best and most available medium for a street railway to keep itself before the public in its true guise. Most companies would be happy if they could make the public see them as they really are. The thing that managers complain of is not that they and their companies are exposed to public criticism, but that they are misrepresented. The most effective remedy is co-operation with the newspapers upon the basis of frankness on the part of the company and fairness on the part of the paper. Such an arrangement is usually feasible and agreeable to both parties.



## UNIFORM STANDARDS OF EXAMINATION OF RAILWAY EMPLOYEES

BY DR. F. H. PECK

I am placed in a position of some embarrassment in coming before a convention of men engaged in the executive departments of railway management, with a paper which has to deal solely with medical questions, in their relation to the policy of the railway surgical department. In order to make myself perfectly clear to the lay mind, I shall endeavor to divest my subject of all technical terms as much as possible.

To increase the factor of safety to the utmost, compatible with the rapid transportation demanded by the strenuous times in which we live, must be the endeavor of all railway managers. A recent newspaper article informs me that in 1903 the number of persons killed and injured on the railways in the United States reached a total of more than 86,000. Of this great number I believe that a large proportion were injured through their own carelessness, or contributory negligence. But it is possible to reduce the number of casualties by improving the personnel of railway employees. The only way to accomplish this result is by the establishment of uniform standards of examination, in the hands of competent surgeons, of all applicants for positions in the operative service of the railways, with rules requiring the re-examination of these employees, as often as once in five years, or after recovery from serious illness or injury.

At the first glance it would seem that the responsibilities of the electric motorman are not nearly so great as those of the engine-driver on the steam roads, as the lighter load renders the momentum of the electric car but a small fraction of that of the heavy steam train, and emergency stops can be made in much shorter space. This difference in momentum, and the difference in center of gravity in favor of the electric car staying on the track, should make the trolley much less hazardous both to the passenger and to those on crossings and in streets used by the respective roads. On the other hand, the fact that the trolley traverses the thickly peopled streets of our cities tends to act as an offset to the extra factor of safety inherent in the car and its mode of propulsion.

The factor of safety to the public is best conserved by the rigid examination of all candidates for employment as motormen and conductors. Both should be men of sobriety, with sound minds in healthy bodies, of good nerve—quick and decisive in an emergency—and in the perfect possession of visual and auditory faculties.

In the examination I would recommend two classifications or standards of requirements: one for new applicants for employment and one for old employees seeking promotion, which should most rigidly insist on the possession of full normal vision and hearing; the other for re-examination of experienced employees not seeking promotion, and which should require at least two-thirds normal vision and hearing. This for the reason that the man who has for years been a motorman or conductor has by experience gained a knowledge of his work, which renders him quite as capable as the novice possessing unimpaired faculties, though the former may have but two-thirds the normal faculty of vision and hearing.

### TESTS FOR VISION

The Snellen test cards are recognized as standards of tests for accuracy of vision the world over. They consist of sheets of white paper on which are printed block letters in types of various sizes, each line of type bearing a number which shows the distance in feet at which the line should be read by the normal eye. Thus on the card which I exhibit the top line is numbered "70," and should be read at the distance of 70 ft.; the bottom line marked "20" should be read at the distance of 20 ft. In testing vision the card is placed in good illumination at a distance of 20 ft. from the candidate. Each eye is tested separately, by directing the applicant to cover the other. He is then required to read the lines as far down the card as possible, and his acuity of vision is recorded as a fraction; the numerator being the distance in feet at which he reads the types; the denominator being the numeral corresponding to the smallest line correctly read. Thus normal vision is indicated by the fraction 20-20, which means that he can read the line marked "20" at 20 ft. If he cannot read this line but can read the one next above, his defect in vision is indicated by the fraction 20-30, which means that he reads at 20 ft. the line which he should read at 30 ft. If he reads all but three of the letters in the line marked "20" correctly, and mistakes those three for letters of somewhat similar appearance, he should be passed as possessing normal vision.

New applicants for the position of motorman should be pos-

sessed of normal vision, and their examination papers should bear the fraction 20-20 as recording the vision of each eye without the aid of glasses. This rule should also apply to motormen in the service seeking promotion. Candidates for the position of conductor whose vision equals 20-30 with each eye without glasses, and is susceptible of correction by the use of glasses so that they can read 20-20, are marked as "average" for employment.

### COLOR TESTS

In testing for defects in color perception, I use both the Holmgren test worsteds and the Williams color test lantern—both of which I exhibit. By the worsted skeins color vision is tested by selecting one of the large untagged skeins and requiring the candidate to pick out and lay beside it all the skeins of the same color in its various shades. The small skeins have each a metal tag stamped with a number. Those corresponding to the test skeins have odd numbers, while those liable to be confused with the test colors by the color-blind subject, and called "confusion skeins," bear even numbers. The colors which are liable to be mistaken for each other by the person who is color blind, are green for red, and vice versa, gray for green, and brown for red.

Color blindness varies in degree in different individuals; those who pick out red or rose-colored skeins and place them with the green as being all of a color, or those who select light greens when picking out the reds are radically color blind; while those who choose light brown or gray in selecting reds and greens respectively have a seriously defective color perception, and are none of them fitted for positions requiring prompt recognition of red and green signals. Those who handle all the colors over and over with marked hesitation before coming to a decision, though they may finally be correct in grouping the colors, have a slow and therefore defective color perception, and it is my practice to further test them with the lantern.

The lantern is so arranged that by turning a circular disc in front of the lights different primary colored glasses are successively illuminated, as well as their corresponding numbers; though the latter are concealed behind a smaller disc and can only be seen by the operator. There is in addition a sliding diaphragm perforated with apertures of different sizes to give the effect of various distances to the test colored lights. If the applicant can correctly and readily call the names of the colors illuminated he is accepted. If he mistakes reds for greens, or vice versa, he is rejected. One thing in which the examiner should exercise great care is to differentiate between color ignorance and color blindness. Many men of the class who apply for positions as trolley employees have a defective color education and cannot readily name the colors, though their color perception may be normally acute. The grouping of the worsted skeins is manifestly the fairer test in these cases.

### TESTS FOR HEARING

For testing the hearing I use the voice test and the tuning fork. In the former, after testing the vision of each eye separately by the Snellen test cards, I direct the candidate to plug one ear with his finger; then standing by the test cards, at a distance of 20 ft. from him, I ask him in a low voice, what is the last letter in the line he has just read; then with the other ear stopped, I ask him what is the first letter in the line, or if he can read any of the letters next smaller. Usually he will repeat my question, or will show by his answer whether he has heard correctly, and will be unconscious that I am testing his hearing, imagining that reading the letters with his ears successively obstructed is a continuation of the visual test. If he shows any doubt in regard to the voice test, I further test his hearing with the tuning fork. Standing behind him, I direct him to tell me the point at which he begins to hear the instrument as I approach it to either ear. I set the fork ringing by pinching the ends between my thumb and forefinger and suddenly releasing them, so that his attention would not be called to the loud noise which would be caused by striking the fork against any hard substance. Asking him to describe the character of the noise he hears, I can judge whether he is honestly telling when he hears the fork. The hum of the fork should be heard at about 20 ins., while its tone should be clearly heard and described at 5 or 6 ins. The record of his hearing is made in a fraction of which 20 is the denominator, representing the distance at which the examiner stands from him in the voice test. Perfect hearing is indicated by the fraction 20-20; one-half perfect by 10-20, etc.

### PHYSICAL HEALTH EXAMINATION

The application blank should show applicant's name, occupation, residence, age, height, weight, color of eyes and hair; the pulse and respiration should be recorded; also history of any illness subsequent to the diseases of childhood. Specific examination should be made as to the presence of hernia or any deformity. The history of any injury or accident should be elicited and sig-

nificant scars or deformities marked on the diagrammatic figures on the blank. Special examination should be made as to the existence of any disease of heart, lungs, kidneys and urinary organs, joints, veins, hands and feet, arms and legs, and spine. Examination for hernia, hydrocele, varicocele or varicose veins should not be omitted. The question as to the use of intoxicants should be supplemented by the examiner's opinion as to whether applicant shows evidences of using liquor. A history of recent vaccination should be required, or in its absence revaccination. The examiner should express the opinion as to whether the candidate appears bright and alert, or dull and slow in his mental processes, and finally, the surgeon should state whether he considers the applicant to be first-class, average or defective for the position sought, giving his reasons, in case of rejection, in a space left for supplementary remarks.

## TYPES OF INTERURBAN CARS

BY J. N. SHANNAHAN,

General Superintendent Electric Division, Fonda, Johnstown & Gloversville Railroad.

It is the purpose of this paper to describe two of the types of interurban cars in service on the Fonda, Johnstown & Gloversville Railroad, the service in which they are used, and to point out their advantages and disadvantages for that service. It may perhaps be well to describe first the conditions of service which were to be satisfied by these two cars.

The cities to be connected were Gloversville, Johnstown, Amsterdam and Schenectady, the total length of line being 33 miles. The builders of the line realized that two distinct kinds of travel must be provided for: the through long-distance rider who must be carried in the shortest possible time, and with a maximum of comfort, and the local short-distance rider, who desires to be carried from his own door to that of his neighbor, a few miles distant.

To provide for the long-distance rider the company arranged what was termed a limited service, which made the run of 33 miles in a little less than an hour and a half, and provided for no stops outside of the cities. To care for this limited service the management caused to be designed a car capable of making an average speed of 45 miles per hour, and with every convenience possible to a passenger in an electric car.

The dimensions of the car are: Length over all, 55 ft. 4 ins., and the width over all, 8 ft. 9 ins. The trucks are spaced 33 ft. center to center. The weight of the car-body is 53,500 lbs., and of car complete with trucks and motors is 86,500 lbs. The great weight is a result of the steel floor frame, which has been illustrated and described in several of the technical journals in the past. The management of the company felt that inasmuch as the cars were to run at high speed, every precaution should be taken to safeguard the passengers against possible accident, hence the steel floor frame. The great weight of the car has, however, aided in bringing about another most desirable result, namely, an easy and comfortable riding car. The writer does not wish to be understood as stating that this result is accomplished by the weight of the car-body alone, but that it is the combination of trucks with the heavy body which has brought it about. In a run occupying an hour and a half the following points must be considered in looking to the comfort of the passenger:

1. Easy riding qualities in the car and trucks.
2. Comfortable seats.
3. Toilet conveniences.
4. A smoking room which shall be comfortable for the occupants, but unobjectionable to the other passengers.
5. Ice water, luggage racks, etc.

The first has already been considered and need not be referred to, further than to state that the trucks were manufactured by the Taylor Electric Truck Company. The second point, with reference to the seats, need not be particularly discussed beyond stating that they are of the Walkover type, with head-roll back made by the Hale & Kilburn Company, and upholstered in plush. The seats are 37½ ins. long, 19½ ins. deep, with a back 24½ ins. high, and an arm rest. These seats were designed especially for this car, and have proven most comfortable in every way.

After considerable discussion it was decided to place in the cars a toilet room similar to those in a first-class steam coach.

The proper location for the smoking room was carefully studied, and it was finally decided to pattern after that in use in Pullman cars, except that the seats should be longitudinal rather than lateral. That the occupants of the smoking room are entirely isolated, and ladies not obliged to pass through the compartment in

entering or leaving the car, have proven a most satisfactory arrangement.

Each car is equipped with an ice-water tank, which is given attention at the end of each round trip. The luggage racks run the entire length of the main compartment on each side of the car. Another feature especially designed for the convenience of the passenger is the window. When closed the view is not obstructed by any wire guard or grating, but when the window is dropped in warm weather, a brass grill, placed above the top of the sash, and attached to it, provides the necessary protection. When the window is raised the grill passes entirely out of sight.

Care was taken that the car should be so well lighted that passengers would have no difficulty in reading in any part. The result is that the car is brilliantly lighted, there being 40 16-candle-power incandescent lamps in the main compartment alone.

The vestibules are arranged in a manner similar to those of a Pullman car. The steps do not project beyond the side of the car, and are covered by a trap door when not in use. Each vestibule is provided with a motorman's cab.

The heating of the cars is accomplished by a Peter Smith hot-water heater. The further precaution has been taken of applying storm sash to these cars, and we experience no difficulty in keeping them properly warmed at all times.

The cars are equipped with the Westinghouse straight air brakes, and also with the Sterling safety hand brake.

The interior of the car is finished in tabasco mahogany, with Marquetrie design in border and panel.

The electrical equipment consists of four General Electric Company's No. 73 motors (75 hp each) with type-M train control. The motors appear to be admirably adapted to the service, as no difficulty has been experienced in making the run of 33 miles, of which 8 miles is in streets or highways, regularly in an hour and twenty-four minutes.

The particular advantages claimed for the car are:

(a) The ability to make the run at high-speed, thus successfully competing with the steam railroads.

(b) The possession by the passenger of all the comforts found in a modern steam railroad coach.

(c) The minimum liability of injuries to passengers, which was admirably demonstrated a few months ago in an accident in which one of these cars running at a speed of 45 miles per hour crashed into a 15-ton steam road roller. The roller was almost completely demolished while the damage to the car was confined almost entirely to the front vestibule, and was repaired for the sum of \$625. Though the car carried 34 passengers, none were seriously injured.

For the conditions under which this car operates it is admirably designed, and the writer is at a loss to point out any particular disadvantage. It might perhaps be urged that slowness in loading and unloading is one, but that is not possible to correct without a general rearrangement of the entire car. The placing of the smoking compartment in one end and toilet room in the other end of car makes a narrow entrance compulsory. This is not with us a serious objection, for the time lost in unloading and loading can be provided for in stand time at terminals or made up by slightly faster running en route.

The car was designed in the office of C. H. Ledlie, consulting engineer for the railroad company, and under his immediate supervision, and was built by the St. Louis Car Company. The cost of car complete was about \$15,000. The wisdom of purchasing so expensive a car may be questioned, but it was the belief of this company that sufficient additional traffic would be attracted by such a car to justify its purchase, and the results of 18 months' operation completely demonstrate the correctness of this belief.

No reference has been made to the value of such a car as an advertisement for the railway, but there is no doubt that the company has received much favorable notice for operating so fine a type of car.

To provide for the short-haul business the company arranged what is known as the accommodation service, which provides for slower speed than the limited cars make, and for a large number of additional stops. To cover the accommodation runs we purchased 8 cars manufactured by the St. Louis Car Company as one of their standard types of interurban car. The dimensions of the car are: length over all, 45 ft. 4 ins., and width over all, 9 ft. The trucks are spaced 22 ft. center to center. The weight of car body is 36,000 lbs., and of car complete with trucks and motors, 58,700 lbs.

The car has side or main sills of 5-in. x 8-in. yellow pine, reinforced by a ¾-in. x 8-in. steel plate, and intermediate sills of 4-in. x 5-in. yellow pine, reinforced by 5-in. channels.

The car is equipped with the St. Louis Car Company's walkover seats, upholstered with rattan. The seats are not provided with an arm rest. The car is mounted on the St. Louis Car Company's No. 23 trucks, and equipped with the Christensen straight air

brakes, and four of the General Electric Company's No. 57 motors. The interior is finished in quartered oak. The heating is accomplished by a Peter Smith hot-water heater.

These cars make the run of 33 miles in two hours.

The advantages of the heavier car for the limited and fast service have been spoken of, and I believe are quite apparent. As to whether the advantages of the lighter car for the accommodation service are as real may be questioned. That its passengers can be unloaded and loaded in less time is unquestionable, and that it can make the accommodation runs with the frequent stops with a much less consumption of power is equally true. But whether the amount saved in these ways will equal the increase in the damage account due to the lighter construction of the wooden car is a question which is not easily answered.

### NEW YORK STATE QUESTION BOX

The questions and answers in the Question Box prepared for the Street Railway Association of the State of New York, were based to some extent upon the Question Box that has been conducted for the past four months as a regular department of the STREET RAILWAY JOURNAL. Several of the more important questions appearing in this paper were selected and these, with certain explanatory comments, were mailed as a preliminary canvass to representatives of all the electric railway companies in the State of New York. A large number of replies was received as the result of this canvass, and these answers, together with a few of the answers selected from the STREET RAILWAY JOURNAL, made up the report. The following answers are some of the replies that have not yet appeared in this paper. The rest of the new answers will be published in an early issue:

#### GENERAL

##### ADVERTISING

**No. 2.—What means of advertising have you found most effective?**

Display cards on the inside of end windows have been found to be a very successful method of advertising attractions, because they are a conspicuous announcement to every person who rides on the cars daily, and as people, generally, when riding on the cars have little to do except to read advertisements, a very large majority of them are likely to take notice of the display card. Also it is a reminder to persons as they are going home in the evening where they can be entertained after supper. We think this means of advertising the most effective and economical. We also use boards to hang over the dash announcing ball games and other attractions along the line of the road.

E. G. CONNETTE, V. Pres. & Gen. Mgr.,  
Syracuse Rapid Transit Ry. Co.

We advertise attractions by means of banners, which are placed on the fenders of the cars. Posters are sometimes displayed in the windows. I think the best results are obtained from banner advertising, as the banners are continually before the public.

F. J. GERDON, Supt. Trans., Utica & Mohawk Valley Ry. Co.

The International Railway Company uses newspapers, illustrated folders, time cards, bill-board posting with three-sheets and half-sheet posters in car windows.

As to the relative merits of the different kinds of advertising, it is our opinion that the conditions of the locality govern to a great extent according to the class of people it is desired to reach. Newspaper advertising, while expensive, if judiciously placed in the shape of three to five-inch display at amusement rate, which carries the privilege of liberal reading notices, is undoubtedly a good medium. With such an arrangement or contract with newspapers, the advertising agent should be able to secure from time to time interesting stories of a news nature, for instance, following a day of a big event on the line. Such information given out as news is good reading matter for the newspapers and of value to the railway company.

In large cities it is difficult to secure much window space except in the outlying districts, where the advertising is not of great value. In return for such advertising it is customary to give one or two tickets to the place advertised, and if their value does not exceed the 25-cent rate, this remuneration for 10 days' display is reasonable. In some cases, however, the fare to such points is 40 or 50 cents, at which rate two tickets would be an excessive payment. In downtown districts it is almost impossible to secure

window space for any length of time, and this plan of advertising in large cities does not appeal to the writer as one to bring results.

Souvenir postal cards appear more or less as a great effort to reach a very small circulation, although the printing of such cards at the rate of 1 cent each or less enables the railway company to give them gratis to souvenir stands, where they can be offered for sale.

The plan of railway companies publishing small leaflets weekly and distributing same in folder racks on all the cars appears to be a good form of publicity, inasmuch as the public is brought closely in touch with the business of the railway, and can be advised through this medium of all changes in car service, as well as up-to-date news of parks and resorts reached by the company. This company has found the method of advertising in car windows most effective for local purposes, inasmuch as the entire territory governed by the railway lines can be thoroughly covered and good publicity given to resort features and events.

J. E. STEPHENSON, Pass. & Fr. Agt.,  
International Ry. Co., Buffalo.

Folder containing small map giving general idea of the system and principal points reached by it and a company publication of our own are combined in one published weekly during the summer—this year from May 27 to September 2 inclusive—under the name of "Trolley Topics." This magazine, which consists of 36 pages, 4 ins. x 8 ins., contains time tables and map of all divisions of the Rochester Railway and Rochester & Eastern Rapid Railway, which latter road enters Rochester over the line of this company; also time tables of the steamboat lines with which we connect at Summerville for points in Canada and the Thousand Islands, general information regarding the parks and resorts in and near Rochester and what is going on there, theatre and baseball news, yachting items, etc. A short story and a few jokes are mixed in with this, and these with several pages of advertisements at either end complete the magazine. Mention is also made of the pleasantest trips to be taken on our lines, the price of tickets, and where to obtain same.

We believe that a certain amount of newspaper advertising is indispensable if one would obtain the best results. Short locals, an occasional write-up and now and then, for special occasions, a good strong display advertisement keeps you before the public and brings results. We recently inserted an advertisement in rhyme, which caused considerable comment, and, we believe, brought about some extra business.

Banners or signs on cars and car-window advertising were all used by this company to some extent until recently for advertising many things outside of the railway company's own affairs. This has now been entirely done away with, except that we now allow one sign on either dash of the car, 9¼ ins. x 25¼ ins., and these signs are only for advertising the company's business or something directly connected with it, such as "Baseball To-day," "To the Circus," "1000 Island Excursion," "Lilacs in Bloom—Highland Park," etc. We have the signs printed on cardboard by a printer, and these are then tacked on to boards of the same size which are made with iron hooks on the back. These are hooked on to an iron plate on dash of car, and can be changed at a moment's notice. We find that these tersely worded signs call the people's attention to the main fact. The details they learn from the papers, sometimes in an advertisement, but often in the news column, the car signs simply serving as a reminder.

Display cards in cars are used by us for calling attention to certain popular or to-be-made-popular trips, and, we believe, are a good medium. We advertised our "Apple Blossom Route" (the Rochester & Sodus Bay Railway) this year with a card gotten up in pink, green and white, showing a branch of apple blossoms and reading:

DON'T MISS  
APPLE BLOSSOM WEEK  
on the  
ROCHESTER & SODUS BAY RAILWAY.  
Round trip tickets 75 cents, at Amsden's.

The Rochester & Sodus Bay Railway runs through one of the richest fruit and garden sections in the State, and during the early part of May, when the apple blossoms are out, the line is advertised as the "Apple Blossom Route—40 miles of Apple Blossoms," etc. A regular car, holding from forty to fifty persons, can be chartered for this trip for \$40, or single daily excursion tickets for 75 cents. In the case of private parties, souvenir cards, decorated with apple blossoms, and containing an eloquent invitation to see the real apple blossoms in all their glory, have been issued in one or more instances. We had more apple blossom passengers than ever before.

For advertising special attractions we have found that house-to-

house distribution of hand-bills has proved a very good medium. We get up the bill in neat and attractive form, and put it in the hands of a distributing agency for distribution.

We believe that our own publication, which is put directly into the hands of passengers on the cars, as well as being distributed at all stations and agencies on our outside lines, in connection with the newspaper advertising, perhaps brings the largest returns. Attractive display cards in cars no doubt contribute a good share, and the dash signs assist also.

We have mentioned six methods of putting ourselves before the public, and while each would bring us good results, we believe none of them is complete without the support of the others. The several different methods when united make a strong combination. All railway companies are "held up" to a certain extent by certain large social organizations who get out "Official Programs," "Souvenirs," etc., in which the railway is obliged to place its advertisement. This is more in the nature of a donation, however, as there are no direct results to the company.

Band concerts at parks and resorts are always good advertisements, and in Rochester these park concerts are held every Saturday and Sunday, the railway company paying one-half the expense of the band. The newspapers publish this as news, and the railway company puts on its dash signs, "Band Concert To-day." The people do the rest.

GEO. G. MOREHOUSE, Sec.,  
Rochester Ry. Co.

Folders, cards in cars, small hangers, souvenir postal cards and newspaper advertising, which includes both paid advertising and all the news items that can be furnished. We have found the newspapers and folder time tables the most effective mediums for advertising our road and its attractions.

J. H. PARDEE, Gen. Mgr.,  
Rochester & Eastern Rapid Ry.

This company has not as yet gone into any general advertising of its road and attractions. We have been going through a period of construction for the past three years, and, on account of the rapid growth of the business in this city, our time and attention have been so taken up with handling the traffic and building extensions that we have not found time as yet for the developing of new business through advertising. We have been spending about \$1,000 a year for advertising our time tables, and have just started out preparing folders containing maps, time cards and general information. Inasmuch as we have not gone into any general advertising, it is not possible for us to determine the most effective means of increasing business through advertising.

E. J. RYAN, Supt., Schenectady Ry. Co.

**No. 3.—How much money can be spent profitably by an electric railway company for advertising, and how much does your company spend each year for advertising? Please answer this in detail.**

The amount of money to be spent for advertising depends upon what a street railway company has to advertise. The average company has nothing to advertise except attractions along the line of the road, and the advertising then should be done within reasonable limits to induce pleasure travel.

E. G. CONNETTE, V. Pres. & Gen. Mgr.,  
Syracuse Rapid Transit Ry. Co.

For advertising banners for our park attractions during the season we spend approximately \$50.

F. J. GERDON, Supt. Trans.,  
Utica & Mohawk Valley Ry. Co.

This question is most difficult to answer, but the percentage of gross receipts which the railway can afford to spend for advertising would seem to depend largely upon the amount of business over normal traffic which can be attracted to the trolley cars. The expenditure of this company per annum, which includes all items charged to advertising, is approximately \$10,000.

J. E. STEPHENSON, Pass. & Frt. Agt.,  
International Ry. Co., Buffalo.

Depends entirely upon class of road and results of advertising. Expenditure must be governed entirely by results.

J. H. PARDEE, Gen. Mgr.,  
Rochester & Eastern Rapid Ry.

This company has been spending about \$1,000 a year for advertising time tables. We can better determine how much money can be spent for advertising after giving the matter a thorough trial.

E. J. RYAN, Supt., Schenectady Ry. Co.

Last year this company spent about \$8,000, which was charged to advertising and attractions. This included salary of excursion

agent, expense for company publication, percentage of receipts paid on account of carnival held at one of our resorts, newspaper advertising, cards on outside of cars, advertising cards inside of cars, miscellaneous advertising in programs, souvenirs, etc., appropriation for park band concerts, other band concerts, handbill distribution, and all concessions made to picnics either in cash or prizes. For our purposes we believe the advertising for the year can be done for about one per cent. of the gross receipts for the six months from April 15 to October 15.

GEO. G. MOREHOUSE, Sec., Rochester Ry. Co.

#### CLAIMS

**No. 4.—Do you have a sinking fund for the settlement of accident claims? Please give details of the methods you use for handling this matter.**

We estimate a certain percentage of the gross earnings of the company to take care of accident claims. At the present time we are charging out 4 per cent of our gross earnings to what we term "Accident Fund Account." At the end of our fiscal year if we find that during the previous year the percentage charged to this account has not been sufficient, we increase the rate. All money actually paid out on account of accidents is charged to this accident fund account, and the percentage mentioned above charged to the proper expense accounts monthly.

R. B. HAMILTON, Claim Agent,  
Utica & Mohawk Valley Ry. Co.

We have no sinking fund for the settlement of accident claims, but charge off a certain amount each month sufficient to take care of the entire expense for each fiscal year.

E. G. CONNETTE, V. Pres. & Gen. Mgr.,  
Syracuse Rapid Transit Ry. Co.

This company has no sinking fund; its claims are paid from the current earnings of the road.

A. J. FARRELL, Claim Agt.,  
International Ry. Co., Buffalo.

Yes, we charge to damage operating account a certain percentage of our gross income each month, and the moneys disbursed in the payment of claims is charged to a damage reserve fund account.

J. H. PARDEE, Gen. Mgr.,  
Rochester & Eastern Rapid Ry.

This company has such a sinking fund. Every month \$3,000 is credited to an account known as "Accrued Damages." This amount is fixed at this figure as our experience has taught us that such an amount is sufficient for this purpose. All payments in settlement of claims are charged to this account.

MR. ROBINSON, Claim Dept., Schenectady Ry. Co.

Every month we credit 5 per cent of the railroad's gross receipts to an accident insurance fund. From that fund we pay all damage claims and legal expenses in connection with the claim department. We have been following this practice for about a year and a half, and find it very satisfactory.

B. B. NOSTRAND, JR., Pres. & Gen. Mgr.,  
Pe skill Lighting & R. R. Co.

We charge off a percentage of our gross receipts to an accident fund, from which are paid all expenses resulting from accident claims.

R. E. DANFORTH, Gen. Mgr.,  
Rochester Ry. Co.

**No. 5.—How can the claim department best co-operate with the operating department in the prevention of accidents?**

By having the claim department and the superintendent, their assistants and road officers have a conference at least weekly, on the previous week's accidents, with suggestions from the representatives of both departments as to the best way to avoid a repetition of such accidents.

R. B. HAMILTON, Claim Agent,  
Utica & Mohawk Valley Ry. Co.

I do not know how the claim department can assist the operating department in the prevention of accidents, except in an advisory capacity. The claim department should, however, notify the operating department of all acts of negligence causing accidents.

E. G. CONNETTE, V. Pres. & Gen. Mgr.,  
Syracuse Rapid Transit Ry. Co.

The claim department can help the operating department by giving to the latter a full report of every case settled, with remarks and suggestions, which may lead to the betterment of the service by improved discipline.

CARLETON BANKER and JULIAN DU BOIS,  
Div. Supts., F. J. & G. R. R.

After full investigation of claims, all papers are turned over to the operating department for its inspection and information as to the cause of the accident, and for proper action. Benefits may be derived as to the prevention of accidents by suggestions made by the claim department to the operating department, as the claim department is obliged to go into each and every accident minutely, and, therefore, suggestions from the claim department should prove of value to the operating department in the prevention of re-occurrence of similar accidents.

A. J. FARRELL, Claim Agt.,  
International Ry. Co., Buffalo.

Complete co-operation between head of claim department and head of operating department will have excellent results in the prevention of accidents. The claim department can furnish much information to the operating department regarding the little things which have caused accidents, the remedy for which should be supplied by the operating department. And the operating department can furnish much valuable information to the claim department for use in the settlement of claims.

J. H. PARDEE, Gen. Mgr.,  
Rochester & Eastern Rapid Ry.

Our experience has taught us that the old adage, "An ounce of prevention is worth a pound of cure," can be very advantageously applied in the operation of a railroad. The members of the claim department are constantly on the alert for any practices on the part of the car crews that might result in an accident, and also for anything defective in the mechanical equipment that can be observed by anyone riding on the cars. Our men are riding on the various lines of the road daily, and whenever they see anything which, in their opinion, might be the cause of an accident, a note is made of it and sent to the transportation department or mechanical department, as the case may be. Upon the receipt of these notes these departments take the matter up at once, and the remedy is applied. Many accidents are thus averted. These suggestions are never made in any captious or critical manner, but with a sole view of keeping down the cost of the operating of the road from the standpoint of damages, and they are always received in the spirit in which they are made. This will depend somewhat upon the character of the men in charge of the different departments, and occasionally one meets with the head of a department who seems to think that suggestions of this character are personal criticisms, and instead of endeavoring to correct the dangerous practice, seeks to justify it. The best of feeling should exist between the heads of departments, as without it co-operation is impossible.

When an accident does occur, a rigid investigation is made, both from a legal and a transportation standpoint, and every effort is made by both the claim department and the transportation department to avoid a recurrence of the same. Another practice of this company, which we believe is a good one, is that all car men report to the office of the claim agent before they are permitted to take charge of a car. They are carefully instructed as to the legal rights of the company and of passengers, and are notified just what to do in case of accidents, and how to do it. An effort is made to impress upon their minds that the safety of passengers is the first and most important requirement, and that everything else is subordinate to that. Often instructions of this kind made by a man whose work consists chiefly in the investigation of accidents, and who realizes keenly the importance of what he says in regard to prevention of accidents, are more emphatic than instructions by a transportation man whose chief point of view is that of the transportation department. It is necessary for the applicant to have the signature of the claim agent upon his practice slip, which certifies that he has been properly instructed by that department, before he can begin work.

MR. ROBINSON, Claim Dpt.,  
Schenectady Ry. Co.

Claim department should assist in instructing new motormen and conductors in matters relating to accidents, and post them concerning the most frequent kinds of accidents and methods of preventing same.

R. E. DANFORTH, Gen. Mgr.,  
Rochester Ry. Co.

**No. 6.—Have you ever used the camera to good advantage in adjusting damage claims? Please give details.**

The camera is used to good advantage occasionally in the defense of damage suits. Photographs should be taken showing the conditions and the surroundings of certain kinds of accidents, to be used not only in adjusting claims but also in defending suits in the courts.

E. G. CONNETTE, V. Pres. & Gen. Mgr.,  
Syracuse Rapid Transit Ry. Co.

We have used the camera to very good advantage in the preparation of evidence in damage claims. It is our custom in cases of serious accident, where the question of the exact locality may be a

factor, to have photographs taken immediately after the occurrence of the accident. We aim to have these photographs show what evidences there may be of the accident, and our experience has been that the photographs can be used to very good advantage, not only in the adjusting of claims but in court.

R. B. HAMILTON, Claim Agent,  
Utica & Mohawk Valley Ry. Co.

We have done so by photographing cars and places where accidents have occurred. This method gives an accurate reproduction of the conditions.

CARLETON BANKER and JULIAN DU BOIS,  
Div. Supts., F. J. & G. R. R.

This company has never used the camera in the adjustment of claims, but has been very successful in the trial of cases in using photographs taken at scenes of accidents. In this connection, it often has suggested itself to the claim department that in large cities of mixed population, among some classes of claimants a system of identification should be adopted, by photograph or otherwise, to prevent fraud in future claims. It has occurred several times where the same person, under an assumed name, has made repeated claims for damages arising out of alleged accidents of which the company has no report and which it has reason to believe did not occur.

A. J. FARRELL, Claim Dept.,  
International Ry. Co., Buffalo.

TRAILERS

**No. 7.—Please give your ideas and experience relative to trailers.**

I do not believe that it pays in the long run to operate what are usually called trailers, on account of the extra hazard connected with their use. I do believe in the train system, using the multiple-unit control, for interurban roads and for city lines where the traffic is congested and heavy.

E. G. CONNETTE, V. Pres. & Gen. Mgr.,  
Syracuse Rapid Transit Ry. Co.

I do not favor trailers for city service for short hauls. I think that frequent service is the better and less dangerous of the two. Trailers on interurban or elevated roads, where cars are run in trains of two or more, I think could be used to good advantage where stops were not too frequent. Where stops are frequent the two or more car-train consumes more power in starting and stopping, and there is also additional delay to a great number of passengers on the train, whereas if the cars were run at intervals the stopping and starting load would be greatly reduced. I think trailers have a tendency to increase accidents. The economy, if there is any economy in running trailers, is simply that two cars can be operated by three men, if that can be called economy when the additional risk referred to is considered.

F. J. GERDON, Supt. Trans.,  
Utica & Mohawk Valley Ry. Co.

We have used trailers on our local lines, but had trouble with derailments at switches and special work. We have also had difficulty in maintaining the schedule. With a comparatively straight and level track, with a loop at each terminal or with a belt line, trailers could be used to advantage during rush hours or on days of heavy traffic. Trailers should be equipped with air brakes and run with train control. The draw-bars and couplings between the cars should be carefully designed. The chief economy in running trailers is, of course, the saving of one man in each crew.

CARLETON BANKER and JULIAN DU BOIS,  
Div. Supt., F. J. & G. R. R.

The running of trail cars is an economical way of handling travel night and morning during rush hours, or on special days when travel is heavy. I am of the opinion that trailers decrease the number of accidents. The economy is in the saving of time of one man, equipment and power.

C. A. COONS, Supt. Trans.,  
International Ry. Co., Buffalo.

On a high-speed road containing heavy grades as we have, we do not consider that trailers, so called, should be used. But when it becomes necessary to run more than one car in a train we make up the same, operated by multiple control. We have, however, operated three-car trains, with the center car dead and the two live cars at the ends. This class of trains with us has worked very satisfactorily for handling excursion parties or any other class of special passenger work when we do not have to maintain the regular schedule train running time. On our road we have found that we are unable to take two cars, one of which is a dead trailer, and maintain the regular schedule running time making the necessary stops. Consequently, this is the reason why we invariably make up our two-car trains with both cars having a full equip-

ment of four motors. It has not been our experience that trains of two or more cars have increased our accidents in any way; therefore, we do not consider them any more unsafe than the single car trains. On our single track road, where regular trains are an hour apart, we find that two and three-car trains help us out very materially at certain times of the day when traffic is congested, also when the excursion business is heavy, it can be handled advantageously in this way. From a power standpoint at the present time, we are unable to state the exact economy of running cars in trains, but trains of this class require less labor and are therefore cheaper on that account, besides being much easier to handle in the single unit than the same number of cars would be in separate units.

W. R. W. GRIFFIN, Supt.,  
Rochester & Eastern Rapid Ry.

This company does not operate trailers on its lines, and, therefore, we have had no experience. From a general point of view, trailers cannot be conveniently operated unless there are loops at all terminals. Trailers properly find a place in the operation of a railway where the traffic is so heavy that close headway is necessary in order to handle the business. Trailers can then be used and the headway decreased, thereby economizing in operation. As this company runs no trailers, we can give no data as to accidents. However, I do not think that the use of trailer cars should increase the number of accidents, provided they are properly handled.

E. J. RYAN, Supt., Schenectady Ry. Co.

Trailers add to flexibility of equipment at small cost, but increase number of accidents. Trail cars are properly used for excursion travel occurring at irregular or infrequent intervals. The economy is in decrease in power consumption per passenger and increase in carrying capacity per trainman.

R. E. DANFORTH, Gen. Mgr., Rochester Ry. Co.

**No. 11.—If trail cars are used, should cars be equipped with some form of multiple-unit control? If so, would you favor using four motors on the first car and none on the second, or two motors on each car, or four motors on each car? Should cars be equipped with master controllers at both ends? What are the factors entering into the question?**

If trailers are used as trippers only I would favor four motor equipment with no motors in the trailer. If cars are run in trains on a single-track road, where there are no "Ys" or terminal loops, cars should be equipped with controllers on both ends. In this case two motors to each car I should think would be sufficient.

F. J. GERDON, Supt. Trans.,  
Utica & Mohawk Valley Ry. Co.

Decidedly, if cars are run in trains they should be equipped with multiple-unit control. Unless there are loops at all terminals there should be master controllers at both ends of the train.

CARLETON BANKER and JULIAN DU BOIS,  
Div. Supts., F. J. & G. R. R.

Would recommend that the motor car be equipped with four motors, and that both motor car and trailer be equipped with air brake connections. Our conditions here make it advisable to have master controllers at both ends of motor cars.

C. A. COONS, Supt. Trans.,  
International Ry. Co., Buffalo.

We are very much in favor of always running cars in trains with the multiple unit control. When using two cars in a train on our road with its present profile, we find that we have to use both with four motors, on account of being unable otherwise to make our regular schedule. When using three cars in a train on excursion work, we find that the center car running light without motors makes a very fine combination, but, as before stated, we are unable to place trains of this make-up on our regular schedule time on account of their being unable to make the running time with the necessary stops. On our road we do not use the master controllers on both ends, except on two cars, which are used in places where we have no place for turning. All of our trains are turned at both terminals.

W. R. W. GRIFFIN, Supt.,  
Rochester & Eastern Rapid Ry.

If trailer cars are used, I should advise multiple unit control, with motors on both cars. The question of number of motors depends upon the class of the car. It would not be necessary to have controllers on both ends, provided the cars could be looped at the terminals.

E. J. RYAN, Supt.,  
Schenectady Ry. Co.

## FARES

**No. 12.—In making up a schedule of fares for an interurban road, is it better to base rates on mileage or with reference to municipal boundaries, and what is the proper rate per mile for passenger business? Also to what extent should the rates be reduced by the sale of commutation tickets, monthly tickets, coupon books, etc.?**

It is frequently wise to base fares on municipal boundaries rather than on mileage. Local conditions should be consulted. Commutation rates should be about 50 per cent of the regular fare.

CARLETON BANKER and JULIAN DU BOIS,  
Div. Supts., F. J. & G. R. R.

We have no commutation tickets. We have single and round-trip tickets, which are sold at regular ticket offices along the line, the return ticket being sold at a reduction of 5 cents on the round-trip. We do not make any reduction except on round-trip tickets. Whether rates were based on mileage or municipal boundaries I should think would depend on franchise conditions.

F. J. GERDON, Supt. Trans.,  
Utica & Mohawk Valley Ry. Co.

It does not appear that any basis of rates per mile could be arrived at which would govern very many localities, as the conditions in each territory are very different, and as most municipalities, whether thickly populated or not, impose certain rates of fare in franchises where the right of way is along the public road, the plan of basing rates on mileage cannot well be carried out.

In the case of an interurban line operating on private right of way, the rates of fare doubtless depend largely upon the expense of operation and other liabilities. For the reason that interurban lines must compete with steam roads, 1½ cents per mile should be a very reasonable basis of interurban rates, and as very few towns through which interurban lines run cover a distance of more than three miles, the customary 5 cent fare for such territory seldom brings the rate below 1½ cents per mile. Competition must also be considered.

Commutation rates, where there is a daily travel between points, play their part in promoting travel. These rates are also governed by competition, and, on the basis of 1½ cents per mile for regular travel, should be about ¾ cents per mile to be attractive to the person who travels daily.

J. E. STEPHENSON, Pass. & Frt. Agt.,  
International Ry. Co., Buffalo.

I should advise that in every instance fares be based on mileage, and I think that 1½ cents per mile is a proper rate for interurban business. However, this would depend in a very large measure on the locality of the road and the conditions. It is our practice to make the price of commutation tickets 33⅓ per cent. less than our regular rates.

E. J. RYAN, Supt.,  
Schenectady Ry. Co.

In operating our interurban line, the Rochester & Sodus Bay Railway, about 40 miles between Rochester and Sodus Point, we have divided the distance into 12 5-cent zones, or limits, with reference to the village boundaries rather than on a mileage basis. This makes a single fare 60 cents for 40 miles, or 1½ cents per mile. The round-trip rate (unlimited) is 90 cents (for 80 miles), or 1¼ cents per mile, and 75 cents for daily excursion ticket, or 15-16 cents per mile. Commutation tickets are sold in books containing 250 5-cent limit tickets (value \$12.50) for \$10, or 20 per cent. less than full regular fare. School tickets are sold to children not over 18 years of age, when properly signed certificate from principal of school is presented to agent. These books contain 40 limit tickets (regular value \$2), and sell for \$1, or 2½ cents for each limit. School tickets are good only on school days, and are not accepted during July and August. Half-fare round-trip tickets (unlimited) are sold for 50 cents, or 33⅓ per cent. less than regular full fare unlimited ticket (Rochester to Sodus Point).

GEO. G. MOREHOUSE, Sec., Rochester Ry. Co.

**No. 13.—What is the best method of collecting and checking fares on suburban and interurban roads?**

The duplex ticket system.

CARLETON BANKER and JULIAN DU BOIS,  
Div. Supts., F. J. & G. R. R.

There are many good methods of fare collection, but it would seem that the system by which passengers can be encouraged to buy tickets before boarding cars is the best of all, as the less cash a conductor is required to handle the more time he has for other

duties, and this is greatly simplified if passengers present tickets for the distance traveled.

A recording register that will enable conductor to ring up actual amount paid by passenger, as cash fares, seems to be the best method and safeguard that can be employed.

J. E. STEPHENSON, Pass. & Frt. Agt.,  
International Ry. Co., Buffalo.

Make cash fares paid on trains considerably higher than regular ticket fares, and place tickets on sale at all principal points and as conveniently as possible, so that number of cash fares paid on trains will be reduced to the minimum. Issue mileage books in denominations of 100, 500 and 1000 miles. Place 100-mile books on sale with the conductors of all trains, so that patrons boarding trains at stops at which there are no ticket offices can obtain the 100-mile books from the conductors at the same rate per mile as charged for tickets. We issue duplex for all of our cash fares, form of which is substantially the same as used by steam roads. We register our 5-cent cash fares on ordinary fare register.

J. H. PARDEE, Gen. Mgr.,  
Rochester & Eastern Rapid Ry.

The best system of collecting and checking fares on suburban and interurban roads depends in a very large measure upon the road and the conditions. On account of the high speed of our interurban lines, it is not possible for us to use a zone system, although that system has been worked out satisfactorily on a great many roads. Each of our interurban lines is about the same length—namely, 15 miles—and we make two collections and two registrations. One collection is for the local city, and the other the interurban. We find this is very satisfactory, and it is possible for us to check the road very easily.

E. J. RYAN, Supt.,  
Schenectady Ry. Co.

We use a recording fare register which, in combination with the conductor's day sheet, is entirely satisfactory to us as a means for checking fares.

O. G. POUCH, Supt.,  
Orange Co. Tract. Co., Newburgh, N. Y.

We use recording registers, and fares are classified as 3-cent, 5-cent, 10-cent ticket, etc., and rung up accordingly. The printed slip inside register is taken out when car comes in, and is sent to cashier. It is then checked against the conductor's report of receipts.

GEO. G. MOREHOUSE, Sec.,  
Rochester Ry. Co.

**No. 14.—How do you handle your half fares?**

We have no half-fare rates.

CARLETON BANKER and JULIAN DU BOIS,  
Div. Supts., F. J. & G. R. R.

We do not have any half-fare. Children under eight ride free, and over that pay full fare.

F. J. GERDON, Supt. Trans.,  
Utica & Mohawk Valley Ry. Co.

Interurban rates on this company's lines do not provide for half fares, children being carried free at ages up to eight years.

J. E. STEPHENSON, Pass. & Frt. Agt.,  
International Ry. Co., Buffalo.

We have no half fares, except on Sunday school excursions. Otherwise, we carry children under ten years of age, when accompanied by adults, free; when ten years of age or over, or when unaccompanied by adults, full fare. We find that this works out satisfactorily.

J. H. PARDEE, Gen. Mgr.,  
Rochester & Eastern Rapid Ry.

We have no half fares on our system, except school tickets on the city lines.

E. J. RYAN, Supt.,  
Schenectady Ry. Co.

We sell half-fare tickets on suburban lines and ten school tickets for 25 cents on the city division. The half-fare tickets are sold only from our office, and they are returned by the conductors as whole tickets, and are recorded on the conductor's day sheets as whole tickets. We find that by confining the sale of half-fare tickets to our office, any misuse of them by the public or the employees is avoided.

O. G. POUCH, Supt.,  
Orange Co. Tract. Co., Newburgh, N. Y.

Half-fares, if cash, are rung up as 3-cent fares. If tickets, they are rung up as such.

GEO. G. MOREHOUSE, Sec.,  
Rochester Ry. Co.

**DESPATCHING**

**No. 14 A.—Information is requested relative to good despatching systems on interurban roads.**

We are firmly of the opinion that for a high-speed long-distance interurban electric railroad the only proper method of despatching is the same method that is adopted by the American Railway Association, or, in other words, the "complete" system, as given by the American Railway Association standard code. This class of despatching, by telephone, necessarily has to be modified slightly. The modification that we use is in the form of delivering orders to train crews.

On 44 miles of track, we maintain seven ticket offices and operating stations. At these stations train orders are received and written by the operator. After writing, the operator repeats the order back to the dispatcher, and, if correct, receives an O.K. The completion of the order is made by the conductor of the train reading this same order to the dispatcher over the telephone, and if read correctly, or is written correctly, the dispatcher gives the conductor the completion of the order.

Orders are always written in triplicate. One copy is left at the station, and the conductor takes two copies, giving one to the motorman retaining the other for himself. The motorman then reads his order to the conductor, who is comparing them at the same time, thereby detecting any mistakes which the motorman may make in his reading.

After the conductor sees that the motorman understands his orders, he signals to proceed.

Outside of the regular stations in which operators are maintained, the train crews are always able to obtain orders at any of the sidings, as our road is equipped with telephone jack-boxes at each siding, and each car carries an independent telephone.

In cases where train crews obtain their own orders the motorman of the train becomes the operator, and after he receives the order he writes it and gets the O.K., and it is again completed by the conductor with the same procedure as at the stations.

This method of handling orders, we consider, if anything, a little better than the methods used on the steam railroad by telegraph, for the reason that we are always sure that one of the train crew has obtained the order, and has read it properly.

W. R. W. GRIFFIN, Supt., Rochester & Eastern Rapid Ry.

**No. 15.—What is the proper method of numbering trains?**

East and southbound trains should have even numbers. West and northbound trains should have odd numbers. In a good many cases the class of train can also be denoted by its number.

CARLETON BANKER and JULIAN DU BOIS,  
Div. Supts., F. J. & G. R. R.

Trains should be numbered consecutively, odd numbers being applied to northbound and even numbers to southbound trains. We find this is the simplest and briefest method. When necessary to refer to a train in a train order or otherwise the number indicates the time and direction in which the train is moving.

M. SHEEHAN, Supt. Lockport Div.,  
International Ry. Co., Buffalo.

We are very much in favor of handling all trains numbered even in one direction and odd in the other. Train numbers end with the end of the trip in the stated direction. In fact, we follow the universal steam railroad practice in this matter.

W. R. W. GRIFFIN, Supt., Rochester & Eastern Rapid Ry.

Odd numbers west bond; even numbers east bond.

O. G. POUCH, Supt.,  
Orange Co. Tract. Co., Newburgh, N. Y.

All our interurban lines are double-track lines, and we do not have any system of numbering trains.

E. J. RYAN, Supt.,  
Schenectady Ry. Co.

This is a matter of opinion. We believe in carrying in plain sight, on the front end of each train, the train number corresponding with the number indicated on time table.

R. E. DANFORTH, Gen. Mgr., Rochester Ry. Co.

**No. 16.—What is the best method of keeping records of orders given in order to insure accuracy?**

All orders given should be written in full in a book provided for that purpose at the superintendent's office, showing the time the order was issued, to whom it was issued and the despatcher's initials.

CARLETON BANKER and JULIAN DU BOIS,  
Div. Supts., F. J. & G. R. R.

The despatcher telephones the order to the sub-station attendant, who repeats the message back to the despatcher. The sub-station attendant then sends a copy to the train crew, keeps a copy himself and forwards a copy to the superintendent.

F. J. GERDON, Supt. Trans.,  
Utica & Mohawk Valley Ry. Co.

Train orders should be numbered consecutively for each day as issued, beginning with No. 1 at midnight. They should be addressed to those who are to execute them, naming the place at which each is to receive his copy. Each order must be addressed in full in a book provided for the purpose at the train despatcher's office, and with it must be recorded the names of trainmen and others who have signed for the order, showing the time, also from what offices the responses were transmitted, and the train despatcher's initials. These records should be made at once on the original copy, and not afterwards from memory. We find this method of recording train orders simple and accurate.

M. SHEEHAN, Supt. Lockport Div.,  
International Ry. Co., Buffalo.

By entering orders in a despatcher's record book having permanent numbered pages with spaces, giving the order, time of O.K. and completion, together with the initials of the operator and the conductor of the train. The despatcher's book is practically the same as those used on steam roads.

W. R. W. GRIFFIN, Supt., Rochester & Eastern Rapid Ry.

We issue no train orders on our road covering the movements of cars, and as yet have failed to find where it is practical. A report of orders should be given in duplicate, and the signatures of all employees concerned should be taken.

E. J. RYAN, Supt., Schenectady Ry. Co.

Orders should be written by conductor in triplicates, one for the conductor, one for the motorman and one for the superintendent or despatcher. These should be checked over with train sheet.

O. G. POUCH, Supt.,  
Orange Co. Tract. Co., Newburgh, N. Y.

Despatching orders should be made in manifold, last copy being retained in the despatcher's office.

R. E. DANFORTH, Gen. Mgr.,  
Rochester Ry. Co.

**No. 17.—What special precautions do you take to insure that employees understand the orders and carry them out properly?**

The agent taking the order after getting "Complete" from the despatcher, reads the same to the conductor, who signs for it on the regular order blank. The conductor reads the order to his motorman, who places it in a clip before him until executed, superseded or annulled.

CARLETON BANKER and JULIAN DU BOIS,  
Div. Supts., F. J. & G. R. R.

Train men receiving train orders should read them aloud to the operator. When telephone is used by trainmen the conductor should receive the order and motorman repeat it back from copy made by conductor. In case the order is not understood by trainmen, they must get an explanation from train despatcher, and must not proceed until it is fully understood. Train despatchers should report persons failing to carry out train orders properly.

We see that our men are well drilled in train rules and understand train orders before allowing them to take charge of a train, and by strictly carrying out precautions as outlined it insures employees understanding train orders and carrying them out properly.

M. SHEEHAN, Supt. Lockport Div.,  
International Ry. Co., Buffalo.

By having the conductor of the train repeat the order to the despatcher over the telephone, as made out by the operator, and thereby getting the completion of the order. In other words, we never allow an order that alters the movement of trains from the regular time table schedule to be completed except by the conductor. This assures us that at least one of the train crew thoroughly understands the order before it is acted upon. After

the order is completed by the conductor, one copy is given to the motorman, who has also to read the same aloud to the conductor. We consider that by handling the orders in this way we are sure of our trainmen properly understanding them. We also have a rule by which our men are instructed that in case any one of the three men involved, namely, the operator, motorman or conductor, does not understand the meaning of the order, it is their duty to immediately call the despatcher and have him explain it, instead of any one of the three trying to influence the others.

W. R. W. GRIFFIN, Supt., Rochester & Eastern Rapid Ry.

Despatcher gives order over telephone to conductor; conductor writes order in triplicate and retains one for himself, gives one to motorman, and the other is turned in at office. Motorman then reads order over telephone to despatcher and receives O.K., and proceeds.

O. G. POUCH, Supt.,  
Orange Co. Tract. Co., Newburgh, N. Y.

When train orders are received by the trainmen they are repeated to the despatcher or operator. Trainmen are required to register at each end of the line and at two intermediate stations, in standard steam road register book. Passage of trains is reported by station agents to despatcher.

R. E. DANFORTH, Gen. Mgr., Rochester Ry. Co.

All important orders or notices on this road are given in writing, and bulletins are posted daily. When bulletins are removed from the board they are placed in a file which is always open for the inspection of the trainmen, and no excuse is taken for failure to familiarize themselves with all orders.

E. J. RYAN, Supt.,  
Schenectady Ry. Co.

**No. 18.—Please describe a simple board for despatcher's use, showing location of all trains at all times.**

A despatcher's sheet is preferable to a board.

CARLETON BANKER and JULIAN DU BOIS,  
Div. Supts., F. J. & G. R. R.

Have board made about 2 ft. long by 12 ins. wide, with diagram of switches placed on same. Number switches, and have about three holes in each side of switch. This will allow six cars to pass on switch if necessary. Have plugs with run numbers on same to represent cars. By the movements of these plugs despatcher will be able to follow the movements of cars.

O. G. POUCH, Supt.,  
Orange Co. Tract. Co., Newburgh, N. Y.

A train sheet should be used by train despatcher to record the movement of trains at all times, beginning with a new sheet at midnight. We prefer the train sheet, because we think it makes a more complete record, and is easily filed for future reference. It provides for the explanation of delays or accidents as well as for the movement of trains, and makes a complete record for each day's work.

M. SHEEHAN, Supt. Lockport Div.,  
International Ry. Co., Buffalo.

We use a despatcher's standard sheet, cross-sectioned, with the station and siding numbers on the horizontal line, and train numbers on the vertical lines. All of our stations have operators, and as trains are reported out of such stations, the despatcher checks the actual time in the cross section opposite the station and under that particular train. This is always done at the time that train is reported out of such station, consequently the despatcher always has his trains closely located.

W. R. W. GRIFFIN, Supt.,  
Rochester & Eastern Rapid Ry.

We do not use any despatching system on this road.

E. J. RYAN, Supt., Schenectady Ry. Co.

**SPECIAL REWARDS TO EMPLOYEES**

**No. 19.—Has any system of giving special rewards or prizes to conductors and motormen for meritorious service proven practical and satisfactory? Please give details of the system, and the results secured.**

My experience and information on the subject is against giving any special rewards or prizes to conductors or motormen. Pay them in wages what the earnings of the company will justify. Promote the men to the best runs according to their age in the service.



Have them all render meritorious service if possible, and get rid of men who have no interest in their work. This is the best system in my judgment.

E. G. CONNETTE, V. Pres. & Gen. Mgr.,  
Syracuse Rapid Transit Ry. Co.

We have no system of giving special rewards or prizes to conductors or motormen, and while we have had no experience in this line, we do not approve of such a plan, for the simple reason that a trainman would be inclined to withhold information and not make reports in order to secure rewards.

E. J. RYAN, Supt., Schenectady, Ry. Co.

**SAFETY PRECAUTIONS**

**No. 19 B.**—Please describe some of the **SPECIAL** things you are doing to reduce accidents and to introduce a greater element of safety in the operation of your lines. In other words, describe any means, devices or methods you are using that are in the nature of special safety precautions.

We take particular trouble to instruct our motormen how to stop a runaway car in case the brakes refuse to work or the trolley pole leaves the wire. Our road has a number of bad hills, and in the event of a car getting beyond control, the motorman, after trying all other means for stopping the car, is instructed to go through the following procedure: If the car is running forward down the hill, first throw off the hood switch, thus cutting off the line current. Then throw the reverse lever to the reverse position. Then swing the controller handle to the first multiple notch. With the K-10 controller the effect of this is, of course, to start the two motors bucking each other. In a very short interval of time the stronger motor will overcome the other and the effect will be that the stronger motor will act as a generator, and will tend to drive the other motor, as a motor, in the reverse direction. The tendency will be to reduce the speed of the car at once. It is, of course, evident that it is not possible to stop the car absolutely on a hill by this method, for as soon as the motors cease turning, the car will immediately start forward again, but the effect will be to jerk along down the hill at greatly reduced speed. We have prevented a number of bad accidents to our cars by motormen following out these instructions, and we have sometimes wondered why this rule for stopping a car has not been included in the rule books of more companies. If the car happens to be running backward down the hill, the same motions should be carried out, with the exception that it is not necessary to throw the reverse lever.

B. B. NOSTRAND, JR., Pres. & Gen. Mgr.,  
Peekskill Lighting & R. R. Co.

**MECHANICAL**

**FIRE PROOFING CARS**

**No. 20.**—What can the master mechanic of the average surface road do to prevent fires on cars, and to render his cars more nearly fireproof?

Steel cars are used on the New York subway and on the Long Island Railroad electrified lines, and are to be employed on the New York Central for electric service. These cars, of which the writer is the originator, have demonstrated not only that an all-metal car can be built at a moderate cost, but that the cars can be made as light as a well constructed wooden car, and much stronger than the latter.

The wooden cars used on the subway are also from the writer's designs, and have a steel underframe and special protection in the way of asbestos board and sheet steel underneath, so that in case of a derangement of the electrical apparatus fire will not be readily communicated to the woodwork of the car. The outside of these cars has a copper-covered wood sheathing, thus forming a slow-burning construction. In ordinary service, and except in case of derailment or collision, it is difficult to see how danger can arise from fires by electrical causes. In case of derailment or collision, which would break up the structure of the car, I see no method of absolutely avoiding fires except by making the car entirely of metal, and this latter form of construction, I believe, will come into universal use for electric motor cars, especially where the attendant results of fires are serious, as they are in congested city transportation lines, in tunnels or on an elevated road.

In the case of the ordinary street trolley car, where the speeds are slow, and where the car can be readily stopped, the situation is somewhat different, because the means of escape from a burning car are so much greater. For this service steel underframes and forms of asbestos and other fireproof floor construction can doubtless be devised which will be a very efficient protection against fire in the electrical apparatus underneath the car. There is, however, in my mind, no valid reason why the all-metal construction cannot be applied to street cars as well as elevated and tunnel cars, and I think that the use of metal for this service will be a development of the

very near future, and I also believe that the development will be found a paying one from an operating standpoint, as it will make a stronger construction and one from which there is less hazard from fire, either on the road or in the car house, than where wood is employed to any extent.

GEORGE GIBBS, Consulting Eng.,  
Pennsylvania, New York & Long Island R. R. Co.

Cover the motor leads with wire-wound hose well taped at the ends, and this will probably remove two-thirds of the trouble. For the rest hang the resistance from the supporting frame work, which frame work is bolted to the car framing. This gives ample ventilation and no possibility for leakage. Keep cables well painted.

W. J. HARVIE, Elec. Eng.,  
Utica & Mohawk Valley Ry. Co.

In installing electrical equipment and wiring cars, follow as closely as local conditions will permit the car-wiring specifications as drawn up by the Underwriters' Electrical Bureau. Make and enforce a rule that all trolley poles be pulled down when cars are housed in car houses and storage yards.

J. A. HANF, Gen. Foreman Shops,  
International Ry. Co., Buffalo.

The master mechanic can do a great deal towards preventing fire on cars. In the first place, all cables should be carried in iron pipe, and at the end of the pipes, where the cable leaves the pipe, the pipe should be provided with a bell mouth, and the bell mouth should be furnished with a bushing so as prevent chafing of the insulation on electric cable. Too little attention has been paid in the past to taking care of chafing of insulation. The use of transite or any other fire-proof material over the rheostats will also do a great deal towards preventing fires in cars. The Schenectady Railway Company has adopted the following standard: All new cars have the under-flooring lined with transite and afterwards with sheet iron, and it has been found that on cars taken care of in this way very little damage was done in case of a bad burnout.

J. G. BAUKAT, Master Mechanic,  
Schenectady Ry. Co.

Run the cables through asbestos or transite line troughs, and lead wires on porcelain knobs and tubes. Also line floor of car around resistance with protective material.

F. P. MAIZE, Master Mechanic,  
Rochester Ry. Co.

**BEARING LUBRICATION**

**No. 21.**—State experience with use of oil instead of grease for lubricating motor and axle bearings.

We use oil on all motors of 40 hp or over, on the armature bearings only, and grease for the axle bearings. On single-truck equipment we use grease exclusively.

W. J. HARVIE, Elec. Eng.,  
Utica & Mohawk Valley Ry. Co.

Our experience with oil is still in an experimental state, therefore is limited to too short a period to give comparative costs. We have been using oil long enough, however, to convince us that a good oil is the proper lubricant.

J. A. HANF, Gen. Foreman Shops,  
International Ry. Co., Buffalo.

We use oil for both motor and axle bearings, with good results, and have effected a considerable reduction in cost of lubrication by the use of same. We also get a longer life out of bearings, and the danger of armatures getting down on pole pieces, by reason of bearings melting out, has been greatly lessened.

W. H. COLLINS, Master Mechanic,  
F. J. & G. Ry. Co.

We find that we get double the mileage with oil, and less wear on the armature shaft.

F. P. MAIZE, Master Mechanic,  
Rochester Ry. Co.

Oil lubrication is far better and cleaner and involves less labor than grease. It is not necessary to take a stick and prod down the oil as you have to do with grease, nor do you have so much grit and dust mixed with the oil when the cups are refilled as you do with grease. Oil lubrication is 5 per cent cheaper than grease, considering the saving in wear and labor. Of course, the condition of the weather influences the amount of oil used. During the season when the nights are cool the amount of oil necessary will be less, but when the weather is warm the amount of oil used will be greater. Our double-truck cars lubricated with a standard oil compound make on the average 195 miles a day and use one pint of oil.

HOMER TICE, Master Mechanic,  
Poughkeepsie City & Wappingers Falls Elec. Ry. Co.

## LONDON LETTER

(From Our Regular Correspondent.)

The result of the year's working of the London County Council's electric tramways on the southern side of the river makes more satisfactory reading this year, when compared with the results for 1903-1904. The total surplus amounts to £182,269, which, after deducting the usual interest and sinking fund charges, income tax, etc., and after transferring £35,000 to renewals fund, leaves a surplus of £7054 appropriation account. In 1903-04 it will be remembered that there was a deficiency of £8283, when nothing was set aside for renewals, but in that year a large amount of construction work was being done, and the full value of the tramways service was not received. The amount this year is not by any means entirely satisfactory, but it shows a great improvement on last year, and the figures for operating expenses are not yet as low as they probably will be. The operating expenses this year work out at the figure of 8.03d. per car-mile run, which is, of course, too high a figure for a large installation like that of the London County Council, but it must be understood that it has not yet got its own power house in working order, so the cost of current is still considerably too high. When the new Greenwich power house is in working order it is confidently expected that this figure will be reduced to the vicinity of 7d. per car-mile run. The number of passengers and the number of car-miles run are both increased, the number of passengers being 164,000,000, and the number of car-miles run 14,000,000. Both of these figures, however, include the results of a small portion of horse car service which still exists in the south of London. On the leased northern lines which are still run by horse cars, a profit of £22,836 was realized after meeting all charges, but nothing has been put aside for renewals, as this system will doubtless at an early date be changed over to electricity. The Highways Committee are also recommending the construction of a number of new tramways. One from Camberwell Green via Denmark Hill to the Junction of Lordship Lane and Crystal Palace Road; the second from the terminus in Lordship Lane to Forest Hill; the third from Grove Vale by East Dulwich and Peckham Rye to Peckham; the fourth from existing tramways in New Cross Road by way of Lewisham to Rushey Green, and the fifth a line extending from Greenwich to a pont near Blackwall Tunnel. The total length of these tramways is about 17 miles, and the cost is estimated to be about £287,150.

In connection with the London County Council Tramways, reference was made last month to the effort which the Council was making to get the sanction of Parliament to construct tramways across Westminster and Blackfriars Bridges and along the Embankment. So far as the House of Commons is concerned, the bill has now been returned for the third reading, after a hard fight. It is, therefore, very probable now that the electric tramways of the southern system will be carried across both of these bridges, and also along the Embankment, but Parliament has not permitted the London County Council to make any actual contract connecting the proposed Embankment Tramways with the new system of tramways which is intended to run down through the underground tunnel extending from Holborn to the Embankment, and which has been created during the past two years at a very large expense. As will be remembered, this tunnel is of the shallow type, and has been constructed under the new streets called Kings Way and Aldwych, something on the same style as the underground tramways in Boston and Budapest. A petition has also been made that if the tramways are brought across the Blackfriars Bridge, that that bridge will have to be widened, which will also involve a large expenditure, but is an improvement undoubtedly required.

There has been much disappointment about the delay in opening the District Railway and the Metropolitan Railway to electric traction. For some time the power house at Lots Road, Chelsea, has been in complete readiness to deliver power. The whole feeder system and the electrification of the tracks, the sub-stations, and, in fact, the whole electric installation has been in readiness, but the delay has occurred on account of the non-delivery of the rolling stock. For some time past, of course, the Metropolitan Railway Company has been operating some electric trains from the Baker Street Station outwards, but no electric trains have yet been run on the Inner Circle which is the portion of the railway that the public are most interested to see electrified, and which is, of course, completely in tunnel. The District Railway now has some of its electric trains running on one of the outside lines connected with its inner system, and it is understood that the rolling stock for the Inner Circle will now be delivered in a very short time, so that it is stated confidently that some time in July the steam trains on the Inner Circle will be displaced by these new electric trains. The Metropolitan Company has really been ahead of the District Railway Company, as it has been fully ready to commence its portion of

the work since about the beginning of this year. It is hoped, therefore, that before the great heat of the summer comes on that all of the steam trains will have disappeared, and that the cooler and much more pleasant service of electric trains will have become operated.

In the May 6 issue, an interesting description was published of the power house which has recently been completed in Manchester, and which is known as the Stuart Street Station. Unfortunately, a printer's error was made in regard to the insulation of the cables which was given in millimeters instead of mils. We also regret that we stated in that article that Mr. G. F. Metzger, who designed the whole station, and who was responsible for the whole of the work of that station, was still the city electrical engineer of Manchester. This is, of course, an error, as Mr. Metzger resigned his position as city electrical engineer something like a year ago, and is now in consulting business with an office at 3 York Street, Manchester. We regret having made these errors, and take this early opportunity of making the necessary correction.

References have been made recently in these columns to the tremendous battle which has been going on before Lord Camperdown's Committee in the House of Lords between the sponsors of the various electric power bills which have been brought before that committee. It will be remembered that the most important of these bills was that of the Administrative County of London and District Electric Power Company, a new company which desired very comprehensive powers for the whole district of London. The company desired to supply electricity in bulk to the whole of the northern area, and naturally was opposed by all the existing companies who already have rights in London, and by the municipalities who are supplying current in their own areas. The committee has come to a very prompt decision, and the result has been a compromise, the administrative county bill having been passed with certain important modifications, so as to safeguard the interests of the existing companies. The area of this company which overlapped the Metropolitan Company's area has been struck out. The North Metropolitan electric power bill and a portion of the County of London Company's bill and the Central Electric Company's bill have been passed, but the bills of the Charing Cross Company and the City of London Company have been rejected.

A rather interesting experiment is being made at present by the Lancashire & Yorkshire Railway on its electric railway from Manchester to Southport. This is, as everyone now knows, a third-rail system, and the experiment of their engineers is to find out if a special ballast between the rails will assist in improving the insulation of the third rail, and prevent possible leakage and also accident to any one coming in contact with the live rail. A small portion of the line just outside Southport Station, therefore, has been ballasted with a special white limestone ballast at a portion of the line where there are some specially complicated points and crossings. All broken stone ballast is of a much more non-conducting nature than cinder or ash ballast, which contains a large percentage of carbon. This white limestone ballast, however, is even a poorer conductor than the ordinary ballast used for railways, and good results have so far been secured.

The Electric Lighting, Traction and Tramway Committee of the Batley Corporation has decided to accept the tender of Dick, Kerr & Company for the laying of the track and the erection of the standards and overhead wires. The paving will be done by the corporation. Dick, Kerr & Company have now obtained the contracts for the laying of the whole of the double set of rails from Dewsbury market place to Birkenshaw, and it is expected that the work will be commenced almost forthwith. Electric cars will be running on some part of the route, it is confidently predicted, by the end of August at the latest.

The Folkestone Corporation has now under consideration the offers of two companies to construct tramways from the harbor through Cheriton to Shorncliffe Camp and Hythe. The Traction & Powers Securities Company proposes to put down the overhead system, and the National Electric Construction Company specifies the Dolter surface contact plan. Each company offers to pay the Town Council £15,000 towards the expense which it has incurred in widening Cheriton road, and £1,200 to reimburse the corporation in regard to the cost incurred in securing a provisional order to construct its own tramways. Under that order there is an agreement with the Earl of Radnor not to adopt the trolley system, and his Lordship has refused to waive his objection.

The Town Clerk has reported to the Streets and Buildings Committee of the York Corporation that he has received a letter from the Tramways Committee asking the municipal body to consent to the company working the trams by electricity, and grant them the privilege of extending the system. The committee, after considering the matter, have decided to inform the company that

it is their intention to recommend the Council to purchase the tramways at the expiration of the next septennial period.

A substantial commencement has at length been made with the work of extension of the tramways from the terminus on the eastern side of the Bournemouth system to Christchurch, via Southbourne. The contractors are J. G. White & Company, of London, who carried out the Bournemouth borough tramways scheme. It is hoped to have the line as far as Tuckton Bridge completed by August.

The Birmingham Corporation Tramways Committee, in its report to the City Council, states that under the terms of the agreement with the City of Birmingham Tramways Company the latter has informed the committee that the order in which it desires the reconstruction of the under-mentioned tramways under lease to it to be proceeded with is as follows: 1, Saltley and Nechell's route; 2, King's Heath route; 3, Moseley Road route; 4, Stratford Road route. Specifications for the necessary materials and the works of reconstruction having been prepared by the city surveyor and tramways manager, tenders for the same were invited, and the following have been accepted: 1650 tons of tram rails, with the necessary number of fishplates, Bolckow, Vaughan & Company, of Middlesbrough, £5 10s. per ton; special tramway work, Hadfield's Steel Foundry Company, Sheffield, £1,703 10s.; for the work of reconstructing the permanent way on the above mentioned routes, Dick, Kerr & Company, of Preston, £42,261 15s. 1d. (this amount is exclusive of the cost of paving the sides of the roads, which will be carried out by the same firm at the same time for the Public Works Committee; it is also exclusive of the cost of the overhead electrical equipment). The work of reconstruction will commence shortly, and it is hoped will be completed by the end of October. The committee have accepted the lowest competitive tender, that of Dick, Kerr & Company, for 200 electric cars, including provision of spare parts and contingencies, of £110,411 12s.

At Aberdeen Town Council recently a protracted discussion arose over the management of the Corporation electric tramways. David Moonie, the present superintendent, is to retire on an allowance of £110 a year. Two proposals were made for the future management of the tramways—one being that J. A. Bell, city electrical engineer, should have entire control of the system, and the other that J. D. Caird, the present acting superintendent, should be appointed manager. In the end the Council, by a large majority, remitted to the Tramways Committee to define the duties of the manager and fix the salary, with a view to advertising the vacancy.

The latest addition to the network of council-owned electric tramways rapidly covering suburban Essex was recently inaugurated when eleven miles of the Walthamstow system were declared open by C. J. Wilkes. This is the first electric tramway to enter Epping Forest, through which it runs for two miles. Inter-communication is also now opened up between Walthamstow, Leyton, Chingford, Woodford, and Tottenham, and the Great Eastern Railway is to be asked to issue through tickets from Liverpool street to the portions of the forest lying around Walthamstow and Woodford, available at the forest end of the journey on the council's trams.

As showing the trend of railway companies to keep the local traffic in outlying lines in their own hands, and to enable them at a moderate cost to give a frequent and economical service, hitherto unobtainable by regular train service, the following orders which have recently been placed will be found interesting.

The directors of the London, Brighton & South Coast Railway Company have recently placed a contract with Beyer, Peacock & Company, Limited, of the Gorton Foundry, Manchester, for two steam motor cars, to be run this summer between Hastings and Eastbourne, of somewhat similar design to those the Gorton firm has just completed for the North Staffordshire Railway Company. The same company has ordered from Dick, Kerr & Company, of Preston, Lancs., two petrol-driven motor vehicles, which will be of similar type to those recently put on the G. N. R.'s Hatfield-Hertford branch line. The Great Northern is also to start a motor car service on its St. Alban's Hertford section, and has ordered two steam motor cars from Messrs. Kitson & Company, of Leeds, two from Kerr, Stuart & Company, Limited, of Stoke-on-Trent, and two from the Avonside Engine Company, of Bristol. These vehicles are to be fitted with locomotive type boilers and will have a seating accommodation for 50 passengers.

It is proposed to promote in the next session of Parliament a bill asking for powers to construct the South Manchester Electric Railway to connect the outer Cheshire suburbs and the city of Manchester. The proposed railway will be an express suburban cross-country "belt line" of standard gage and constructed as a light railway, the main line being about 16 1-2 miles long,

and the branches bringing the total mileage up to about 26 miles. The line is intended for both passenger and goods traffic, and will transversely intersect and connect all the existing southern trunk lines from Manchester to London. It will commence from a proposed new centrally situated terminal station on the southern outskirts of the city, thence running out about seven miles south-westwards direct into Cheshire, and thence through the outer belt of North Cheshire suburban residential districts, at an average radius of nine miles from the Manchester Town Hall, and terminating at a proposed new station at Hazel Grove, adjacent to the Stockport Corporation tramways terminus, and to the Midland Railway Company's new main line station. A. C. S.

### COOLED AIR FOR THE NEW YORK SUBWAY

Refrigerating plants and forced-air apparatus are to be installed in the subway to cool the air and improve the ventilation. This was announced by Controller Grout, on June 22, after the Rapid Transit Commission had discussed various ventilation plans. Tests are to be made as soon as possible at two or three of the stations, and then, if the apparatus proves efficient, the entire subway will be equipped with the plants. Chief Engineer Rice was instructed to install some device "at once," and later it was determined to make the first test with refrigeration and forced air, the impression of the engineers and of the commissioners being that the air in the subway was pure enough, but that it needed cooling.

The subject of subway air came before the commissioners when the secretary read a letter from Dr. Darlington, health commissioner, requesting the Rapid Transit Commission to consult with his department before taking any steps toward the ventilation of the subway, and also submitting to him any and all plans for the ventilation of future subways. Controller Grout immediately announced that action should be taken at once to improve the condition of the subway air, and on his motion the resolution was passed instructing the chief engineer to act. Commissioner Smith wanted to have a fan system installed in the tunnel on the ground that even if this did not cool the air it would make the people believe it was cooler, and would look cooler. Commissioner Starin wanted a partition between the north and south bound tracks so that the suction in each section of the tunnel would be entirely in one direction. Chief Engineer Rice said that this was not feasible.

Mr. Rice said he already had engaged George A. Soper, a bacteriologist, to make a scientific investigation of the subway to ascertain just what the defects are. Mr. Rice will seek to have drip pans installed on cars so as to catch the surplus oils.

### INDIANA SANITARY RULES ADOPTED

At a conference held between the Indiana State Board of Health and representatives of the interurban and street railway companies, rules were agreed upon governing the sanitation of interurban and city trolley cars. The board had drawn up a system of proposed rules as published in the STREET RAILWAY JOURNAL of June 17, and these were discussed, modified to some extent and adopted. The rules provide for a thorough cleaning and scrubbing of the cars, and disinfecting the same. Similar, if not more stringent, rules were adopted for steam cars. The following interurban men were present at the conference: A. A. Anderson, general superintendent of the Indianapolis & Cincinnati Traction Company; W. G. Irwin, Indianapolis, president and general manager of the Columbus & Southern Traction Company line; H. A. Nicholl, general manager of the Union Traction Company, and L. M. Clark, master mechanic of the Indianapolis & Northwestern Traction Company.

### TWELVE HUNDRED MILES BY TROLLEY

Robert H. Derrah, the originator of the Boston-New York trolley trip, and the general passenger agent of the Massachusetts Electric Companies, is the author of "Twelve Hundred Miles by Trolley," a small booklet distributed through the Metropolitan News Company, of Boston. Mr. Derrah has crowded into the 64 pages of text all the information that the most exacting traveler by trolley could desire about the historical places, seashore resorts, rivers, valleys, lakes and picturesque suburban scenery of Eastern Massachusetts. The traveler by trolley in New England would do well to call upon Mr. Derrah at his office at 309 Washington Street, Boston. Here he will find a corps of assistants at his service, and may be benefited by suggestions which they may make. It is a base from which to plan the most strategic operations. In any event, Mr. Derrah's guide will prove of great assistance and should be included as a part of one's equipment. The price is 10 cents a copy.

## CHICAGO TRACTION MATTERS

The traction companies of Chicago, through their attorneys, met the local transportation committee and Mayor Dunne last week, and presented a proposition by which the city could acquire the street railways for municipal ownership. The following is an outline of the plan proposed:

1. That steps be taken in the immediate future for a thorough rehabilitation of the properties, so that the service shall be of the best, all at the expense of the owners.

2. That such work be done upon plans to be agreed upon with the city and subject to the approval of the city's experts.

3. That the city shall have immediate representation upon the board of directors or otherwise provide for co-operation between the city and the companies to the common end.

4. That an ordinance be passed and accepted and submitted to popular vote providing that at the end of the period required for rehabilitation the city shall have the right to acquire the properties so rehabilitated, upon the following terms:

(a) The amount hereafter expended upon the properties under the city's supervision.

(b) The value of the present tangible properties to be determined by arbitration either now or later.

(c) The arbitrated value of such franchise rights as the courts of last resort may determine the owners are entitled to. Upon the legal questions being finally determined the arbitrators to decide the values, based upon such decision. If desired, a number of names of men of high standing, well-known integrity and of experience, from whom such arbitrators shall be selected, to be agreed upon in advance.

5. Payment for the properties to be made in Mueller certificates, their validity being sustained in the interim by the Supreme Court, with such provisions in connection with the same as to render them a reasonably safe security.

6. If an understanding can be reached on the foregoing, the city to join in arguing a speedy hearing at Washington of the question of franchise rights; to make no fresh attacks upon the properties in the meantime, but to co-operate in bringing about at the earliest practicable moment the best of service for the public.

The Chicago City Railway Company suggested the following as a method of arriving at a settlement of the value of the property:

1. The value of its tangible property to be determined, if possible, by agreement; if not, the same to be determined by appraisers agreed upon prior to the passing of the ordinance for the purchase of the property.

2. Value of the rights of the company in the streets to be determined by appraisement immediately after the final determination of the suits now pending in relation to said rights; the appraisers to be agreed upon prior to the passage of the ordinance for the purchase of the property.

3. Plans to be prepared at once, under the joint supervision of the city and the company, for the rehabilitation of the railway property; also draft of mortgage to secure Mueller certificates; and ordinance, prescribing the terms upon which company shall operate until purchase by city is completed, shall be prepared. Upon value of company's property being ascertained, as above provided, city to purchase and pay for the same at the value thereof as so ascertained, either in cash or in Mueller certificates (provided the validity of said certificates shall have been sustained by the Supreme Court of Illinois), unless the city shall elect to have the property rehabilitated before purchase.

4. When the validity of the Mueller certificates shall have been sustained by the Supreme Court of Illinois, and plans for the rehabilitation of the railway property shall have been agreed upon between the company and the city, such rehabilitation shall, if the city shall so elect, be proceeded with at once under the supervision and control of the city, at the expense of the company, but such rehabilitation of the property shall not be proceeded with until an ordinance providing for the issuance of Mueller certificates to pay for the company's property shall have been submitted to a vote, and been ratified by such a vote, as required by law.

In the event of the rehabilitation of the property at the expense of the company, the cost thereof shall be added to the purchase price of the property, and the city shall complete its purchase when the property shall have been rehabilitated.

In the event of the rehabilitation of the property before purchase by the city, such rehabilitation may be made either by the company or its nominee or assigns, the company guaranteeing the performance thereof.

Mayor Dunne objects to the plans proposed. He said at the conference:

"My objections to the plan proposed by the traction companies are two: First, that it provides for the settlement of the alleged rights under the ninety-nine-year act in the Federal courts at Washington as the tribunal of last resort. I am of the opinion that the State courts are the courts of proper jurisdiction in the determination of these rights.

"Second, I am opposed to the proposition submitted by the traction companies because it provides for the arbitration of the so-called ninety-nine-year franchise at some time in the dim and distant future, thus leaving the value of the property to be acquired by the people of this city uncertain and undetermined, while in the meantime the city will be locked up by a contract with these companies under which they would have the right to occupy our streets without the people being informed as to what they would eventually have to pay for the property.

"My proposition for the determination of the value of these

unexpired franchises is to settle the value of these franchises by agreement now as follows: First, upon the assumption that the city's contention in reference to the ninety-nine-year act is correct; second, upon the assumption that the companies' contention is correct as to their right; third, upon the assumption that Judge Grosscup rightly and properly decided the ninety-nine-year question.

"If the companies would agree to three prices in the alternative, and the three prices were fair, just and reasonable, it might be possible to arrive at some conclusion. Otherwise, I am not in favor of accepting the proposition in its present condition, providing, as it does, for the determination of the value of the ninety-nine-year franchises in the distant future."

Negotiations appear to be off between the city and companies. Mayor Dunne's "immediate municipal ownership" plank upon which he was elected last April, appears to be about as much of a dream as those who were familiar with the Chicago traction situation knew it to be at that time. In the meantime the Mayor is going ahead with plans to build 100 miles of municipal street railway on streets where franchises have or soon will expire.

## THE PHILADELPHIA AND WESTERN

Recent developments indicate that the Pennsylvania Railroad is financially interested in the Philadelphia & Western Railway, the third-rail electric line being built from Sixty-Third and Market Streets to Wayne. It is said that this line is to be a part of a general plan devised by the Pennsylvania Railroad for the relief of its increasing suburban traffic along the main line, and to provide a right of way for the completion of the low-grade freight line which it is proposed to extend into West Philadelphia. It is possible that the ownership of the electric line may eventually pass into the hands of the Pennsylvania. Much secrecy has been maintained by President Van Brunt and General Manager Bramlette, of the Philadelphia & Western, as to their plans. Contracts for the construction of the line have been awarded to the Southern Construction Company.

## STEAM TURBINE EQUIPMENT FOR RAILWAY SERVICE

An important contract for a 10,000-hp power house equipment has just been awarded to the Westinghouse Companies, Pittsburg, Pa., by the Fort Wayne & Wabash Valley Traction Company, of Fort Wayne, Ind. The entire electrical equipment, comprising both three-phase and two-phase apparatus, the former for railway, and the latter for lighting service, will be built by the Westinghouse Electric & Manufacturing Company, and the steam turbines by the Westinghouse Machine Company.

The principal apparatus covered by the contract comprises two 1500-kw and one 400-kw turbo-generator units, delivering 375 volts, three-phase, 25-cycle current to rotary converters, and two 1500-kw and one 500-kw turbo units, delivering 2300 volts, two-phase, 60-cycle current to step-up transformers for the lighting system; four rotary converters; seven 375 kw, fifteen 75-kw, six 100 kw, and three 150-kw oil-insulated self-cooling transformers; four switchboards for 125, 550, 600 and 2300 volts, and low equivalent lightning arresters, choke coils and disconnecting switches are included in the equipment. The steam turbine equipment is to be of the standard Westinghouse-Parsons type, operating under 150 lbs. steam pressure. Many distinctive features will be embodied in the arrangement of the new power house now building.

## TWO HUNDRED CARS FOR BALTIMORE

The J. G. Brill Company has just received an order for 200 semi-convertible cars from the Baltimore United Railways, of Baltimore, Md. The order calls for 160 cars to be mounted on the builders' No. 27-GE-1 truck, which is a short base double truck with solid forged side frames, and 40 cars to be mounted on the builders' high-speed, No. 27-E-1, which also has solid forged side frames. The cars are all to be 30 ft. 8 ins. over the bodies, and will have 5-ft. platforms. The 160 cars mounted on the short-base trucks are for city service and will have portable vestibules, and the 40 mounted on the high-speed trucks will have stationary vestibules, and will be run on a division extending for some distance out of the city. The semi-convertible window system will include the recent improvement which eliminates the sash trunnions and runways formerly used, and simplifies the method of connecting each pair of sashes. The general plan of the lower sash carrying the upper into pockets in the side roofs is preserved. The arrangement has come to be known as the "grooveless post semi-convertible." The decks are to be the standard monitor type, and the seating plan consists of transverse seats with reversible backs and longitudinal corner seats accommodating four passengers each.

**THE YARDVILLE CROSSING LITIGATION**

The Trenton Street Railway Company has received another setback in the famous Yardville crossing case, in which the Court of Errors and Appeals reverses the decision of the Court of Chancery, by the terms of which the Trenton Street Railway, or its subsidiary company, the Mercer County Traction Company, was permitted to cross the Pennsylvania Railroad tracks at Yardville, 5 miles southeast of Trenton, N. J., at grade. The court's opinion is to the effect that the ordinance passed by the Hamilton Township authorities for the benefit of the Mercer County Traction Company, was void because the proper number of consents had not been secured from the property owners fronting upon the public highway, alongside of which the track is built.

The case has been before the courts of the State five years or more. First of all, the Trenton Street Railway Company extended its Broad Street Park line to White Horse and Yardville, building the road also on the south side of the Pennsylvania Railroad at Yardville to Crosswicks, pending the settlement of a crossing of the Pennsylvania tracks. No agreement being reached, the street railway company sought the courts to have the method of crossing determined, and the Pennsylvania company went into the fight with a vim. After carrying the case through all the courts it was decided that the Trenton Street Railway had no legal existence at Yardville, because the extension from Broad Street Park was an extension of a short extension which had no legal existence, since one of the formed companies operating the line had failed to accept the ordinance, although building a small piece of track under its provisions.

With this first decision from the highest court was an injunction restraining the Trenton Street Railway Company from operating any part of the line beyond Broad Street Park.

The Trenton Street Railway immediately transferred its Broad Street Park-Yardville line to the Mercer County Traction Company, and that company sought a crossing at Yardville. After long delays in the courts and a wandering through small technicalities, it was first decided that this road could have no legal existence, because the Trenton Street Railway already operated a line over the route chosen, but this was practically disproved, and it was then held that the road was not legal because it had no franchise. In the last decision handed down in the Court of Chancery, Vice-Chancellor Reed held that the new franchise granted by Hamilton Township was legal because, technically, no street railway existed over the route covered by the ordinance. He also held that the consents given by the property owners were legal, although given prior to the time the Mercer County Traction Company filed with the Secretary of State a map of its proposed route. On this latter point the Court of Errors differs with him, although agreeing with him in the first instance, as to the legal existence of the Trenton Street Railway tracks.

The various decisions emphasize the necessity of watching the small technicalities of the street railway laws in New Jersey, and conforming to them in every particular, so that when a legal battle is fought with a steam railroad company it may be upon equal grounds. Not a single thing has been brought to show that the street railway is not wanted or needed at Yardville, nor that the crossing would be dangerous.

**PERSONAL MENTION**

MR. LEVERETT M. CLARK, prominently connected with the engineering department of the Indianapolis Traction & Terminal Company, of Indianapolis, was married in Willimantic, Conn., on Wednesday, June 21, to Miss May A. Murphy, of the latter city. Mr. and Mrs. Clark will spend a few days in Boston, after which they will locate permanently in Indianapolis. Mr. Clark formerly was connected with the Willimantic Traction Company.

MR. ARTHUR W. PRATT has severed his connection with the Public Service Corporation to accept a position with the United Railways & Electric Company of Baltimore. Mr. Pratt has been in the employ of the street railways now operated by the Public Service Corporation for the last fourteen years, having personally superintended the construction of most of the tracks and several of the car houses, besides having been operating superintendent of two of the divisions and of District No. 2.

MR. JAMES H. BRYAN, who has been president and general manager of the Woronoco Street Railway Company for a number of years, has resigned as general manager. Mr. Bryan will remain as president of the company, but feels that his health will not allow him to continue as general manager. He has devoted much time looking after the interests of the road, and his efforts have been greatly appreciated by his fellow-directors. The new manager

elected is Mr. A. D. Robinson, of Pittsfield, formerly of Westfield. Mr. Robinson has been associated with the Berkshire Street Railway Company ever since it was organized, serving as secretary. He had much to do with the construction of the road, and has been active in its management ever since.

MR. CHARLES H. BIGELOW, inspecting engineer in the department of motive power and machinery, of the Boston Elevated Railway Company, has resigned and accepted a position with Stone & Webster, his first duty being to take charge of the installation of a large power plant at Dallas, Tex. Mr. Bigelow has had an extended experience in electrical and mechanical work, both before and after graduating from the Massachusetts Institute of Technology in 1892, having been with the Bell Telephone Company, of Canada, four years before entering the institute. He entered the employ of Stone & Webster after his graduation, and in 1894 entered the employ of the West End Street Railway as superintendent of construction of the East Boston power plant. Mr. Bigelow remained in the employ of the West End and Elevated ever since, holding the positions of inspector of power stations, inspecting engineer and chief mechanical draftsman of the department of motive power and machinery.

MR. EDWARD G. CONNETTE, vice-president and general manager of the Syracuse Rapid Transit Railway Company, has accepted the position of general manager of the Consolidated Street Railroad Company, of Worcester, Mass., the acceptance being contingent upon the board of directors of the Rapid Transit Company releasing him from his contract at Syracuse, which has a year and a half to run. This announcement was made upon Mr. Connette's return to Syracuse June 24, after an inspection of the Worcester lines.



EDWARD G. CONNETTE

Mr. Connette will succeed Mr. Frederick W. Huntress, who recently went to Rio de Janeiro, Brazil, to manage the street railway and electric lighting plant. The Worcester Consolidated Company owns all the trolley lines in that city, and all of the suburban lines running out of the city with the exception of the line to Boston. There are 140 miles of track in the system. Mr. Connette is one of the ablest and most progressive electric railway managers of the country. He appreciates fully that in point of service the interests of the company and the public are mutual. His progressive policy in this respect has greatly added to the prosper-

ity of the Syracuse Rapid Transit Railway Company. During his five years at Syracuse he has improved the service and equipment, and the system has been extended in several directions. Mr. Connette has been very popular with the employees and citizens generally. Three times in the last five years he has raised the wages of the conductors and motormen voluntarily, and there has been no suggestion of labor troubles. Mr. Connette is a former president of the New York State Street Railway Association, and a member of the committee on rules of the American Street Railway Association. He has been connected with the street railway industry for over fifteen years, ten of which were spent in Nashville, Tenn., where he was manager of the Nashville street railway system, and later of the combined railway and lighting properties of that city.

MR. HAROLD ULMER WALLACE has resigned as chief engineer of the Illinois Central Railroad to become third vice-president of J. G. White & Company, and to direct the management of its construction department from the company's main offices in New York. Mr. Wallace graduated from the Chicago Manual Training School in 1892, after which he took a special course in civil engineering at Purdue University. He entered the service of the Illinois Central Railroad in 1894 as assistant engineer, and had charge of the construction work and of new concrete and masonry work. In 1896 he was appointed resident engineer of the Lake Front improvement work at Chicago, which was completed in eight months, and cost \$1,000,000. From 1896 to 1900 he was roadmaster of the Chicago Terminals and the Louisville division. During the two years of his assignment to the Louisville division, its main line was entirely reconstructed. From 1900 to 1902 he was superintendent of the Freeport & Louisville division. Since 1902 Mr. Wallace has been chief engineer of the Illinois Central Railroad, and has had charge of the maintenance of way, bridges and buildings and reconstruction work, including the building and rebuilding of yards, double-tracking and grade reductions. He has also directed the construction of elevators and wharves at New Orleans, and a ten-story office building at Chicago.

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. ‡ Decrease due to strike.

COMPANY	Period	Total Gross Earnings	Operating Expenses	Net Earnings	Deductions From Income	Net Income, Amount Avail-able for Dividends	COMPANY	Period	Total Gross Earnings	Operating Expenses	Net Earnings	Deductions From Income	Net Income, Amount Avail-able for Dividends	
AKRON, O. Northern Ohio Tr. & Light Co	1 m., May '05	78,587	40,792	37,795	22,917	14,878	LONDON, ONT. London St. Ry. Co.	1 m., Apr. '05	13,508	10,510	2,998	2,068	935	
	1 " " '04	74,917	39,614	35,303	22,467	12,836		1 " " '04	12,140	9,518	2,622	2,159	463	
	5 " " '05	340,315	191,077	149,239	114,581	31,655		4 " " '05	52,520	43,692	8,828	8,235	593	
	5 " " '04	316,582	184,987	131,594	112,535	19,059		4 " " '04	44,802	39,768	5,033	8,217	13,183	
AURORA, ILL. Elgin, Aurora & South- ern Tr. Co	1 m., Apr. '05	35,409	20,393	15,016	9,233	5,783	MILWAUKEE, WIS. Milwaukee El. Ry. & Lt. Co.	1 m., May '05	268,334	133,585	135,049	77,089	57,960	
	1 " " '04	33,425	22,011	11,414	9,133	2,280		1 " " '04	281,994	128,331	133,662	74,465	59,197	
	10 " " '05	314,316	215,208	159,107	92,773	66,385		5 " " '05	1,270,836	649,117	621,719	371,708	250,011	
	10 " " '04	378,055	229,589	148,466	91,774	56,692		5 " " '04	1,272,767	672,950	599,817	308,269	231,548	
BINGHAMTON, N. Y. Binghamton Ry. Co.	1 m., May '05	23,277	10,895	12,382	-----	-----	Milwaukee Lt., Ht. & Tr. Co	1 m., May '05	47,398	21,166	26,232	20,435	5,798	
	1 " " '04	21,217	11,197	10,020	-----	-----		5 " " '04	36,484	17,428	19,055	16,430	2,625	
	11 " " '05	234,395	124,900	109,495	-----	-----		5 " " '05	201,661	99,840	101,821	96,311	5,480	
	11 " " '04	216,369	119,513	96,856	-----	-----		5 " " '04	154,504	83,029	66,475	77,077	110,602	
BUFFALO, N. Y. International Tr. Co.	1 m., Apr. '05	330,279	182,105	148,174	135,994	12,180	MINNEAPOLIS, MINN. Twin City R. T. Co.	1 m., Apr. '05	355,213	170,808	184,405	97,325	87,080	
	1 " " '04	312,708	216,218	166,490	132,704	136,214		1 " " '04	337,463	160,803	176,599	72,177	103,822	
	4 " " '05	1,276,511	771,852	504,659	538,821	157,044		4 " " '05	1,389,516	689,169	700,347	389,300	311,047	
	4 " " '04	1,291,447	832,561	476,486	533,530	157,044		4 " " '04	1,325,475	641,464	684,011	-----	-----	
	10 " " '05	3,549,240	1,921,136	1,628,104	1,372,162	235,942		MONTREAL, QUE. Montreal St. Ry. Co.	1 m., May '05	236,399	134,693	101,706	28,749	72,958
	10 " " '04	3,383,812	1,997,338	1,386,474	1,329,975	56,499			1 " " '04	230,154	126,612	93,513	22,641	70,871
CHICAGO, ILL. Aurora, Elgin & Chi- cago Ry. Co.	1 m., Apr. '05	44,149	27,021	17,119	-----	-----	8 " " '05		1,675,791	1,129,927	554,865	169,654	385,211	
	1 " " '04	38,585	20,901	7,685	-----	-----	8 " " '04		1,529,307	1,018,348	510,959	149,076	361,883	
	2 " " '05	79,370	50,527	28,843	-----	-----	OAKLAND, CAL. Oakland Traction Con- solidated		1 m., May '05	134,426	62,185	62,241	32,151	30,090
	2 " " '04	52,967	39,592	13,375	-----	-----			1 " " '04	113,897	53,420	60,477	26,562	33,915
Chicago & Milwaukee Elec. R. R. Co.	1 m., May '05	44,213	20,557	23,655	-----	-----		5 " " '05	567,426	298,391	269,033	-----	-----	
	1 " " '04	34,176	13,773	20,703	-----	-----		5 " " '04	497,783	258,948	238,836	-----	-----	
	5 " " '05	158,756	81,751	77,005	-----	-----	OLEAN, N. Y. Olean St. Ry.	1 m., Apr. '05	10,935	6,487	4,448	2,968	1,480	
	5 " " '04	123,412	57,451	64,962	-----	-----		1 " " '04	7,877	4,841	3,036	2,528	508	
CLEVELAND, O. Cleveland, Painesville & Eastern, R. R. Co.	1 m., May '05	20,681	*11,463	9,218	-----	-----		10 " " '05	94,340	48,079	46,261	6,868	19,393	
	1 " " '04	19,052	*10,597	8,455	-----	-----		10 " " '04	83,917	41,932	41,956	24,596	17,359	
	5 " " '05	75,475	*49,916	25,529	-----	-----	PHILADELPHIA, PA. American Rys. Co.	1 m., May '05	126,914	-----	-----	-----	-----	
	5 " " '04	72,396	*47,420	24,976	-----	-----		1 " " '04	119,829	-----	-----	-----	-----	
Cleveland & Southwest- ern Traction Co.	1 m., May '05	47,028	26,253	20,775	-----	-----		11 " " '05	1,332,660	-----	-----	-----	-----	
	1 " " '04	41,341	25,567	15,874	-----	-----		11 " " '04	1,276,062	-----	-----	-----	-----	
	5 " " '05	188,818	121,963	66,855	-----	-----	ROCHESTER, N. Y. Rochester Ry. Co.	1 m., May '05	146,474	75,550	70,924	27,840	43,084	
	5 " " '04	160,641	119,872	40,749	-----	-----		1 " " '04	123,171	66,943	56,228	26,525	29,703	
DETROIT, MICH. Detroit United Ry.	1 m., May '05	433,734	*251,917	181,817	92,806	89,011		5 " " '05	672,639	371,550	301,109	186,348	164,761	
	1 " " '04	391,473	*230,536	160,937	87,395	73,542		5 " " '04	580,602	338,312	242,290	131,577	110,713	
	5 " " '05	1,884,455	*1,167,493	716,962	460,559	256,403	SAN FRANCISCO, CAL. California Gas & Elec- tric Corporation.	1 m., Apr. '05	442,585	339,650	102,935	49,329	53,606	
	5 " " '04	1,673,971	*1,101,778	569,193	443,369	125,824		1 " " '04	322,969	233,441	89,528	48,958	40,570	
DULUTH, MINN. Duluth St. Ry. Co.	1 m., May '05	54,501	28,832	25,669	16,810	8,859		4 " " '05	1,712,903	1,267,453	445,450	196,980	248,470	
	1 " " '04	52,259	27,885	24,374	16,513	7,861		4 " " '04	1,202,195	840,302	361,893	169,582	172,311	
	5 " " '05	219,216	131,098	110,196	83,752	26,444	SAVANNAH, GA. Savannah Electric Co.	1 m., Apr. '05	46,333	26,521	19,811	10,554	9,257	
	5 " " '04	239,368	142,635	96,673	82,362	14,311		1 " " '04	40,941	26,004	1,937	10,300	4,631	
EAST ST. LOUIS, ILL. East St. Louis & Sub- urban Ry. Co.	1 m., May '05	113,183	56,790	66,393	-----	-----		12 " " '05	557,209	320,882	26,327	127,247	109,080	
	1 " " '04	105,34	55,459	49,675	-----	-----		12 " " '04	528,067	303,224	224,843	121,883	102,960	
	5 " " '05	530,357	237,105	293,222	-----	-----	SEATTLE, WASH. Seattle Electric Co.	1 m., Apr. '05	293,425	144,124	59,301	24,765	34,536	
	5 " " '04	478,108	240,413	237,695	-----	-----		1 " " '04	187,874	131,317	56,557	24,949	31,608	
FINDLAY, O. Toledo, Bowling Green & Southern Tr. Co.	1 m., May '05	25,575	14,050	11,525	6,495	5,030		12 " " '05	2,367,280	1,633,666	733,614	293,948	433,666	
	1 " " '04	23,096	15,996	7,100	-----	-----		12 " " '04	2,197,847	1,538,177	659,671	276,231	383,440	
	FORT WORTH, TEX. Northern Texas Traction Co.	1 m., May '05	57,080	29,766	27,314	11,576	15,787	1 m., Apr. '05	75,743	43,875	31,868	20,450	11,418	
		1 " " '04	50,747	25,116	25,620	12,194	13,426	1 " " '04	69,043	41,223	27,811	20,348	7,469	
5 " " '05		244,732	139,673	105,059	53,770	51,289	10 " " '05	736,200	422,743	313,547	203,292	110,255		
5 " " '04		211,722	121,945	89,777	50,519	39,258	10 " " '04	690,611	406,799	289,812	202,915	86,837		
HANCOCK, MICH. Houghton County St. Ry. Co.	1 m., Apr. '05	12,056	25,985	123,929	3,615	127,544	TAMPA, FLA. Tampa Elec. Co.	1 m., Apr. '05	38,716	20,453	13,263	1,885	11,378	
	1 " " '04	16,919	11,395	5,524	3,446	2,077		1 " " '04	30,484	18,750	17,734	2,093	9,641	
	12 " " '05	173,308	160,148	13,160	41,280	128,120		4 " " '05	128,968	78,370	50,598	7,609	42,089	
	12 " " '04	188,189	129,229	58,963	36,332	22,630		4 " " '04	111,984	65,413	46,571	8,352	38,219	
HOUSTON, TEX. Houston Electric Co.	1 m., Apr. '05	40,377	25,311	15,065	8,713	6,354	TERRE HAUTE, IND. Terre Haute Ir. & Lt. Co.	1 m., Apr. '05	46,761	34,779	11,982	8,744	3,238	
	1 " " '04	32,049	22,078	9,971	7,941	2,030		1 " " '04	42,045	31,576	10,459	9,171	1,281	
	9 " " '05	322,731	207,116	115,621	75,718	39,913		12 " " '05	588,446	374,328	209,217	113,411	96,168	
	9 " " '04	292,239	203,875	88,365	68,922	19,443		12 " " '04	507,456	336,793	170,661	98,622	72,040	
INDIANAPOLIS, IND. Indianapolis & East- ern Ry. Co.	1 m., May '05	19,031	11,750	7,281	5,167	2,114	TOLEDO, O. Toledo Rys. & Lt. Co.	1 m., May '05	154,492	*82,740	71,752	41,894	29,858	
	1 " " '04	17,556	8,789	8,767	4,167	4,600		5 " " '04	142,581	*78,864	63,717	41,862	21,855	
	5 " " '05	83,156	53,889	29,267	21,834	7,433		5 " " '05	732,567	*382,889	349,678	212,043	137,635	
	5 " " '04	75,675	42,637	33,033	20,833	12,205		5 " " '04	677,222	*380,023	297,199	208,706	88,493	
YOUNGSTOWN, O. Youngstown-Sharon Ry. & Lt. Co.	1 m., Apr. '05	43,763	*23,152	20,611	-----	-----	MONTREAL, QUE. Montreal St. Ry. Co.	1 m., Apr. '05	37,602	*22,856	14,746	-----	-----	
	1 " " '04	37,602	*22,856	14,746	-----	-----		1 " " '04	169,547	*95,487	74,060	-----	-----	
	4 " " '05	169,547	*95,487	74,060	-----	-----		4 " " '05	148,233	*92,242	55,990	-----	-----	
	4 " " '04	148,233	*92,242	55,990	-----	-----		4 " " '04	148,233	*92,242	55,990	-----	-----	