Street Railway Journal

VOL. XXVI. NEW YORK, SATURDAY, JULY 8, 1905. No. 2.

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.

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 8000 *copies are printed. Total circulation for* 1905, *to date,* 221,350 *copies, an average of* 8198 *copies per week.*

Request of the Committee on Rules

It will be remembered that at the last convention of the American Street Railway Association the Committee on Standard Rules requested that during the year all companies which had adopted the rules should report to the committee any observations as to their working, and especially any modifications which they had made in the rules. These rules will come up again for discussion at the Philadelphia convention, and it is very important that the committee shall be put into possession of all the information possible in regard to this subject. There is no branch of the work perhaps in which a greater interest is being felt not only by members of the association, but by the boards of railroad commissioners, and it is to be hoped that the request of the committee will receive prompt response.

The Lake George Convention

The success of the Lake George Convention of the New York State Street Railway Association justified the action of the executive committee in changing the date of the meeting from the fall to June. In spite of the short notice given of this radical departure from former precedents, the attendance was large and the greatest interest was taken in the meetings by the delegates present. The convention was essentially a "working" convention, and the sessions on the first day extended practically continuously through both morning and afternoon, and on the second day until adjournment at half-past two. This left but little time for excursions, or even for inspecting the exhibits, but brought out a very full discussion on the papers and question box.

The range of topics discussed was quite large, and the interest taken in them was so active that it is impossible in this issue to publish even an abstract of all of the proceedings. A report is therefore given of the discussion of the first day, notes on the convention, the paper by Mr. Wilson, of Buffalo, on "Types of Cars for City Service," and the remainder of the question box. A report of the proceedings of the meeting on Wednesday will be published in our issue of July 15.

We have taken occasion before to commend the admirable work accomplished by the New York State Street Railway Association, and the convention last week, as well as the work carried on by the association during the past year, are worthy in every respect of the past history of that body. In his devotion to the interests of the association, President Allen, like his predecessors, has made a great many personal sacrifices in the way of time and comfort, and the members of the association owe him a great debt of gratitude for his efforts in behalf of the body, both in connection with the work incident to the Lake George convention and for that accomplished during the year which has just passed. So long as the street railway interests of the Empire State can secure such presidential timber as President Allen and President Danforth, the interests of the association are in safe hands, and it is bound to enjoy an excellent reputation for good work accomplished.

Cars for City and Suburban Service

One of the questions which received serious consideration at the convention was that of the most desirable type of car for city and interurban service, and it was interesting to note the number of advocates of the short car for urban runs. For a long time the tendency has been toward longer cars for all classes of service, until now the use in cities of cars 46 ft. over all is not uncommon. Nevertheless, there seem to be many managers who believe a continuance of the use of the shorter car advisable.

In any discussion on this subject it is desirable first to define clearly the class of service under consideration, that is, whether it is strictly city, suburban, light interurban or heavy interurban, or whether it is a combination of one or more of these classes. We should then determine the effect of the proposed car on traffic, original cost and cost of operation.

City service can properly be divided into (1) that which is practically continuous and where a slight difference in headway does not materially affect the traffic, as on the trunk lines of New York, Chicago, Brooklyn, St. Louis and the largest cities, and (2) that in a smaller city where the cars run at greater distances apart and where the traffic depends to a considerable extent upon the headway of the cars. In the former case the cost of labor is the principal item in the expense of operation, and the proper length of car is practically limited only by that in which one conductor can properly collect all of the fares. In the smaller cities we believe that the other items entering into the proposition demand greater attention, and that they can fairly be divided into the effect of the proposed car on (1) traffic, (2) original cost, (3) maintenance of rolling stock, (4) maintenance of track and special work, (5) labor, and (6) power house expenses per passenger carried.

The discussion at Lake George indicated that the single-truck car is superior to the long double-truck car in counts 1, 2, 3 and 6. There was, it is true, some difference of opinion as to whether a longitudinally-seated car is as popular with the general public as a cross-seated car, but on the shorter headway which the short car would run and with an ample wheel base to prevent oscillation, we believe that there is no serious objection on the part of the short rider to a single truck car. The effect of the different types of cars on track and special work did not come up for discussion at the convention, and we should be very glad to see some testimony on this point, especially as the single-truck car has always been considered to be rather destructive of track. The labor cost is, of course, the chief drawback of the single-truck car, and it is a question for special study in each case whether the additional expense of propelling the long cars during the slack hours is going to be equal to or exceed the expense of the additional labor for the short cars during the rush hours. Theoretically, if it were practicable, the ideal solution in purely city service would be the operation of long, double-truck cars during the rush hours and of short cars during the slack hours. As this is impossible, it has been suggested that the solution most nearly approximating this condition is the employment of short cars at all hours and the use of trailers or multiple-unit trains during the rush hours. Multiple-unit trains would have the advantage that the speed would not be cut down during the rush hours, when the question of moving cars rapidly is more important than at any other time. There has certainly been a considerable change of opinion in regard to the practicability of the short car and the trailer during the last few years. Whether this will result in a return to general popularity of the single-truck car for purely urban service in cities of small size it is impossible to say, but we doubt very much whether for this class of work there is anything superior to it.

Closely associated with this question is that of the semi-convertible car vs. a double equipment of open and closed cars. In his advocacy of the cross-seat open car Mr. Root struck a popular chord, and we agree with him entirely that for roads which can afford a double equipment, especially in the Eastern States, where the open car is very strongly entrenched in popular favor as a summer car, nothing can equal it as a passenger winner. A canvass of the smaller cities, however, would show, without doubt, that the semi-convertible car is gaining in favor, and that this car may now fairly be said, more than any other one type, to be the standard, outside of New England and contiguous cities, and of the far West.

One speaker of experience in urban railway operation recommended a 20-ft. body car for city service, a 28-ft. double-truck car for suburban service, and a 34-ft. body car for light interurban service, with such variations from these dimensions as local conditions required. The latter length, we assume, would hardly be taken as a maximum for high-speed long-distance interurban lines. Nevertheless, there is no doubt that when about this length, or a little more, is exceeded the weight of a car per seat rapidly increases, and in the desire to reduce the number of car units the danger is incurred of increasing the amount of dead weight carried per passenger. We need more light on this subject, and the discussion at Lake George was one of the most instructive on this topic which has occurred at a convention for a long time.

The Trailer Question

The subject of trailers, which is also discussed in the Question Box of the State Association, shows a very considerable increase of interest in the subject, and upon the whole, good results from trying the experiment. The objections suggested by a few correspondents seem to be from a theoretical rather than a practical standpoint. A good many roads, particularly high-speed roads, hesitate to try trailers at all on account of the risk at curves. A subsidiary question is the motor equipment in case trailers are to be employed, and from the answers received it really looks as if the younger generation of street railway men had almost forgotten what a trailer was meant for. A trail car with motors is improperly so designated. The whole point of using trailers is to increase capacity without adding much to the weight and cost of equipment, and the moment one starts on multiple-unit control an entirely different situation is encountered. We have several times made a strong plea for short trains as tending toward economy and safety, but the trailer is a very different matter. We particularly wish that the matter of safety might have been more fully discussed. The roads that use trailers freely report favorably with respect to safety, while other roads seem to have been deterred by fear of danger. It is, of course, possible that roads with very sharp curves might find trouble with short and light trail cars, but we hardly see why a long, easy-riding, double-truck car should not, when properly coupled, take the curves with entire safety. Of course, if the intermediate platforms are freely used and insufficiently protected, there might well be danger of accident. Denver, which reports exceptionally good results from trailers, used a side entrance car, which tends to remove the risk at platforms. The saving of power from the use of a proper trailer system is certainly very great, and we are inclined to think on the whole the trailer is rather advantageous, assuming that there are no local conditions that set strongly against it. But we firmly believe that the trailer should be built with that use in view instead of being an old car tagged on anyhow.

Politics in Municipal Ownership

An interesting side light has been thrown this week on the practicability of municipal ownership for street railways, for which Chicago is so enthusiastic, in no less a city than Chicago itself. Mayor Dunne is convinced that Chicago can and should operate its street railway system, but at the same time is demonstrating the evils which would result from such a policy by his treatment of the fire department in that city. If there is any branch of a municipal government which should be kept out of politics, it is the fire department. Chicagoans, like the residents of New York and many other cities in this country,

have put up with politics in the police and water departments for many years, but have always insisted that the efficiency of their fire departments should not be impaired. Nevertheless, the recent experience in Chicago has shown that even in a small department of this kind, politics can be arrayed against discipline and good service, and with the chances in favor of politics.

It seems that for some time past the chief of the fire department and the firemen have been in dispute as to the hours of labor. Under present conditions the chief believes that shorter hours cannot be put in operation without vitally weakening the department, until the city's revenues shall be large enough to permit a large increase in the force. The men became dissatisfied with the ruling and formed an organization, which promptly brought their claims before the Mayor and insists upon the chief's dismissal. In the meantime, some of the men have been taking time off without leave, and the association is paying the fines for this dereliction of duty out of its own funds. This policy is followed by the association in the case of fines assessed for violations of other rules. Such action, the chief claims, is subversive of the discipline of the department.

Chief Campion, who is at the head of the fire department, has established a wide reputation as an efficient fire fighter, and the fire insurance interests as well as the representative business men have become alarmed at the situation, as they realize that no self-respecting man would consent to head the department in the case of the chief's dismissal under these circumstances. They have therefore appealed to the Mayor in several communications to support Chief Campion against the conspiracy of his subordinates. They have testified at length to his ability and integrity, and demand that he shall be supported in these two points, which are the only ones at issue in the controversy. They have claimed, and rightly, that the policy of the Firemen's Association in paying the fines assessed against individual members because of misconduct and breaches of the rules is absolutely opposed to the maintenance of that proper discipline within the department which is necessary for the protection of the community.

The question is squarely up to the Mayor, yet he hesitates. He says that his mind is in a blank about the merits of the controversy. He has taken the memorial of the Firemen's Association "into consideration" and is looking into "both sides of the question," but has given the general impression that he sides with the firemen's committee, although under the existing law he may not be able to remove the chief.

The root of the trouble, of course, is politics. The insubordinate employees have political affiliations, and their association is strong in certain districts. Its support or non-support can make or unmake aldermen, and several of the latter have already weakened under the pressure. The question is whether the Mayor can withstand the demands made upon him. His indecision has already had a tremendous effect in undermining the discipline of the department.

It is not difficult to see the effect which would follow similar tactics with a municipally operated street railway in a country where the suffrage is so broad as is our own. The employees would exercise a tremendous influence in all political matters on account of their numbers, and they would be the masters; discharge could probably be accomplished only after reference of every case to a board appointed by the Mayor and hence governed by political reasons, and the manager would be at the beck and call of every ward politician who could exert influence at elections.

The Safety of High Speed

We are glad to note that the most unhappy and lamentable accident to the Twentieth Century Limited is not to result in the abandonment of the schedule. The contingency of a maliciously misplaced switch is not to be averted by a reduction of 10 per cent in speed, nor would the results be rendered thereby perceptibly less disastrous. If speed were to be limited to a figure that would ensure safety under such circumstances the public might as well walk. The accident doubtless has lessons, but the intrinsic danger of a small increase of speed is not one of them. It is possible that a different system of signalling might have averted the disaster, but even a well-placed distance signal might have been tampered with. Of late years railway speeds have, upon the average, risen considerably, although the maximum speeds have not been greatly increased, and it is quite possible that the safety precautions have not been improved at an equal pace. A fast and heavy railway train carries a very long, dangerous space ahead of it, and the whole signalling system should be arranged accordingly. The dangerous space is that distance within which the train can be substantially brought to rest, and it obviously depends both on the weight and the speed of the train. Therefore, it must have increased greatly within recent years, for the weight of the rolling stock has increased, longer trains are run at higher speed, and the efficiency of the brakes has not increased proportionately. The longer dangerous space means enhanced danger, and the only corrective which can be applied is in the improved block system with distance signals placed with the increased dangerous space in mind.

The problem is exactly that which the electric roads have been facing in the last few years. As the weight per wheel has increased and the speed has gone up, the dangerous space has risen until the imperative need of extra safety precautions has been acutely felt, and is now being met. Cars of eight or ten tons weight, running at 10 or 12 miles per hour are easily controlled, but doubling both weight and speed brings risks which are only averted by safety devices of commensurate power. The big trunk lines are face to face with a precisely similar situation. The dangerous space of the fast trains has outgrown the safety appliances in vogue a few years ago, and there must be a prompt readjustment of means to ends. During the Zossen trials the braking problem constantly presented itself. The dangerous space lengthened amazingly, and even with the peculiar facility gained for an electric car by using the motors in braking action the need of extraordinary precautions was felt. Every railway manager should know the dangerous space with which he is dealing and should use this knowledge as the basis of remedial measures. No foresight can avert occasional accidents, but the record of the English railways, compared with our own, suggests very forcibly that the danger can be very greatly reduced. High speed in itself need not increase danger perceptibly, but high speed is an element of danger unless the precautions are increased with the speed. Certainly, foreign roads manage to get their trains over the ground at a fair rate without an annual casualty roll like that of the Russo-Japanese war, and it behooves us on this side of the water to find out the reason why. Surely, there is some manner of reason for the increased danger that is manifest here, and it is a thing which ought to be exhaustively investigated by the Government. Generally speaking, American railway methods are effective and their failure to ensure safety is so at variance with their ordinary efficiency as to be a subject for wonder.

PORTABLE SUB-STATION FOR CINCINNATI & COLUMBUS TRACTION COMPANY

BY JOHN R. HEWETT

Some two years ago the railway engineering department of the General Electric Company, at Schenectady, designed several portable sub-station equipments for operating

FIG. 1.—EXTERIOR VIEW OF 400-KW PORTABLE SUB-STATION, TRANSMISSION POTENTIAL 16,500 OR 33,000 VOLTS

from high-tension transmission systems. Since that date several such equipments have been manufactured, and have proved themselves useful adjuncts to the lines on which they are employed. As was at first anticipated, they have been of great service in dealing with an occasional abnormal rush of

FIG. 2.—INTERIOR VIEW OF CAR, SHOWING TRANSFORMER, BLOWER SET, OIL-SWITCH LEVER AND STARTING PANEL

passenger traffic on lines where the usual load is light, but at the same time may be subject to sudden peaks out of all proportion to that existing during the greater part of the year. The General Electric Company has, up to the present time, designed and constructed portable sub-station equipments ranging in capacities from 200 kw to 400 kw, and these have already demonstrated the fact that they are capable of lending greatly increased flexibility to almost any existing electric railway. The equipment under consideration at present forms a 400-kw plant.

Fig. 1 shows an external view of the Cincinnati & Columbus Company's portable sub-station, taken before it left the works at Schenectady. In this instance the machinery and apparatus are installed in a freight car of standard design. Figs. 2 to 4 are internal views, showing the arrangement of machinery, etc. Great attention has been paid to the location of the heavier units, to avoid undue strain being brought on any part of the car or machinery during the time it is in motion. The rotary converter is placed at one end of the car and the transformer at the other, in each case the center of gravity being immediately over the truck.

An equipment consisting of a rotary converter and transformer has been found by experience to be preferable to employing a synchronous motor generator set. The former not only has the advantage as regards weight, but it is also less costly, has a better overload capacity and the connections are simpler. Added to this, were a motor generator set installed, it would involve the use of an exciter set and a high-voltage starting compensator and switches.

The rotary converter installed in the Cincinnati & Columbus sub-station is a six-poled, three-phase machine with a normal output of 400 kw when running at 500 r.p.m. The potential at the d. c. brushes is 600 volts. It is fitted with a speed limiting device connected up in such a manner as to open the d. c. circuit breaker in case the speed rises above the normal, due to a failure in the a. c. power circuit, when the converter would run as a d. c. motor with a differential field.

In the first portable sub-station designed at Schenectady, three single-phase transformers were employed. But this was only due to the fact that such apparatus could be obtained at the works ready for immediate use. In the present case, one

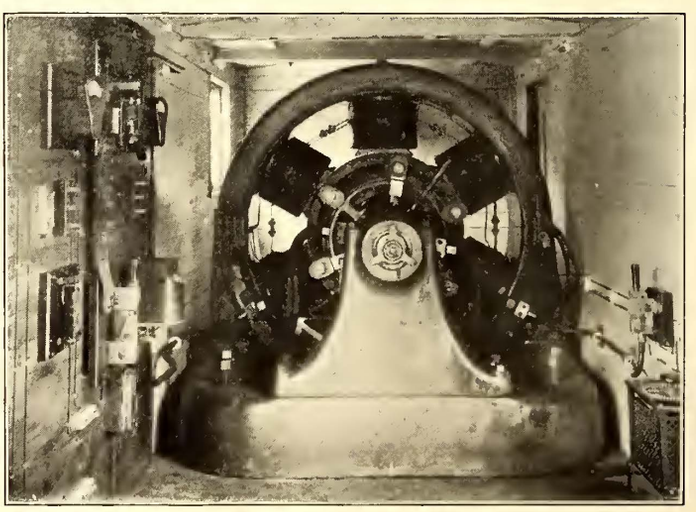


FIG. 3.—INTERIOR VIEW OF CAR, SHOWING ROTARY CONVERTER AND SWITCHBOARD

tri-phase transformer has been installed, and this arrangement possesses the two-fold advantage of being light in weight and occupying a minimum floor space. It is designed for a capacity of 440 kw, is a 25 cycle unit, and the primary is wound for both 33,000 and 16,500 volts, while the secondary delivers current at a pressure of 370 volts.

The blower set for supplying the air-blast consists of an ordinary rotary blower, direct-coupled to an induction motor; its

location in the sub-station will be seen on reference to Fig. 5. The details of equipment are somewhat simpler than in permanent sub-stations, certain modifications being made in the switchboard apparatus, etc., all the refinements used in permanent sub-stations not being considered necessary for portable emergency work. The switches, instruments, etc., are mounted on individual bases, which are again secured separately to a neat wooden switchboard fixed to the walls of the car. This arrangement avoids the use of large slate or marble panels, which are costly, and might easily be broken, due to the motion of the car if traveling at a high rate of speed.

The following will give a more detailed list of the apparatus installed in this portable sub-station:

1 rotary converter, provided with a centrifugal speed-limiting device, field break-up switch and necessary field rheostat.
1 tri-phase air-blast transformer.
1 complete blower set, consisting of rotary blower, direct connected to an induction motor.

The following switchboard apparatus, etc., is also provided and installed:

ALTERNATING-CURRENT EQUIPMENT

3 S. P. S. T. automatic oil switches, with operating mechanism. including electromagnetic tripping device, connected to a lever on front of panel.
1 panel for oil switch handle.
1 three-phase rotary converter starting panel, with D. P. D. T. starting switch.
1 front connected, station type ammeter.
1 set of three single-phase lightning arresters.
2 current transformers.
1 overload relay.

DIRECT-CURRENT EQUIPMENT

1 series shunt switch, mounted on machine.
1 field break-up switch, mounted on machine.
1 quick-break positive main switch.
1 equalizer switch.
1 field rheostat.
1 recording wattmeter.
1 T. F. T. ammeter and shunt.
1 G. E. permanent magnet voltmeter.
1 magnetic blow-out circuit breaker, on base.
1 d. c. lightning arrester.

As just stated, modifications are made in the electrical equipment. Knife switches, as commonly used to disconnect lightning arresters in permanent sub-stations, are omitted. In the

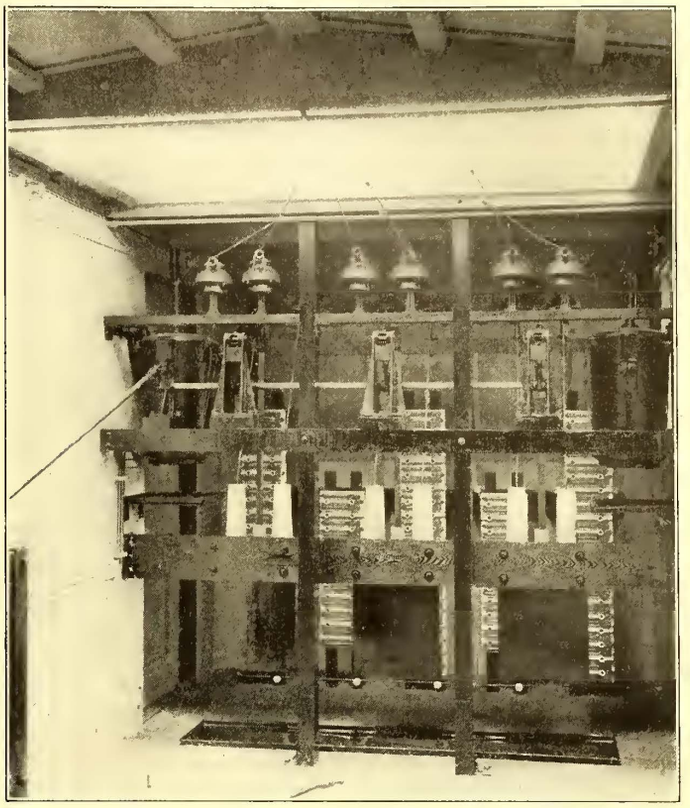
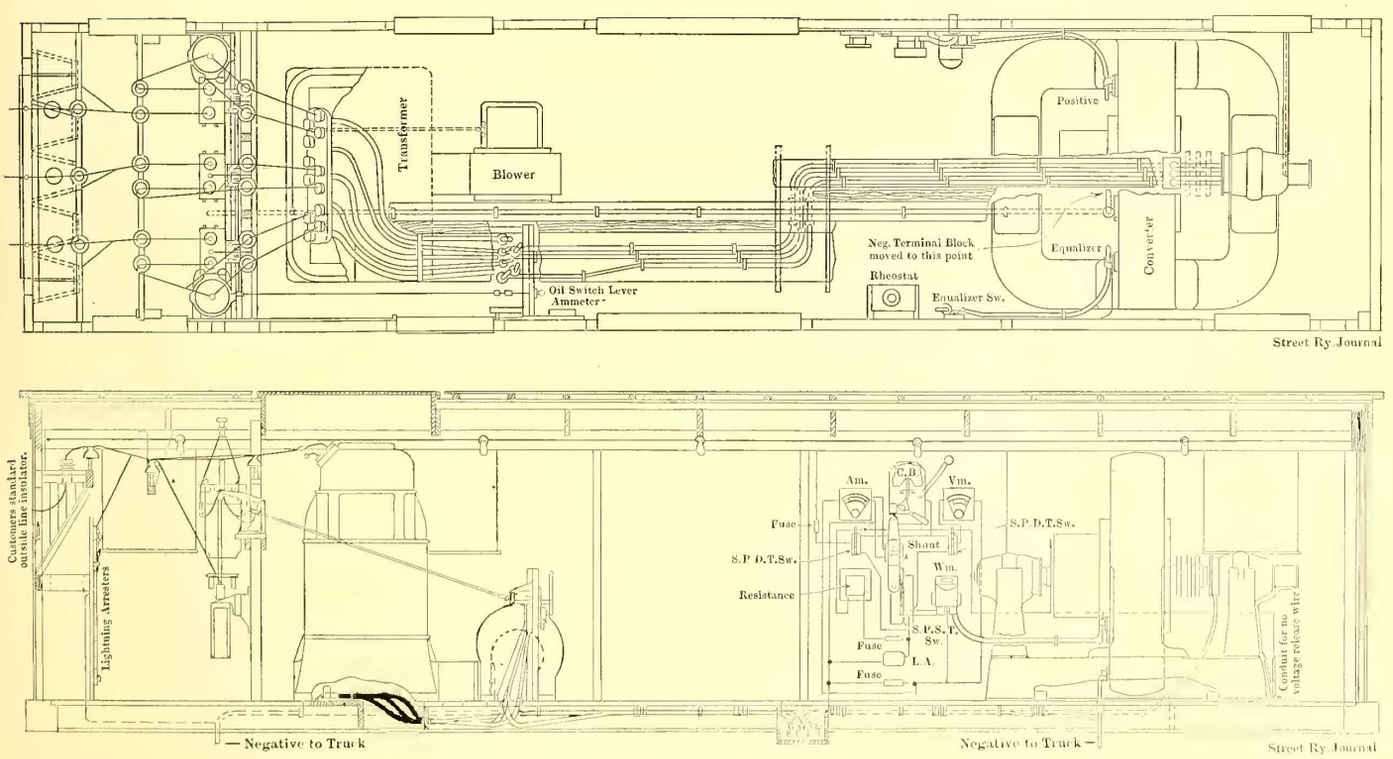


FIG. 4.—INTERIOR VIEW OF CAR WITH TRANSFORMER REMOVED, SHOWING HIGH-TENSION OIL SWITCHES, LIGHTNING ARRESTERS, CURRENT TRANSFORMER AND LINE INSULATORS

place of Form K switches installed in brick cells with barriers, etc., the three single-pole, automatic, Form K oil switches are mounted on a frame as shown in Fig. 4. The handle for operating these is mounted on a separate panel, situated in front of the transformer (see Fig. 2), the connecting rod being carried by the side of the transformer as shown in Fig. 4. The latter illustration is of special interest, as, being taken when the transformer was removed, it shows the situation of all the high-tension apparatus behind the transformer. The lightning



FIGS. 5 AND 6.—PLAN AND ELEVATION, SHOWING ARRANGEMENT OF MACHINERY IN PORTABLE SUB-STATION

arresters, which are of the General Electric standard pattern for 33,000 volt circuits, the current transformers, the high-tension oil switches, and the high-tension leads and insulators, are all clearly seen. It will be noted that no high-tension apparatus is brought in front of the transformer, a factor which insures the safety of the sub-station attendant.

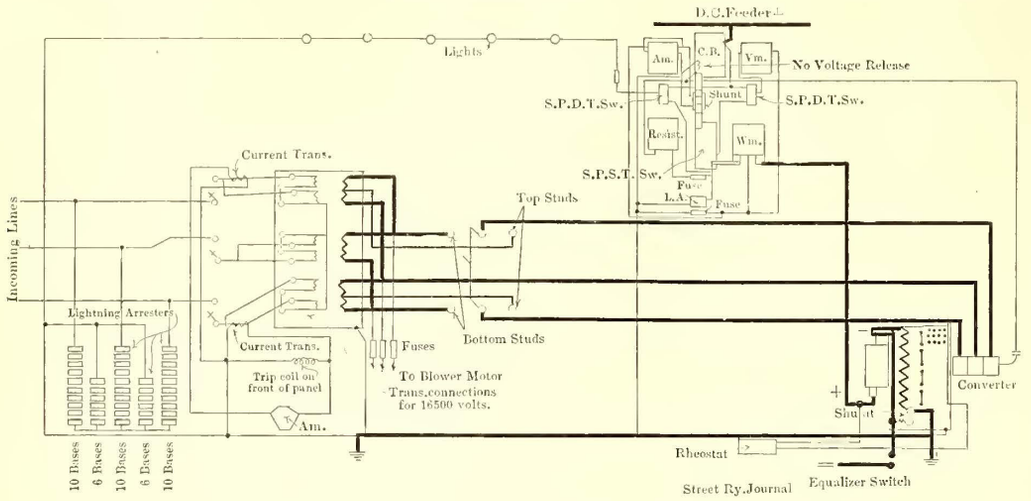


FIG. 7.—DIAGRAM OF CONNECTIONS FOR 16,500 VOLTS

The usual form of low-tension a. c. starting switch is retained, and no d. c. starting rheostat switch, or synchronizing apparatus is included in the equipment. Both power factor indicator and a. c. voltmeter are also dispensed with. No negative switch is provided, the negative terminals of the machine being connected directly to the metal truck, which is, of course, in metallic connection with the track. The rotary converter is compound wound, with the series coil on the negative side—that is to say, between the armature and ground connection. An equalizer switch is provided on the negative side of the machine for use when the car is in operation as a reserve to a permanent sub-station close at hand. The equalizer switch running to a flexible jumper can readily be connected to the equalizer bus bar in the neighboring sub-station; and again, the jumper can be connected to the ground should it become desirable to run the converter as a shunt-wound machine.

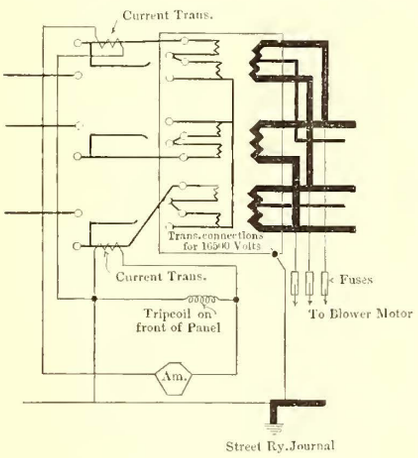


FIG. 8.—DIAGRAM OF CONNECTIONS FOR 33,000 VOLTS

The sub-station can be lighted from either the trolley or the rotary converter; and the voltmeter is provided with a double-throw switch to permit readings being taken of either the trolley or machine voltage at will. A flexible lead is taken through the wall of the car directly from the machine circuit-breaker to a terminal block on the outside, so that connections may readily be made to the trolley wire, d. c. feeder, or positive bus bar in the permanent sub-station, as occasion demands. The a. c. leads are carried out through a special weather-proof entrance, which is plainly seen in Fig. 1, and from this point connections are made to the overhead high-tension transmission lines.

Figs. 5 and 6 are respectively a plan and elevation showing the general arrangement of machinery and apparatus, and give a clear conception of the connections. In Fig. 6 the way of introducing the high-tension leads to the sub-station is clearly shown, and the opening in the roof, through which the transformer is introduced, will be noted. The end of the car near which the rotary converter is located is made detachable, to facilitate installation. The rotary converter is held in position by means of wooden cleats, which fit snugly to the interior form of the base, and provision is also made for leveling the rotary converter, should it be found necessary for the sub-station to be operated on a grade. As will be seen in Fig. 6, all the wiring from the transformer to the rotary converter is carried under the floor.

Figs. 7 and 8 show the scheme of connections diagramatically. In the former the transformer connections are for 16,500 volts, and in the latter for 33,000 volts.

The approximate dimensions of the car are:

Length	41 ft.
Width	9 "
Height	8 " 6 ins.

The car is fitted with hand brakes, but no motors are installed, as their occasional use would hardly justify the extra expense. When the sub-station is moved, it is drawn by a motor car. During transit over the steam railroads, standard M. C. B. wheels are used, but when the car reaches its destination, these are replaced by wheels of narrower tread and shallower flanges, suitable for running over city lines, switches and points, as well as rounding curves, etc. Cars for operating on lines where little clearance is provided between the top of cars and bridges, can be supplied with hand-brake rigging mounted below the roof line.

MISTAKES IN MOTOR CONNECTIONS AND THEIR EFFECTS

BY CALE GOUGH

The leads permanently attached to the motor and the motor leads of the car cables are usually marked with brass or fiber tags in such a manner that the proper connections may be be made without difficulty. Often, however, the tags become lost, and in such an event the cables must either be rung out from the controller when the motor is connected, or the less certain cut-and-try method must be resorted to. The great number of wrong connections possible, especially with the leads of No. 1 motors, sometimes makes this latter method consume more time than would be required to test out the cables. A little reasoning from cause to effect, however, will usually make it possible to connect the leads properly on the second trial.

The accompanying figures show all of the misconnections possible, together with the effects produced. Consecutive diagrams, as Figs. 1 and 2, 3 and 4, etc., show the connections for both the forward and rear positions of the reverse handle; that is, if Fig. 1 shows the connections with the reverse forward, the connections with the reverse to the rear are shown in Fig. 2, and vice versa. The arrows indicate the relative directions of the current in the fields and armature. With both arrows pointing in the same direction as in Fig. 1, a forward direction

of rotation of the motors is assumed. Arrows pointing in the opposite directions indicate that the motor is reversed.

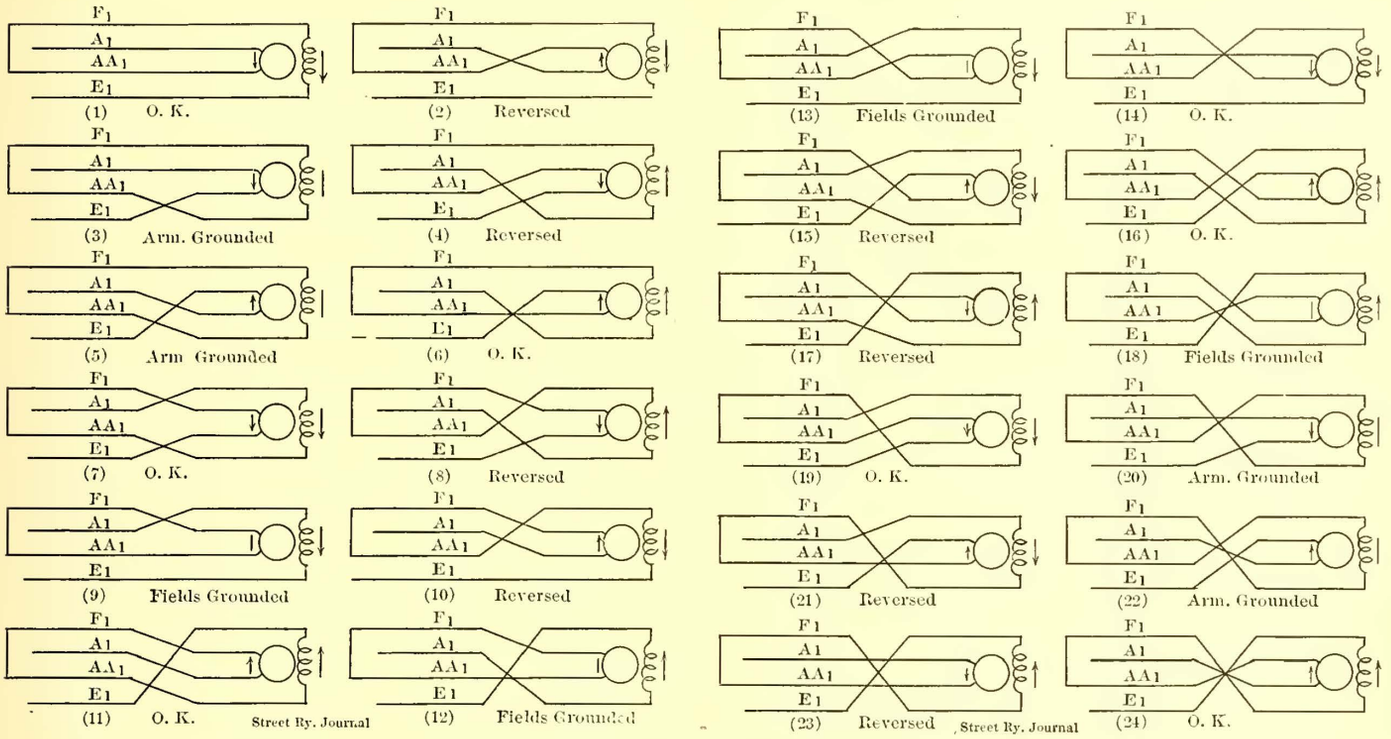
In all there are twenty-four different possible connections of No. 1 motor leads. The fact that one of the field leads of No. 2 motor is usually grounded direct on the shell of the motor limits the number of possible connections of its leads to six. Fig. 1 shows the proper connections of No. 1 motor; Fig. 2 shows the armature leads reversed, which mistake simply results in a reversal of the direction of rotation of the motor.

An interchange of the leads AA1 and E1, Fig. 3, is made evident by the fact that with the reverse lever in the forward position the motor refuses to pull on the series points, and when the motors are thrown into multiple the fuse is blown or the breaker opens. These effects are due to the fact that the armature is grounded, the fields being short circuited. The fact that when the reverse is thrown to the rear the motor tends to operate in a reverse direction distinguishes this misconnection from those shown in Figs. 5 and 20. There is, however, no way of distinguishing, by the action of the motor, this crossing of the leads AA1 and E1 from the very complicated crossing of connections shown in Figs. 22. In either case the armature is grounded with the reverse forward and throwing the reverse to the rear reverses the motor. In the same way the connections shown in Figs. 4 and 21 cannot be distinguished from each other. The connections indicated in Figs. 5, 6, 19 and 20 may be recognized by the fact that the armature is grounded for one position of the reverse handle, while the motor operates in the proper direction when the reverse is thrown. Figs. 7, 16 and 24 show connections permitting the motor to operate properly. It may be noted that in Figs. 7 and 16 the fields are placed in the circuit on the trolley side of the armature. The connections shown in Figs. 7 are often used by those who believe for various reasons that the fields should be placed in circuit on the trolley side of the armature.

Four connections, Figs. 9, 12, 13 and 18, give grounded fields and short-circuited armatures. Such connections would cause the motor to act as a generator, being dragged by No. 2 motor. Two of these connections, as in the case of those causing grounded armatures, give forward direction of the car when the reverse is thrown to the rear, while the remaining two cause No. 1 motor to oppose No. 2 motor.

In general the several possible connections may be divided into three distinct groups: (1) Those giving forward and reverse direction of rotation of the motor with different positions of the reverse handle; (2) those by which the armature is grounded with one of the other positions of the reverse handle, and (3) those by which the fields are grounded with one or the other positions of the reverse handle. Those of the first class cannot be distinguished from each other by the action of the motor. However, should the motor operate in a direction opposite to that corresponding to the position of the reverse handle the fault may be corrected by simply interchanging the armature leads of the motor.

The connections of class two and class three are distinguished from each other by the fact that in one case the motor exerts no torque when the controller handle is in the series position and the reverse is thrown in one or the other direction, while in the other case the short-circuited armature causes the motor to act as a generator retarding the movement of the car. The different connections in these two classes may be further identified by noting the position of the reverse handle when the motors operate, and by this means the mistake may be recognized as being due to one or the other of two possible connections.



DIAGRAMS SHOWING POSSIBLE CONNECTIONS OF THE NO. 1 MOTOR LEADS

The only possible connections of the leads of No. 2 motor when the fields are grounded direct on the shell are those shown in Figs. 1, 2, 9, 10, 13 and 14. All of these may be definitely identified at once by observing the action of the motor and the position of the reverse handle.

It cannot, of course, be presumed that the car house man becomes so familiar with the several misconnections and their effects as to recognize at once the proper changes to be made. Rather than spend so much time in studying possible mistakes it would be more economical and more satisfactory in general to keep the leads properly marked and thus avoid mistakes.

The officials of the Indianapolis, Columbus & Southern Traction Line have been notified that a regular pouch mail service will be started on that line by the United States Government.

VIENNA-BADEN SINGLE-PHASE RAILWAY

The Austrian Siemens-Shuckert Works, of Vienna, is preparing to convert the Vienna-Baden division of the Vienna Tramways now operated partly by steam and partly by direct current. Most of the line is double track with standard gage, and has a total length of about 28 km (17 miles), the steepest grade being 2.75 per cent, and the shortest curves 16½ meters (54 feet). It is to be noted that this line enters the centers of both cities over the tracks of the local street railway lines. These city divisions are respectively 4.3 km (2.6 miles) and 2 km (1¼ miles) in length, and over them the cars will use direct current at 550 volts. Only on the actual interurban division, which is about 21 km long (12.6 miles), 500-volt single-phase current will be used. The power house of this division is about 2 km (1.2 miles) from Baden and contains two 200-kva, 10,000-volt single-phase generators; one 550-volt, 165-kw, direct current generator; and two revolving transformer sets, each consisting of one 150-kva, 10,000-volt, synchronous, alternating-current generator, a direct current 100-kw, 550-volt machine for an 11-ton fly-wheel, and lastly, an accumulator battery. The high tension of 10,000 volts is divided into six divisions along the line for the corresponding step-down transformer stations.

The motor cars are furnished with two single trucks and carry four-series motors rated at 50 hp each for one hour's run. Series and parallel connections with resistances are provided, both for the direct-current as well as the alternating-current service. For the alternating-current work there is also a transformer with six voltage taps, three of which are for stepping down and three for raising the operating voltage of the motors, thereby regulating their speeds. The motors are planned for a maximum speed of 60 km (36 miles) per hour. The initial equipment consists of thirteen motor cars weighing 18½ tons each, and eighteen trailers of 10 tons each. The schedule has been so planned that with the shortest headway of 15 minutes expresses can be run as well as locals. The express trains are expected to operate at 35 km (21 miles) an hour. The largest number of cars which is contemplated to operate for the summer traffic is at the present time placed at 21 to 45 express cars and 17 and 16 locals for week days and Sundays, respectively. It is believed that the entire division will be ready for service about the middle of 1906.

TRAIN CREWS' REPORTS OF CAR DEFECTS

The Schenectady Railway Company has recently instituted a comprehensive system of reports whereby the train crews make daily record concerning the condition of the cars in their charge. It is pointed out that inasmuch as troubles and defects in cars and equipments are usually first noticed in the operating department, there should be a systematic method whereby the car crews can each day report to the mechanical department any defects or troubles in connection with their cars.

For this purpose blanks are provided, a sample of which is reproduced in this connection. The blanks are 13¾ ins. long x 5½ ins. wide, and there are four sets of the same blank used, one printed on white paper, one on pink, one on blue and one on yellow. These are supplied in pads to the car houses from which cars leave. On turning his car in, the motorman, if he has discovered any defect or has had any trouble with his car, marks an X in column headed "Motorman's Report," opposite the particular defect noticed. The list of "troubles" has been carefully selected to include all the common defects in car body, motors, trucks, controllers, air brakes, etc. The white blank goes to the superintendent's office and is at the disposal of the claim department. The pink blank goes to the general manager's office. The blue and yellow blanks go to the master mechanic's office, one being filed under the car number and one under the motorman's number.

It will be evident that the system accomplishes a number of things. Primarily it keeps all departments informed as to the condition of cars. It also serves as a check on employees, both in the operating department and in the mechanical department. As soon as a car is turned in it is inspected by the barn foreman's force, and a record is made in the column headed "Barn Foreman's Report." This report checks against the motorman's report, and if the barn foreman finds troubles not reported by the motorman, or if the motorman reports defects not noticed by the foreman, the discrepency is at once evident in the office, and the knowledge of this fact tends to keep up the watchfulness and interest of all employees. Furthermore, the two sets of blanks filed in the master mechanic's office give an accumulating comparative record of the behavior of each car and its equipment, and also affords a tab on the efficiency of individual motormen. For instance, if one man seems to be having an unusual number of troubles with his car, investigation can be started to determine if, possibly, the trouble does

SCHENECTADY RAILWAY COMPANY.

Motormen's Report of Defects in Car No._____

Date_____ 19___ _____ A. M. _____ P. M. Route_____

Place of Trouble _____

Motorman _____ No._____

CAR BODY TROUBLES	Motorman's Report	Barn Foreman's Report
Bell		
Bell Cord		
Brake Chain		
Broken Fender		
Broken Glass		
Broken Panel		
Broken Steps		
Car Dirty		
Car Floor		
Car Seats		
Curtains		
Dash		
Draw Bar		
End Door		
Gong		
Grab Handle		
Handstraps		
Heaters		
Light or Light Switches		
Register		
Register Rod or Handle		
Side Door		
Signs		
Ventilator		
MOTOR TROUBLES		
Armature Shaft Bent		
Armature Trouble		
Broken Gear Bolt		
Brush Holder		
Commutator Worn Bad		
Field Burned Out		
Field Wire Burned off		
Motor Bearings		
Motor Bucked		
Motor Flashed		
Motor Leads		
TRUCK TROUBLES		
Brakes Chatter		
Broken Brake Rigging		
Broken Spring		
Can not Brake Car		
Emergency Brake		
Flat Wheel		
Hot Box		
Need New Shoes		
Split Switch at		
Snow Scrapers		
Sprung Axle		
Truck Noisy		
CONTROL TROUBLES		
Circuit Breaker		
Circuit Control Magnet		
Controller		
Fuse Blows		
Hood Switch		
Jumps in Multiple		
Jumps in Series		
Miscellaneous		
Resistance Grids		
Reverser		
Slow in Multiple		
Slow in Series		
Trolley Base		
Trolley Pole		
Trolley Wheel		
Trolley Wire		
AIR BRAKE TROUBLES		
Air Whistle Out of Order		
Brakes do not release quickly at times		
Brakes do not stop car quickly enough		
Compressor Fuse Blown		
Compressor Out of Order		
Governor Does Not Work		
Motorman's Valve Leaks		
Motorman's Valve Stiff		
No Motorman's Report		
Reservoir Hose		

Signed_____ In Charge

Place check mark (X) opposite defect reported. If the defect cannot be readily located give in addition to check mark particulars on the other side of this sheet which will assist in locating trouble.

SCHENECTADY RAILWAY COMPANY'S BLANK COVERING REPORT ON CAR DEFECTS

not lie as much with the man as with the car. The idea is not to continually pick flaws in the work of the men, but to cooperate with them in increasing the general efficiency of the force. The men understand this and are in entire accord with the objects of the system. The blanks and system were developed by J. G. Baukat, master mechanic of this railway.

PROCEEDINGS OF THE LAKE GEORGE CONVENTION

The twenty-third annual meeting of the Street Railway Association of the State of New York was held at Fort William Henry Hotel, Lake George, N. Y., on June 27 and 28, 1905.

The meeting was called to order by President C. Loomis Allen, of Utica, at 11 o'clock on Tuesday morning. On motion of J. H. Pardee, duly seconded and carried, the official registration made by the secretary was accepted in lieu of the roll call. On motion of E. H. Peck, duly seconded and carried, the minutes prepared by the secretary and printed recording the proceedings of the twenty-second annual meeting were approved.

The president then read his annual address as follows:

PRESIDENT'S ADDRESS

At the last annual meeting of this association the executive committee was, by unanimous vote, empowered to change the time of the next annual meeting, and was also authorized to select a suitable place for the holding of the same. In acordance with this authority the executive committee selected the Fort William Henry Hotel, Lake George, and Tuesday and Wednesday, June 27 and 28, were the dates selected as the time for the holding of the twenty-third annual meeting of this association.

The change in the dates seemed to be necessary to meet all existing conditions. The American Street Railway Association has desired for many years to hold its annual meeting in September, and it was believed by your executive committee unwise to hold the New York State convention the same month. Furthermore, to obtain a suitable location where the delegates, guests and supplymen would find suitable and roomy quarters underneath the same roof, it was necessary to hold the convention at a time when some of the large summer resorts were open. There is much that might be said in favor of changing the date of the meeting from a fall meeting to a spring meeting; the most forceful argument being that there would be more time for the preparation of papers to be read at the annual meeting, and better preparation for the discussion of the same prior to July 1, than after that date.

Our fiscal year, which is about to close, has been one of commercial prosperity, as well as one of advancement in the science of transportation. The best energy and brains of our country are engaged in solving difficult transportation problems, and this is evidenced by the inauguration of quick and convenient rapid transit service in New York City, on Oct. 27, 1904, upon which date the subway system of the Interborough Rapid Transit Company was opened to passenger traffic. The rapid transit facilities offered by the subway in the territory which it serves are unparalleled in the transportation world.

Our brethren of the steam railway field, who for many years thought electricity impractical and not feasible as a motive power, are not only considering the same favorably, with a view to recovering the local traffic, which was decreasing where better served by electric traction, but are installing the same at the large terminals, for the purpose of handling not only local traffic, but the heavy limited trains as well, at these points. At the last annual dinner of the Transportation Club in New York City, so eminent an authority as the Hon. Chauncey M. Depew stated that within ten years the usefulness of the steam locomotive would be over.

Experiments that are being conducted on the New York Central's experimental track, immediately west of Schenectady, have demonstrated that the electric locomotive is not only capable of performing the service now being handled by the steam locomotive, but that the same service can be performed at considerably less cost. It is hardly necessary for me to state that it is impossible for one to foretell the advancement and improvements which will be made in transportation facilities in the next decade, due to the adoption of electricity as a motive power, but the street railways who have experimented and fostered the development of electric traction can justly claim a portion of the credit from the success achieved in electric traction due to the development which is sure to follow.

The legislature, after a session lasting 125 days, adjourned without passing any measure adverse to street railway interests. The only measure becoming a law that might be considered burdensome to street railways is the act which increases the Board of Railroad Commissioners from three to five members. The only criticisms that might be made to this measure are the increased cost to the railroads of maintaining this commission, together with the fact that this tribunal might be, by reason of increased numbers, unwieldy and difficult to obtain determination of questions submitted to them.

There are two things that I desire to bring to the attention of this association and to urge careful consideration, and I hope affirmative action upon the part of the association. The first is the revision of Article 4 of Chapter 39 of the general laws, known as the railroad law. The railroad law as enacted did not contemplate conditions as exist now. The demands of the public for increased transportation facilities, and the construction made necessary to give better facilities in transportation have created conditions not contemplated by the railroad law as enacted to-day. There are many legal provisions that are required by railroads in order that better facilities can be afforded the public. There are many provisions that the public require to satisfy public demands that are not to-day incorporated in the railroad law, and I believe that this association should be foresighted enough and in favor of advancement to urge upon our legislature the advisability of revising this act.

The other matter which I wish to bring to the attention of the association is the question of municipal ownership. For many years municipal ownership of public utilities has been agitated by certain classes. Discussions and agitation have steadily increased until to-day it is a subject of much discussion by writers in the daily press, the editors of our conservative magazines, and by the professors in our universities and institutions of learning. It is becoming so important to many minds, that it is believed that it will be one of the important issues in our next national election. In the early part of the winter it was my pleasure to attend a banquet where a fair-minded lawyer, of considerable repute, in responding to the toast of municipal ownership, without in any way making an expression of his opinion, occupied the time allotted for his toast in reading extracts from the published reports of Glasgow, Leeds, Plymouth and Huddersfield. This agitation and discussion are rapidly educating the public to the idea that municipal ownership is the only salvation of cheaper fares and better transportation facilities, and also to the idea that the municipality, owning and operating its public utilities, will, from the moneys derived from the net revenues of operating its public utilities, reduce the burden of taxation to a very considerable extent.

It seems to me that the public utilities, and street railway interests in particular, are derelict in their duty in failing to keep pace with the trend of public sentiment in this matter. We all know that there can be no successful street railway manager, unless that manager first considers the demand and needs of the public, and we know that the successful policy of a transportation corporation is one that, first of all, is ever particular to consider and care for the needs of the public. It is a fact, with possibly few exceptions, that the men engaged in street railway operations in the United States know less of real facts concerning the question of municipal ownership than many of the citizens that patronize street railways believe they know. We, of all others, should be the first to know, in minutest detail, the facts, figures, conditions and results of municipally operated street railways. I have read with great interest all the articles upon municipal ownership that it has been possible to obtain, but have been forced to the conclusion that these articles were prejudiced either in favor of or against municipal ownership. It is not a prejudiced statement of facts that street railway men desire. It is a true statement of conditions and facts that is needed before forming our opinions, as to whether municipal ownership is the best thing under our conditions and under our institutions. There are in this State some ninety street surface railways in operation under a common legislative act. We are reporting and are amenable to the same authorities, and our interests and conditions to a certain extent are similar. It seems to me that no better expenditure of money could be made by this association than to, at this convention, authorize the executive committee of this association to employ experts, who will make a study of municipal ownership of street railways and furnish reports to the members of the association, in such detail as we would expect to obtain from experts when examining a property with a view to purchasing its securities. Your executive committee has considered this question at two meetings and has embodied in its report a recommendation which I hope will be discussed and favorably considered before the adjournment of this meeting.

By referring to the program it will be seen that the sessions of this convention will be devoted to the reading of papers upon interesting subjects followed by discussion upon the same. The Question Box for a second time will be a feature of the convention. Copies of this Question Box have been liberally distributed, and we must all appreciate the excellency of the production. It reflects great credit upon C. B. Fairchild, Jr., associate editor STREET RAILWAY JOURNAL, who prepared the questions and edited the data containing the answers.

The manufacturers' committee has rendered good service to the association, and have obtained an exhibit in street railway supplies that is well worth the attention of every delegate. Sufficient time

has been allotted for the examination of the exhibits, and I believe the organization, known as the manufacturers' committee, will be a feature, hereafter, of our conventions.

The entertainment provided, as outlined in the programme, is for the ladies. It was deemed best that entertainment for delegates and supplymen should be confined to the annual dinner which will be held on Wednesday evening.

I wish to urge upon all delegates and supplymen the necessity of attending the sessions as outlined in their programme. The best results will be accomplished, I am sure, if we take up the business of the convention and proceed with it, leaving the entertainment feature of the convention to the ladies.

In closing, I desire to thank my associate officers and members of the executive committee for the support accorded me during my incumbency as president. Their loyalty to the organization and to the association has been unquestioned.

The report of the executive committee outlining the work of the committee during the past eight months was then read and approved, as were also the minutes of the executive committee.

The secretary and treasurer read his report, which showed a balance on hand of $1,953.25. The report, on regular motion, was approved.

MUNICIPAL OWNERSHIP.

The President—The first paper which your executive committee has seen fit to present for consideration of this meeting is on the subject, "Contrasts Between Company and Municipal Ownership and Management of Public Utilities," by Henry W. Blake, editor of the Street Railway Journal, New York.

Mr. Blake then presented his paper, which was published in the Street Railway Journal for July 1.

The President—I am sure we must all feel ourselves under great obligation to Mr. Blake for the preparation of his able paper. I have felt for a long time that when the question of municipal ownership was mentioned to the average street railroad man he always played safe—he shut his mouth, looked wise and said "yes." I feel that the paper that has just been read by Mr. Blake will be productive of much good. It has, to my mind, conveyed more real facts to the members of this association on the subject under consideration than any other article I have ever read or heard of. I hope you will not all "play safe" in discussing this paper, but that there will be a general expression of views upon the subject.

E. L. Gould, "Street Railway Review," Chicago—I have not prepared any thing, but will say a few things which have occurred to me as I listened to the reading of the paper. Mr. Blake seems to have laid open the question of municipal ownership and the arguments for and against it, and he has also very properly considered the difference in the conditions which prevail in different countries. In some foreign cities the natural conditions as relate to politics and the government of the cities seem to be favorable for municipal ownership, while in this country we have the political machines to watch out for, and as the success of any business undertaking depends directly on those men who are in control and plan for the success of that undertaking, we must look to the character of the men who would be in control of municipally operated street railways in this country, if the policy of municipal ownership should be established here. If we consider that when any city railway system is operated by the municipality, the men who have the operation of that system in control are given a vast amount of power in the municipality, we can see how important this question becomes from the standpoint of municipal politics. Take, for instance, such a city as Philadelphia, where there are perhaps 10,000 city railway employees, car men and other men, and each man has a brother or two, and perhaps a brother-in-law or two, and it comes around to the time for election, you can hardly estimate the power that the people in control of the operation of the city railway would have.

Then there is the question of practical results from the operation of a municipal railway—the profitableness of the proposition. You can hardly expect to elect a man to take charge of the system—perhaps a business man who is not familiar with the technical side of the operation of street railways—and have such a man take up the official duties of railway operations, and make plans for years ahead, such as must be done in any well-managed system, and expect from him the results you could get from a man who has started out in railroad work, which he has made his life's work, and which he intends to follow out all his days, and who expects to receive not only the direct financial returns from the operation of the railway, but we might say the glory of starting a railway enterprise, promoting a railway and bringing it into successful operation and expanding its field of operation year by year.

The consideration of the subject as it applies to European cities and the cities of this country, it seems to me, is a widely different proposition. At this time we have a great deal of newspaper talk about it, and sensational writers elaborate on the fact that municipal ownership gives to the passenger better service and a cheaper fare. I think if we watch the technical articles on the subject and consider the data given here by Mr. Blake, we will see that such is not the case. As an interesting point, it may be mentioned that some of the English city systems that have been held up as models have laid aside but a fraction, two-tenths of one per cent, for depreciation. It seems to me that a careful study of this question must be made, and the railway men must have the facts, the authoritative facts, on which to argue their side of the question.

Mr. Rogers, of Binghamton—If municipal ownership was a question to be decided by the clear-headed and financial men of the country, and the people having the business of the country at heart, I think this most excellent paper prepared by Mr. Blake would settle the question. Is not the question of municipal ownership most largely agitated by certain yellow journals and a certain class of people who have not the interest of the country at heart? Again, how can they acquire our properties? If they want to buy mine they can have it at a fair valuation. That is all I ask. I do not think we have anything to fear from municipal ownership. Of course, we all know how some things are done in Chicago. I think if they will only adopt it there, we will have a fair example of the matter, which will settle the question in this country. My opinion in regard to municipal ownership is that we have nothing to fear from it. We have fanatics who are discussing the matter, and we have more or less agitation in the newspapers, but I do not think there is any real demand on the part of the business people of the country for municipal ownership.

C. S. Powell—I am rather opposed to the last speaker in his opinion regarding municipal ownership. I think it is a question which the street railway man has treated rather too lightly. The facts which appeal to the public in these things are not the cost of operation, the cost of maintenance, the cost of production of power, nor the cost of carrying passengers so many miles, but it is the kind of service which is rendered by the corporation.

The question of municipal ownership resolves down to the question of differences in conditions. Take, for instance, the zone system of fares in Glasgow. I heard a prominent railway manager say recently that if we could establish a system of zone fares in this country we would make money very easily.

I think the companies in this country should go into this matter. They should get the data; they should find out about the service, as that is what appeals to the common people. I think if it can be shown that the service is no better than in this country, and perhaps not as good, that point will appeal more to the people here than any other argument we can make.

The President—The zone proposition was tried in the city of Cleveland at the request of Mayor Tom L. Johnson. There were three experimental zones adopted, the first being a 3-cent fare zone, running about 2½ miles east, 2½ miles south, and 2½ miles west, from the public square. Certain cars were

designated as the 3-cent cars, and no transfer privileges were given on those cars. On the same lines were 5-cent fare cars, which ran east, south and west from the square for a distance of about 9 miles, and the conductors on these cars issued transfers on the payment of the cash fare of 5 cents. I think these experiments were conducted for seven days, and at the end of that time the cars were withdrawn. As to the results of operation of these cars I recall these figures: The car miles run was increased about 14,000 or 15,000 car miles. There were added to the schedule 87 cars. The receipts during the seven days' operation were decreased over the previous seven days' operation a considerable amount.

I feel this way on the question of municipal ownership: I do not believe we have anything to fear. I believe we have all to gain, if we have a knowledge, and a true knowledge, of the facts. It may not be so with other public utilities, but I believe, from conversations that I have had with people who have made a study of municipal ownership, that street railways have everything to gain by obtaining a true statement of the facts and conditions as they exist in municipally operated cities.

GROUP OF DELEGATES AND GUESTS AT THE LAKE GEORGE CONVENTION OF THE NEW YORK STATE STREET RAILWAY ASSOCIATION

PUBLICITY AND ADVERTISING

A paper was then read on "Publicity" by J. Harvey White, of the Boston Elevated Railway Company. This paper was published in the issue of the STREET RAILWAY JOURNAL for July 1.

The President—I am sorry indeed that Mr. White is not present to go a little bit further into this subject than his prepared paper does. Mr. White is the mouthpiece of the Boston Elevated Railway. If the railway has any statement of fact or any announcement to make, it is made through Mr. White. Their bureau of publicity follows matters that are not covered in this paper in very minute details. As an instance, a motorman of the Boston Elevated Railway may come from the western part of Massachusetts. In the course of time he takes his vacation, and it is the duty of the publicity bureau to see that when motorman John Jones takes his vacation that there is inserted in the little paper published nearest the locality in which he lives, a statement to the effect that motorman John Jones, who is running on the ———— Division of the Boston Elevated Railway, and has been in the service of the company ——— years, is at present taking his vacation at his home. Little things like that, when followed up, have been productive of very good feeling on the part of motorman Jones and his family and others.

For the purpose of obtaining discussion on this paper I would divide it into two heads. Publicity can be dealt with from the standpoint of the announcements that the corporation desires to make to the public, and also from the standpoint of advertising that the corporation desires to make to obtain patrons. We will first take up the question of dealing with the press from the standpoint of making announcements.

Oren Root, Jr., of New York—I agree with the writer of the paper very thoroughly in his high estimation of the newspaper profession and of the men who are engaged in it. I think as a class they stand well, compared with other classes of men, and I think they are susceptible to similar influences that other men are susceptible to. In a city such as New York, I think there are two classes of influences which a public service corporation may have upon the press. The first is the relation existing between the executive head or the financial interests back of the property, and the financial ownership of the paper or the controlling manager. The second influence to be exerted upon the press is the treatment of the newspaper men, the reporters, with whom the manager or his staff come in contact. I do not think you can overestimate in the long run the beneficial influence which polite and courteous treatment on the part of the officials of the railroad has upon the reporter himself, however small and unimportant he may seem, or however poorly he may be dressed. The cumulative effect of polite treatment of reporters is bound to be very great in the long run. I am reminded of an incident which occurred last year when there was some criticism being made of the New York City Railway Company on account of the number of open cars that were being operated. A reporter came to see me one night as I was leaving the house rather hurriedly, and propounded several propositions to me bearing upon the subject. I did not have time to discuss the subject very fully with him, but I gave him the facts and told him to go ahead and write an interview and I would stand for it. I was very much gratified the next morning to pick up the paper and find an interview occupying a quarter of a column, and which was far superior to anything I could have written. As another illustration, a short time ago, when there was some agitation on the part of the management of the company in the exposing of transfer frauds, we desired to get our position before the pub-

lic in order to eliminate any undue sympathy on the part of the public toward any people engaged in the transfer frauds whom we were intending to arrest and prosecute. We arrested some 150 men who were engaged in the fraud. I called up one of the reporters whom I knew and told him what I would like to have him do. I told him the whole story, including the inside facts of the case, and indicated what we would like to have published and what we would like to have left out. I said I did not want to be quoted at all in the matter. The whole conversation did not take over five or ten minutes, with the result that the next morning when this paper, one of the most, if not the most, important paper in New York, was issued there appeared an article of a column or a column and a half stating in a very favorable light our position, as far as this transfer proposition was concerned.

My experience has been the same as the writer of this paper, as regards the desire on the part of the press to report truthfully the occurrences which come to their attention, and I believe that a very large percentage of the misstatements of fact which we see in the newspapers come either from a lack of proper information, or from a desire to make a readable story, and without any desire to injure the company concerned. Some time ago there appeared in the evening paper a statement of a serious collision which was supposed to have occurred late at night in the lower part of the city between a vehicle and one of our surface cars. I noticed the account in the paper, and upon reaching my office the next morning could find no report of any such occurrence. I immediately started an investigation with the result that it was proven conclusively to my mind that no such occurrence ever took place. I got together a sufficient amount of data on the subject, and had the matter laid before the city editor of the paper which published the story, with the result that the reporter who wrote the story of the alleged accident was discharged from the paper. It seemed that the information had been turned into the office through one of the numerous runners who give information to the newspapers, with the desire of being paid for this information. They discharged the reporter on the ground that he did not properly verify the facts, which he could have done had he desired to do so. I think, as a general proposition, if you treat the newspaper men with the same consideration and apply the same rules of business amenities to them as to any other body of gentlemen, treating them politely and courteously, giving them what you want to tell them, not necessarily telling them the whole story unless you feel it is desirable, but treating them fairly, frankly and honestly, the results will be very satisfactory, and with the exception of a very few and unimportant cases you will find that they will not abuse your confidence.

W. E. Harrington, of Camden—My experience has covered, to a great extent, both views of this question. For several years one of the companies I was with was very strongly opposed to furnishing any information to the press, and for years carried out that policy very tenaciously. The result was that the company was misrepresented in very many instances, and was often placed in a very bad light. The company gradually changed that policy and began to furnish information to the press, and even went so far, in many cases, as to ask the newspapers to send a reporter to the office of the company for information, which the company freely furnished. The good results were so noticeable and so marked that it has been the practice of the companies with which I am associated and the companies generally in our vicinity to secure the dissemination of information in this way. The company with which I am now connected very frequently sends to the different newspapers in the different municipalities through which we operate notices of changes in our schedules and matters of general information; and we find without exception that the public at large is better posted upon matters pertaining to the railway company than it was before, when it was the policy of the companies not to furnish any information to the press. The furnishing of this information has redounded to our benefit. Furthermore, I have found that as a result of this policy the editors and reporters will, in many instances, when they receive information from other channels, call us up to see if it can be confirmed, and to find out if we wish to have it published or not.

W. W. Cole, of Elmira—Tersely speaking, I do not think there is any general rule that can be applied to this subject. As a matter of fact, the reporter, in going out on his assignment, is, of course, anxious to get the news. He has two sources from which to draw it from, either fact or his fancy. He prefers to get the facts, if he can, as it is the easier method for him. If he does not get the facts he draws upon his fancy, and every time he does that, trouble arises. I think in giving out the facts the company should appoint one man to whom all information should be given and who should determine what shall be given out for publicity. Where two or more men give out the news, one man generally talks too much, and the other man does not talk enough. It should be decided just what is to be given out, and one man should give to the press all the information that the company desires published. Under this arrangement the reporters become accustomed to going to one man for the news, and the official who is responsible for giving out information to the newspapers becomes acquainted with all the representatives of the papers, and is generally on a friendly basis with them. In this way the best results are secured, and the information that is given out is more likely to be correctly stated. Such a course does not lead to trouble, as in the case where a company tries to conceal news and allows the reporter to work on his imagination. I think that is the only general rule that can be applied.

C. B. Fairchild, Jr., associate editor of the Street Railway Journal, then read the section of the Question Box relating to advertising.

J. E. Stephenson, of Buffalo—A great many ways of advertising have been mentioned in the Question Box, but it will be at once appreciated that the methods of advertising employed must depend largely upon the amount of money that the company can afford to spend for that purpose. The methods of advertising which we have found of the greatest advantage in Buffalo have been through the medium of the illustrated folders. We have published folders at different times, and they have averaged about one cent each in cost. The tendency for an up-to-date advertising man is to get out the nicest class of advertising he can. That is shown by the class of advertising being issued by the steam railroads of the country. They frequently pay for publications in small editions as high as 25 cents each. It depends largely on the revenue which can be attracted through that kind of a pamphlet. A trolley company could not afford to spend that much on a publication, but in view of the average fares to trolley resorts it would seem that a publication costing about one cent each would be a good medium for advertising. It does not necessarily follow that a person paying a 10-cent fare has cost the company one cent to reach him, through the medium of these folders, because one person who may ride as the result of the folders is the means of inducing other persons to ride. Much cheaper forms of advertising are also commendable. Time tables are necessary, and other information which can be put in cheaper pamphlets will carry a great deal of weight in the development of the business.

Newspaper publicity is preferred by a great many, while by others it is considered an expensive means of advertising. That, it seems to me, depends largely on the kind of newspaper advertising which is done. If a contract is made with a newspaper for a very small space, the cost of that space may reach a considerable sum by the end of the season, without

bringing any satisfactory results. We have found that spasmodic newspaper advertising, taking space of three to six or eight inches, at intervals, the announcements not appearing in two newspapers the same day, is a good means of advertising events and keeping up the traffic on the interurban roads. With advertising of this nature, which costs a little higher than the flat rate for running a given space for a period of time, it is the practice of the newspapers to give reading notices, and the standing of the railway company with the newspaper will govern these notices to a great extent. It depends a good deal on the liberality of the business manager and the policy of the newspaper. At times you can get only a very small space, and at other times the paper will insert a reading notice of half a column in connection with a 6-in. advertisement. Advertising of this nature is almost always accompanied with good results.

The practice in Buffalo has been to advertise events and special occasions by posting display cards in the car windows: a half-sheet poster will do for this purpose, as it is readable from the outside. With these posters in the cars that cover the city lines, you can reach the public with your announcements very quickly and very thoroughly, because a person does not need to be on a car to see the notice. We have come to the conclusion from the offers which we have received from advertising agents all over the country, that that space must appeal to the practical advertiser as a very valuable medium. We constantly change our matter. We had a lithograph poster during the winter time, which we had made up in large quantities, but the prevailing opinion was that the public tired of seeing it and we have gone back to the printed posters, which admit of more frequent changes. On the back of the poster facing the outside of the car we have another poster which faces the inside of the car, and that reaches the people traveling in the car. Notices of change of schedule and change of routes reach the people that way, and such notices are more valuable in this position, because they reach the people who are interested in the information.

On motion the meeting then adjourned until 3 o'clock.

TUESDAY AFTERNOON SESSION

President Allen called the meeting to order at 3:20 o'clock, and the discussion on methods of advertising was continued.

D. F. Carver, of Rochester—With the opening of the summer business we have gone into the publicity part of the service with great activity. We carry some advertising on the outside of our cars. We have a board, 9 ins. x 25 ins., made so that it will hang on the dash of the car without injuring the dash, and we use a printed card tacked onto the board. The cards are printed in type large enough so that the sign can be read by a person on the sidewalk. Using type of that size does not allow much reading matter to be put on the sign, but we can put enough on the sign to attract the attention of people and get them talking about what is going on. In this way we created a great deal of business for the "Lilac Route," and in the spring when the lilacs were in bloom we had on the sign the words "Lilacs in Bloom." The signs are changed sometimes three times a week. Our idea is to get people talking about the road. Strangers may not understand it all, but they can find out from others. We use similar signs for the suburban lines. We think we get a great deal of business on these lines from this advertising. We try to feature some special thing.

E. J. Wilcoxen, of Rochester—On the suburban line running to Sodus Point we advertise excursions extensively. We started what we call a "novelty advertising scheme" for calling attention to the foliage along our route. For instance, when apple blossoms were in bloom, we put in the railway ticket offices a branch of apple blossoms every morning, and also put branches around in different parts of the city. We then advertised on the boards on our cars "Apple Blossom Excursions." We found in doing this that it called the attention of the school principals to our park and led them to make up parties to visit the section through which the cars passed. We also tried the scheme of putting in the windows of some of the sporting goods stores fish caught at one of our resorts. The fish were furnished by the oarsmen whom we hired at the bay. We noticed for two or three days after an exhibit of fish had been placed in the windows in this way that our receipts on this line were increased to quite an extent. For instance, on off days, such as Tuesday and Friday, the travel is increased by putting an exhibit so as to cover those days. We have also tried this scheme with several different things, such as peaches, farm produce, and other things, that at the particular time are particularly attractive on the lines of our road, and we have found this advertising adds somewhat to the receipts.

In regard to "company publications" the Rochester Railway is publishing a regular pamphlet which consists of about 36 pages. The book we have this year is called "Trolley Topics," and it is published once a week from about Decoration Day until Labor Day. It contains some advertising matter, and a small amount of space is given to each town along the line calling attention to certain industries which are there, and there are one or two pages devoted to theaters, attractions and write-ups of all the summer resorts. I think it costs us, after deducting receipts from the advertising in the book, about $500 a year.

Mr. Fairchild—Is it money well spent?

Mr. Wilcoxen—It certainly is.

Mr. Fairchild—There has been a good deal of interest in these little weeklies. Most of the company publications which are published in this country have emanated through the example set by the Detroit United Weekly. In the Question Box there are a number of letters referring to company publications, and I believe these are found to be valuable mediums for advertising the road.

W. E. Harrington—The matter of publishing a periodical is one which has been considered by our people on at least half a dozen occasions. It has always come back to the question of the man who would have charge of it. If a paper of that kind is not properly looked after, made spicy, and the matter in it continually changed, it would not be a success. The public would lose interest in it. It depends upon the character of the man you have to look after it.

As to the value of a periodical of that kind, there is no question of the great good it would do and the benefit to be derived from circulating it throughout the community that you serve. The greatest amount of good, however, I think could be derived from your time-tables and folders, specifically describing the lines and containing a map of the system showing the points of interest. If a periodical could be gotten up by some one, and the main portion of the publication could be used by the companies in the various small places, somewhat along the same idea as newspapers are printed and published throughout the country districts, having the body of the paper the same in a number of places, the local news being inserted by the local editor or publisher, I should think possibly a street railway publication along that line might be useful generally throughout the United States. I do not know whether that idea has been thought of or suggested, but it seems to me such a publication would be very valuable to many companies and would supply an actual need.

J. H. Pardee, of Canandaigua—We have never issued what might be called a regular publication. We issue time-tables, folded once or twice, so that they will fit into the vest pocket. We issue these in large quantities along the line, and we find that almost every person in the community, at least every man, has one of these little time-tables in his pocket. The people will not carry the large folder with them, but they will carry the little time-table. Then we issue a folder descriptive of the

line. We have distributed a large number of these very carefully in the towns, and these seem to be preserved. In my opinion an attractive folder, which people will look at the second time, is very valuable and the money is well spent. We have a peculiar situation. We have two or three different classes of people whom we have to attract to our line, which is strictly an interurban line. We have no summer resort on it, except a lake, on which there is a steamboat line. It is a very easy matter to advertise the line along the towns, and for getting the people out of the city we use newspaper advertising and display advertising during the summer time. Then, to attract the general traveler and the commercial traveler, we have felt that we should inform the public so generally about our line that no man or woman living within 100 or 150 miles of Rochester, when they arrive at Rochester or Geneva, would fail to know that there was an electric line to Rochester or to Geneva, and they would know enough about that line to take it instead of the steam line. We are confronted with very strong competition from the steam line. In order to accomplish the effect desired I have had these folders distributed in the folder cases in all the hotels and railway offices in Western New York, west of Syracuse and Binghamton. That is all we have done or been able to do. We cannot afford to spend a very large amount of money in advertising, and are compelled to take outside or alien advertising in our folder to help pay for it. Our general offices are in a small town, and we have adopted another plan for our advertising in that town and the adjoining territory. There is a local newspaper reporter there, and he writes articles for the country newspapers all over that section of the country. I get electrotypes of scenes along the lines, one column wide or two columns wide, and he sends these to the country newspapers in the towns near by and furnishes an article with them, and the newspapers are always glad to publish these articles as news. Somewhere in the article it says that the Rochester & Eastern Railway is running to certain points. That is a very valuable method of advertising, and is not very expensive. The newspaper man can easily use such advertising. If a company is large enough so that it can afford to engage a man to look after its publicity department, that is the best method, but with a company not able to maintain such a department, it can accomplish these results inexpensively in the way indicated.

W. E. Harrington—It occurs to me it may be well to bring to your attention a practice we followed for some time. When we make a change in our time-table, or have any particular notice regarding our car movements, we get up a circular announcing the change, and we make an arrangement with the local newsdealers in the different towns affected by the changes, by which, for a very nominal consideration, a few dollars, they will put the circular in all the newspapers which they distribute from house to house through the neighborhood the following morning, so that the circular or advertising matter would be in each residence within 24 hours after it was issued.

H. J. Clark, of Auburn—In Syracuse there has recently been started a publication, it might be termed a pamphlet, which I think is called "Trolley Topics." This is issued without any expense to the railroad company, by an individual who is not connected directly with the railroad company, and who relies on the advertising he can obtain to pay his expenses. We are enabled in this way to make note immediately of any change of our time-tables in this publication. Although we operate a strictly interurban line between Syracuse and Auburn, we use the lines of the local companies for advertising purposes. We have two cards in each car. We believe that has paid us many times over.

G. Tracy Rogers, of Binghamton—We have an interurban and a city line. Some two or three years ago we got up a souvenir book, 10 ins. x 18 ins., which was entitled "Views of Binghamton and Its Surroundings." We mailed that to every society within 100 miles of Binghamton. We issued the book to these societies in order to have them arrange for excursions to Binghamton. We have been very successful in that direction, and have made money as the result of our effort. Then on our cards we have a large painted sign, extending from the top of the car, down on the side of the car, advertising vaudeville shows and other matters of interest. Then we have a car the whole side of which is used for advertising purposes. This is run as a special car, and at times we have a band of music in the car to attract attention. In the office we have one man who writes the notices for the newspapers. Each paper has a notice every day of the different entertainments and general information for the public. Our method has been very successful in securing a large attendance at our parks. We have two or three, and have found that this form of advertising is very successful.

The President—If you will take the statistics of the income and operating expenses per car mile of roads which are members of the association, for the year ending June 30, 1904, compiled by H. M. Beardsley, of Elmira (this table will be published in the next issue), and examine account 31, which includes "Advertising and Attractions," you will see a great difference in the cost of advertising and attractions among the different roads. By following through these different roads you will see there are some roads which do not have to build up traffic, and, of course, do not spend anything for this purpose, for example, like the New York City Railway Company. It certainly must be a subject of great interest by reason of the diversity of these figures.

George J. Blakeslee, of the Albany & Hudson Railway—Perhaps it would be well for me to describe briefly our layout. In the first place, our road is built through a country in which the business along the line is hardly sufficient to support the road. We have a combination of 36 miles of third-rail road, two gas companies and two electric light companies. We found it was necessary to attract people from Hudson and Albany, Albany in particular, to support the road. In order to do so we established what we called "Electric Park," a resort which is pretty well known throughout the State. The best method of advertising, in my opinion, is what has been mentioned in regard to the newspapers. We treat the newspapers pretty well and advertise our time-tables in them, and some of them we supply with transportation. That does not amount to very much, as they do not come very frequently. We find that by selecting one paper for our announcements, as, for instance, the Times-Union in Albany, that the people get into the habit of looking in the "Times-Union" to see what is going on at Electric Park. By following that practice regularly, after a while everyone knows where to look for information about the park. Last year we had a number of photographs made, which we framed in an attractive manner, and we put them in the principal hotels. This is a good plan, because a picture in a place like a hotel comes to the attention of all traveling people. We got out a souvenir book containing ten or a dozen illustrations. These were sent to all the societies in our neighborhood, which are in the habit of holding picnics. We also had these on sale at our park, and sold enough of them to pay for the publication. Then we use the billboards very largely. I think that is one of the best means of advertising which we have employed. If anyone is in the habit of going to Albany they will see on all the billboards there the name "Electric Park." The billboard does not tell where the park is, or much about it, but everybody knows where it is. We have a vaudeville entertainment and run a good class of shows. We have a programme for our vaudeville, which is paid for by the advertisements, and this programme is pretty generally circulated. We find in the summer time it is a good plan to have a man to look after excursion business and advertising, and all

that sort of thing. It pays very well. Our expenses charged up against our earnings for advertising and publicity are not very large—less than $500 per year. We tried some experiments last year with our park, with regard to winter sports, and the experiment was so satisfactory that we are going to keep the park open all the year, which will mean a little more expense in the way of advertising. When there is any special entertainment or attraction we have cards printed and hung up in the cars and distributed among the stores. It is an inexpensive way of calling the attention of the people to the park. We found this year we did not need to advertise as extensively as heretofore, because Electric Park is so well known. A good many of the companies do not need to advertise as much as we do, because our bond interest is paid by the people whom we attract to Electric Park. You know what that means.

F. J. Ryan, of Schenectady—I ask the opinion of some of the delegates on the relative merits of the souvenir folder as against the pamphlet periodical, and the best means of distribution?

Mr. Stephenson—In Buffalo, we have done very little in the nature of advertising through the medium of pamphlets. I presume the gentleman refers to the pamphlet company publication distributed in the cars. We have not adopted that plan of advertising, but it seems to me from what I have seen in other cities that the idea is a very good one and serves to bring the company and its affairs more closely in touch with the traveling public. In other words, the company takes the public into its confidence by keeping the people fully informed on the current topics, and at the same time places its resorts and other features along the line before the public and keeps them there. I think the pamphlet idea of advertising is a good one, but I would not attempt to pass on the relative merits of that, as compared to the folder. My experience in advertising has led me to believe that the public will not pay attention to advertising matter unless presented in an attractive and readable form. Notwithstanding the fact that the electric railway business and the steam railroad business are two different things, the public is educated undoubtedly to the folder plan of advertising when it comes to getting information on a traffic matter, whether it be a steam road or a trolley road. People will pick up an attractive folder and read it carefully much quicker than they will pick up a leaflet, which may be at first glance like an advertisement for patent medicine or something else which is thrown into the doors every day.

Our experience with cheap advertising, such as handbills, has been that it is shown to be a rather expensive form of advertising in the end, because the handbills, while they may not cost much money for the printing of them, have to be distributed in quantities of not less than 20,000 to cover our population, and the distribution of the handbills costs $1.50 a thousand and in many instances we find them thrown away, and we cannot place much dependence upon the distributers. A distributer is given $1.50 a thousand for distributing the handbills, and it is an easy matter for his man to throw away five hundred in an ash barrel. We used to find that handbills would turn up in ash barrels and all manner of places where we did not expect to find them. For that reason we discarded the distributing of cheap literature from house to house.

We publish an attractive folder. Our folders of the different kinds average just about one cent apiece. We find the distribution of that folder from house to house has a good effect, because it is not thrown away or classed with cheap literature. The cover at once shows what class of literature it is and invites inspection. While we have a good deal of faith in the distribution of a weekly pamphlet in the street cars, I do not think a distribution from house to house is advantageous. I think the cost of distribution is greater than the results of the work justify. I do not believe it can be considered a good form of advertising for our business.

For a period of ten weeks I think a folder prepared in an attractive form ought to be produced at from $35 to $40 a week, depending on the number of half-tones and the class of paper. You can vary the expense very much, according to the quality of paper you use. If you use machine-finished book or coated paper, the expense will be somewhat higher; but the better the paper the better the work you can bring out. You can get out an edition for possibly $30 a week, or you could spend $60 a week for an 18-page folder.

Mr. Blakeslee—We use a folder in addition to our programme, and we have not been obliged to pay any thing for it. As a matter of fact, last year we sold the programme privilege for $100. We have a number of stations along our line, and in Albany and Hudson, and other places, where this advertising matter may be properly distributed, and I do not think there is any need of spending money for a programme or a folder, because there are people who will be glad to print it for the advertising they get out of it. That is my experience. Our folders and catalogues have not cost our company much money. After the first year's experience, we found people who were glad to undertake the work free of expense to our company.

E. F. Peck, of Schenectady—Recently I have received prices on a very elaborate booklet, 12 ins. x 12 ins., which is to open endwise and which will be handsomely illustrated. The price quoted me for the cuts and reading matter complete for an edition of 25,000 was $600. This was to be more elaborate, I think, than any of the booklets which have been described here. The pictures are to be high-class, and the book put together in fine shape with a handsome cover. I wonder whether that will be good advertising or not? It is to be used in connection with the illustrating of features along our road, the describing of historical points and the illustrating of picturesque scenery. The book is not to be distributed to everybody, but we will advertise in the papers that it will be sent on receipt of a 2-cent stamp.

Mr. Stephenson—It occurs to me in connection with the price which Mr. Peck mentions for the folder that the price quoted would be at the rate of 2.4 cents a copy. The question arises whether the result of such advertising would justify that expenditure.

I would like to hear further discussion as to the experience of the various companies which have taken alien advertising in the various publications to defray the expense of the publications. It seems to me to be the prevailing opinion of the railroads that they can get an advertising man to take the publication and deliver them to the company free of charge and pay the expense of its distribution; the advertising man being reimbursed through the amounts which he receives for the advertising in the publication. If that can be done, it seems to me to be a good method of advertising. The question is, how is the company to determine the number of copies printed and the number of copies distributed? If you leave it to an outsider he has something to gain by running an edition ten thousand or fifteen thousand short of the agreed number. As we know, many advertising agents have a tendency to represent their publication as issuing 25,000 or 50,000 copies, while as a matter of fact they may only issue 10,000 copies. We have made it a rule in Buffalo to advertise as little as possible in programmes and other similar publications. When we do go into such advertising, however, we make it a rule to insert a clause in the contract that the money will be paid when we find that the agreed number of copies have been printed and circulated. We had to take that precaution, because we found that many advertising agents will represent that they are giving out 50,000 copies, when by figuring out the cost of the production and the revenue derived from the advertising, we found that the man could not possibly issue 50,000 copies, based on the prices he charged for advertising. As a matter of fact, 10,000 copies seem to be the limit most agents will issue. If

that rule applies in advertising of that kind, does it not follow, when an advertising man takes a publication off your hands and agrees to distribute it, there is a question whether he is not going to take advantage of you and distribute a smaller number of copies than you would if you were doing the work yourself?

Mr. Rogers—In regard to the expense of advertising, I think there must be a difference as to the method of charging it to the company. I would ask where the roads charge their music. We furnish a band every day in the summer. I ask some of the members where they charge that expense. We are putting these things into advertising, and taking the profits of our parks and casino and putting the result of that in the season's profit. I ask where other roads are placing these charges?

Mr. Stephenson—According to the classification laid down by the Street Railroad Commissioners, that expense should be put into account 31, "Advertising and Attractions."

Mr. Rogers—If that is so, some of the roads cannot furnish music, as the music would cost them as much as their whole charge for advertising. I am paying from $2,000 to $3,000 for music each year. I see some of the roads expend only $2,000 altogether.

The President—Speaking for the Utica & Mohawk Valley Railway, we have two parks, and this is our method of handling these accounts: The net deficit resulting from the operation of the parks is charged to account 31.

Mr. Rogers—That is what we have been doing.

Mr. Pardee—The folder we issued this spring is devoted entirely to the railroad and the connecting lines. We have some local advertising and some alien advertising. The folder consists of 24 pages inside and four pages of cover, 28 pages in all. We put in a very heavy paper for the cover, so that it approximated the steam railroad folder, although it was not quite as good. We issued 25,000, which we thought would be enough, but we are going to get out another 25,000. The first 25,000 cost approximately $350. The alien advertising paid within $50 of the total cost. The folders were distributed in a house to house distribution in Rochester, and the work was very carefully done. As far as alien advertising is concerned, the ideal thing is to get out a folder without alien advertising in the same way as do the steam roads. But with a small company in the issuing of these folders, it is often a question of taking some alien advertising or not getting out the folder.

CARS FOR CITY AND INTERURBAN SERVICE

The President—If there is no further discussion on advertising we will take up the next topic, which will be a discussion on the merits of single-truck cars and double-truck cars for city service, and heavy and light cars for interurban service. This subject will be taken up first by T. W. Wilson, general manager of the International Railway Company, of Buffalo, in a paper entitled "Suitable Cars for City and Surburban Service."

Mr. Wilson read the paper, which is published elsewhere in this issue.

Oren Root, Jr., of the New York City Railway Company—I had hoped that Mr. Starrett, our chief engineer, would be here and that I could place the burden of opening this discussion on him, but he was unable to be present. I do not consider that any one can argue convincingly on this subject by dealing in generalities. The subject is essentially one which must be handled according to the conditions which arise in any particular locality. I have noticed for some time that the general trend of opinion of managers throughout the country has been along the lines suggested in this paper by Mr. Wilson. I have no doubt that their judgment is correct, certainly so far as we have heard in regard to the conditions which exist in a great majority of the cities in this country. But I must certainly take issue with them as regards their opinion when it refers to Manhattan Island. No amount of theory has any weight with practical experience in that case. There is no doubt in my mind as to the desirability of the double equipment as used in New York City at present. In other words, the standard closed car and the complete open car. There is nothing, in my mind, which will take the place of the open car unless it should be the development of a full convertible car—a complete closed and a complete open car. As far as my knowledge of the situation goes at this time, I do not know of any such car which I should consider feasible for up-to-date city service. If the convertible car was thoroughly practicable and you could take an open car and make a first-class closed car out of it with no attendant disadvantages, that would be an ideal situation. At the time that the Metropolitan Street Railway Company took over the Third Avenue system in New York, there were about one hundred cars on the Third Avenue system which were of the St. Louis type. They were excellent cars, as far as the cars themselves were concerned, and, as I remember, were 42 ft. over all, with cross-seats and the aisle in the center, large windows, and substantially what is known as the semi-convertible car. The car was not adapted, in the opinion of the officials of the Metropolitan Street Railway Company, to our winter service. The condition in the winter service was, that the car during a round trip, which would be made by our standard type of car in 220 minutes, could not be made with the cross-seat car, with the loads we are forced to carry in New York City, within about 15 minutes of the time the trip could be made with our standard car. This loss of time was almost entirely caused by the time that it took people to get out of the car when it was crowded. The normal conditions during certain hours of the day, probably three or four hours, in New York, are crowded cars. It is only necessary for you to figure up mentally the great loss in business and in operating expenses to the company by this decrease in the running time of the cars. The slowness of the operation of the cars under consideration was on account of the length of the stop. But that was not the principal objection. The Third Avenue line, on which these cars ran, carried during the summer months on the normal day probably 190,000 passengers, so that you can see it is a typical trunk line in the New York City service. We ran these cross-seat cars, which may be termed a semi-convertible car, in conjunction with the standard Metropolitan open cars. I have stood on the street corners and watched them for hours. Upon a hot afternoon—particularly on Sunday afternoons—when this line was carrying upward of 200,000 passengers during the 24 hours, I have seen the standard open cars so crowded there was scarcely room for another passenger, and people standing along the streets waiting to board the cars. A cross-seat, semi-convertible car would come along immediately behind a standard open car and the seats would not be filled. There is no amount of theorizing that can possibly offset, in the mind of a practical man, the result of such a test as that. In other words, it was absolutely convincing to my mind (and it does not seem to me that any man could fail to be convinced in a similar manner), that the standard open car was the kind of car the people riding at that time wanted. Whether it is possible to educate the people to the use of the semi-convertible car is a question. I do not believe you can, as compared with the standard open car.

Regarding the advisability of carrying this double equipment, since we have put on the open cars, we are carrying about 240,000 cash passengers a day more with the open car equipment than we did just prior, when we were running the complete closed car. You do not have to take your pencil to figure out the great advantage to the company, financially, of having that double equipment. So I say you cannot argue convincingly as to the advisability of any particular type of ear and make any general deductions applicable to all conditions.

It is for this reason I would take issue with the statement in the paper which says: "The cross-seat car is one of these modern conveniences. It is prescribed by law to-day in Chicago and other cities, and, in our opinion, will be within a few years the standard street railway car of America." I do not question the correctness of the statement as applied to street railway operation outside of New York City; but I do not believe anyone who analyzes the New York situation—without necessarily being connected with the operation of the railway there—could help but believe that as far as New York is concerned that statement is incorrect. I believe not only that that statement is incorrect, but I also believe that anyone who is familiar with the subject will agree that the situation as it exists to-day is the correct one, as far as Manhattan Island is concerned.

The President—The next paper will be on types of interurban cars, by J. N. Shannahan, general superintendent of the electric division of the Fonda, Johnstown & Gloversville Railroad.

Mr. Shannahan read the paper, which was printed in the last issue.

W. W. Cole, of Elmira—During the month of February last, E. P. Dandridge and R. R. Drake, of Cornell University, made a test of our single-truck and double-truck cars. I have their report in my hand. The data which they give bearing on these tests are rather voluminous, but their summary is interesting. They state:

Summing up the results for the two days we find that the watt hours for the complete run with the single-truck car amounted to 76,870. The length of the run was nine hours. The cost of power per kilowatt-hour was 1.25 cents. Hence, cost of power for the day was $76.870 \times 1.25 = 97$ cents. The cost of platform labor was 35 cents an hour, or $3.15 for the nine-hour run. Total cost for the run $= 97 + \$3.15 = \$4.12$. The seating capacity of the car was 25, and the distance traveled was 84 miles; hence the cost of operation of the single-truck car per car seat per car-mile was

$$\frac{\$4.12}{25 \times 84} = .196 \text{ cent.}$$

The watt hours for the complete run with a double-truck car amounted to 129,380. The length of the run was 5.3 hours. The cost of the power for the run was $1,293.80 \times 1.25 = \$1.622$. The cost of platform labor was 35 cents an hour, or $35 \times 5.3 = \$1.86$ for the 5.3-hour run. Total cost for the run was $1.62 + \$1.86 = \$3.48$. The seating capacity of the car was 40, and the distance traveled 52 miles; hence the cost of operation of the double-truck car per seat per car-mile was

$$\frac{\$3.48}{40 \times 52} = .167 \text{ cent per car seat per car-mile.}$$

The per cent gained by using double-truck car, figured on the basis of car seat per car-mile is

$$\frac{1.97 - 1.67}{1.97} = 15 \text{ per cent.}$$

TABULATION OF FINAL RESULTS

	Platform Expenses for Run	Cost of Power Consumed	Seating Capacity	Mileage	Cost per Car Seat per Car Mile
Car No. 26..	$3.15	$ .97	25	84	.196
Car No. 21..	$1.86	$1.62	40	52	.167

Percentage gained per car seat per car-mile in favor of double-truck car equals .029 cent, or 15 per cent.

Upon receiving this report I wrote the gentlemen that they had not taken into consideration the passenger factor, or ton factor in that report, and it was suggested to them that the final results should be figured out in terms of cost per seat occupied, per car mile.

The following are the determinations made on this basis:

Cost of operation of single-truck car	$4.12
Cost of operation of double-truck car	3.48
Passengers carried during run with single-truck car	245
Passengers carried during run with double-truck car	306
Miles traveled by single-truck car	84
Miles traveled by double-truck car	52

Hence, cost per car seat occupied per car mile equals, with car No. 26, $412 \div (245 \times 84)$ or .02 cent for the single-truck car. With car No. 21, the cost is $348 \div (306 \times 52) = .022$ cent.

From this it follows that, if the capacity of the smaller car is ample for the maximum load conditions, then it is the part of economy to use comparatively many single-trucks cars in preference to a few double-truck cars.

H. M. Buegler, superintendent of the electric department of the Elmira Water, Light & Railway Company, went over these tests and checked up the figures, and I have his letter as follows:

With a view of determining the difference in cost of operating single-truck and double-truck cars, operating under exactly the same conditions, we carried on a test last February, confining it entirely to local conditions. The results obtained, at first glance, are somewhat misleading, as the problem we set out to solve was to determine the cost of operation per car seat, per car-mile, ignoring the fact as to whether the car seat was occupied or not, and the ton-mile factor. The conclusion reached, without taking into consideration the passenger factor, is about 15 per cent in favor of the double-truck car, but this difference in cost is brought about entirely by the fact that there is a fixed platform cost that does not fluctuate with increased travel per car-mile, as in the case of current consumed. With the 40-seat double-truck car the platform expense per car seat per car-mile is only .0009, while with a single truck, 25-seat car, the platform expense per car seat per car-mile is .0015, or about 40 per cent in excess of the double truck. On the other hand, with the double-truck car, the power consumption per car seat per car-mile costs .0004, while with the single-truck car with 25 seats, the cost of current per car seat per car-mile is 48 per cent less than with the 40-seat double truck. If we were to operate our equipment idle, without stops or passengers, the above results show conclusively that there would be some economy in operating double-truck cars, but this would ignore the passenger factor entirely. When we bring this into the problem and determine the cost per seat occupied, per car-mile, the results are decidedly in favor of the single-truck car. The following are the determinations made on this basis, which shows a percentage in favor of the single truck, 25-seat car of 10 per cent, operating under actual conditions, and taking into consideration the seating capacity, passengers carried, mileage, current consumed and fixed platform cost.

The total cost of operation of the single-truck car 84 miles, carrying 245 passengers, is $4.12. The cost of operation of the double-truck car 52 miles, carrying 306 passengers, is $3.48. The cost per car seat occupied per car-mile with the single-truck car, is .02 cent, and with the double-truck car .022 cent. From this, it follows that if the capacity of the smaller car is ample for maximum load conditions, then it is the part of economy to use comparatively many single-truck cars, in preference to a few double-truck cars for the purely urban service in cities of the third class. I am of the opinion that there is an economy of at least 15 per cent in the use of single-truck cars, as compared with the double-truck type, such as are in use in Elmira. The fact that the current consumption per ton mile in the double-truck car showed an excess consumption of 50 per cent over the single-truck car, convinces me that with the traffic we have, we can double the number of cars in service during the rush hours and show a decided decrease in operating cost, as compared with a double-truck equipment, including all such important factors as car seat capacity, current consumption, passengers carried, platform cost, and the ton-mile.

I have carefully gone over the results of the test and I find them correct, except in the conclusion, where every factor which would tend to decrease or increase power consumption should have been taken into consideration.

J. E. Duffy, of Syracuse—For a great many years we have operated in Syracuse a single-truck, 22-ft. body car, but during the past five years all of the new cars we have been ordering have been double-truck cars. The first double-truck cars we ordered were 30-ft. over all, seating 44 passengers. We found that that type of car was a little large for our service in Syracuse. It might and would do upon our main line, with no curves, but we found considerable trouble in operating that car on other lines. Another trouble experienced with that car, even on our main line, was the fact that it was hard work for the conductors to collect all the fares in a car with a seating capacity of 44 passengers and a standing capacity of 40 or 50 more passengers. In our city, for a distance of about 7 or 8 blocks through the center of the city, it is almost impossible for our conductors to go into the cars to collect fares, owing to the large amount of special work and the large number of passengers who are boarding and leaving the cars at the more

important transfer points along these 7 or 8 blocks. We found by inspection that we were losing a large number of fares, due to the use of the extremely long car. The last nineteen cars which we ordered were cars 28 ft. over corner posts, seating 40 passengers, and up to this time we have adopted this car as our standard car. I believe the management of our company has ordered eighteen more of these cars to be delivered some time this fall. As I say, we have found this an exceedingly good car for our city service and for what little interurban service we have, which is on one line running 8 miles from the city and on another line running 5 miles from the city. I have no data in relation to the amount of power consumed in the double-truck cars over the single-truck cars. I would not disagree with Mr. Cole as to the ratio that he expresses, but with the large number of cars in our city, and in view of other considerations, which are strictly local, I would state that the type of car we are now using has given us excellent service. Mr. Root spoke a little while ago of some cars of the semi-convertible type, which were used on the Third Avenue line in New York City. I am sorry to say that we have several of those cars in Syracuse. I am not surprised that Mr. Root wanted to get rid of them. We do not run these cars much in the summer time, as the platforms are not very large and they are enclosed with a vestibule in our city, which they were not in New York City. Perhaps our vestibule on the double-truck cars which we use is not as large as that in some other cities. In fact, on our 28-ft. body car the vestibule is not nearly so large as on the 30-ft. body car, but we have decided that a 4-ft. 6-in. platform is a pretty large platform for our city. We are more than satisfied with that type of double-truck car in our city and for what little interurban service we run.

T. W. Wilson, of Buffalo—I am of the opinion that the New York cars cannot be made much wider than 8 ft. There is a great deal of difference between an 8-ft. semi-convertible and a 9-ft. semi-convertible with longitudinal seats at the end and room enough for two people to get on and off at once, and also to move up in the aisle.

Mr. Duffy—That car is 8 ft. 2½ ins. over corners.

Mr. Wilson—Add the difference between that and 9 ft. to your aisle and you have a car in which you can handle people very easily.

Mr. Duffy—Our track centers limit us to a car less than 8 ft. 5 ins. wide. Our standard type is 8 ft. 3 ins. wide.

The President—What has been your experience, Mr. Duffy, with the semi-convertible type of car which you have had in use in Syracuse?

Mr. Duffy—The great trouble is when you want to avail yourself of the convertible features of the car, the windows do not go up or come down easily. Most of this trouble was experienced with the type of semi-convertible car in which the windows drop into the wall-pockets, although we experienced some trouble with those that went into the roof. This was due, perhaps, to the condition of the weather.

D. F. Carver, of Rochester—Personally, I am very much in favor, for this northern climate, of the semi-convertible car with windows going into the roof. Mr. Duffy spoke of the windows sticking. In the semi-convertible cars the sash are all wood, and if a heavy rain comes on, unless the windows are put up before the rain gets a chance to run down the post, some of the windows usually stick. With a semi-convertible car, with the windows in the roof, the water does not touch the sash slide, and I might also add that in the latest type of car the slide is being made of tin instead of wood. We have fifty of them in Rochester, and expect to get twenty more in a few weeks. We get larger receipts per car-mile from the open car, but these cars have the disadvantage that on long runs it is very hard to change them when a rain storm comes up. I know that in some places where open cars are run it takes two or three hours to change the equipment from open cars to closed cars when a storm comes up. With the semi-convertible car you can change from an open car to a closed car in a few minutes and keep the seats dry. If you are handling heavy crowds on Sunday and Saturday afternoons, and take people long distances in an open car or a semi-convertible car that cannot be changed easily, and a heavy rain comes up, you get a large number of the passengers wet; whereas, if you take them out in a car which can be converted into a closed car rapidly, you can keep a large percentage of the passengers and get them home in good order. For purely economical reasons, I think the single-truck car has a great advantage over any double-truck car, but there are other considerations than economy in getting business. Foremost among these considerations are those of safety. I think a double-truck car is much safer than a single-truck car. It is easier to keep on the track, and if a double-truck car should happen to become derailed, my experience has been that the difficulty and the injury is not so great as it is with a single-truck car.

Mr. Wilson—I will also add that one of the other advantages in having the window slide up into the roof pocket is that it gives you about 2½ ins. more to your seat, and if you do not have a double side to your car you can put your seat right up against the outside sheathing.

Mr. Duffy—That was one of the main reasons why we ordered the car with the windows going into the roof—it increased our aisle space.

W. E. Harrington, of Camden—For purely city service, I am firmly of the belief that a single-truck car is best adapted for city conditions. If you have a service where you go from a city into the country, and fast running is incidental to the service in the country, there is almost an absolute necessity for a double-truck car. If you go out further, 10 or 20 miles, then you need the interurban type of car of the larger kind. We used in Camden for years a 20-ft. body car, for the box cars, with 7-ft. 6-in. wheel-base truck, and we finally put on an 8-ft. wheel-base truck. We were fearful, before we put on the 8-ft. wheel-base truck, that we would have trouble from derailments in going around some 30-ft. radius curves, of which we had a few. To our surprise, we found no trouble whatsoever from this, and the use of the long wheel-base truck eliminated practically all the oscillation and other troubles incidental to the operation of single-truck cars for city service. The power consumption was so materially less, the average current consumption being 25 to 28 amps. per car for the 20-ft. car, against an average current consumption of 55 to 60 amps. per car on the 28-ft. double-truck car, that this alone is a factor in the economy of its operation. Other advantages are the quicker acceleration, the less amount of repairs and the fact that you can vary your number of cars to suit the different classes of business from day to day or from week to week. The largest car that we purchased in Camden was a double-truck semi-convertible car 33 ft. 9 ins. over the end posts of the car, equipped with four No. 56 Westinghouse motors, and the average current consumption was 100 to 105 amps. per car, with momentary inrushes of current 175 to 250, and sometimes 300 amps. In all this discussion I have not heard anything about increased fixed charge item brought about by the necessity of more power-station capacity. It is one of the important factors in the selection of cars. When we put on larger cars, we bought twelve 33-ft. 9-in. body cars, it brought about the necessity for putting in another 800-kw unit in our station. It hits us, when you put on these large equipments, in more ways than we think of. While I object to a single-truck or double-truck open car with cross seats on one point, and that is, the greater liability of accidents, there is no question but that you increase the number of passengers carried by the use of the open car, and the single-truck open car is certainly a winner. In the notes read by Mr. Cole as to the advantage of the single-

truck and double-truck car he made no mention, that I could hear, as to the increased expenses that would be chargeable to the double-truck car by reason of this increase of equipment required in the power station or to the greater depreciation which would ensue from the larger number of parts and motors and the trucks, which are incidental to the double-truck cars. Therefore, I believe that the single-truck car, with an 8-ft. wheel-base truck, and body 20 ft. over all, with longitudinal seats for a box-body car, and with cross-seats and side steps for open cars, seems to prove to be the best type of car for purely city service. For semi-interurban or suburban service, running out 4 or 5 miles into the country, I would say that a 28-ft. body double-truck car would be the best, and for regular interurban service, running long distances, a 34-ft. body car, with double trucks, having 6-ft. 6-in. wheel base and inside hung motors, would give the best results.

G. Tracy Rogers, of Binghamton—There is a serious element in the use of these very heavy cars which confronts us all, and which has not been referred to in this discussion. I refer to the effect of this heavy equipment upon our tracks and special work. These heavy cars are pounding our tracks, and sooner or later a serious question will confront us as to the replacement of the tracks.

The President—There is no doubt all of us who have had power stations which were able to care for single-truck cars on a given service have found, as our ideas have grown toward the double-truck car as the car which would become standard, that the power house has fallen short of doing its duty. We have accepted this state of affairs, and have excused ourselves with the thought that the increased receipts and increased good will in a community, due to changing from a single-truck to a double-truck car, would more than compensate for the difference in the cost of current. I see we have with us a number of master mechanics, and while we are discussing this question of the most suitable type of car for city service, I am reminded that one of the elements certainly includes the cost of maintenance, I should like to hear from some of the mechanical men as to what has been their experience in maintaining single-truck and double-truck cars.

Fred DuBois, of Syracuse—I think the double-truck equipment is less expensive to maintain than the single-truck equipment. It rides the track more easily and the bearings and equipment throughout stand a great deal more service than with a single-truck car. Much of the trouble in the latter car is due to the spinning of the wheels. You do not have the spinning of the wheels on a four-motor equipment that you would have on a two-motor equipment. Therefore, I think there is less wear and tear on the parts on the four-motor equipment than on the two-motor equipment, and that the total expense of the truck and motor repairs is reduced. I have, however, no data which I can offer on this subject.

J. G. Baukat, of Schenectady—Perhaps our company is in a class by itself, but our experience has been that the single-truck is the cheapest to maintain. I will point out one thing—that you have a very expensive brake rigging to take care of on the double-truck car which you have not on the single-truck car. I think that in itself will prove that the two different types of truck will show that the double truck is the most expensive to maintain. Our heaviest expense on the double truck is the brake rigging, whereas on the single truck we have not that to take care of. For city service I would, by all means, say use a single truck with an 8-ft. wheel base. We made some experiments with regard to the wheel base and we found that the 8-ft. wheel-base truck was not only the best truck, but gave the best flange wear.

Mr. Duffy—I will add one thing I overlooked mentioning in my previous remarks: On one of our lines we operate fourteen single-truck cars. Last February we added seven double-truck cars to our equipment and placed them on that line, running them alternately with seven single-truck cars. That line is nearly 11 miles for the round trip, and after we put on the seven double-truck cars that line showed an increase in receipts for three months of over 35 per cent, whereas our total average increase in receipts was less than 10 per cent. That showed to us plainly and conclusively than the double-truck car is what the people want.

Mr. Wilson—I think the gentleman who has just spoken has struck the keynote of the whole situation. We have been talking of economy, economy; but we ought to have in mind a surplus, and in order to get a surplus we must have increased receipts. The single-truck car is an admirable car for very small towns, but where you go into a larger population there is no doubt in my mind that your earnings will be greatly increased by giving the people a car which not only carries them satisfactorily, but is pleasant to ride in. As opposed to the economies which have been spoken of in favor of the single-truck car, there is one great economy in favor of the double-truck car, and that is the trainmen's wages. I think Mr. Cole's very scientific discussion seemed to show that taking all these factors into consideration, the economy was rather in favor of the double-truck car. Did I not so understand it?

W. W. Cole—Yes, where you have sufficient capacity. I think the whole thing in the summary comes down to this: That a 21-ft. single-truck car will consume on an average about 42 amps. in the ordinary city service. The 30-ft. double-truck car will consume from about 71 to 80 amps., and it comes down to a question of the difference in the cost of current between the two cars. There is no doubt about the popularity of the 8-wheel car. The people will wait on some of our lines, where the cars alternate, and take the 8-wheel car in preference to the single-truck car. On lines where you get a sufficient patronage or seating demand, so that you can afford to run cars five minutes apart, the 8-wheel car is the one adapted to that line, as far as economy is concerned. On lines ordinarily running cars every twenty minutes, you can better afford to run the 20-ft. car every ten minutes than the 30-ft. car every twenty minutes.

Mr. Carver—I think I was the one who started the statement about the economy of the single-truck car, but I always prefer to have the double-truck car. There is no question about the earning capacity of the double-truck car and the preference of the riding public for the car. I am familiar with such cases as Mr. Duffy referred to, where the earnings of a line have been greatly increased by the use of double-truck cars, and I have also been familiar with some cases where the people will not ride in single-truck cars at all. They will let them go by, time after time, and take the double-truck cars. I do not think it pays to run single-truck cars alternately with the double-truck cars.

Mr. Duffy—One more point in relation to the use of double-truck cars in a city the size of Syracuse: During the rush hours we usually put thirty or forty cars on the road for a few hours. We cannot keep men waiting around all day to make two or three trips at night, and we know 75 per cent of the register shortages come from the new men. If we have double-truck cars, which are large enough to carry the people, we do not require so many extra cars during the rush hours.

The President—There is no doubt that a very poor place at which to economize in street railroad operation is in the train service. Train service is the place where we sell our wares, and to economize even in favor of less expensively operated cars, as is shown by Mr. Cole's figures from the standpoint of the consumption of power, would be a very poor place, I am sure, in the mind of every one of us, to begin to economize.

We will now take up the discussion in relation to the best type of car suitable for interurban service. I will ask H. J.

Clark, of the Auburn & Syracuse Electric Railroad Company, to lead in that discussion.

Mr. Clark—We have but one type of car on our road. We operate between the city of Syracuse, with 230,000 population, and the city of Auburn, with 30,000 population, running over a very hilly country. Consequently, we have no tangents over 3 miles in length. It is a steady climb, without many curves. The car which we selected weighs thirty-four tons, of which fourteen tons is in the car body itself, the balance of the weight being the trucks and motors. It measures 50 ft. over all, 40 ft. over corner posts, and is equipped with four Westinghouse No. 76 motors and Westinghouse air brakes, and is heated with electricity. The car has a monitor roof and the windows lift, but do not slide into the roof as in the semi-convertible cars. Our car is narrow, 8 ft. 3 ins. over all, and that is due entirely to the fact that we operate in the city of Syracuse, where that is the limit to the width of the cars, owing to the distance between the tracks. The car floor and platform stand 4 ft. above the rail. That gives us one advantage, and that is the opportunity to suspend the motors from the outside. All inspection as the car passes the car house on each trip is done from the outside, and it is not necessary for any employee to disturb the passengers in raising the trap doors. We first had cane seats throughout the car. The last cars we purchased have been identical in size with the previous ones, but we placed cane seats only in the smoker and plush seats in the passenger compartment, as we found the plush seats to be much easier riding, especially on our crooked roads. While it is only 27 miles from Syracuse to Auburn, it takes us an hour and a half to make the trip, owing to the fact that we spend twenty minutes in Syracuse and fifteen minutes in Auburn, where we follow the city schedule. We are just about ordering cars for the Rochester-Syracuse double-track road, and they will follow practically the same dimensions, with a little heavier equipment. We have just purchased one steel-framed car, and it arrived last week. As to the safety of passengers and people crossing the track, I might say that we have not had a collision as serious as that Mr. Shannahan spoke of, although we hit a traction engine weighing ten tons, and the car was going 20 miles an hour. The car was not derailed, and we carried the traction engine along on the pilot 61 ft., the traction engine skidding on top of the rails. The floor system was not broken at any point. Apparently, 4 ft. above the rail the posts supporting the vestibule were not weakened. We also had a collision with a wagon loaded with stone, with a total weight of three tons, and we carried that wagon on the buffer of the car for 30 ft. with no damage to the floor system of the car, or even to the vestibule itself, and consequently no damage to the passengers. We have left out of consideration up to the present time the question of toilet accommodations. There has been very little demand for them. While our shortest ride occupies an hour and a half, there has not been any demand for such accommodations. On our through service, from Syracuse to Rochester, of course we will make provision of that character for the accommodation of the passengers. Our smoking compartment is in the end, and for this reason we are not able to turn the car; in fact, the ladies have to enter the smoking compartment going one way. The seating capacity is 56, and even with a slightly longer running time we find that we take practically all of the business which formerly went to the steam road. There is one question I would like to ask, and that is in reference to arms on the ends of the seats on the aisle side. We have considered them seriously, but have not yet adopted them. I have only heard of one car which has arms on the end of the seats, and that is the car spoken of by Mr. Shannahan. We have, of course, a narrow aisle, owing to the 8-ft. 3-in. dimensions, which is necessary on our cars, because they run in the city of Syracuse, and the question of an arm on the end of the seat is a serious proposition. If any one knows of a folding arm, or has seen any description of it, I would like to be informed regarding it.

The President—There is no subject, in my opinion, that is of so much interest to railway men concerned in the operation of interurban systems, as this question of the different types of cars on interurban railways. A year ago I was visiting a car manufacturer, and in passing through his shops I saw some cars 48 ft. over corner posts, 9ft. over all in width, and weighing 95,000 lbs., when equipped with brakes, motors and trucks. I inquired as to the road on which they were to be operated. I have since followed the history of those cars. Although the company was having twelve cars constructed in the shop at the time, the gross receipts of that interurban road have never equaled $100,000. The operating expenses, the last time I saw the figures, were 88 per cent of the gross receipts. In my judgment, at least, they had overdone the car proposition. I have had the pleasure of discussing at different times with the managers of the different interurban roads in New York as to their experiences with the different types of interurban cars as to whether the largest and heaviest type of car or whether a medium-weight car was the better. It is most difficult to lay down any iron-clad rule on this subject. Local conditions, to a certain extent, control.

Mr. Peck—We have three interurban divisions, and they are all of equal length, about 15 miles, and we have three distinct types of cars. On our Albany division we are running cars which are from 51 ft. to 52 ft. long. These cars weigh in the neighborhood of 60,000 lbs. On our Troy division we are running cars about 40 ft. in length, and the weight of these cars is about 48,000 lbs. On our Ballston division we have the large type of cars, 52 ft. in length, weighing, with full equipment, unloaded, 76,000 lbs. These three divisions have distinctive features. On the Albany division we have no very heavy grades. On the Troy division we have a line which follows an old country highway, and is full of curves, with a very heavy grade on one end. On our Ballston division, which is our latest division, we have an almost straight road with very few curves. On our Albany division we feel that the cars we have there, the cars measuring about 52 ft., seem to answer that service very well. On our Troy division the lighter cars are best. On that division we recently made a test of one of our cars and kept records, and found that we made fifty stops in fifteen miles on a schedule of one hour and 10 minutes. It goes without saying that a lighter car is the car for that division. On the Ballston division the large car is rather a white elephant. On a 15-mile run with a car weighing 76,000 lbs., the car is entirely too heavy and the equipment too heavy, and as a result of that conclusion the last cars we ordered are 43 ft. A 43-ft. car seems to be the car in use in Schenectady, and that is the type which will ultimately be used on all divisions. The difficulty of running different types of cars on different divisions is the fact that we are at times crippled on one division or another, which makes it necessary to take cars from one division and put them on the other division. This winter, when we have been short of cars, we have been seriously crippled because we could not use the Ballston type cars on our Albany division. That seemed to be an important factor which led us to decide on a standard type of car. The car we recently ordered, 43 ft. over all, seems to us to be the proper type for car for our particular work.

J. N. Shannahan—I ask Mr. Peck a question which enters into the discussion of the proper type and details of an interurban car, as to the most economical method of heating a car of this length. Mr. Clark spoke of heating his cars electrically. I would like Mr. Peck to state his conclusions on that line.

Mr. Peck—We formerly heated all our cars electrically, but recently we decided to make some experiments in regard to the heating of the cars. We have had two of our cars on each division heated with hot water, and as a result of these experi-

ments it is our intention to change our heating system to hot water heating. We get a more uniform heat for our climate, and it is much cheaper.

We have had some experience with semi-convertible cars on our interurban divisions, and I must say, as far as we are concerned, that they have not been a success. We have destroyed the semi-convertible feature of the cars by placing stops so that the windows cannot be opened, except for a certain distance. It has been very difficult, indeed, for us to heat these cars.

I also wish to say, in answer to the question asked by one of the gentlemen, that we have found arms placed on the aisle side of the seat a very favorable feature. I have talked with our conductors, and they tell me that a car with seat arms in the aisle is a much easier car to handle.

Mr. Shannahan—I would ask Mr. Peck to be more specific, if he will. That is to say, will he give us the cost of heating a car 52 ft. long for an 18-hour day, each way, that is, electrically and by hot water?

Mr. Peck—I am very sorry to state I have not these figures at hand. I know it was very much in favor of the hot water heating.

Mr. Baukat, of Schenectady—As nearly as I can remember in regard to the heating, it takes all the way from 100 to 120 lbs. of coal for 24 hours, and if I recollect the figures aright, in the semi-convertible car it would cost somewhere around $4 to $5 a day for the heating. We conducted some very accurate tests, and the General Electric Company was with us in these tests. I am sorry I cannot give you the correct figures, but that is about the average cost, from $4 to $5 a day. It took about 120 lbs. of coal for 24 hours, at a cost of about $4 This is quite an item, because the cost of coal would determine the cost of heating the cars by the hot-water heater system, although there is extra labor involved in taking care of the hot water heater. In undertaking the experiments with the hot water system, we procured special heaters, designed with a magazine large enough to take care of the heating for 24 hours, in connection with which very little attention is required, so that one of the car cleaners can take care of all the cars we have equipped up to date, and the heating is certainly much better than the electric heating. In regard to the new car referred to by Mr. Peck, we decided to buy twelve more interurban cars. We made several designs and then considered a convertible car. The idea was we did not like to have so much money tied up in cars which could only be used for a portion of the year. It was our idea that a car which could be converted into an open car in the summer time and into a closed car in the winter time, would be an ideal car, but we found that this form of construction destroyed the strength of the car. The question of maintenance and repairs will come into consideration at some time or another, and if you once get into it you never get out of it. We concluded that the thing to do was to secure a well-built car, which we considered would be the best investment we could make. We found that if the floor framing of the car is built strongly that it is the very best investment we can make on a car, so we started to design a car in the following way: We took a piece of boiler plate the total length of the car, that is 43 ft. in length, 24 ins. in height, and ⅜ in. thick. On the bottom of the boiler iron a channel was riveted on one side and an angle on the other side. The angle as well as the channel was filled with wood, and in the center we have two 6-in. I-beams running the entire length. We have no off-set vestibule, and the rest of the car is the same as any other type of car. The only new feature we have in this type of car is the boiler iron on each side of the car. I am well satisfied with this type of construction. The total weight of the car is, I think, 24,000 lbs. I think we will have a very rigid car.

Mr. Harrington—We started in to run between Camden and Moorestown a special club car service, the distance being about 12 miles. We ran a 33-ft. 4-in. body car, semi-convertible, Brill make, equipped with four No. 56 Westinghouse motors, and made that run regularly every day in thirty-five minutes. We figured that was practically 33 miles in an hour and a half, or a little more. It was fast service and was very satisfactory service, so much so that the service has been increased this year and is run under conditions that nearly parallel the average interurban service as it is usually in operation in this country. The car complete, I do not think, weighs much over 33,000 lbs. Why we go into these large, heavy equipments, with cars 40 ft. or 50 ft. in length, with the added structural difficulties and added weights, I fail to understand. I do not think we should do it. I do not believe that such equipment is necessary or advisable, in view of the question of first cost and the question of repairs. Any car builder will tell you if you construct a car over 33 ft. 4 in., or thereabouts, in length of body, you get into another class of construction that requires additional bracing and trusses which increase the weight of the car, and the percentage of increase is very marked. I believe a car of the size just mentioned, properly designed, and properly painted, will give all the appearance of weight necessary, and will actually give the necessary weight. In addition, it will take much less power to operate, and hence the operation expense will be less, the investment cost less and the results obtainable would be such as to change the investment feature of cars for an interurban road to a much more desirable basis.

Mr. Baukat—In regard to lightly constructed cars, we had some light cars built at one time, and in about three years the cars were fit for the scrap heap. That was the only evidence we had on which to base our conclusions in favor of the heavy construction. Contrasted with these light cars, we had some much more strongly built, and these cars are about as good today as they were when we first bought them. That is what impelled us to build a very heavy and rigid car.

The President—I was sorry to hear Mr. Peck speak so unfavorably of the semi-convertible car. My experience has been the exact opposite of what his has been, and I feel I would not be doing justice to myself or to the builder of our cars unless I should say a good word for the semi-convertible car.

We placed in operation four years ago next September on an interurban line 38 miles in length, taking four hours and fifteen minutes for the round trip of 76 miles, a 34-ft. 4-in. body car, from post to post, 8 ft. 4 ½ ins. over all in width, equipped with four Westinghouse No. 56 motors. The car, when weighed on the railroad scale, without its passengers, weighed 47,250 lbs., having a seating capacity of 48 persons. We have had these cars in constant operation, using the semi-convertible feature very freely, between the first of April and the first of November. We have added to that equipment by supplementing on two different occasions orders for additional equipment of the same kind, and we feel that the car is the right car for the service. A careful counting of the number of stops made on the run of 38 miles has shown that the car has stopped, and that not on an extraordinary run, 116 times for the purpose of letting off or taking on passengers. It would not be the car that I should select for a limited service. I do not hesitate to say that. If I were operating a limited service I would select a heavier type of car, but this is a territory in which limited service could not be given, if you understood the problem to be solved from a transportation standpoint.

Mr. Pardee—On the Utica & Mohawk road they have a proposition on which a shorter type of car, a lighter type of car, works admirably. There are other interurban roads where a larger car is necessary, as, for instance, on the Fonda, Johnstown & Gloversville Railroad, and I think that the conditions on each road must necessarily determine the type of car. If you have very frequent stops and a large amount of traffic, so

that you have to maintain frequent service and make very frequent stops, it seems to me a lighter type of car is necessary and very advantageous, but where you have long runs and have many through passengers, then it is necessary, in my opinion, to make your car just as comfortable and make it ride just as easy as possible, as outlined in Mr. Shannahan's paper, or you do not get the business. Our line is 44 miles in length, without including 3 miles operated over the city lines in Rochester. Our route is from Rochester to Geneva. We found we were not getting a considerable amount of business from Geneva to Rochester. The business men told me the reason they did not ride with us was because we made a good many stops, and they would rather pay a little more money for fare and get into a big, comfortable seat, and have a nice ride to town. Because of this we put on a limited service, running through in 1 hour and 45 minutes, making only four stops, and we are getting all that business.

We have two classes of interurban cars, one that we call our large type of car, 52 ft. in length, having a motorman's cab on the front end and a large vestibule on the rear end. We have a toilet room in the rear of the main compartment, and a smoking compartment of eight seats in the front end, four seats on each side. We carry considerable express matter on our line, and on four of these cars we have moved back the front bulkhead the length of one side seat, so that it gives us a large, roomy cab, and we carry all our express matter in that cab on an hourly schedule. This has enabled us to build up something of an express business. As we do not turn our cars at the terminals, we can run the single-end car, and for that reason we would not adopt the kind of a smoking compartment that Mr. Shannahan has adopted, because the women passengers do not like to pass through the smoking compartment. We can open up the doors and there are spaces on the front end, so that we can unload from that front end, if necessary. We have what we call our smaller type of car, which is 46 ft. in length. This is practically the same general style of car as the other, except that most of them are arranged for a double-end car, and some of these are equipped with type M control, and we run two and three-car trains and take care of our excursion business in that way. These cars have no toilet rooms. We expect this coming winter it will be necessary to use some of these cars for winter service, and we plan to put toilet rooms in these cars. We find it is necessary to make provision for toilet accommodations. The public seems to require such provision, and there is usually some complaint to the conductor from a passenger, where the smaller cars go through from Rochester to Geneva, on account of the lack of toilet facilities.

Mr. Peck—The semi-convertible car I object to is a larger car than President Allen describes, and is used on that part of the road where we make 50 miles an hour, and the semi-convertible feature is absolutely useless for that type of service.

The President—Mr. Wilson, in his paper, says: "Having equipped the car with this gate, and having installed a mirror, by which means the motorman can see everything that occurs at the rear step, the starting of the car can then devolve upon the motorman, who, after glancing at his front step and seeing in his mirror that the rear step is clear, can then close his rear gates, give two taps with the gong as a signal to the conductor that all is clear and then start his car upon two bells from the conductor. This will leave the latter free to devote his time to the collection of fares and the stopping of the car upon signal from the passengers."

There are two questions which occur to me in this connection. I ask what are the advantages of installing a gate operated by the motorman? That is the first question. The second question is, having installed the gate and the mirror, don't you think the time required for the making of the stop, letting the passengers off and on, would be greatly increased as compared with letting your motorman control the front end of the car and the conductor look after the rear end of the car?

Mr. Wilson—In answer to the last question, I can say that I think the time with this form of gate would be increased over a car we at present operate with both front and rear platform open. In Buffalo, at the present time, we only allow the passengers to enter and leave from the rear end. I think it would be advantageous to let them in by the front platform as well as the rear platform, and you can make the platform 6 ft. deep instead of 4 ft. deep, as at present. The front platform would be an additional way of entering and leaving the car, so that by the introduction of this car in the Buffalo service I do not believe the headway would be cut down. The chief advantage of this gate is in cutting down the class of accidents which are due to people falling in getting on or off the car. I have seen the gate operated in Minneapolis and St. Paul, and it seems to me to work like a charm. I had that in mind when I recommended it. Another advantage in the use of the gate is that it allows the conductor to devote his whole time to the collection of fares. At the present time he has to rush back to the rear platform and watch it, or he has to ask some one on the rear platform if everything is clear, and take the word of the passenger for it. In a 30-ft. car, such as we operate now, it makes it practically impossible for the conductor to get all his fares. I think those two things gained will more than compensate for a little loss in the headway.

Mr. Harrington—I am informed by the managements of both the Kansas City and Minneapolis roads that the use of the gates has decreased the running time, saving all the time previously taken by the conductor in making certain that the platform is clear when he is inside the car. It has also materially reduced the accident accounts. On our road we had 200 persons injured last year in falling off the cars for one reason or another, and 75 or 80 per cent of these accidents could have been avoided if the gates had been used. I think the gate is a good idea, and I am interested in seeing it generally adopted.

Mr. Peck—How does the motorman clear his platform? Is not considerable time lost in getting the passengers to go inside?

Mr. Wilson—I would allow the passengers to ride on the front platform, outside, just as they do in Chicago at present. I had Chicago in mind in proposing this gate. I was led to favor this gate by the fact that in Buffalo to-day the motormen lean over the front dash, look behind and watch the rear step, and when they see the rear step is clear they bang on the dashboard with their controller handles or something of that kind. That being the natural way that the motormen have adopted, it seems to me we should facilitate it by some such mechanism as has been suggested.

The President—The reason I ask the questions is this: In Minneapolis last fall I first saw this gate operated by the motorman, and it impressed me very much, indeed. I thought that these people must be making money in the reduction of their accident expense; in other words, that they could not have any accident account. I did think that perhaps it would take a little longer time to operate the cars with the gate. When I arrived home I took occasion to find out what the accident account of the Twin City Rapid Transit Company was, compared with the city of Cleveland and with the city of Buffalo, and very much to my surprise I found that the Twin City Transit Company charged off in their accounts a little more in relation to their gross receipts than did Cleveland. They were charging off 4 per cent of their gross receipts. As to what the other side of the balance sheet was I cannot say, and it is a thing entirely obvious to any one who sees a great deal of passengers getting on and getting off cars.

These are the facts, and I think these figures I am quoting are exactly what the amounts are.

Mr. Harrington—In reference to the motormen's mirror,

we tried a mirror of this kind and finally had to take it off for two reasons. One reason was that in rainy weather the mirror was obscured and was not reliable, and the second reason was that it projected outside the car and was broken by passing vehicles.

The meeting then adjourned until Wednesday morning.

NEW OFFICERS

At the last session of the association, held on June 28, the following were elected officers for the ensuing year: President, R. E. Danforth, president Rochester Railway Company; first vice-president, B. B. Nostrand, Jr., president and general manager Peekskill Lighting & Railroad Company; second vice-president, J. H. Pardee, president and general manager Rochester & Eastern Rapid Railway Company; secretary, C. B. Fairchild, Jr., associate editor STREET RAILWAY JOURNAL; treasurer, W. W. Cole, vice-president and general manager Elmira Water, Light & Railroad Company; executive committee, the officers and E. F. Peck, general manager Schenectady Railway Company; T. W. Wilson, general manager International Railway Company; Oren Root, Jr., general manager New York City Railway Company; and J. N. Shannahan, general superintendent Fonda, Johnstown & Gloversville Railroad Company.

A report of the proceedings on June 28 will be published in next week's issue.

ENTERTAINMENTS

The Lake George Convention was strictly a working convention, so that practically all of the entertainments and trips which were provided were participated in only by the ladies in attendance. The slight showers on the morning of Tuesday and Tuesday evening interfered somewhat with the programs at those times, but the weather during the rest of the convention left nothing to be desired and contributed greatly to the enjoyment of those present.

The first regular excursion was that on Tuesday afternoon, when, upon invitation, a special car of the Hudson Valley Railway Company was taken at the hotel and a trip was made to Warrensburg, 6 miles northwest of the Fort William Henry Hotel. The road extends through a beautiful country lying in the foothills of the Adirondack Mountains, and with the band on board the car the excursion was a very attractive one. It was originally proposed after returning from Warrensburg to take the party to Glens Falls, 9 miles, and Saratoga, 18 miles distant, but the time was found to be rather brief for making this trip, and after the Warrensburg trip the party returned to the hotel.

In the evening an exhibition of fireworks was provided by the Pain Fireworks Company and lasted from 9 p. m. to 10 p. m. The display was given directly in front of the broad piazza of the Fort William Henry Hotel and was witnessed by all of the attendants at the convention. There were forty-two features in the program. Following the display of fireworks there was dancing in the ballroom of the hotel.

On Wednesday morning, at 11 o'clock, upon invitation of the association, a trip was made on the steamer Sagamore to the Sagamore Hotel, located near Bolton, N. Y., about halfway up the lake. Upon arriving at this hotel an attractive lunch was provided, and the return trip was made by the steamer Horicon, reaching the hotel about 4 o'clock in the afternoon.

In addition to these official trips, there were a large number of special trips and excursions made on the lake by private launches, which were greatly enjoyed. Among those who acted as hosts on these occasions were William M. Field, of the Barbour-Stockwell Company; Jerry M. Hayes, of the Frank Ridlon Company, and W. M. Johnson, of the Schoen Steel Works.

THE BANQUET

The annual banquet was held in the main dining room of the Fort William Henry Hotel, on Wednesday evening, June 28, and was a thoroughly enjoyable affair. C. Loomis Allen, the retiring president, introduced W. Caryl Ely, of Buffalo, as toastmaster, and Mr. Ely contributed much to the success of the evening by his characteristically felicitous handling of the duties of this office. Considerable merriment was aroused by a clever impersonation of Booker T. Washington, and this feature of the program was particularly appreciated by those at the speakers' table, including the toastmaster, and it resulted in numerous calls for A. B. Colvin, the chairman of the entertainment committee. The other speakers were as follows: J. M. Wakeman, of New York, who replied to the toast "From the Writer's Standpoint," in place of James H. McGraw, of New York, to whom the toast had been assigned, but who was unable to be present; Rev. Robert M. Reilly, of Glens Falls, who won the hearts and applause of the audience by his happy response to the toast "When the Wheels Go Round"; Joseph A. Lawson, of Albany, who spoke to "Sic Transit"; Judge Tierney, of Troy, who spoke for ex-Judge L. E. Griffeth, of Troy, on our "Sweethearts and Wives"; and E. M. Angell, of Glens Falls, who replied to the toast "The Farmer and the Financier." Music was furnished by the ladies' orchestra of the hotel, and the special program included several feats of juggling by Willie De Lisle, the boy juggler of Glens Falls. The banquet adjourned at 12 o'clock in order to give delegates and attendants time to catch a special train which left Lake George at 1 a. m.

THE WHEEL QUESTION

BY C. G. BACON, JR.

It is probably true that there is no one mechanical question which is deserving of more thought and investigation on the part of the railway official of to-day than that of wheels, and equally true that no time is wasted which is spent in the study of that important subject. George L. Fowler's article in the STREET RAILWAY JOURNAL of June 17 brings out several very interesting points, which are well worthy of the closest attention; for instance, briefly he refers (1) to the guaranteed life of cast iron wheels; (2) to the variables which go to affect that life, and (3) to the value of the guarantee, per se. In this connection it is suggestive to refer to the data recently obtained in inves-

OPEN CARS

Make of Wheel	Number of Wheels	Average Life, Miles	Per Cent of Failures	Average Life, Including Failures, Miles	Miles Guaranteed
"A"	202	28,434	14¾	26,789	30,000
"B"	363	39,007	16⅛	37,666	40,000
"C"	64	21,833	15¼	19,917	30,000

CLOSED CARS

Make of Wheel	Number of Wheels	Average Life, Miles	Per Cent of Failures	Average Life, Including Failures, Miles	Miles Guaranteed
"A"	317	27,018	17⅚	23,987	30,000
"B"	146	37,406	18¼	35,843	40,000
" "	43	20,013	16½	19,105	30,000
"D"	136	29,654	16½	28,423	30,000

tigating the subject of wheels on a railway operating some 400 cars, in both city and interurban service, these figures covering a period of some four or five years' experience with 33-in. cast-iron wheels.

Under the heading of "failures" in these tables are included all cracked hubs, broken spokes, broken flanges, cracked wheels, etc., and all the flat wheels which it was impossible to true up for further service, and the most astonishing feature of the situation is that in only one instance (that of the "C" wheels), had any claim been made by the railway company upon the manufacturers for restitution under the guarantees. The settlement made even in that instance was not sufficient to cover the discrepancy as developed by these investigations.

Again, and in another instance, 1200 cast-iron wheels were furnished under a guaranteed life of 42,500 miles. None of these has been in service long enough as yet to have reached this mileage, but 345 of these wheels (or 28¾ per cent) have already been removed from service on account of failures, and this total of 345 wheels shows now an average mileage of only 16,190 per wheel.

The only conclusions which can be drawn from these, and numerous other showings of similar purport, are simply:

(1) Despite the earnest and successful efforts of several manufacturers to produce the very best cast-iron wheel, such wheels cannot possibly be made to fulfil economically or safely the requirements of the high-power, high-speed and heavy-weight interurban, or even urban, service of the present day.

(2) It is not the mileage of those wheels which give their full life in service which is the determining factor, but, rather, the large percentage of failures which enters in to affect very materially the average life, which must be considered by the mechanical and operating officials, and

(3) A "guarantee" is a most uncertain quantity under ordinary conditions, largely because, as was stated by the head of the mechanical department of one large road after he had had a part of his force following up "guaranteed" material for upwards of a year, "it costs more for clerk hire in 'keeping tabs' on guarantees than the total amount of the restitution under those guarantees."

Consideration of the foregoing tables will bring to light another point which is worthy of note, viz.: that, all other conditions being the same, the life of wheels of the same make is greater under open cars than it is under closed cars. Extensive investigation on this point has shown that during the three winter months, when the rails are covered with ice, snow and sleet, the wear of the wheel per 1000 miles is about twice as much as it is during the other nine months of the year. This is due, of course, to the fact that on account of the slipping, particularly in starting, a wheel is revolving five or six times the distance of its own diameter in traveling the distance of its circumference. This ratio would apply to wheels engaged in an active city service, and would be variable in other kinds of service in proportion to the number of stops, grades and curves, but a fair average would not be very different from as 2 to 1.

But it is more particularly toward the "variables that so affect the life of the wheel," to which Mr. Fowler refers, that attention should be directed, for therein lies the greater part of the wheel question of to-day. If the Schoen steel wheel, to which he refers, is going to cause a reduction in the percentage of failures, so as to bring it down to say 3 per cent to 5 per cent, as against say the 14 per cent to 18 per cent as at present in the case of the cast-iron wheel, then the all-steel wheel proposition becomes an attractive one from the very start, in spite of a trebled first cost, because the saving in the labor item and in the ability to keep cars out of the shops and in active service, not mentioning the increase in the factor of safety, would cause our railway managers to favorably consider this type of wheel in very short order.

Going a step further, however, and considering what the life of the all-steel wheel is going to be, and also as to what extent it lies within the power of the railway official to control these variables, one is brought face to face with the old saying that "an ounce of prevention is worth a pound of cure." It is generally accepted as a fact that the "miles per 1-16 in. of wear" are just as great in the case of a cast-iron wheel as they are with an all-steel wheel, during the life of the best part of the chill in the cast-iron wheel. The chill, of course, it will be remembered, is projected at right angles to the chill block, and only to a certain depth and even in that depth in a gradually decreasing density. In other words, let it be assumed for the sake of illustration, that the chill extends into the wheel to a depth of say ¾ in., and that the "miles per 1-16 in. of wear" are 4000 with the new wheel; then, after, say, ¼ in. of the chill had

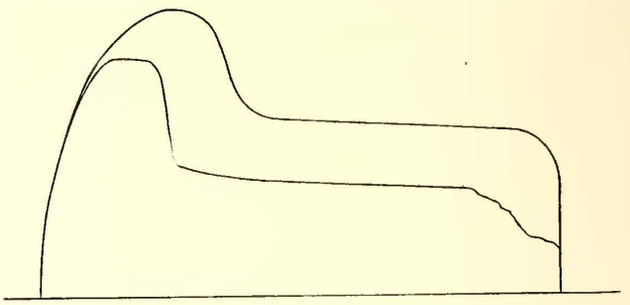


FIG. 1.

been worn away, the "miles per 1-16 in. of wear" would be reduced to, say, 3000, and after a second ¼ in. of the chill had been worn away the "miles per 1-16 in. of wear would be still further reduced to say 2000. Theoretically, then, such a wheel would have a life of 36,000 miles for a total of 12-16 in. of wear or an average of 3000 miles per 1-16 in. of wear. But the all-steel wheel would have the same mileage per 1-16 in. of wear as the cast-iron wheel during the first ¼ in. of its chill, or 4000 miles, and this wheel would maintain this same rate of wear throughout say 1¾ ins. of wearing tread. That is, it would have a total of 28-16 ins. at 400 miles per 1-16 in., which equals a life of 112,000 miles. Such a life would thus be somewhat more than three times as great as the life of the cast-iron wheel, and the absolute economy of the all-steel wheel would be demonstrated.

An important element which enters into any such discussion as this, however, is the problem of handling the all-steel wheel so as to minimize the loss of wearing body involved in

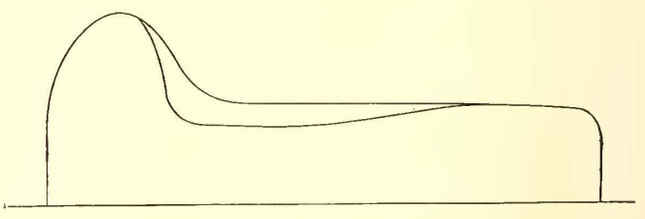


FIG. 2.

turnings, and the labor item, loss of service, etc., attached thereto, and here is where the "ounce of prevention" may profitably be used.

Would any railway official consider that a particular make of wheel, or its manufacturers, were responsible for the condition of affairs as set forth in Fig. 1 and Fig. 2? Yet these are conditions which are frequently, if not almost constantly, met, though they are remediable to a very great extent.

And why is it not possible so to care for all-steel and steel-tired wheels in service that 98 per cent or 99 per cent of them will wear through their entire lives without turnings, and preserving throughout their original contours, in the same manner as did the wheel shown in Fig. 3?

As a matter of fact, it certainly is possible, with proper care and attention, to handle these improved types of wheels so that they can be kept "trued up" throughout their lives, and

the railway managers who have already come to a realization of this important item are those who are securing the most satisfactory and economical results.

Hand in hand with the developments which are being made in the manufacture of wheels must go improvements in the care of wheels in service, not along the lines of curing the variables, but of preventing them, or keeping them down to a minimum, in order that due value may be obtained from the rapid advances which are being made in wheel manufacture, and all of which should certainly accrue very largely to the benefit of the railway companies.

Lack of space, and the impossibility of setting forth any fixed rule which should control all cases (since the local conditions of each railway company would be very largely the determining factor, and would all have to be taken into account when considering the indicated prevention) render it impossible to deal here with the exact and specific ways and means, but it is easily susceptible of proof in practical service that these ideal conditions can be attained in the vast majority of cases. This is rather a bold assertion, and 1 per cent or 2 per cent of exceptions must be allowed to prove the rule, but it is a statement of fact which can be so clearly and definitely demonstrated as such that no hesitancy need be had in its making, or in its acceptance.

The present situation and the great importance of this wheel question certainly should induce every street railway in this country, large and small, to investigate, test, and sift the matter most thoroughly. It will never do to sit back and await results on some other road, for local conditions form the controlling and determining factor. Each and every road should determine this matter very largely for itself, and under its own conditions of service—and this remark has special significance

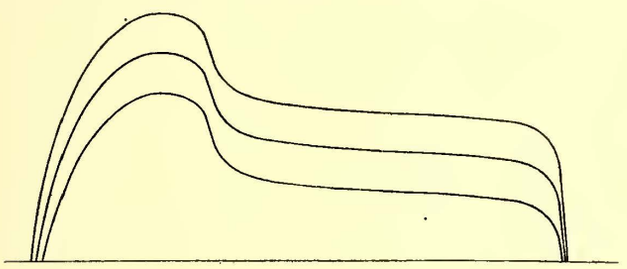


FIG. 4.

in connection with the care of wheels, to even a greater extent than in connection with the selection of any particular make of wheel.

And, in conclusion, nothing could be more fitting than to quote from the editorial which appeared in the STREET RAILWAY JOURNAL of December 10, 1904, as follows:

> The practice of testing equipment and supplies is one which has of late grown considerably in favor among railways. No small amount of time and money can be thrown away in experiments by hasty or ill-considered methods. It is generally a mistake to lay the burden of making tests of a special nature upon the operating department of a large road. Such a course is liable to hamper the regular business, and when men laden with the responsibilities of keeping a great system in motion are required to undertake an exhaustive and scientific study of special equipment, there is every likelihood that justice will not be done to the tests, interested as the men who are making the tests may be to secure good results. The expert should be called upon, like the physician, to correct railway ills, and it is rarely that his services are over-paid.

The Grand Rapids, Grand Haven & Muskegon Railway has put on a fruit express to connect with the steamers of the Crosby Transportation Company for Milwaukee.

CORRESPONDENCE

HEATING TOOLS

NORTHWESTERN ELEVATED RAILWAY COMPANY

Chicago, July 5, 1905.

EDITORS STREET RAILWAY JOURNAL:

In a shop where fuel or illuminating gas is accessible, and where high-speed steel is used for turning steel tires, it is possible that the accompanying sketch will be of value to some one. As this particular high grade of steel should be worked when at a fusing heat, it becomes necessary to devise a plan for quickly heating the end of the tool to be dressed without heating 3 ins. or 4 ins. farther back than is actually required, which, if done in a blacksmith's fire, will invite sulphur from

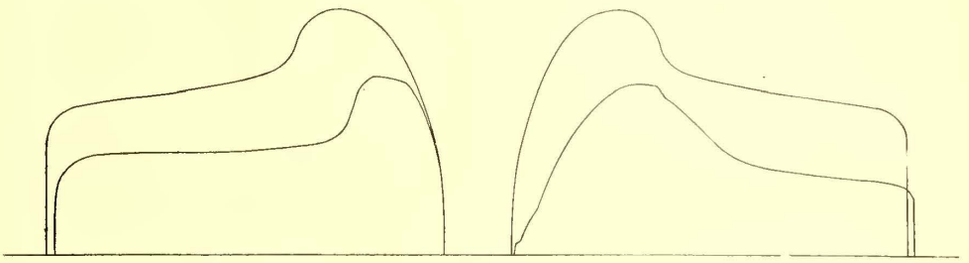
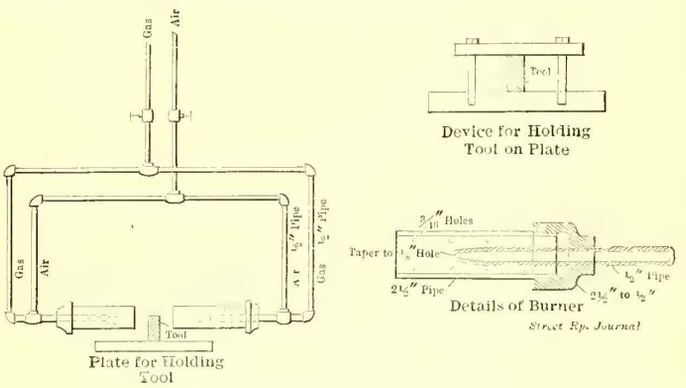


FIG. 3.

the coal to unite with the molecules of the steel, which is considered injurious.

After the tool has been dressed to the desired shape it may be clamped to the plate as shown in the sketch and brought up to a fusing heat by the use of a combination of gas and compressed air, which should be regulated to produce a blue flame. The proper temperature of the steel may be determined by the



DEVICE FOR HEATING TOOLS

appearance of small blisters. When it has been attained the gas should be shut off immediately, and the air valve opened wide enough to allow a full volume of air to strike the end of the tool. The mixing chamber will at this time be hot enough to extract from the air the moisture that possibly exists.

I may mention that the distance between the mixing chambers should be not less than 6 ins.

J. E. OSMER, Master Mechanic.

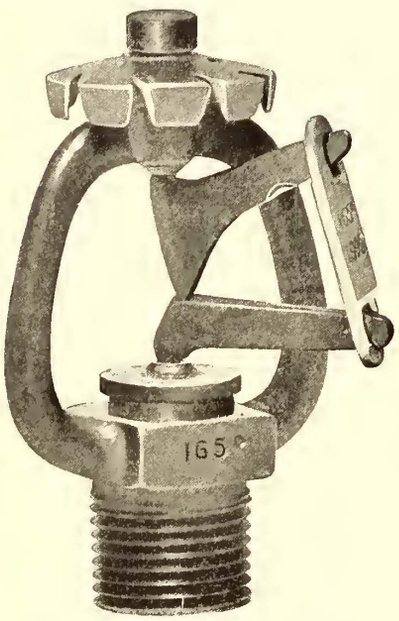
PROPOSED ELECTRIC RAILWAY AT PANAMA

Bids will be received by R. Chiari, municipal treasurer at Panama, on July 24, for the construction of an electric tramway in the City of Panama. The line is to start from the Plaza de Armas, and will follow a course along Carreras, Nacional, Picaurte, Bolivar, Constitucion and Ithmo up to the new station of the Panama Railroad Company, the public market and the cemeteries. The cars are to run from 5:30 a. m. to midnight, and three years after the main line shall have been completed the contractor is to pay 2½ per cent of the gross receipts of the tramway to the city, and after five years 5 per cent.

FIRE-PROTECTIVE APPARATUS FOR CAR HOUSES

The efficacy of automatic sprinklers for car-house protection has been demonstrated so often that it is hardly necessary to expatiate upon the wisdom of installing such apparatus. However, as so many different systems are on the market, it may not be amiss to describe the details of the "Evans" automatic sprinkler devices developed by the International Sprinkler Company, of Philadelphia, because they have been officially approved by all the fire underwriters of the United States and Canada, and have found such wide acceptance among users of this class of apparatus.

This sprinkler system consists of a series of lines of pipe hung from the ceiling of any building, running parellel and every 8 ft. to 10 ft. apart, with sprinklers attached along these lengths of pipe at distances of 8 ft. to 10 ft. Thus to every 64 sq. ft. to 100 sq. ft. there is an automatic sprinkler. This pipe system must have a sure source of water supply. There are two sprinkler systems, the wet and the dry—the former being used in buildings in which there is no danger of freezing the water in the pipes, and the other in buildings where freezing is possible. The water supply is intercepted at the point where freezing may occur, by the dry pipe valve. Between this valve and the sprinkler heads the pipes are filled with compressed air. A relatively low air pressure of 30 lbs. pressure per sq. in. operating on the dry valve keeps it closed against any available water pressure. Upon the occurrence of fire, causing the opening of one or more sprinklers, and the reduction of the air pressure to approximately 10 lbs., the dry valve opens automatically and floods the system with water. The automatic alarm is used in both systems whereby electrical or mechanical gongs, one or both, are sounded upon the opening of one or more sprinklers from fire or accidental break in the piping.



DETAILS OF SPRINKLER HEAD

The sprinkler head made for this system has been designed to satisfy the highest standards in art, manufacture, and performance. It is preferably installed in the upright position, as shown in the accompanying cut, but operates as well reversed, or "pendant." It consists of a bronze frame, threaded for attachment to the pipe system, containing a water outlet, and opposite thereto a reflector, normally rotating in action, but giving equally good distribution when stationary. The water outlet is kept perfectly closed by a bronze cap, retained by two levers, whose ends are in turn secured by a fusible link, consisting of two bronze plates transversely corrugated and soldered together.

As soon as the air about any sprinkler head, by reason of combustion, reaches a given temperature—usually 165 deg. F. —the solder link in the head melts. Thereupon the valve cap which closes the outlet end of the water-supply pipe is released. Water then pours through the opening against the distributor, and is spread over the ceiling and floor of the building.

The "International" head distributes water perfectly, above, below, and for a desired distance around—in large drops and not in a fine spray, which runs into steam too rapidly to combat a fire successfully.

The fusible link, due to its thin design and exposed location, is very sensitive to heat and certain in operation. The entire device incorporates in itself a spring, ensuring the promptest action at rated temperatures.


EAVE SPRINKLER

Experience with this design in large quantities for many years has proven it free from accidental injury no matter where installed. The "International" head is made in four different fusing temperatures, namely: 165 deg., 212 deg., 280 deg., and 360 deg.

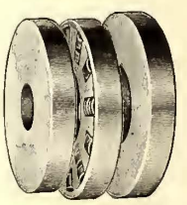
This head is made of "standard" size, same as cut; and also in "Jumbo" size, which is four times as large as "standard," for rare application at points requiring a large discharge of water.

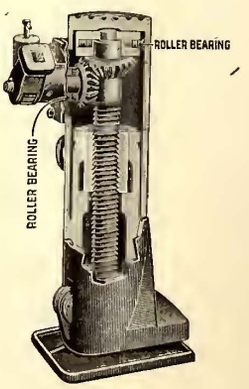
The "International" eave sprinkler illustrated is made of bronze and is used to protect the exteriors of buildings, and wall and window openings.

Other devices made by this company in connection with its sprinkler systems are: A dry pipe valve, which under any conditions of water pressure opens promptly should accident or fire cause any sprinkler heads above it to open; an alarm valve, consisting of a complete check valve, retarding chamber, electrical alarm and water motor for the mechanical alarm; and a combined elevated tank and gravity reservoir, which consists of a stand pipe divided sectionally by a floor, the upper portion being an elevated tank, and the lower a gravity reservoir for pump supply.

A NEW ROLLER-BEARING SCREW JACK

A line of some twenty-five or more different sizes of a new roller-bearing screw jack has just been placed on the market by the Duff Manufacturing Company, of Pittsburg, Pa., which announces also that it has other sizes and designs in the course of construction. This jack has been put to abnormal tests to prove its superiority over any other style of jack for heavy work. The manufacturer of this jack states that these tests demonstrated that this new type will involve a large saving in operating expenses, time and labor, and developed the fact that loads could be lifted with about 15 per cent less effort than with any other anti-friction screw jack.


ROLLER BEARING



SECTION OF NEW SCREW JACK

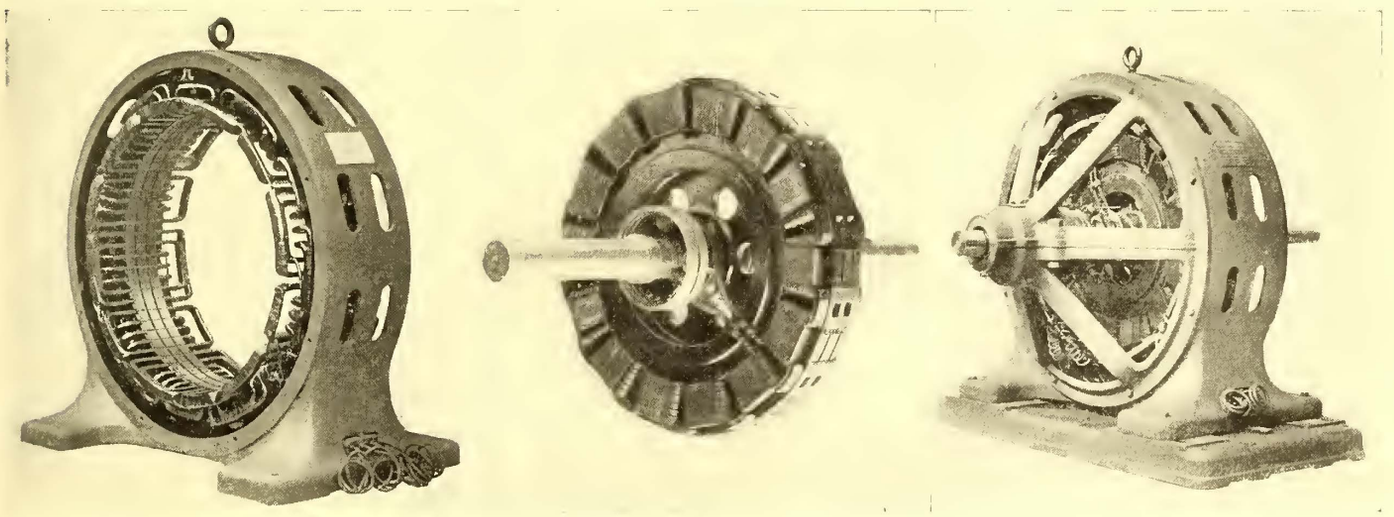
It will be seen from the accompanying sectional cut that the jack contains two roller bearings—one large or main bearing at the head of the jack, and another bearing to take the thrust on the level pinion. This additional bearing is a valuable feature, and is said to be found only in the "Duff" jacks. The main feature of any anti-friction jack, however, is the bearing itself. The roller bearing used is of a construction particularly valuable when applied to lifting jacks. It consists of two hardened ground tool steel plates with a cage between them carrying the hardened ground tools. This form of bearing will stand heavier loads and will wear better than ball-bear-

ings, or any other form of roller bearings. The rolls will not crush or flatten, or wear grooves in the hardened plates after continuous service, as is often found in other types of anti-friction bearings. When the bearings are removed from the jack frame, they remain intact and do not separate and become hard to handle. The ratchet on this jack may be reversed easier and quicker than the old style ratchet.

This roller-bearing jack covers a wide and an important field in the handling of railway equipment, in bridge work and in the way of wrecking purposes. It is manufactured in all sizes, with capacities from 15 to 70 tons, and the company is also making cone-bearing and roller-bearing journal jacks with capacities of 10, 15 and 25 tons.

WESTINGHOUSE BELTED TYPE, ROTATING FIELD ALTERNATORS

A line of belted type, self-contained, rotating field, alternating-current generators, such as shown in the illustrations, has recently been placed on the market by the Westinghouse Electric & Manufacturing Company. The machines are built for single, two and three-phase circuits, in sizes from 30 to 200 kw.



FIGS. 1, 2 AND 3.—ROTATING FIELD ALTERNATOR

The single-phase generators are manufactured for 220, 440, 1100 and 2200-volt circuits at 7200 alternations, and besides these the polyphase machines are wound for 6600 volts and both 3000 and 7200 alternations. In this type of generator the armature is stationary, a construction which facilitates the insulation of its windings and provides that the field current instead of the armature current pass through the brushes and collector rings. Alternators of this type are therefore especially adapted to high voltages or large current output.

The frame of the stationary armature is cast in one piece with slots machined on the inside for holding the punchings which receive the windings; these are composed of wire, strap or bars, depending on the size and voltage of the generator. Open slots are employed in machines up to 75 kw, with coils held in place by hard fiber wedges. In the larger machines partially closed slots are used. Horizontally split brackets, which carry the bearings, are bolted to this cast iron frame. The bearings are generous in their dimensions and are self-oiling, having oil rings and an oil gage on each, thus giving superior running qualities. All generators have bed plates with large foundation areas and suitable belt tighteners. These generators may also be arranged for direct connection to an engine or water-wheel.

The fields of the smaller generators are of cast steel, with pole caps of the same material. The poles of larger sizes are laminated and keyed or dovetailed to a cast iron spider. The field coils are composed of square wire so wound as to expose the maximum surface. In the generators having laminated poles heavy brass wedges, which hold the field coils in place, retard any shifting of the field between the poles, and thus practically eliminate pumping between the generator and any rotary converters or synchronous motors which may be connected in the system and insure satisfactory parallel operation of two or more generators. A large shaft insures cool running of the bearings, and the absence of any distortion which might result from the pull of the belt.

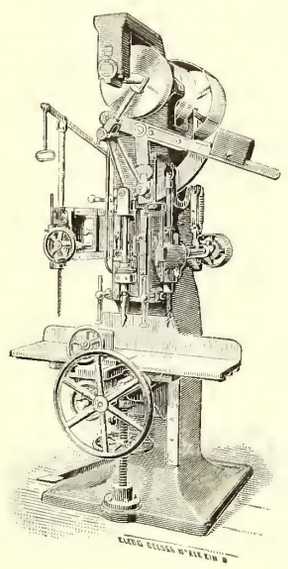
Every means has been utilized for the rapid dissipation of heat from all parts of the machines. Open spaces in the laminated field register with those in the armature, and during operation air is drawn in through the field spider and forced out through the stationary core and windings, thus insuring low operating temperature. Excellent regulation is obtained by properly proportioning the armature and field windings in preference to saturating the magnetic field.

The single-phase generators have compensating field windings supplied with rectified alternating current. A commutator on the shaft adjacent to the collector rings has its brushes connected to the secondary of a series transformer in the armature circuit and its segments to the self-exciting field coils. The compensating winding is so designed that the generator can be adjusted for practically constant voltage from no load to full load or for an increase in voltage.

The Grand Rapids (Mich.) Railway Company recently inaugurated a novel contest among its patrons. In the "Street Railway Weekly," which is to be found in every car on the company's lines, it announced a query to its patrons: "Where will five cents invested in a street car ride net the passenger the greatest return?" To the patron sending the best response prior to July 1, the company gave 300 tickets, and for the second best response 200 tickets. Answers were confined to fifty words and sent to the editor of the "Street Railway Weekly." The announcement called attention to some of the best known attractions on the street railway lines, then said: "There are endless nooks and corners of the Grand River Valley about which only one resident in 1000 knows. We anticipate that this embryo contest may unearth some of these attractions for more general popularity. Have you some favorite spot for an afternoon with your novel? Tell us of it. Do the car lines carry you into forgetfulness of the busy world of commerce? What is the route? Be a good Samaritan; let others into the secret. * * *"

LARGE CAR MORTISING AND BORING MACHINE

A very heavy and substantial car mortiser and borer has been brought out by the J. A. Fay & Egan Company, of Cincinnati, designed to cut in any kind of wood, mortises from ¼ in. to 3 ins. wide and up to 6 ins. deep, and adapted for the heaviest description of car and bridge work. The column is a single casting, which, being hollow, is amply strong to stand up to the heaviest strain to which a machine of this kind may be put. The entire machine is self-contained, and its broad floor base insures freedom from vibration. The driving pulley and crank shaft are supported between the bearings instead of being overhung, as is the case with some machines, adding materially to its capacity and power. The outside bearing supports the crank shaft in front. The front and center bearings are placed on top, being a part of the main column, and receive the shock of the ram. This is one of the new features of this machine, and is claimed to be superior to all other methods for this purpose. The new strap device on the upper end of the pitman, connecting it with the crank shaft, is especially provided for the take-up of the wear and to permit changing the bronze bushing without dismantling the upper part of the machine, saving much time and labor over other methods.



CAR MORTISER AND BORING MACHINE

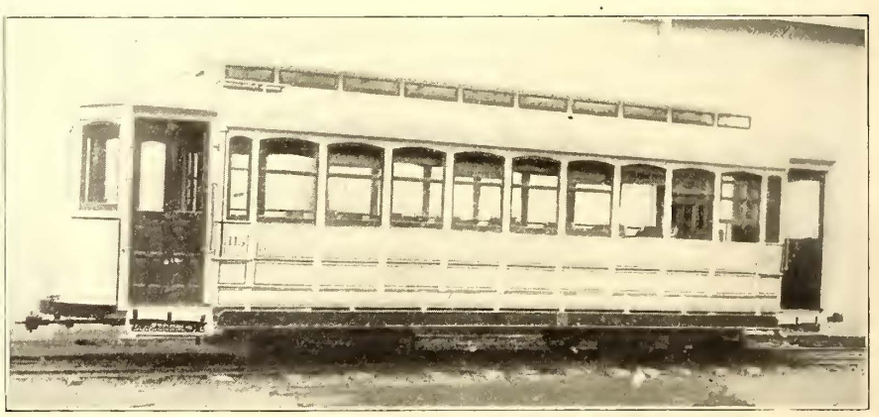
The chisel mandrel, large in diameter, and made of the best cast steel, is connected to a solid ram working in planed ways, making it impossible for the mandrel to spring when mortising at full stroke the hardest kind of wood. It has a perfectly graduated stroke, commencing at a still point above the extreme upper throw and working gradually down into the mortise, with little or no perceptible jar and under perfect control of the operator. The chisel reverser, which is perfectly automatic, is controlled by a treadle movement operating upon the chisel mandrel and reversing the chisel every time it is brought to the still point by releasing the treadle, locking the chisel bar and holding it in the correct position. The radial slide is attached to the connections and operated by the treadle, and prevents the slightest jar on the foot, even when mortising without first boring a hole to admit the chisel, a feat which it is claimed has heretofore never been accomplished on a machine of this kind.

The bed will receive timber 19 ins. wide x 16 ins. thick, and the chisel will cut a mortise 6 ins. deep, or, by changing the face of the timber, it can be made to mortise clear through the thickness of 12 ins. The table is supported on a central screw, by which means the effect of the thrust or blow of the chisel is conveyed to the foundation and relieving the table bracket. The table is 48 ins. long and has a longitudinal movement by means of rack and pinion of 27 ins. There are two boring attachments, arranged in a novel and compact manner, one on a line with the chisel, to bore the hole to start the mortise, and which will bore to a depth of 8 ins.; also an adjustable auxiliary boring attachment, for boring bolt holes, which has a 15-in. stroke and may be moved by a hand wheel and screw to bore to any point within the width of the bed, which is 19 ins. Both boring attachments are driven directly from the countershaft of the machine, and each is provided with a stop for gaging the depth in boring. A spring counterbalance is provided for returning the boring mandrel after the stroke. The tight and loose pulleys are 16-in. x 4½-in. face and should make 275 r. p. m. The company furnishes its non-dripping, self-oiling, bronze-bearings, loose pulley.

CONVERTIBLE CARS FOR THE LONG ISLAND ELECTRIC RAILWAY COMPANY

The Long Island Electric Railway, Jamaica, N. Y., has recently placed on its lines five convertible cars, built by the J. G. Brill Company. The cars will traverse a most beautiful section, being operated on lines connecting Brooklyn, Queens, Jamaica and Far Rockaway, and also reaching Interstate Park, where the national shooting matches are held, Queens Park, Belmont Park and the Jamaica race track. In the summer, particularly, large crowds are handled and the convertible type is expected to be highly satisfactory, as the cars, when closed or open, are practically the same as the standard types, and conversion or semi-conversion may be effected quickly and easily, thus always being prepared for any sudden change of weather. The cars are mounted on "Eureka" maximum-traction trucks, which carry long car bodies practically as low as a single truck and are easier on the rails. Brackets connect the back of the seats with the posts, thus forming convenient handles which encourage passengers to face in the right direction when leaving the car. Thirty-six passengers may be comfortably seated on the spring cane seats. The interiors are of cherry in natural color, and the ceilings are of decorated birch. The vestibule sashes are composed of single lights and are arranged to drop into pockets.

The cars are 25 ft. 9 ins. over the end panels and 35 ft. 2 ins. over the crown pieces. The platforms are 4 ft. 8½ ins. The width over the sills and the panels is 7 ft. 6¼ ins., and over the posts at the belt 8 ft. 1 in. The sweep of the posts is 3½ ins. The distance between the centers of the posts is 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 ⅝ in. The thickness of the corner posts is 3¾ ins. and of the side posts 3⅜ ins. The trucks have a wheel base of 4 ft. and move 33-in. and 20-in. wheels. Among the specialties are angle-iron bumpers, radial drawbars, "Dedenda" gongs, "Dumpit" sand boxes and ratchet brake handles.



CONVERTIBLE CAR OPERATED BY THE LONG ISLAND ELECTRIC RAILWAY COMPANY

A special car on the Indiana Union Traction Company line made a record-breaking run from Noblesville to Indianapolis on June 27, covering the 22 miles in twenty-seven minutes. This included 5 miles in the city, where the speed was slackened.

NON-ARCING LIGHTNING ARRESTERS

The recent transfer of the patent rights on the Shaw non-arcing lightning arresters and static dischargers by the Shaw Engineering & Manufacturing Company, Newark, N. J., to the Lord Electric Company, Boston, Mass., is a matter of more than usual interest. A great deal of importance attaches to the subject of lightning arresters at this time by reason of the great demand for an instrument which will afford better protection against abnormal potential strains caused by crossed wires, static discharges, or lightning. By far the worst of these conditions is lightning, a fact due, in some measure, at least, to the universal lack of knowledge regarding its power.

To successfully perform its important duty the internal resistance of an arrester must bear such relation to the circuit and apparatus which it protects as to offer a path of such low resistance that the executive current will pass through it to the ground, and this should be accomplished without allowing the useful current to follow it or in any way disturb the normal operation of the electric circuit.

It not infrequently happens that induced charges in the circuit produce abnormal potentials between line and line, as well as between line and ground, and it is therefore advisable to make provision to equalize these high potentials from line to line of the different phases, as well as from line to ground. The rapid increase in long distance, high-potential transmission lines has increased the difficulties and dangers from lightning, and the demand for a satisfactory device to protect the great amount of valuable apparatus used in connection with such lines. Although usually very high, the frequency of lightning disturbances undoubtedly varies greatly in different cases, and there is no positive knowledge by which to formulate a rule applicable to the demonstrations of the discharge.

It is well known that an ordinary current will follow the convolutions of a coil of wire, while lightning will leave such a metallic circuit and jump across an air gap. This is illustrated in the burning out of a dynamo by lightning where the discharge will leave the metallic circuit of the coils, puncturing the insulation and going directly to the core and thence to the ground, the explanation of this being in the distinction between ohmic and inductive resistance.

The Lord Electric Company has made this the subject of special study for some time past, and has re-designed the standard instruments so as to improve their efficiency and make the parts uniform and interchangeable. In the construction of the improved Shaw non-arcing lightning arrester two metal caps are used, each having circular serrated edges. These caps are supported by metal brackets and they in turn support a hollow insulating tube on which are placed alternately mica washers and carbonized rings. These rings are specially prepared high-resistance carbonized material. In both the low and high potential types this composition is formed into oval rings, affording a large surface of discharge area, and when placed in series with mica rings to supplement the air gap, the resistance surface of the mica acts as a discharge plate and materially assists in presenting a continuous surface of the abnormal or static discharge. At the same time this combination of resistances will not permit an arc to form or a dynamic current to precede or follow it. This high resistance feature and the peculiar shape of the rings afford one of the many advantages possessed by this form of arrester.

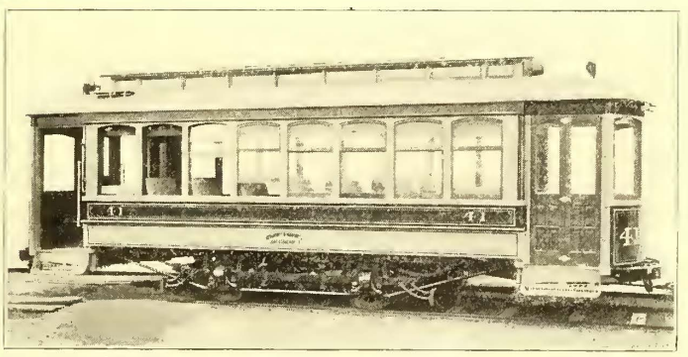
The supporting brackets are secured to the insulating base, which is raised from the bottom of the steel box in which it is enclosed, allowing the free circulation of air and preventing the formation of an arc between the box and instrument. As a further precaution the box is treated with special insulating enamel.

The box itself is made of heavy pressed steel, with a cover of the same material held in place with winged screws. The openings in the sides of the box for circuit wires are provided with special insulating bushings, the whole making a compact and durable instrument of neat appearance, the several parts being so proportioned and distributed as to make the combined instrument convenient to handle, place and connect. All of the parts are readily accessible for inspection and test at all times.

NEW EQUIPMENT FOR MENOMINEE & MARINETTE TRACTION COMPANY

The American Car Company has recently delivered to the Menominee & Marinette Light & Traction Company, Menominee, Mich., the type of semi-convertible car illustrated. The railway company operates systems in Menominee and Marinette and a line connecting the two cities, and also owns the attractive resort, Lakeside Park. Menominee is at the extreme southern point of Northern Michigan, and Marinette is just opposite in Wisconsin. Both are just off the coast of Green Bay.

The car illustrated is seated for twenty-eight passengers, and the seats are of spring rattan. The semi-convertible window system permits the admittance of as much air as desired, the windows being arranged to be held at any height or raised entirely into the roof pockets. Cherry, with neatly decorated birch ceilings and bronze trimmings, constitutes the interior



TYPE OF SEMI-CONVERTIBLE CAR USED BY THE MENOMINEE & MARINETTE TRACTION COMPANY

finish. The furnishings include Brill angle-iron bumpers, "Dedenda" gongs, radial drawbars, ratchet brake handles, etc., and American Car Company's sand boxes. The Brill No. 21-E type of single truck is used with a wheel base of 7 ft. 10 ins. and 33-in. wheels.

The length over the end panels is 20 ft. 8 ins., and over the crown pieces 30 ft. 1 in. The distance from panel over the crown piece is 4 ft. 8½ ins. The width over the sills, including the panels, is 7 ft. 9½ ins., and over the posts at belt 8 ft. 2 ins. The sweep of the posts is 2¾ ins. The distance between the centers of the posts is 2 ft. 5 ins. The side sills are 5 ft. x 3⅜ ins., and the end sills are 3½ x 6⅛ ins. The angle-iron sill plates are 6 ins. x 3½ ins. x ⅜ in. The thickness of the corner posts is 3¾ ins., and of the side posts, 3¼ ins. The seats are 36 ins. long, thus leaving a 22-in. aisle.

Three hundred men on June 22 changed the gage of the East St. Louis & Suburban Railroad, running between East St. Louis and Belleville, Ill., by 1½ ins., the entire alteration, in the route between the two cities and in the tracks running from the limits of Belleville, to its public square, being effected in little more than nine hours. The original gage was known as the "street car," and this was altered to the standard width. Cars were run all day between the limits of Belleville to East St. Louis, where transfers were made to the city line at the Belt line crossing. In Belleville the service was interrupted from 6.30 a. m. to 4 p. m., when the change was completed.

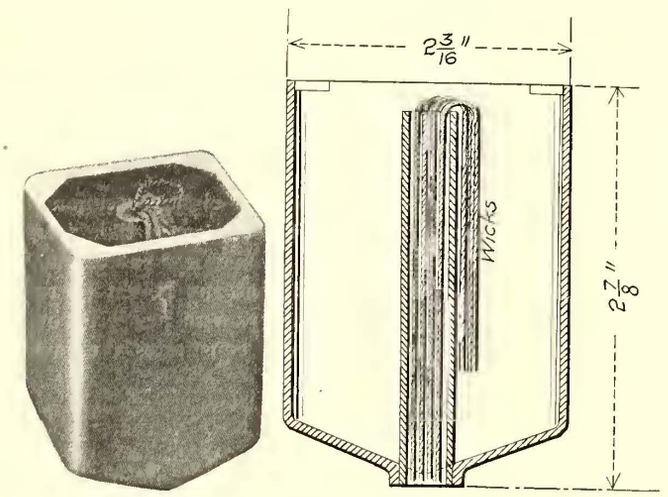
NEW YORK STATE QUESTION BOX

In the last issue of this paper was published a portion of the new answers contained in the Question Box prepared for the Lake George convention of the Street Railway Association of the State of New York. The remaining answers are given herewith:

MECHANICAL (Continued)

No. 22.—Give description with sketch of oil cup or journal-box, suitable for using oil as the lubricant.

The Schenectady Railway Company has adopted the use of oil for lubricating motor, axle and journal bearings. The motor and axle bearings are lubricated by an oil cup designed in our shops as per the accompanying illustrations. This cup is very simple,



OIL CUP USED BY SCHENECTADY RAILWAY

and the number of wicks entirely governs the feed. It was found that by using oil entirely 25 per cent of armature trouble has been eliminated, besides cutting expense of lubricant in half. The use of grease for lubricant in my opinion is a thing of the past.

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

We use a cup with a piston feed, the jar of the car causing the piston to move and feed the oil.

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

WHEELS

No. 23.—Give your ideas and experience with respect to the following:

(a) Life and cost (per 1000 wheel-miles) of cast-iron wheels?

Average mileage taken from 1458, 400-lb. cast-iron wheels, showed an average of 40,014 miles per wheel, and including one re-grinding show a cost of 22 cents per 1000 miles.

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

Cast wheels on this road have been giving an average of 12,582 miles at a cost of .00718 per mile. Steel-tired wheels thus far have not filled their entire life with us, and consequently can give but little idea of the mileage and cost at the present time.

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

Average life of cast-iron wheels about 30,000 miles. Cost per 1000 wheel-miles, 20 cents.

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

Average life, 25,000 miles. Cost per 1000 miles, 19 cents.

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

(b) Life and cost (per 1000 wheel-miles) of steel-tired wheels?

None of our steel-tired wheels have been finally removed, but the majority of them have been turned up twice with an average of 38,000 miles for each turning. Not having the complete life of any of these wheels, we are unable to give the cost per 1000 wheel-miles.

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

Average life of steel-tired wheels 150,000 miles. Cost per 1000 wheel-miles, 13½ cents. This cost is based on price of tires only, as we consider the wheel center should be classed as a permanent feature of the truck when considered in comparison with cast-iron wheels. The shop cost of turning the tire on one steel-tired wheel during its life time is practically the same as for boring and fitting five cast-iron wheels, which it would be necessary to use to make the same mileage. The value of scrap returned after 150,000 miles service is, however, in favor of the cast-iron wheels to the amount of about $4, which would reduce the cost of the cast-iron wheel per 1000 wheel-miles, to 17.4 cents.

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

(c) Life and cost (per 1000 wheel-miles) of rolled-steel wheels?

We are unable to give the life or cost per 1000 wheel-miles on rolled-steel wheels, owing to the fact that we have had them in service but a short time. I would say, however, that from the present indications, their performance should be very satisfactory.

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

No. 24.—What are the deciding factors in determining the wheel problem, and under what conditions will the steel wheel supplant cast iron?

For interurban use the most important factor is that of safety. Another argument in favor of steel wheels is the removal of the flat wheel nuisance.

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

With us the principal deciding factor is the city tracks of Rochester. We are unable to get cast wheels with flanges that will not chip more or less.

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

To my mind the factor of safety will be the deciding one in determining the wheel problem, and I believe as a matter of economy, the steel-tired wheel will eventually supplant the cast-iron wheel, at least on suburban and interurban cars.

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

No. 24a.—If steel wheels come into vogue, what additional equipment will be required at the repair shops, and what will be the effect on cost of wheel maintenance.

A wheel-turning lathe, and a systematic inspection of wear of flanges.

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

The only additional equipment in the shops to maintain steel wheels with us will be a tire-turning lathe.

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

In shops not already equipped, it will be necessary to provide a wheel-turning lathe. The cost of wheel maintenance should not be increased.

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

BRAKE SHOES

No. 25.—What has been your experience with different types of brake-shoes?

We have experienced some difficulty in making a car with insert shoes brake as readily as with the soft shoes.

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

Have used several different types of brake shoes. We have found that air brakes require a harder shoe than we were using, soft shoes having a tendency to skid the wheels. We have also used with success, shoes with patented wearing plates inserted.

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

We have had considerable experience with different types of brake shoes, and can find nothing better suited for our requirements than a cast-iron shoe made in our own foundry.

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

We find that a hard iron shoe with a soft insert gives the best mileage.

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

No. 26.—What effect has the type of shoe on the life of the wheel?

Effects of different types of shoes on wheels are manifold, the contour and composition of metal used with their varying co-efficients of friction being vital to the wheels.

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

The soft iron shoes we use have had but little effect upon the life of our cast wheels.

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

In my opinion the character of the brake shoe has a considerable bearing on the life of wheel; this is especially true of steel-tired wheels. A brake shoe that is too hard or has inserts that are too hard, materially lessens the life of the wheel, and does not afford the braking qualities of a softer shoe.

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

The difference in the wear on the wheel with a hard iron shoe with a soft insert, and a soft shoe is very slight.

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

No. 27.—How thin is it safe to wear a shoe?

By proper adjustment of brake shoes so that an even wear be maintained they can be, with safety, worn down to about 5/8-in. on city cars, and 3/4-in. on high-speed cars.

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

We wear our shoes to less than 1/2-in. in thickness.

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

We make a practice of wearing brake shoes down to 3/8-in. Or in other words, a brake shoe originally weighing 36 lbs. is worn down to 10 or 12 lbs.

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

We found some time ago that a great many brake shoes were being taken out before they were fully used up. We made a number of experiments, and finally came to the conclusion that it was entirely safe to wear a shoe down to about 5/8-in. thickness. We believe it is a waste of good material to take a shoe out which measures 7/8-in. or 1-in. in thickness.

SCHENECTADY RY. CO.

Five-eighths inch to one-half inch.

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

If shoes wear even on both ends it is safe to wear the shoe to 1/4-in., but if one end wears faster than the other, it is necessary to watch the shoe carefully, as the flange of the wheel is apt to wear through and cut the shoe hanger. On single-truck cars I let the shoes wear to almost 1/4-in.

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

No. 28.—What is the cost of your shoes per 1000 car-miles?

Cost of brake shoes per 1000 car-miles is about 7 cents.

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

Seventeen and one-half cents per thousand wheel-miles.

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

Cost of brake shoes per 1000 car-miles, 59 cents.

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

Fifty-eight and three tenths cents.

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

No. 29.—Have you had any trouble with shoes breaking?

Yes:—Shoes frequently break in one of two places, either straight across the center of the shoe, or the eye through which the key goes breaks off and drops the shoe.

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

Practically none.

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

None whatever.

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

It is very seldom that we have a shoe break.

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

We have had no trouble with shoes breaking.

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

No. 30.—What adjustment do you allow between the shoe and the wheel, (a) With air brakes? (b) With hand brakes?

We get the best braking results when we adjust the shoes so as to just clear the wheel when the brakes are off.

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

Our shoes are adjusted to from 1/4-in. to 3/8-in. in both cases.

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

From 1/8-in. to 3-16-in. we find sufficient for air, and 3-16-in. to 1/4-in. for hand brakes.

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

(a) One eighth in. (b) One quarter in.

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

Hand brakes 1/8-in.; air brakes, 3-16-in.

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

I allow anywhere from 1-16-in. to 1/8-in. if the car has to run on short curves, and 1/8-in. is not too much. If the shoe is hung too close to the wheel it will bind on the curves, and the edge of the wheel will cause the shoe to clatter. Our road has some bad grades, and we have had trouble with the brake beams becoming sprung, causing the shoes to wear more at the top than at the bottom. I have not yet found any way of overcoming this uneven wearing.

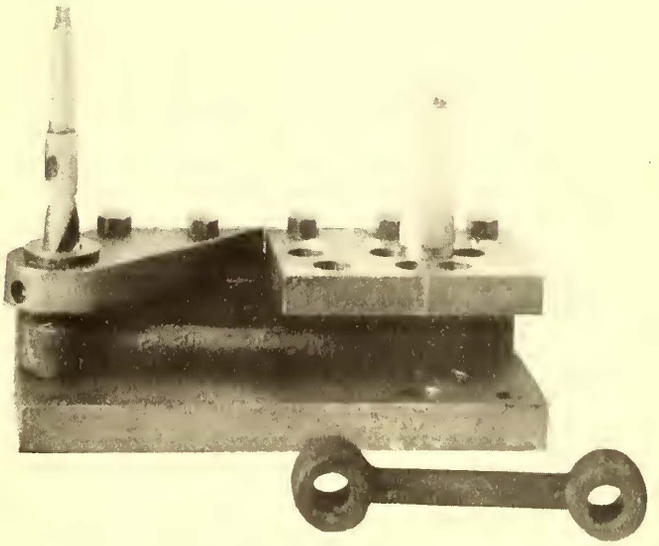
HOMER TICE, Master Mechanic. Poughkeepsie City & Wappingers Falls Elec. Ry. Co.

SHOP DEVICES

No. 31.—There is always a demand for information relative to labor-saving devices and schemes for the shops. If you are using any novel device or labor-saving scheme not recently described, please send description and photographs or drawings.

BORING BRAKE HANGERS

One of the most essential features of brake rigging is the proper position of the shoes on the wheel, and a much neglected detail pertaining to the subject is the boring of the brake hangers. Without uniformity in the hangers, poor braking and improper wear of the wheel and shoe is sure to result. In order to eliminate trouble of this nature, and at the same time materially reduce the labor



JIG FOR BORING BRAKE HANGERS, BUFFALO

costs, the "jig" shown in accompanying illustration was designed.

The undrilled hanger is first drilled on one end, centered by the eye only. It is then placed in the "jig" and the pin inserted in hole

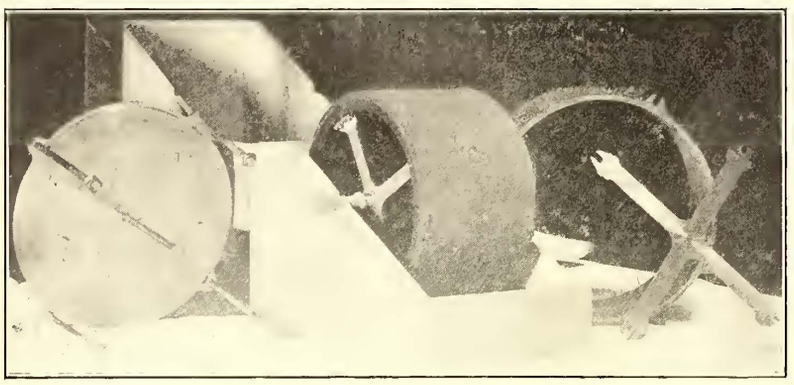
governing the length required. By means of a set screw in back (not shown in the illustration) the hanger takes the correct position without further adjustment. The hole is then drilled, the drill being guided by a steel bushing. The "jig" is suitable for any length of hangers from 6 to 10 ins., increasing in steps of ½-in. at a time.

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

GRAINING WOOD

A device that we have lately put into service, and which has already proven itself a money saver, is an outfit for transferring the natural grain of wood to our sash, etc.

While the apparatus is in no way a new thing, it is not (to our knowledge) extensively used by street railways; therefore, we submit an illustration of our outfit, thinking it may be of some interest.



DEVICE FOR GRAINING WOOD, BUFFALO

The hand roller, with its composition surface, is shown in the box. An impression is made from the natural wood to the composition, and from that to the surface to be grained. The other articles shown comprise a brass cylinder, bottom and bolts with which it is put together, forming a circular mould. The roller is placed in position inside the cylinder and the melted composition poured in, making a continuous surface, so that no cracks or seams show in the graining. This outfit is entirely home-made, the roller being wide enough to grain two stiles or rails at one time. It has proven itself in every way superior to the old and lengthy process of graining by hand.

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

THE POWER HOUSE

TREATING FEED-WATER

No. 32.—How can the engineer of a small power station, without consulting a chemist, determine the scale-forming ingredients of the feed-water he is using, with a view of injecting neutralizing chemicals?

The engineer, unless he is himself a chemist, should not attempt any extensive doctoring of feed-water, any more than he should prescribe for sick members of his family. The fee charged by an expert chemist for analyzing feed-water is merely nominal, and if the water requires treatment at all, it is worth doing in a scientific manner. There are many reputable firms making boiler compound who will analyze feed-water without charge, and furnish the proper neutralizing chemicals at reasonable price.

If there is corrosion of boilers due to presence of acid in the feed-water, the acid may be detected by use of litmus paper. Blue litmus paper will turn red if dipped in water containing acid. Soda may be used to neutralize acid; it should be used in such quantity as to render the water slightly alkaline. This condition will be shown by the turning blue of litmus paper previously turned red by the acid.

G. A. Harvey, Elec. Eng.,
International Ry. Co., Buffalo.

Take a glass vessel and fill it with the water to be tested. Add a few drops of water of ammonia until the water is distinctly alkaline. Next add a little phosphate of soda. The action of this is to change the lime magnesia, etc., into phosphates, in which form they are deposited in the bottom of the glass. The amount of matter thus deposited gives a crude idea of the relative quantity of sediment and scale-making material in the water.

C. Davis, Eng. of Pow. Sta.,
New Paltz, Highland & Poughkeepsie Tract. Co.

No. 33.—Is it practicable to use soda ash for purifying boiler feed-water? What are the objections? Under what conditions should soda ash be used, and in what quantities?

No snap-judgment should be formed as to the use of soda ash in feed-water. If an expert chemist is consulted, he will designate the quantity to be used if its use is advisable. If the "small power station" is so located that an expert chemist is not within call, he can be reached, nevertheless, by mail, and samples of water and scale can be sent to him.

Where deposit is due to presence in feed-water of chloride and sulphate of magnesium, carbonic acid and oxygen, sulphate of lime or carbonates of lime, magnesium and iron, soda ash may be used. Soda ash is also helpful where corrosion is due to fatty acid contained in some cylinder oils.

Too much soda will cause foaming. Such quantity may be used as to render the water slightly alkaline. Determine this by litmus paper test.

G. A. Harvey, Elec. Eng.,
International Ry. Co., Buffalo.

The writer does not consider it practicable to use soda ash regularly for purifying boiler feed water. However, soda ash may be used for cleaning out the boiler by dissolving 4 to 6 lbs. in clean water in a tub or tank, and pumping this into the boiler. The boiler should be worked two or three hours, and then should be cut out and allowed to cool, after which it should be blown out, and man-holes and hand-holes removed, and the boiler thoroughly washed out with a hose.

C. Davis, Eng. of Pow. Sta.,
New Paltz, Highland & Poughkeepsie Tract. Co.

Soda ash is used to soften the scale, to bore it out easily with a mechanical pin. One objection to the use of soda ash is the danger of using too much.

D. F. Carver, Gen. Supt.,
Rochester Ry. Co.

No. 34.—Under what conditions can kerosene be used to advantage in boilers? What are the objections to the use of kerosene?

In water causing an incrustation due to presence of soluable salts, kerosene may be used. It decreases the tendency of small particles to crystalize and to adhere to the iron, and keeps them in the form of a soft slush which can easily be blown out.

In boilers which have already become scaled, kerosene may be used to advantage by allowing the boilers and scale to become thoroughly dry; then pour in kerosene, and very slowly fill boilers with water. The oil floating on the surface will saturate the scale as it rises.

One of the most serious disadvantages in the use of kerosene is the rapid formation of rust which results. This will be found in all parts of the system, even as far as the low pressure cylinders of the engines. On delicate valves the corrosion is apt to cause sticking, and the use of kerosene in boilers has accounted for the twisting off of Corliss valve stems.

The effect of kerosene on pipe joints is very bad. It will quickly open up joints which are slightly defective, and it causes the rotting of any packing which contains rubber.

Scale removed from boilers in which kerosene has been used will be found, if closely examined, to contain traces of iron adhering to it.

Kerosene also has a tendency to destroy lubricating qualities of cylinder oil.

G. A. Harvey, Elec. Eng.,
International Ry. Co., Buffalo.

Kerosene may be used if it is fed into the boiler by means of a lubricator of some kind. It should be fed one drop at a time in the same way as feeding oil to an engine cylinder. The objection to using kerosene is that it greases the tubes and shell, and may cause the flues to burn, giving rise to all sorts of trouble.

C. Davis, Eng. of Power Sta.,
New Paltz, Highland & Poughkeepsie Tract. Co.

No. 35.—Will zinc placed in a steam boiler prevent scale or corrosion? Under what conditions of feed-water impurity should zinc be used?

I do not think that it will.

C. Davis, Eng. of Pow. Sta.,
New Paltz, Highland & Poughkeepsie Tract. Co.

Zinc placed in boilers might have a tendency to neutralize certain acids contained in the feed-water, but the direct application of a proper compound to the water before it enters the boiler will effect a more thorough and uniform neutralization.

G. A. Harvey, Elec. Eng., International Ry. Co., Buffalo.

CARRYING THE PEAK

No. 36.—In a small or moderate-sized plant, what is the best method of increasing the boiler capacity during heavy peak loads? Give details and results obtained.

The capacity of a boiler might be compared to the strength of a chain. When it is once strained by overwork, it is thereafter always a doubtful quantity. The best method of operation is to always keep the boilers thoroughly clean, both inside and out, and they will then be in shape to take care of as heavy loads as should properly be placed upon them. The stirring of fires and increasing of draft to a reasonable limit is about as much forcing as should be resorted to. G. A. HARVEY, Elec. Eng., International Ry. Co., Buffalo.

The best way to increase boiler capacity is to put in more boilers. C. DAVIS, Eng. of Pow. Sta., New Paltz, Highland & Poughkeepsie Tract. Co.

No. 37.—Is it practicable to inject live steam under boilers to raise the steam pressure at times of heavy demands? Please give details of proper arrangement and results secured.

The writer does not consider it is practicable to inject live steam under the boiler to raise steam pressure. A better way is to insert a steam jet in the smoke-stack. C. DAVIS, Eng. of Pow. Sta., New Paltz, Highland & Poughkeepsie Tract. Co.

No. 38.—What pointers or suggestions can you give for the benefit of the chief engineer of power station, who is called upon to run his station heavily overloaded during the summer months? What are some of the things you do under these conditions?

All power station machinery has a "normal rating" given it by the manufacturers, which can safely be exceeded for definite limited periods. If these limits are exceeded, either as to amount or duration of overload, the policy of operation is most unwise. Continued excessive overloading is sure to result, sooner or later, in break down of some part of the apparatus, which will result in serious hindrance of operation. There should always be some margin of spare machinery. If there be no margin, there is all the more reason for limiting the load to an absolutely safe point. G. A. HARVEY, Elec. Eng., International Ry. Co., Buffalo.

LIGHTING

No. 39.—Is it possible to run a lighting or power load from generating units that are supplying current for railway purposes? How can it be done? What is the best method of regulation in such cases to prevent fluctuations in the lighting or power circuit?

If lighting on power circuits is permitted by the underwriters, and the use of 500-volt current and lamps in series can be tolerated, the lighting can probably be done in a manner that will be sufficiently satisfactory for the purpose. Lighting circuits should be taken directly from the power-station bus-bars, and there should be nothing but lighting service on the leads that are provided for that purpose. With a station having modern units, not greatly overloaded, such lighting service ought to be quite satisfactory. If possible, the generators should be adjusted for flat compounding curve. If there are storage batteries in connection with the plant, the lighting will be better.

A still better method of lighting from railway power would be to install a motor-generator set, for the motor of which power should be taken directly from the station bus-bar independent of any railway feeders. The generator of this set could be built for 110 volts. If the field is worked at a high point on the saturation curve, the power-station fluctuations will be considerably cushioned at the lamps. G. A. HARVEY, Elec. Eng., International Ry. Co., Buffalo.

We are doing it every day by the use of a synchronous motor-driven, 60-cycle alternator, and are having no trouble whatever with the regulation. W. R. W. GRIFFIN, Supt., Rochester & Eastern Rapid Ry.

LIGHTNING

No. 40.—Please state in detail what trouble you have had with lightning at your power house. Then please state in full what steps you have taken to prevent damage from lightning.

We have found that suitable lightning arresters properly installed and cared for, will take care of any lightning discharge which is likely to occur. This applies principally to the high-tension lightning arresters installed in the sub-station; each station is also equipped with arresters on the D. C. side, but these arresters, it might be added, do not show signs of having operated, while the high-tension arresters have been seen to operate. This condition leads us to believe that the high-tension system is more sensitive to lightning discharges and is, therefore, a protection to a neighboring D. C. line, and to station equipment. W. J. HARVIE, Elec. Eng., Utica & Mohawk Valley Ry. Co.

Lightning troubles of the International Railway Company, aside from temporary interruptions of power due to short circuiting or grounding of high-tension transmission line, have been limited to burning out of current transformers, and occasionally the relays connected thereto. The manufacturers have since increased considerably the insulation in the make-up of current transformers. Attention has been given to lightning-arrester outfits. The ground plates have been carefully installed, being embedded in powdered coke at such depth that they are constantly in moist earth. Where each ground plate is buried, a 2-in. iron pipe is placed in the earth, so that the lower end reaches the bed of coke and the upper end projects above the surface. The coke can thus be kept wet if there is any doubt as to natural moisture of the surrounding soil. Choke coils have been installed in connection with the lightning arresters, and the gaps of the arresters have been cut down to the minimum safe amount. Arresters now take discharges more frequently than previously. G. A. HARVEY, Elec. Eng., International Ry. Co., Buffalo.

Have had no serious trouble on our line from lightning. In addition to the regular arresters on the D. C. switchboards, we have a home-made arrester made up of 9 or 11 No. 27 single cotton-covered magnet wires, twisted together in the center and the outer ends laying across the bare terminals, one of which is attached to the feeder, the other to the ground, thus leaving only the cotton cover of the wire insulated between the trolley and the ground. We find that this works to our entire satisfaction, although several of these little wires need repairing after each thunder storm. W. R. W. GRIFFIN, Supt., Rochester & Eastern Rapid Ry.

LINE DEPARTMENT

LIGHTNING

No. 42.—Please state in detail what trouble you have had from lightning on any part of the transmission or distribution system. Then please state in full what steps you have taken to prevent damage from lightning.

This question has a bearing on Question No. 40. Would say in this respect that we have had to replace D. C. line arresters on portions of our line which are exposed and are not paralleled by the transmission line, while on equally exposed portions of the line that are paralleled by our transmission line we have had very few replacements to make. We installed D. C. lightning arresters every half mile, and have found this sufficient in our climate. W. J. HARVIE, Elec. Eng., Utica & Mohawk Valley Ry. Co.

Refering to the line I am in charge of at present, I have had no trouble from lightning on the high-voltage transmission, as it is well guarded with well-known protective apparatus in the main generating station and each sub-station.

As for the D. C. feeders and trolley we are amply protected with arresters of the wood-box type, which are placed on the pole line at intervals of ½ mile.

Although this line has only passed one lightning season since in operation, we have had no burned-out cars nor any damage whatever as a result of lightning. W. F. BURKET, Chief Lineman, Rochester & Eastern Rapid R. R.

Use the latest improved lightning arrester. Do not think there is any device at present that is a perfect safeguard against lightning. H. L. MACK, Supt. of Line, International Ry. Co., Buffalo.

The writer once saw a number of lightning arresters connected to the direct current feeder of a suburban electric railway. Each arrester was grounded by a connection with one of the track rails. Those who have had experience with three-wire electric lighting systems can imagine what would occur if a lightning arrester was connected between either side of the system and the grounded neutral. At the first storm all of the arresters, with one or two exceptions, were burned out. The management promptly condemned the arresters, and it was only after much argument that they were repaired and connected to the line and with proper

grounds. As well as the writer remembers, none of these arresters were burned out again.

Track rails do not constitute a proper ground for lightning arresters on account of their self-induction and their high resistance to earth, for in many places the track is only ballasted to the top of the ties in the center of the space between the rails, the rails themselves being separated by the ties from the ground. In long continued spells of dry weather the ties become more or less of an insulator and interpose considerable resistance between the rails and the ground.

The proper method of grounding lightning arresters is to connect them by a copper wire of No. 6 B. & S. gage to a copper plate of some four square feet in area buried in the ground. The ground wire should be insulated where it runs along poles or buildings. It should be soldered entirely across the ground plate, without the use of corrosive acids. The ground wire should never be run through an iron pipe for mechanical protection, as such would greatly increase the impedance of the circuit, sometimes to such an extent as to render the arrester useless. If mechanical protection is needed, it is better to provide for the same by the use of a larger size of wire. If the ground plate cannot be buried in permanently moist soil, half a bushel or so of coke or charcoal should be placed below and above the plate to assist in the retention of moisture. When the latter procedure is followed, the ground should be located some distance away from the butt of the pole, as such a ground would produce an excess of moisture at the butt of the pole, which is not to be desired on account of the increased decay that it would produce.

Ground wires should run as straight as possible without bends or pigtails, to interpose self-induction, direct from the arrester to the ground plate. Nearly all of the arresters on the market at the present time will, if provided with proper grounds, give satisfactory service. The writer believes that nearly all of the trouble with the present arresters is due to improper grounds. From the writer's standpoint, the above holds true with direct current and low-tension alternating current distribution.

Bert H. Shepard, Const. Eng., Black River, N. Y.

We have had little or no trouble. We rely mainly on lightning arresters on back of switchboard.

I. E. Matthews, Eng.,
Rochester Ry. Co.

SAFEGUARDS

No. 43.—What is the most efficient method of protecting high-tension lines from contact with trees?

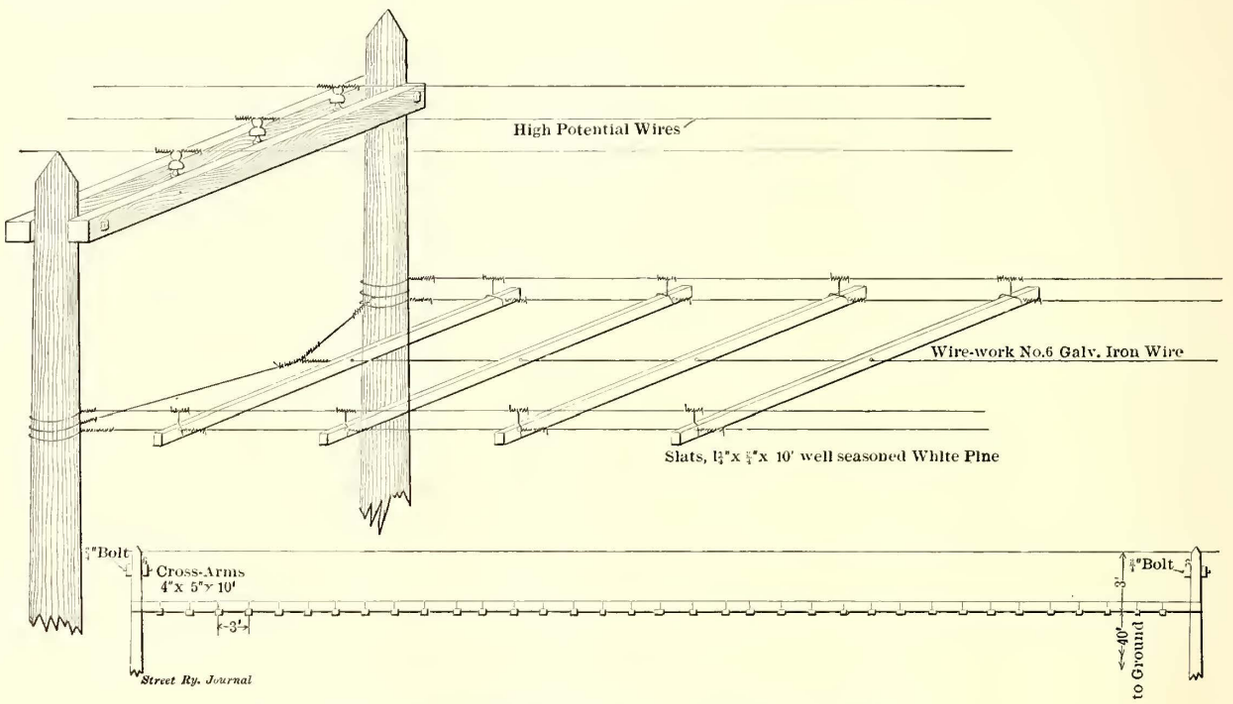
If trees are properly trimmed no trouble will be experienced from contact with high-tension wires.

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

I consider the most efficient method of protection against trees is, if it is possible, to cut the trees. I deem it advisable to construct high-tension lines in a way somewhat different from that followed by some companies at the present time. It seems that the object of some of the companies (especially contractors and companies that build lines to sell) is to build just as cheap as they possibly can, never caring anything about what the trouble is nor who has it after they have been paid for the work or have sold out.

Instead of building the transmission line through towns and villages where there are countless numbers of trees, which are sure to cause trouble in the course of time, a line should be built on private right of way around the villages, thus having no trees to cause trouble at any time, and in case of lines breaking, from any cause, instead of having high-voltage wire down along the street, where anyone may be killed (as may happen and quite frequently does), it would be at a place where no one would be in danger.

In my opinion it would be cheaper to build the line around the villages than to take the chance of paying for the lives that are apt to be lost in case of a break in a busy street. Because, almost



CRADLE UNDER HIGH-TENSION WIRES, ROCHESTER RAILWAY

as sure as a green limb of a tree, wet from a recent rain, touches the wire, whether the line be insulated or not, the wire will fuse especially if it be aluminium, which is often used now-a-days.

W. F. Burket, Chief Lineman,
Rochester & Eastern Rapid Ry. Co.

Set high poles or cut down trees that are near wires.

H. L. Mack, Supt. of Line, International Ry. Co., Buffalo.

The cutting down of all trees within a distance from the line equal to their height is the only sure method of protection against them. If it is impossible to secure the right to do this, as in villages or cities the line may be built above them. When built above them, the trees will in time grow to reach the line. This may be prevented by frequent trimming.

Bert H. Shepard, Const. Eng., Black River, N. Y.

Get rid of the trees entirely.

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

Where allowable we chop off intervening branches; otherwise, wooden sleeves are placed on wire.

I. E. Matthews, Eng.,
Rochester Ry. Co.

No. 44.—What is the best form of cradle or other device for catching broken high-tension lines at highway crossings, or where the lines cross over or under other wires?

The best device of this kind I know of is constructed with 5-16-in. galvanized wire, made similar to a woven wire fence. A cradle of this kind is very simple to construct, as nothing is needed but wire and clamps, and it is very neat in appearance.

W. F. Burket, Chief Lineman,
Rochester & Eastern Rapid Ry. Co.

We make a cradle by stretching two 5-16-in. iron cables from the ends of cross-arms, which are 3 ft. longer than our standard arm, and on these cables at intervals of about 10 ft. we place wooden slats, triangular in section and measuring 2 ins. on a side. Such cradles may either be grounded or insulated; in our case they are insulated. We have never had a line drop on one of these cradles, and, therefore, cannot say from experience which method is advisable. Any device which will prevent the broken wires from reaching pedestrians or vehicles is satisfactory.

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

Wire cradle, using three strands of 5-16-in. galvanized steel cable, one from center of pole and from either end of double cross arm properly guyed, using a No. 9 wire at right angles about every 5 ft.

H. L. MACK, Supt. of Line,
International Ry. Co., Buffalo.

Cradle made of steel cable with good substantial wooden cross pieces.

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

A cradle of wooden slats. See drawing on opposite page.

I. E. MATTHEWS, Eng., Rochester, Ry. Co.

PAINTING POLES

No. 45.—What is the best way to paint trolley poles? Give sketch or photograph and description of apparatus used; also detailed cost of doing the work.

We do not paint poles except in cities and towns, where they are painted in the ordinary manner.

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

Use ladder and paint with brushes. The cost depends largely on the condition of poles. Ordinarily, the cost would be about 20 cents per pole.

H. L. MACK, Supt. of Line,
International Ry. Co., Buffalo.

Wooden poles can be painted very cheaply by a man equipped with paint pot, brush and safety belt, climbing to the top of the pole and painting downward. One man will paint 30 30-ft. poles per day.

BERT H. SHEPARD, Const. Eng.,
Black River, N. Y.

OVERHEAD WORK

No. 46.—What is the best method for attaching span wires to iron and wooden poles?

For iron poles, use a wooden pole plug made of seasoned beech, maple or birch, over which the cast-pole cap is placed, and attach the span-wire to an insulated eye-bolt, which passes through the iron cap and wooden plug. For wooden poles, use the uninsulated eye-bolt, as the trolley hanger is sufficient insulation.

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

Use a plain eye bolt for wooden poles, weld ring or eye and bolt in wood strain insulator for iron poles. This makes a very neat and durable attachment.

H. L. MACK, Supt. of Line,
International Ry. Co., Buffalo.

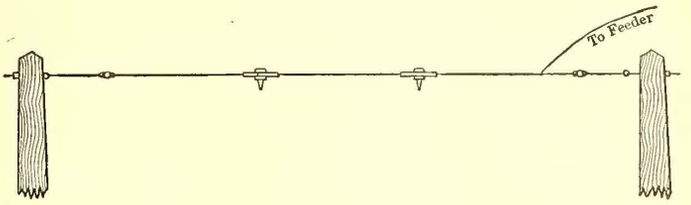
Span wires should be attached to iron poles by means of a clamp of strap iron passing around the pole, the two ends of the clamp being held together by two bolts. The span wire should be attached to one of the bolts by means of a thimble and guy clamp. The two ends of the span wire should be fastened by means of a three-bolt strand clamp in preference to twisting them together, as it makes a stronger, neater, quicker and cheaper job. In addition, it permits of readily undoing the connection when desired for any reason, and does away with the use of expensive and unsightly turnbuckles for taking up slack.

Attachment may be made to wooden poles by means of an iron eye bolt passing through the pole and the end of the span wire made up as described above. While an eye-bolt with a long thread provides an excellent method for taking up slack in the span wire, the writer prefers to do away with eye-bolts altogether, and fasten the span wire by passing the end twice around the pole and fastening the end with a strand clamp. With this method it is not necessary to bore a hole through the center of the pole, where strength is most needed, especially when the pole is carrying other wires above the span wire, and at the same time slack may be taken up with the aid of a pair of blocks almost as quickly as with eye-bolts, and more so when there is more slack to be taken up than can be cared for by the bolt thread. With the clamp placed close to the pole it will be impossible for the span wire to slip, and the two wraps around the pole will be sufficient bearing surface to prevent serious cutting of the pole.

BERT H. SHEPARD, Const. Eng., Black River, N. Y.

We use ball insulators principally. See drawing herewith.

I. E. MATTHEWS, Eng., Rochester Ry. Co.



SPAN-WIRE ATTACHMENT, ROCHESTER

No. 47.—What is the best form of bracket suspension?

Pipe arm with span to support trolley wire.

H. L. MACK, Supt. of Line, International Ry. Co., Buffalo.

The form of bracket consisting of a horizontal member, with a diagonal brace underneath, is liable to be bent downward, at the point of attachment of the brace, by the strains inflicted upon it by the trolley wire. The bracket which is supported only by a truss from the outer end to a point on the pole above the bracket is liable to be bent downward in the center if the truss is pulled tight enough to counteract the strain of the trolley wire. Altogether, the best form of bracket is a combination of the two with a short flexible member to which the trolley wire may be attached. Steel tubing which is usally employed in the manufacture of brackets has an equal resistance to bending in all directions, but this is not really necessary, as resistance to side strain is not of so much importance, for from the nature of the bracket and the method of attachment to the pole, this is better cared for by means of strain guys. A bracket of T-iron would offer much more resistance to vertical bending strains, and at the time be sufficiently strong to resist all ordinary side strains.

BERT H. SHEPARD, Cons. Eng., Black River, N. Y.

Flexible brackets.

I. E. MATTHEWS, Eng.,
Rochester Ry. Co.

No. 48.—What is your practice in guying?

Guy all curves even though slight, and head-guy at all strain ears or anchors; these anchors should be placed every 1000 ft. for span construction with No. 0000 trolley. We have found it necessary to side-guy poles in bad ground, and we are inclined to believe that the best construction is to set the poles straight and side-guy each pole for the entire length of the line.

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

Make the guy strong enough to hold any strain it is liable to get at any time, and have it at the right place.

W. F. BURKET, Chief Lineman,
Rochester & Eastern Rapid Ry. Co.

Use wood block with rod, rod and block to be of sufficient strength to carry the strain.

H. L. MACK, Supt. of Line,
International Ry. Co., Buffalo.

For light guys a 5-16-in. strand, composed of seven No. 12 steel wires may be used. For heavy strains the same sized strand, made of Siemens-Martin steel may be used. The end of the strand should be fastened to the pole by wrapping twice around the pole and fastening with a three-bolt strand clamp. With heavy strains, pole shims should be placed around the pole to prevent the strand from cutting into the pole. The other end of the strand should be attached to some permanent object, strong enough to withstand the strain, as an anchor or dead-man.

For light guys there is a form of harpoon anchor which is secured by driving into the ground, and when the strand is attached and pulled up the anchor pulls up about 6 ins., and the wings,

spreading out, furnish enough bearing surface against the soil to hold fast. These anchors are very cheap to install, and in ordinary earth—not sand or new fills—will hold as much strain as is safe to place upon the ordinary 5-16-in. strand. For heavy strains there is an anchor which screws into the ground. These anchors are made in sizes large enough to withstand any strain which it may be desired to use them for. All straight lines should be double-head and side-guyed every half mile, as a protection against storms.

Bert H. Shepard, Cons. Eng.,
Black River, N. Y.

We use anchors where possible.

I. E. Matthews, Eng.,
Rochester Ry. Co.

No. 49.—What is the most efficient method of tapping trolley wire to feeders?

In using aluminium feeders it is impossible to get a first-class joint. The best, however, is made on the feeder with a clamp made of the same metal as the feed-wire and having a hole drilled for the tap, which is held by two set screws. In my opinion it is impractical to use aluminium until a better joint can be made.

W. F. Burket, Chief Lineman,
Rochester & Eastern Rapid Ry. Co.

The wire tapping from feed to trolley should not be smaller than trolley wire. The taps should not be a greater distance apart than 1200 ft., and where cars are running at frequent intervals the taps should be closer.

H. L. Mack, Supt. of Line,
International Ry. Co., Buffalo.

The most satisfactory method of attaching feeder taps to trolley wires, in span-wire construction, is to make a separate span of the feeder tap between the poles and above the span wire, and to connect the feeder to the ear by means of a flexible connection. In this way if the trolley wire falls the feeder is disconnected, likewise an easy method is provided for disconnecting the feeders at any time. It is not necessary to continue the feeder tap across the entire span, but it may be ended at the trolley wire and connected to a section of steel strand by means of a strain insulator.

Bert H. Shepard, Cons. Eng., Black River, N. Y.

A soldered connection well taped over.

I. E. Matthews, Eng., Rochester Ry. Co.

TRACK DEPARTMENT

BONDING

No. 51.—What is a good method of testing rail-bonds?

There are on the market several bond-testing devices that determine the resistance at the joint in proportional length of the abutting solid rail that have given satisfaction. It is a good practice to test all joints at least once a year, preferably in the late spring, and remedy all defects before summer travel begins. On new work bonds should be tested immediately after installation and, if defective, renewed at once.

M. J. French, Jr., Eng. M. of W.,
Utica & Mohawk Valley Ry. Co.

We consider the best method of testing bonds is with a test car. Equip a car with water tank, necessary switches and contacts; allow a certain amount of current to flow, note line voltage and note drop at each joint. The resistance test comparing the bond to a standard length of rail gives fair results and locates very bad bonds.

F. D. Jackson, Supt. of Track,
International Ry. Co., Buffalo.

We use a patented bond testing instrument, or a mili-voltmeter, and get satisfactory results with either.

I. E. Matthews, Eng., Rochester Ry. Co.

No. 52.—What is the best method of keeping records of individual rail-bond tests?

Number one line of poles, number rails across right of way, and number joint with reference to pole nearest zero stationing. For example: Pole 53, rail 3, joint 2, would be the second joint from pole 53 towards pole 54 on the right hand rail of track number two. A section between poles can be tabulated on a card of a card index system and an accurate record of dates of tests and results may be kept by changing color of ink each year.

M. J. French, Jr., Eng. M. of W.,
Utica & Mohawk Valley Ry. Co.

Divide your line into short sections. Number the right-hand rail in the direction in which you are going with whole numbers and the joints on the left-hand side with fractions, and keep a record of each joint. From your record you can pick up any joint.

F. D. Jackson, Supt. of Tracks,
International Ry. Co., Buffalo.

On forms, a reproduction of one of which is herewith given. "Locality" should be given as on such and such a street, between X and Y streets. It is a good policy to choose for X and Y streets,

BANK AND BUNK RAILWAY COMPANY,
Bank, Bu.

BOND TEST SHEETS.

Test. Sheet No. .....

Tests made by.....
Date.....
Weather.....
Preceding weather..... for..... days.

Locality.	Joint No.	North Track.		South Track.		West Track.		East Track.	
		N. Rail.	S. Rail.	N. Rail.	S. Rail.	W. Rail.	E. Rail.	W. Rail.	E. Rail.

FORM FOR KEEPING BOND-TEST RECORDS

those having special work; and the joints should be numbered consecutively from one piece of special work to the next piece. Short bond tests on special work are not recorded on these sheets, but are recorded on rough sketches of the special work.

J. Stanley Richmond, Conslt. Expert,
New York City.

No. 53.—What has been the experience with soldered bonds?

In 1896 and 1897, at Syracuse, a bond, not strictly a bond of the present soldered bond type, was installed in the following manner: A hole about ½-in. in diameter was drilled through the web of rail to receive the pin of a 2-in. milling facer, with which the rail was faced off bright. A bond consisted of a No. 0000 wire screwed and brazed to cast terminals having a circular milled face 2 in. in diameter, thoroughly tinned, and with a ⅜-in. hole through a boss in the center of the terminal. This terminal was bolted to the brightened rail with a bolt and spring washer and a gasoline blow torch applied until the solder on the terminal reached the melting point. Some of these bonds removed in 1904 and 1905 showed from one-third to two-thirds bright contact, and there is no doubt in the writer's mind that, if the rail had been thoroughly heated and tinned before placing the bond and then, after the bond was tightened in place, soldered according to the present practice of installing soldered bonds, more uniform and better results would have been obtained. From experimental installation of soldered bonds in February, 1905, in my opinion soldered bonds on the outside of ball of T rail and from web of girder rail to fish-plate, are economical, strong and efficient, and I believe will, after a term of years, show a higher efficiency than compression or plug terminal bonds.

M. J. French, Jr., Eng. M. of W.,
Utica & Mohawk Valley Ry. Co.

Soldered bonds do not give good results. Some joints may be all right but they are few, and the remainder show up bad, as it is difficult to eliminate grease, dirt, rust, etc. Solder, owing to mixture of tin and lead, contracts unequally when cooling and crystalizes under the influences of the hammering at joints and the flow of current.

F. D. Jackson, Supt. of Tracks,
International Ry. Co., Buffalo.

On a branch of our system recently equipped with soldered bonds we note a decrease of 10 per cent in the drop. We have not used them long enough to attest as to their wearing qualities.

I. E. Matthews, Eng., Rochester Ry. Co.

No. 54.—In using bond tester on special work in which each joint is bonded in addition to long bonding, what is the method of procedure in case the tie-rods span two or more joints?

Test bond in the usual way, except that contact point for bond test must be carried to cover two joints if bond spans two joints, and disregard the fact that tie-rod is in, as the error is too small, owing to resistance of iron rod as compared to bond.

F. D. JACKSON, Supt. of Track,
International Ry. Co., Buffalo.

CONCRETE FOUNDATIONS

No. 57.—What has been the experience with concrete foundations under rails or roadbed? Please give details as to how concrete was laid, cost of construction and results secured.

In 1900 a track was built on Thirty-Fourth Street, Island of Manhattan, from First Avenue to Tenth Avenue. For the greater portion of this distance the rail was supported by a concrete beam, built as follows: 5-in. x 7-in. x 5-ft. ties were first laid, on 5-ft. centres. Then to these ties the rails were spiked, to bring them to the proper line and gage. Each alternate tie was then tamped with earth, to bring the track to surface. After this was done, the intermediate ties were tamped up with concrete, so that there would be about 5 ins. of concrete underneath them. At the same time a beam of concrete was placed underneath the rail, about 8 in. in depth and 16 in. in width, all being tamped well underneath the rail and any imperfections in surface brought up, either by temporary shimming or by the action of the tamping itself. The concrete was composed of Portland cement, sand and broken stone, mixed one part of cement, three parts of sharp sand and five parts of 1½-in. broken stone. Under granite pavement concrete was also laid at the same time as the beam for the foundations for the pavement, so that on granite block pavement the result was really a bed of concrete, intercepted each 10 ft. by a tie. In asphalt pavement the space between the ties and the concrete beam and outside of the track was filled up with earth, well tamped, over which was placed a layer of concrete, for the foundation of the pavement. Care was taken not to put in this foundation under the asphalt until after the concrete beam had in a measure settled, so that there would not be a bond between the two. This was done in order to facilitate excavation, in case the same had to be made for the replacing of rails or for any other purpose. The cost of this work was approximately $6 per cubic yard of concrete, in place. One reason for adopting this particular method was that horsecars were operated over the track during the course of construction, so that it was necessary to keep the rails at proper gage for the operating of these cars.

On the above-mentioned track storage battery cars, with 9 ft. wheel base, weighing 37,000 lbs. each, with 9250 lbs. on each wheel, were operated for a period of three or four years, when the style of construction was entirely changed, the tracks being made into slotted tracks, when other arrangements had to be made for the foundations. There seemed to be some disintegration of the concrete at some of the joints, which became loose, but it was not during the three years of sufficient moment to warrant any repairs. Repairs could easily have been made by placing steel shims underneath the end of the drop rail, where this disintegration had taken place.

W. BOARDMAN REED, Eng. M. of W. & B.,
New York City Ry. Co.

Portland cement concrete mixed in proportions 1:3:6, thoroughly tamped under base of rail, and extending from bottom of tie to within 5 ins. of top of rail, gives excellent results. Tie rods should be used on girder rail to prevent spreading, and pavement should be of heavy stone poured with tar, or artificial paving blocks thoroughly flushed with Portland cement grout. Brick paving of this class will cost about $3.75 per sq. yd., and sandstone block poured with tar about $4.25 per sq. yd. If Portland cement concrete mixed 1:3:6 is used, and is allowed to set before the tracks are used, there should be no disintegration of the concrete, although I have seen girder rails that have become loosened through neglect to use tie-rods, resulting in the disintegration of the asphalt paving immediately adjoining the rails. Asphalt should never be laid next to the rails, but two rows of alternating headers and stretchers, of heavy stone block, thoroughly set in rich grouting, should intervene between the rails and the asphalt.

M. J. FRENCH, JR., Eng. M. of W.,
Utica & Mohawk Valley Ry. Co.

We generally use 6 ins. under tie. Results are very satisfactory. Cost, $1.00 per foot with 9-in. rails. We have had no trouble with concrete.

I. E. MATTHEWS, Eng.,
Rochester Ry. Co.

SUITABLE CARS FOR CITY AND SUBURBAN SERVICE *

BY T. W. WILSON,
General Manager of the International Railway Company, Buffalo, N. Y.

No subject connected with the business of electric railroading presents such an interesting topic for discussion and investigation, and upon which there is such a diversity of opinion, as that of "Suitable Cars for City and Suburban Service." Every city and every system has an equipment to which it points with pride and calls its standard, and very rarely do any two standards agree. This is, of course, justified, to some extent, by the fact that local conditions of climate or franchise must govern, but too often does the personal equation of the management have the deciding vote. It does seem, however, that, in view of the experience of the last 20 years, we should be able to approximate some general standard to which we could work as nearly as may be.

On inspecting the cars in use in the various localities, one is impressed by the fact that the general trend is towards a larger and more commodious car. In interurban traffic we seem to be approaching very nearly to steam railroad practice, and very rightly, too, as the conditions existing on a modern, up-to-date interurban line are very similar to those on a steam road. By comparing the average dimensions, it will be seen that while an interurban electric car averages 40 ft. over corner posts, the steam coach averages about 60 ft.; that while the length over buffers of the trolley car averages about 50 ft., the steam passenger coach goes to 70 ft., and that while the weight of the interurban car body averages about 30,000 lbs. the steam passenger coach will average about 40,000 lbs. These increases in the weights and lengths of interurban cars have all been gradual, but sure, and the reasons for them may be summarized as follows:

First, it must be kept in mind that the chief business of an interurban electric road is to compete with the steam roads. Up to a few years ago the suburban traffic was entirely handled by the latter, and the people have become accustomed to the wide seats and commodious quarters of those roads. In order to divert the traffic to the trolley lines it is necessary to furnish as many of these conveniences as possible, added to which are the natural advantages of electricity over steam, such as the freedom from smoke and dirt, the transfer privilege and frequency of service.

In order to make a paying proposition out of an interurban line it is absolutely necessary that everyone shall be provided with a seat, except in cases of emergency; therefore, the larger the car the more it will earn per mile and per hour. The limits of size will be largely at the mercy of local conditions.

In 1895, when the Buffalo & Niagara Falls line was first equipped, a car was adopted having a 28-ft. body, with a length over all of 37 ft. 6 ins., a width over all of 8 ft. 3½ ins., and a seating capacity of 40 persons. In 1898, when the Buffalo & Lockport line was built, the body was increased to 31 ft. 8 ins., the length over all to 42 ft. 8 ins., the width over all to 8 ft. 4½ ins., and the seating capacity to 44 persons. Last year in the new interurban car for Buffalo, the length of the body was still further increased to 34 ft., the length over all of 44 ft. 6 ins., the width over all to 8 ft. 6 ins., and the seating capacity to 48 persons. This latter type is the maximum which it is safe to operate over the Buffalo bridges. If we had been entirely unhampered by local conditions we would have probably made the car one window longer and 6 ins. wider, with an added seating capacity of 8 persons; in other words, 56 instead of 48. This would have made the car about 50 ft. long over all, and about 9 ft. wide.

Another reason for the increase in weight and length of the interurban car is the question of safety. In order to compete successfully with steam roads (and that is surely the object of all interurban properties), it is necessary to operate the cars at 45 or 50 miles an hour. In order to do this safely, heavy M. C. B trucks, powerful motors and strong bodies are necessary, and all of these factors tend to increase the dimensions.

When there is heavy traffic from one thickly populated city or town to another, and one car will not carry the people, then the multiple control, or the trailer service, becomes advisable. In Buffalo, it was found that a three-car train, composed of two multiple control motor cars and one trailer, gave the best results. Economy in wages is evident, only one motorman and three conductors being required for the train. The movement of cars in trains also minimizes the danger of collision, in that, instead of having three separate units under three separate controls and sets of orders there is but one unit and one set of orders. This method of operation is especially valuable on single-track road with sidings, where the liability of accident is directly proportioned to the

*Paper read on June 27, 1905, at the Lake George Convention of the Street Railway Association of the State of New York.

number of sections. It may be possible that eventually it will be advisable to operate a four-car train, though it would seem that this would be a little unwieldy for the run in the city. On the Buffalo & Niagara Falls line, on the other hand, it is not practicable to operate three-car trains, primarily because the line is full of curves and grades, necessitating the constant slowing down of the car and the subsequent building up of speed, and it would be impossible to make the schedule run except with a single car. Buffalo experimented last year with a 44½-ft. trailer behind the same length motor car on this division, and found that the service was too much for the motors.

In summing up the interurban situation, it would seem that 60 ft. is about the limit of the length over all of cars which are operated on an interurban line with city terminals. Where the line is entirely on private right of way there is no reason why the cars cannot more closely approximate steam practice. As the steam roads have had years of experience, there is no reason why we should not avail ourselves of that experience.

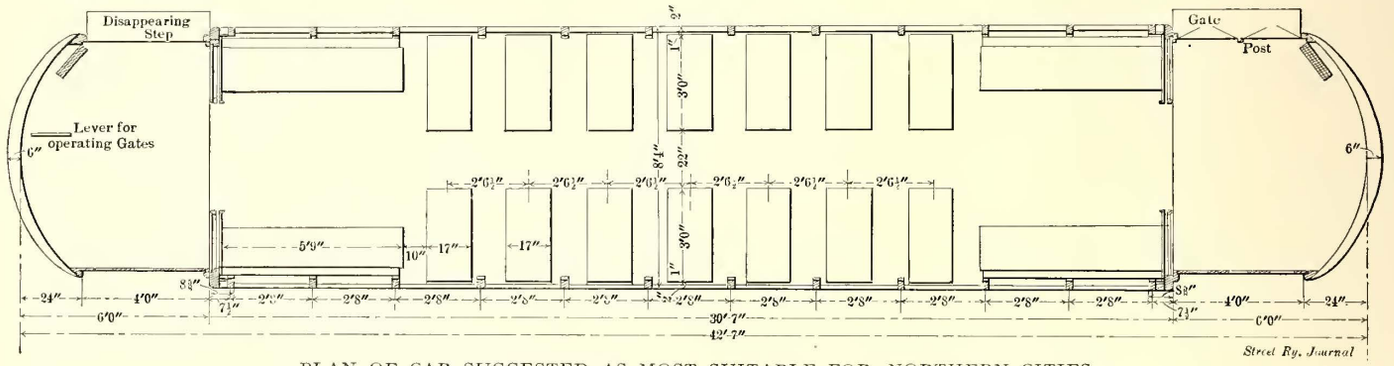
Turning now to the subject of city service, we are confronted with different conditions in different cities which require many varieties of equipment ranging from the small motor and trailer car of Washington to the commodious 46-ft. cars of St. Louis and Chicago. The local conditions must be considered before criticising the equipment of any city. In Washington they have two small open cars, one a motor and one a trailer, the whole train being handled by one motorman and one conductor. The climate is so mild that portions of these open cars are run all the year 'round. The carrying capacity of these two cars is about 80 people seated, and when it is considered that the weight of the motor car is only 17,000 lbs., and the weight of the trailer car 7000 lbs., it will be seen at once that for this service this system is probably as economical as could be devised, both in the consumption of power and in the wages of trainmen. An interesting fact in connection with this service is that they have fewer accidents with one conductor handling the two cars than they formerly had with two.

The trailer service, however, as a general rule (except in very large cities), is only economical and advisable for travel during rush hours and handling crowds from amusement parks, baseball games, etc. As an all-day proposition, in cities with moderate travel, it is hard to fill two cars unless the schedule is arranged to fill the cars rather than to give adequate service to the public. If the motor car is a closed car and the trailer an open car, as is the case in Buffalo, the people naturally take the open car, and the closed motors run practically empty in summer. For the handling of crowds Buffalo has found the trailers invaluable, as at least three trailers, and sometimes four, can be attached to a motor car, thus giving a total capacity of 250 persons to the five-car train. The motor and trailer cars, of course, are equipped with air brakes and controlled entirely by one motorman from the front car, with a conductor on each car. The economy of this method of handling crowds in trainmen's wages and power consumed is obvious.

During the past year Buffalo has been operating closed trailers as "Smokers" during the winter, and open smoking trailers during the summer, but, as stated above, except in rush hours it is hard to comfortably fill the train.

In answer to the query as to what is a suitable car for the city service, it seems that first and foremost the car should be designed for both summer and winter conditions. It is not economical to carry a long line of open cars which have to be jacked up in the fall and stored away for six or seven months without earning a dollar, and the same is true of the closed cars which are stored during the summer. This fact is becoming generally recognized among street railway managers, and has caused the development of the "convertible" and the "semi-convertible" types. During the past year, hundreds of these cars of both types have been built and are now in successful operation. As to the meaning of the terms "convertible" and "semi-convertible," it may be said that the former is a car which, during the summer time, is entirely open, with either a running board on the side or an aisle in the center, or both, and in the winter time is a closed car; while the latter is simply a closed car with cross seat and large windows, the bottom sill of the window averaging about 25 ins. from the floor, and the sash disappearing into roof pockets. For mild climates a full convertible car is most appropriate, while for cities such as Buffalo, Detroit and Chicago, the semi-convertible car is preferable. Cleveland experimented with the full convertible type last year, and during the summer was delighted with them; but when the cold weather came on it was found almost impossible to keep the cars warm.

The following is submitted as our idea of the best car for service in Northern cities: First, the car should be a semi-convertible one with a width the maximum that track center and clearances will allow, and the length of body averaging about 30 ft. The openings into the body of the car should be as wide as possible with double sliding doors. The platform should be at least 6 ft. in length, to allow two persons to enter or leave the car at the same time, and also to accommodate a large number of standing passengers. The car may be either a double or single ender, but for Buffalo service it is necessary to operate the car from either end, and even where the car is normally operated from one end only, it would seem to be poor economy not to install an emergency controller at the other



PLAN OF CAR SUGGESTED AS MOST SUITABLE FOR NORTHERN CITIES

LATEST STANDARDS OF ELECTRIC CARS IN AMERICAN CITIES.

PLACE.	Car Length—Over Bumpers.	Car Length—Over Corners.	Platform Length.	Width Maximum.	Car Op. 1 or 2 Dir'ns.	Seats—No. Cross.	Seats—No. Long.	Seats—Total.	Length Cross Seats.	Width Aisle.
Brooklyn	41′	.....	.....	.....	2	40	8	48	34″	24″
Buffalo	36′ 5″	26′	4′ 8½″	8′	2	0	34	34	0	0
Chicago	45′ 9″	32′ 5″	6′ 2″	9′	2	28	16	44	35″	28″
Detroit	41′	29′	5′ and 6′-.″	8′ 1″ (over sills)	1	24	19	43	..	..
Jersey City, Newark, etc	42′ 8″	30′ 8″	6′ (includes bumpers)	7′ 11½″	2	35	8	43	..	..
Kansas City	43′ 3″	30′ 7″	5′ 9″	8′ 6″	2	36	8	44	34″	..
Nashville	42′	30′ 6″	5′	7′ 11½″	2	28	16	44	34″	23½″
Philadelphia	37′ (over crown pieces)	28′	4′ 6″	8′ 3″ (over posts)	2	32	8	40	..	..
Queens Borough, New York City	40′ 8″ (over vestibules)	30′ 8″	5′	8′ 6″	2	28	16	44	37″	24″
St. Louis	46′ (approx.)	33′ 4⅜″	3′ and 7′	9′ 1″	1	40	12	52	32″	32″
Toledo	41′ 4½″	30′ 8″	4′ 8½″ and 6′	8′ 2″	1	28	16	44	34″	26″

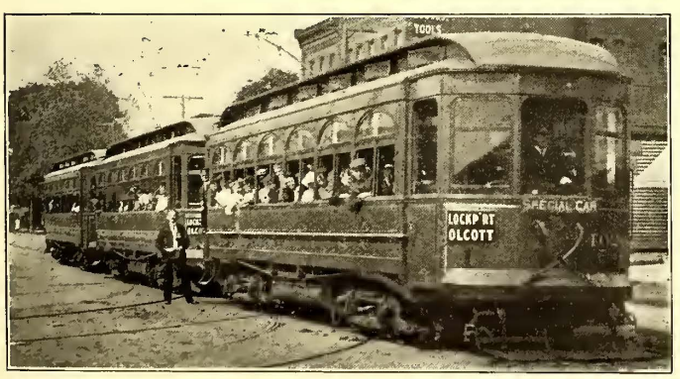
end. A platform similar to the Detroit platform, but without the railing dividing it into two compartments, is suggested; instead of this railing an upright rod on both sides of the platform might be preferable. In arranging the seats, those near the door should be longitudinal, in order to allow more standing room, while those in the center of the car can be transverse, in order to encourage the people to ride and also for the reason that standing room is not so valuable in this portion of the car. With a 30-ft. body it would be possible to get seven cross seats on each side, or a seating capacity of 28 people, and this, together with four on each of the longitudinal seats, would make the total seating capacity of the car 44, with plenty of standing room at rush hours. This seems to be the average seating capacity of the latest types of cars in American cities, as will be seen by examining the accompanying table.

It may be argued that a 30-ft. body makes too large a car for the

MOTOR CAR WITH FOUR OPEN TRAILERS, BUFFALO

conductor to handle comfortably and economically, and this is true of cars in which the seats are longitudinal; for example, in Buffalo the cars of the "800" type have a 30-ft. body, will seat 40, and will stand, in a pinch, about 60 more, making a total of 100 passengers. This is a great many people for the conductor to handle, as invariably the best of the old conductors miss quite a number, while the new conductor will usually fail to get more than 90 per cent of his fares. The 30-ft. body, however, with the cross-seating arrangement, as suggested above, precludes the crowding of the car to the extent possible in the longitudinal seat type, and for this reason we think it will make a reasonable and practicable car with cross seats.

In order to encourage pleasure riding, the windows in the semi-convertible car should be very large, thus making the car cool and inviting in the summer time. In the winter, in order to provide



THREE-CAR TRAIN, BUFFALO

against snow and bitter weather, it will be necessary to have a permanent storm sash which can be put on during severe weather.

One of the classes of accidents which is most prevalent in electric railway service to-day is that of "'falling on or off the car." In order to minimize this class, we suggest the adoption of swinging gates similar to those now in use in Minneapolis. These gates should be placed on the right-hand side of the rear platform and should be operated by the motorman by means of a lever. It does not seem that the gate would be needed or advisable for the front platform, as the motorman can watch the entering and exit of passengers at his platform very readily. Having equipped the car with this gate, and having installed a mirror, by means of which the motorman can see everything that occurs at the rear step, the starting of the car can then devolve upon the motorman, who, after glancing at his front step and seeing in his mirror that the rear step is clear, can then close his rear gates, give two taps with the gong as a signal to the conductor that all is clear and then start his car upon two bells from the conductor. This will leave the latter free to devote his time to the collection of fares and the stopping of the car upon signal from the passengers.

The car as above described is a practicable proposition and should be well liked by the public. The cross-seat arrangement will afford all the delights and conveniences of an open car without any of the dangers on account of running board. In case of sudden change in the weather, such as a thunder storm, the conductor can, within a very few minutes, convert the car into a closed one. With the gate, as above described, it may be possible to educate the public to enter by the front platform and leave by the rear, which will very greatly facilitate the loading and unloading of the car, and decrease the number of accidents. The wide platforms will accommodate smokers, both in front and rear, and smoking is something that will have to be provided for.

The equipment of this car should be four motors of a type sufficiently powerful to pull three or four trailers, if necessary, and with a truck which will be most suitable for all-year service.

In conclusion, it may be said that in recent years the traveling public has awakened to the fact that it has rights. The laws are becoming more exacting, and too much attention cannot be paid to the wishes of the people and their representatives, the State and city officials. These people, having granted valuable franchises, have a right to demand good service and modern conveniences. It is the business of street railway companies to give this service and more, too, for the best policy of a management is not only to give the service the people demand, but to make that service so attractive that the people will wish to ride, thus creating an entirely new business as well as taking care of the old.

The cross-seat car is one of these modern conveniences. It is prescribed by law to-day in Chicago and other cities, and, in our opinion, will be within a few years the standard street railway car of America.

NEW PUBLICATIONS

Trolley Trips Through Southern New England; White & Warner, Hartford, Conn.; 104 pages. Price by mail, 12 cents.

Southern New England has long been the shrine to which the enthusiastic trolley rider turns because its many spots of beautiful scenery and wealth of historical associations offer irresistible attractions. Gradually the electric railway has penetrated almost every nook and cranny, so that to-day even the experienced traveler feels the need for an accurate guide about place, time, distance and cost. An inspection of the handsome booklet entitled "Trolley Trips Through New England," shows how well its publihers have satisfied this want. It is needless to go into any detailed analysis of its contents, but it suffices to say that with this booklet one can visit the territory described to the best advantage, not only happier for enjoying the sight of hill, meadow, river and ocean, but also richer in knowledge of the lore of historic New England.

SUBWAY MATTERS IN NEW YORK

Plans for the ventilation of the subway are being discussed at great length at the meetings of the New York Rapid Transit Commission. Chief Engineer Rice reported that he has men engaged installing electric fans at the Brooklyn Bridge, Fourteenth and Forty-Second Street express stations. These fans, it is declared, will force the foul air of the tunnel through ducts and manholes to the street, thus creating currents that will make pure air rush in through the kiosk entrances. The big fans to be installed each will be capable of forcing out 15,000 cubic feet of air per minute.

DETROIT UNITED RAILWAY ENCOURAGES BOTANICAL STUDIES

The first prize of twenty-five dollars ($25.00) offered by the Detroit United Railway for the best catalogue-list of wild flowers indigenous to the counties traversed by that company's lines, has been won by Warren J. Vinton, Detroit. After a critical study and comparison of the many lists submitted by school children, Prof. Frederick Newcombe, of the University of Michigan, has selected this young man as the winner. Mr. Vinton is 15 years of age, and a pupil of the Central High School. He offered a list comprising 518 names of wild flowers, and of these 502 were correctly designated and classified. Mr. Vinton had a commanding lead over his nearest competitor. Of the excellence of his contribution there can be no question. There were, however, many lists submitted, which, because of the study and botanical knowledge shown, are worthy of honorable mention in the opinion of Prof. Newcombe.

EXHIBIT NOTES OF THE LAKE GEORGE CONVENTION

The Continuous Rail Joint Company of America had a neat exhibit of all types of its rail joints. The representatives present were: B. M. Barr, of the New York office, and W. A. Chapman, of Boston.

Machado & Roller, of New York, had on exhibition with Mayer & Englund, of Philadelphia, Pa., the Roller bond tester and Sage ohmeter, manufactured by the Whitney Electrical Instrument Company. The company was represented by T. F. McKenna.

The Chas. N. Wood Electric Company, of Boston, Mass., was represented by its president, Chas. N. Wood.

The Barbour-Stockwell Company, of Cambridgeport, Mass., was ably and cordially represented by Wm. W. Field. A number of delegates and friends of this company at the convention were indebted to Mr. Field for a very enjoyable trip in a steam launch up Lake George and return.

The Frank Ridlon Company, of Boston, Mass., was very much in evidence at the convention in the person of its popular representative, Jerry M. Hayes.

The interests of the Philadelphia Air Brake Company were well cared for at the Lake George convention by F. S. Drake and J. E. R. Lambert.

The Kalamazoo Railway Supply Company, of Kalamazoo, Mich, had a full size track scraper on exhibition at the Casino. The actual operation of the machine was demonstrated to the delegates at the convention by F. N. Root, the manager of the track scraper department of this company. The Root scraper is in general use on a great number of roads throughout the country, and judging from the number of endorsements it has received by railway managers, its merits stand unquestioned.

The Atlas Railway Supply Company, of Chicago, exhibited a number of full-sized Atlas rail joints for grooved T and girder rails. The company was represented at the convention by James G. McMichael.

Giles S. Allison, of 42 Broadway, New York, had on exhibition, in Parlor A, on the main floor of the hotel, several types of the Security registers. The lately perfected recording type of the Security elicited a great deal of interest and attention among the railway men at the convention. The colonel demonstrated to the satisfaction of a number of the delegates that this machine is mechanically perfect and absolutely reliable, giving the railway manager an absolute record of the conductors' work during the day. Col. Allison also had on exhibition his detachable register handles now coming into general use on a number of railroads throughout the country. The colonel's genial hospitality was enjoyed by all the delegates who visited him at his headquarters. Daniel J. Fitch, from the New York office, was also present at the convention.

The Ohio Brass Company, of Mansfield, Ohio, had a comprehensive exhibit of its overhead line material, Nichols-Lintern sander, and all types of rail bonds and motor bearings. The company was represented by N. M. Garland and R. M. Campbell.

The H. W. Johns-Manville Company, of New York, was represented by S. G. Meek.

Wm. Wharton, Jr., & Company, Inc., of Philadelphia, Pa., had as representatives at the convention, A. C. McClay and Thomas K. Bell.

The Taylor Iron & Steel Company, of High Bridge, N. J., was represented by S. Hewes Mattson.

The General Electric Company's exhibit occupied about one-half of the northern end of the exhibit hall. The company's latest design of 40-hp railway motor, known as the GE 80, was shown, as well as various renewal parts for this and other railway motors. These included field coils, assembled commutator segments and armature coils. An interesting feature was the air compressor automatic governor which was shown in section. A complete assortment of line material was attractively displayed. This included a full complement of catenary suspension devices for use with alternating-current trolley installation. There were also shown a few general railway supplies, such as controller contact fingers, fuse blocks, etc. Moving pictures of electric railway subjects were shown in this exhibit. These included a Ballston-Schenectady alternating-current trolley car in operation, the electric cars operating on the company's experimental track at Schenectady, the Interborough Rapid Transit cars, and the New York Central electric locomotive racing with a steam locomotive. The company was represented by T. Beran, manager New York office; H. G. Grier, New York; J. C. Calisch, Buffalo; H. H. Crowell, Syracuse; W. Gibson Carey, Schenectady; E. M. Kinney, Schenectady, and F. H. Gale.

The Electric Storage Battery Company, of Philadelphia, Pa., had a comprehensive exhibit consisting of a railway power house switchboard, showing the regulation of fluctuating loads as exemplified in street railway practice. The type R, 71-cell of 1050 amps., at nominal rate capacity, similar to those to be furnished to the New York Central & Hudson River Railroad, was shown as were also several small cells for various other purposes. The company had as representatives present F. L. Kellogg and R. C. Hull.

The American Ventilating Company, of New York, was represented at the convention by H. M. Shaw, its treasurer and general manager. A number of types of the American ventilators were on exhibition at the convention.

R. A. Byrns, of New York, presented the claims of the General Storage Battery Company at the convention.

The Hale & Kilburn Manufacturing Company, Philadelphia, Pa., exhibited several types of car seats for city and interurban service. A notable feature of one of these seats was a steel end plate with top forming an arm rest. This seat does away with the old type seat with a separate arm rest. The company was represented by S. A. Walker.

The Pennsylvania Steel Company had its New York agent, John C. Jay, Jr., at the convention.

H. N. Powers was present to represent the American Automatic Switch Company.

The Power Specialty Company, of New York, was well represented by E. H. Foster.

The Traction Equipment Company, of Brooklyn, N. Y., had on exhibition its ventilated spiral car starting resistances, the Hammond sander, and Weber illuminated signs. This company is preparing to push a number of specialties in the street railway field. Its excellent exhibit at the convention was an evidence of its intentions. The company was represented at the convention by George Best and C. V. Rapelje.

The Crouse-Hinds Company, of Syracuse, N. Y., had on exhibition its imperial arc headlights and its well-known harpoon guy anchors. The company was represented at the convention by A. M. Hills and Frank Buchanan.

Dossert & Company, of New York, exhibited all shapes, sizes and types of the Dossert cable joints at the convention. The company was represented by H. A. Bristol.

The Lorain Steel Company, of Lorain, Ohio, had one of the most elaborate exhibits at the convention. One of the first objects to attract attention was a new type of tongue switch in which the tongue performed its function without a pivotal pin fastening of any character whatever. The construction at the heel of the tongue is such that the grooves for the flanges are part of the tongue structure, which is broadened out so that the entire width of the bed of the switch at the heel is utilized for a solid bearing surface for the tongue. The latter is held in place by a method of steel holding-plates along the sides of the tongue, which, in turn, are fastened and held firmly in place by spelter. When worn out the tongue may be easily renewed from the surface of the switch bed without removing the bed, and the wear which takes place at heel of the tongue is entirely eliminated. The hard steel plate which extends from the heel to the toe of the tongue switch forms the guard and running rail as well as the bed of the switch, and is also renewable from the surface. The arms of the switch are formed of rolled rails, and are fitted into extension pockets, which are an integral part of the solid steel body which envelops the rail ends a portion of their length, and are firmly secured to the sub-structure with bolts and spelter. Another interesting exhibit was a renewable frog of 9-in. guarantee construction, and on the two days of the convention the operation of removing and replacing the hard steel center plate was shown, to demonstrate the ease and rapidity with which such removal could be accomplished. This plate is held in place at each corner by two steel wedges, which, in turn, are kept in place by spelter. The actual time consumed in removing the plate during the demonstration on Tuesday evening was exactly ten minutes, while the time consumed in replacing the same plate and repouring with melted spelter did not exceed half an hour, making the total time in which two men were engaged in this work less than three-quarters of an hour. The delegates present watched the operation with great interest, and at its conclusion congratulated the Lorain Steel Company representatives on the successful accomplishment of this most practical test. The company also exhibited, in great variety, samples of electrically-welded rails. Those representing the company were E. B. Entwisle, chief engineer, Johnstown, Pa.; H. F. A. Kleinschmidt, manager electric welding department, Johnstown, Pa., and Randolph Clitz, of New York office.

The Goldschmidt Thermit Company, of New York, had on exhibition a number of samples of rails welded by the Thermit process. Some of these samples were sawed through the welded part, showing the completeness of the weld between the ends of the rail. A number of the various shaped moulds used in Thermit welding were also shown. R. F. Kelker, Jr., who represented the company, made two demonstrations of Thermit welding during the convention. Judging from the number of delegates who witnessed the tests, this process of rail welding is attracting a great deal of popular interest.

The Chase-Shawmut Company, of Newburyport, Mass., had Frank D. Masterson at the convention.

The Sherwin Williams Company, of Cleveland, Ohio, was represented at Lake George by F. A. Elmquist.

The Vendor Company, of New York, was represented by J. Henry Carson.

The O. M. Edwards Company, of Syracuse, N. Y., which was represented by O. M. Edwards and George G. Norris, showed several designs of car window fixtures and vestibule trap-doors. These fixtures are adopted by a great many of the large steam railroads in the United States, as well as in several foreign countries. This fact is enough to commend their use on electric cars, and the fixtures are being adopted on these roads very rapidly.

The president of the R. D. Nuttall Company, of Pittsburg, Pa., F. A. Estep, attended the convention.

The Weber Railway Joint Manufacturing Company, of New York, was represented by Alfred K. Downes.

The Mayer & Englund Company, of Philadelphia, was represented at the convention by H. E. Beach, of the New York office. A comprehensive exhibit of nearly all the street railways specialties handled by this company was prominently placed and neatly arranged in the Casino, and elicited considerable interest among the delegates at the convention.

The National Car Wheel Company, of New York, was as usual represented in an able manner by Edward H. Chapin.

The Magnet Wire Company, of New York, was represented by Frederick H. Cowles.

Harold P. Brown, of New York, was represented at the convention by Julius Alsberg, his consulting engineer, who had a neat exhibit of the well-known Brown plastic and solid copper bond. There was also shown the new switch contact bond, which is soldered to the rail by a unique gasoline torch, capable of heating up a 60-lb. standard T-rail in less than three minutes.

The Continuous Rail Joint Company of America, Newark. N. J., had as its representatives at the Fort William Henry, B. M. Barr and Wm. H. Chapman.

Berry Bros., Ltd., of Detroit, Mich., were represented by F. B. Archibald.

The Lord Electric Company, of Boston and New York, was represented at the convention by H. M. Shaw, of the New York office, and G. B. Crane of Boston. A neat exhibit of all of the various types of Thomas soldered rail bonds was on exhibition at the Casino. The Shaw non-arcing lighting arrester, the manufacture and sale of which have recently been taken over by the Lord Electric Company, was also on exhibition.

The Westinghouse Traction Brake Company, of New York, was ably represented at the Lake George convention by F. V. Green and J. R. Ellicott.

The Heywood Bros. & Wakefield Company, of Wakefield, Mass., had on exhibition an especially designed seat upholstered in leather, with high three-part back, and mahogany arm-rest for long-distance interurban cars. This seat has a brass back band with a grab handle set in the corner of the back, and a pedestal base with shifting foot rest. The company was represented at the convention by Bertram Berry, its New York sales agent.

The National Electric Company, of Milwaukee, Wis., had as its representative J. T. Cunningham.

R. W. Marshall was present in the interests of E. G. Long, of New York.

The Curtain Supply Company, of Chicago, had an especially neat and well-arranged exhibit, showing the Forsyth & Burrows roller tip closed car curtain fixtures, and their Acme, Climax and Forsyth cable fixtures for open cars. The Keeler "pinch handles" and "eccentric" are now owned by this company and were on exhibition. This company was represented at the convention by A. L. Whipple, general sales agent, and distributed as a souvenir a light bamboo cane, which was quite popular.

The National Brake Company, of Buffalo, N. Y., had on exhibition at the Casino a full size Peacock brake, finished in aluminum. A neatly arranged sign was also displayed announcing the fact that the Peacock brake is now in use on 250 roads in the United States. Considering the fact that this company has been in business only about one year, this is a remarkable showing and an indication that the Peacock brake has all the merit claimed for it. The company was represented at the convention by W. D. Brewster and F. D. Miller.

Standard Underground Cable Company, of Pittsburg, Pa., sent as its representative H. P. Kimball.

The interests of the Van Dorn & Dutton Company, of Cleveland, Ohio, were well cared for at the convention by W. A. Dutton.

The Consolidated Car Heating Company, of Albany, exhibited two large panels, one containing several types of Consolidated heaters, and the other different types of switches, and a complete switchboard, such as furnished for Brooklyn elevated cars. The exhibit contained a card, stating that 30,676 Consolidated electric heaters were sold from March 1 to June 24, 1905. These heaters were for 2709 cars. The company was represented by Cornell S. Hawley, general sales agent, and S. B. Keys, district manager.

The Peckham Manufacturing Company, of New York, was well represented by Wm. Wampler and Geo. H. Bowers.

The Standard Steel Works, of Philadelphia, had as its representatives Harry W. Sheldon and E. Sidney Lewis.

The Sterling-Meaker Company, of Newark, N. J., had an exhibit of its various types of registers, register fittings, punches, Sterling brakes and a number of other products manufactured by the company. The company was represented by George E. Willis, of the Newark office.

The Schoen Steel Wheel Company, of Philadelphia, Pa., had a complete exhibit of its pressed steel wheels for steam and electric railway service Samples of all the processes which steel goes through to make the finished wheel were also shown. The company was represented by W. Martin Johnson and N. B. Trist. Through the courtesy of Mr. Johnson, invitations to several trips on Lake George were extended the ladies in attendance. These excursions were made in a private launch, and Mr. Johnson's hospitality was greatly appreciated.

The interests of the St. Louis Car Company, of St. Louis, at the convention were cared for by A. H. Sisson.

H. L. Shippy and G. W. Swan were present in the interest of the John A. Roebling's Sons Company, New York.

The Peerless Rubber Manufacturing Company, of New York, exhibited all kinds of its famous Peerless packing at the Casino. The company was ably represented by C. S. Prosser and W. J. Courtney.

The Pittsburg Reduction Company, of Steelton, Pa., sent four representatives to Lake George in the persons of H. K. Spalding, B. M. Polley, Walter R. Darby and Safford K. Colby.

The Yale & Towne Manufacturing Company, of New York, had on exhibition its chain blocks and electric hoists, which are extensively used in street railway repair shops. This company was represented by William Hazelton, who was one of the pioneers in the electric railway field, and who had many friends at the convention.

American Steel & Wire Company, of New York, had as representatives at Lake George, F. A. Keyes and A. G. Greenberg.

The Sterling Varnish Company, Pittsburg, Pa., had Alvin C. King in attendance at the convention.

The American Electrical Works, of Phillipsdale, R. I., was represented by Albert F. Hills.

The Recording Fare Register Company, of New Haven, Conn., had a comprehensive exhibit at the Casino, consisting of three types of recording registers and one plain register, without the recording feature known as type E. A large assortment of register fittings and car trimmings was also on exhibition. A unique type of a detachable trolley harp recently invented, and for the first time shown to the railway public, was also on exhibition. This harp is remarkably simple in its construction, consisting of only two parts, aside from the shank which is used in all trolley poles. A new type of wheel was also shown, the principal feature of which is the large area of contact. The wheel is so constructed that the current does not pass through the bushing, thus giving greater life to the wheel. A new trolley wheel bushing was also exhibited, constructed on the same principle as the bearings heretofore used in the new Haven trolley wheels. The company was represented by the president, M. DeForest Yates, and the secretary, F. B. Kennedy.

A NEW STEEL TIE

At the Lake George convention of the Street Railway Association of the State of New York, the Carnegie Steel Company exhibited a steel cross-tie which shows a new departure in steel tie construction. It consists of a modified I-beam with depth of 5½ ins., lower flange 8 ins., upper flange 4½ ins., weight per foot 19 7-10 lbs.

The section is extremely simple, and offers a substance which in every respect performs the function of a good cross-tie. The broad lower flange with its flat surface gives a uniform bearing on the road-bed, and can be tamped in the same manner as a wooden tie. The depth is such that the tie can be held firmly in the ballast.

The rail is secured to the tie with four ¾-in. bolts by means of rolled steel clips fitting accurately on the flange of the rail, thus making a positive fastening.

The objection to many of the steel ties offered heretofore has been their light weight. This objection is freely met in this tie, as its actual weight is equal to, but no more than, that of the wooden tie which it replaces. The column of ballast resting on the lower flange gives of course additional weight, insuring the most satisfactory track. The noise which is objectionable in the old hollow type of tie is eliminated entirely in this one, as one familiar with track work can see from the section. This has also been demonstrated at all places where they have been installed.

The first cost of the tie is somewhat in excess of that of a woden tie, but the manufacturers claim that when safety of construction, saving in maintenance, reduction in renewals is considered, the actual cost at the end of a number of years should be a very small item.

The steel tie in track construction is not only consistent with good engineering, but from the growing scarcity and constant increase in price of wooden ties, is daily more forcibly presenting itself to those charged with maintenance. In fact it is probably truly a question of a few years when steel ties will not only be extensively used by street railways, but also on all steam railroads.

The Carnegie people also exhibited the Duquesne spliced bar, an improved joint which embodies all the features of a first-class rail joint. It consists of the simple angle bar to which is attached a depending curvilinear flange, giving depth, and thereby great strength, to the weakest portion of railway track with the maximum saving in maintenance.

The following representatives of the company were present: Fred C. Deming and Fred C. Brunke, of the Buffalo sales department, and N. M. Hench, engineer track appliances, Pittsburg, Pa.

CANADIAN WHITE COMPANY INCORPORATED TO CARRY ON ENGINEERING WORK IN THE DOMINION

The announcement is made of the incorporation in Canada of the Canadian White Company, Ltd., to carry on a general contracting and engineering business on lines similar to J. G. White & Company, Inc., of New York; J. G. White & Company, Ltd., London, England, and the Waring-White Company, London, England. The letters patent of the incorporation were granted the latter part of May, and the organization of the company is now practically completed. The Canadian White Company, Ltd., will carry on a general contracting and engineering business, and will undertake civil, mechanical, electrical, hydraulic and building work. It will be fully equipped to handle large construction contracts for steam or electric railways, and will be prepared to design, build, equip and operate electric lighting plants and power installations, gas works, water supply, sewage systems, piers, docks, harbor works, office buildings, apartment houses, hotels, etc.

The contracting and engineering departments of J. G. White & Company, of New York, will at all times be at the services of the Canadian company, and the company will further have the benefit of the experience of J. G. White & Company, Ltd., London, England, and the Waring-White Building Company, London, England. This insures the Canadian company, from its inception, the benefits and advantages to be derived from very long and successful experience in the contracting and engineering business.

The Canadian White Company, Ltd., has upon its board of stockholders strong representative business men well known throughout Canada. The general manager of the company will be a prominent civil engineer with large experience in railway construction, etc., and who has held executive positions.

H. P. Douglas, formerly vice-president and general manager of the Canadian Otis Elevator Company, Ltd., is treasurer of the company. H. C. Hitch has been secured as superintendent of building construction. Mr. Hitch has been for several years connected with the Thompson-Starrett Company, of New York, as superintendent. Recently he has had full charge of the erection, for the Thompson-Starrett Company, of the Union Bank Building, at Winnipeg. This in one of the largest and most important buildings in Canada, and the record made by Mr. Hitch in connection with this and previous work insures the efficient handling of the building department.

COPIES OF NEW YORK STATE QUESTION BOX

Announcement is made that a limited number of copies of the Question Box, prepared for the Lake George convention of the Street Railway Association of the State of New York, are on hand, and copies may be had by any one interested in electric railway matters, without charge, upon application to the secretary, room 1002, 114 Liberty Street, New York City. This pamphlet contains a large amount of valuable information on practical electric railway subjects.

SPECIAL LEGISLATIVE HEARINGS ON RAILROADS AND STREET RAILWAYS BEGIN AT BOSTON

The first hearing of the joint special committee on railroad and street railway laws, which was made up by the last legislature to sit during the summer recess, was held at the State House in Boston, on June 30. The committee is composed of four Senators and ten Representatives, the chairman being Hon. W. F. Dana. Its object is to revise the laws of the State pertaining to both railroad and street railway corporations, and to consider the expediency of such additional legislation as will better protect the interests of the public and the investors in those corporations.

The session was almost entirely occupied in endeavoring to find out what subjects are likely to come before the committee. Suggestions from the various steam and street railway attorneys present included the matter of merger of steam and electric roads, capitalization, the right of eminent domain, locations, fares, accommodations and relations between corporations and employees. Chairman Carter of the Winchester board of selectmen advocated wide publicity in the advertisement of hearings, and stated that it was his intention to bring before the committee the questions as to civic amendments for the street railway laws, free passes and free tickets, and a speed limit for street cars.

Chairman Jackson, of the Massachusetts Railroad Commission, suggested the advisability of offering amendments to existing laws rather than restating the law in a new code. He advocated general instead of special legislation to give opportunity for the legitimate railway enterprises, and intimated that the treatment of the interurban railway problem might be improved; emphasizing the desirability of the board's determining the necessity of new lines prior to the consideration of that question by local governing bodies along the route.

After an executive session it was announced that a hearing would be held July 11, and continued three days, upon the so-called "merger bill," and the acquisition of land by street railways, whether by purchase or eminent domain.

WIDENER-ELKINS DOINGS IN OHIO

Among Ohio roads much interest attaches to the conflicting reports from high authorities relative to the alleged purchase or lease by the so-called Widener-Elkins syndicate of the Toledo, Bowling Green & Southern Traction Company. Cincinnati newspapers claim that W. Kesley Schoepf and J. Benson Foraker, of the Cincinnati syndicate, make the assertion that the deal has practically been closed for the taking over of this property and the Toledo Urban & Interurban Railway Company, the leasing company of the Bowling Green road. On the other hand, officials of the Toledo, Bowling Green & Southern Traction Company are quoted as saying that no options on the property have been given, and that it has not been leased or sold. It is not denied, however, that the Widener-Elkins interests are negotiating for the property. The line extends from Toledo to Findlay, and is a direct link in the chain of lines which the Widener-Elkins interests are evidently bent upon acquiring to complete a through line from Cincinnati to Toledo. George B. Kerper, president of the Toledo, Bowling Green & Southern Company, leaves this week for a three months' trip abroad, which indicates that if negotiations of this kind are under way the details have been agreed upon.

FINANCIAL INTELLIGENCE

WALL STREET, July 5, 1905.

The Money Market

There were no important changes in the money market this week. The tone was steady throughout, and apart from the flurry in demand money, rates for all maturities ruled practically unchanged from those prevailing at the close a week ago. At the opening call money was in abundant supply at 2¼ to 2½ per cent, but near the close of last week the rate jumped to 6 per cent, as a result of the heavy calling and shifting of loans preparatory to the July 1 interest and dividend disbursements. Very little business, however, was transacted at the high figure. Subsequently, heavy offerings by an international banking house broke the rate to 2½ per cent, which was the closing quotation. In the time loan department business continued quiet. The demand was comparatively small, considering the activity on the part of commission houses in the stock market, and lenders experienced considerable difficulty in placing their funds at the current asking rates. Sixty and ninety day maturities were offered in liberal amounts at 3 per cent, but borrowers were not disposed to enter into contracts for this period. Six months money was in good request at 3¾ per cent, but bankers were not disposed to put out their funds at under 4 per cent, as loans made now would carry the borrowers well into the new year. Sterling exchange was easier, at 4.87 for prime demand bills, thus arresting, temporarily at least, the outward movement of gold to Europe. Mercantile paper continued in good request, at 3¾ to 4 per cent for the best grade. Dealers, however, report a very moderate supply of choice material. The bank statement, published last Saturday, showed an increase in loans of $18,056,300, and probably represented bond syndicate operations. Deposits increased $19,246,000. Cash increased $1,375,700, but the reserve required was $4,811,500 larger than in the preceding week, resulting in a decrease in the surplus reserve of $3,435,800. The reserve now is $11,658,875, as against $36,105,300 in 1904, $8,377,675 in 1903, $10,084,725 in 1902, $5,211,525 in 1901, and $15,389,200 in 1900. The European markets continued easy and practically unchanged. At London the discount rate was 1⅞ to 2 per cent. At Berlin the rate was quoted at 2⅛ per cent, and at Paris 1 15-16, a decline of 1-10 per cent.

The Stock Market

The stock market was fairly active during the past week, and although prices at times displayed a reactionary tendency as a result of profit taking sales, the general tone of the market was decidedly firm. In the early dealings prices were influenced to a great extent by the improved political situation in Europe, and London's heavy purchases of stocks in the local market, and later by the encouraging reports from the Western traffic managers, the progress of the peace negotiations between Russia and Japan, and the reported improvement in the steel and iron industry. Commission house business was also large, indicating a keener public interest in the market, and the failure of the money market to harden as a result of the heavy July 1 disbursements imparted a more cheerful sentiment. The opening was active and strong under the lead of Reading, which crossed par for the first time in its history. In other parts of the market pronounced strength was displayed. Later, however, the advance in the call money rate to 6 per cent caused considerable selling, but the readiness with which the offerings were absorbed prevented any serious reaction. The bank statement, published on Saturday, showing a loss of nearly $3,500,000 in the surplus reserve and a large increase in loans, failed to have the slightest influence on values. There were no unfavorable developments over the holiday, and at the beginning of the present week the upward movment was resumed. Reading continued to be the center of interest, the price rising to 103¼, the highest on record on heavy buying. The Steel stocks, Union Pacific, Pennsylvania and Erie were also conspicuously strong, and all of them established new high records for the present upward movement. Other strong features included Chicago Northwestern, Northern Pacific, New York Central, Louisville & Nashville, Atlantic Coast Line and many of the less important issues. The bond market was only moderately active, and prices generally acted in sympathy with the strength in the stock market. The closing was decidedly strong, at near the highest prices of the week. The cotton market closed active and strong, prices for certain options advancing a cent a pound, owing to the Government report showing a condition of 77, which was considerably below general expectations.

The local traction issues attracted considerable attention, both on account of activity and strength. Metropolitan Street Railway and Metropolitan securities rose sharply on a much larger volume of business, while Brooklyn Rapid Transit touched 73⅜, the highest price recorded in many months. The strength in the latter issue was due in part to pool operations and partly increased earnings. There was also talk of the property being absorbed by one of the large systems in the near future.

Philadelphia

There was a sharp falling off in the dealings in traction stocks this week. Fewer issues were traded in and the individual totals were the smallest recorded for some time. The general tone of the market, however, was firm, in sympathy with the strength prevailing in the New York market. Philadelphia Rapid Transit was the leading feature, both as regards activity and strength. At the opening there was evidence of buying by New York interests, and despite the hostile attitude of the city administration the price rose from 27¼ to 28⅞, and closed at the highest. In all about 11,000 shares were traded in. Philadelphia Company's stock were moderately active and strong, the common advancing from 44⅝ to 44¾, but later on the stock sold at 43¼, ex. the dividend, where it closed, The preferred was decidedly strong, the price rising a full point to 48. Upwards of 3000 shares of the common and about 200 shares of the preferred changed hands. Philadelphia Traction was decidedly strong, 122 shares selling from 100 to 100½. Union Traction was quiet, several hundred shares changing hands at 60¼ to 60. American Railways sold to the extent of 300 shares at 51. Other transactions included United Railways of San Francisco common at 55, the preferred at 87¾ to 87, United Railways Investment preferred at 87½, and a small lot of United Companies of New Jersey at 268½.

Chicago

Trading in this market was extremely dull, and prices displayed some irregularity. Chicago & Oak Park common, after selling at 6 at the opening, broke to 5, from which it failed to rally. The preferred sold at 19. An odd lot of Chicago Union Traction brought 6⅛, and thirty-five shares of North Chicago sold at 64. Northwest Elevated displayed unusual strength, the price advancing from 21⅞ to 24 on the purchase of 270 shares. South Side Elevated held firm, with sales at 95. Metropolitan was firm at 24.

Other Traction Securities

The Baltimore market was decidedly less active, but prices, with few exceptions, scored substantial gains. Interest centered largely in United Railway issues, all of which displayed pronounced strength, owing to the efforts being made to form a syndicate of Baltimore and New York bankers to discount the deferred and coming coupons on the income bonds. The 4 per cent bonds were the most active—about $60,000 of them changing hands at from 93½ to 94. The incomes were in light supply throughout the week, the total transactions for the week aggregating only $22,000, at prices ranging from 60⅛ to 60⅞. The stock sold at 13. Other sales included Atlanta Street Railway 5s at 107½, Augusta Street Railway 5s at 104, Central Street Passenger 5s at 117, Macon Street Railway 5s at 99½ to 98, and Norfolk Railway & Light 5s at 92¾.

Little interest was manifest in the Boston market. Trading was extremely quiet, and price changes were insignificant. Transactions were as follows: Boston Elevated at 157¾ to 157, Boston & Worcester common at 29, the preferred at 74½, Massachusetts Electric common at 18¾, Boston & Suburban at 21½, West End common at 97½, and the preferred at 114½, ex. the dividend. The New York curb market was dull and featureless. Interborough Rapid Transit declined from 202 to 200½ on the sale of less than 1500 shares. New Orleans Railway common and preferred were fractionally lower, about 1000 shares of the former selling at 36, and a like amount of the preferred changing hands at 79½ to 80. The 4½ per cent bonds, however, held firm, $17,000 changing hands at 90 to 90¾. North Jersey Street Railway 4s sold at 77¾ and interest for $15,000, and $30,000 Jersey City, Hoboken & Paterson 4s brought 75½ and 76 and interest, Public Service Corporation certificates sold 68¾ to 68½ for $70,000, United Electric 4s brought 74¼ to 74⅝ and interest for $30,000.

The bonds of the Cincinnati, Dayton & Toledo Traction Company were active in Cincinnati last week, several hundred thousand worth selling at 94½ to 95. The securities of the Cincinnati Northern Traction Company, which is the leasing company, are being

financed in Cincinnati at present, which accounts for the activity in the underlying issues. Cincinnati Street Railway sold at 146¾ to 147, factional declines from recent markets. Detroit United moved up to 93¾ on news of increased dividend. Cincinnati, Newport & Covington common sold at 33¾ and the preferred at 93¾.

Muncie, Hartford & Fort Wayne showed a phenomenal gain at Cleveland, due to prospects of increased dividends. It opened the week at 50½, and advanced to 56¾, with few offerings at that. Northern Texas Traction made a gain from 61 to 63½, Northern Ohio Traction sold at 22½ and 23, Aurora, Elgin & Chicago at 16½, and Cleveland Electric at 78.

Security Quotations

The following table shows the present bid quotations for the leading traction stocks, and the active bonds, as compared with last week:

	June 28	July 5
American Railways	51	50½
Boston Elevated	157¾	a157
Brooklyn Rapid Transit	68¾	72½
Chicago City	a190	a190
Chicago Union Traction (common)	7⅜	7
Chicago Union Traction (preferred)	34	32
Cleveland Electric	79½	79½
Consolidated Traction of New Jersey	82	82
Consolidated Traction of New Jersey 5s	108½	108½
Detroit United	93½	93¾
Interborough Rapid Transit	200¾	200⅞
Manhattan Railway	165	165
Massachusetts Electric Cos. (common)	18½	18
Massachusetts Electric Cos. (preferred)	61½	a62
Metropolitan Elevated, Chicago (common)	24	24
Metropolitan Elevated, Chicago (preferred)	66	65
Metropolitan Street	124	129¾
Metropolitan Securities	81	84½
New Orleans Railways (common), W. I.	37⅛	38
New Orleans Railways (preferred), W. I.	79	80¾
New Orleans Railways 4½s	90	90
North American	104¼	99¾
North Jersey Street Railway	25	25
Philadelphia Company (common)	44½	*43¼
Philadelphia Rapid Transit	27¼	28⅝
Philadelphia Traction	100	100
Public Service Corporation 5 per cent notes	97	97
Public Service Corporation certificates	69	69
South Side Elevated (Chicago)	95	94½
Third Avenue	130	130
Twin City, Minneapolis (common)	113¾	113
Union Traction (Philadelphia)	60	60
West End (common)	97½	97
West End (preferred)	116½	*114

a Asked. W. I., when issued. * Ex-dividend.

Iron and Steel

The "Iron Age" says the feeling in the iron trade generally is distinctly hopeful, and yet there is little that is tangible to justify increased optimism. Those branches which saved the situation after the check of the late spring are still the backbone of good times. These are the plate and structural trades which are flourishing through the railroad buying of cars and engines, and heavy requirements for buildings, bridges and ships. Some good rail orders have been placed lately. The event of the week was adjustment of the sheet and tin plate scales. This removes practically the only cloud on the horizon. There are indications that at least one large consuming interest in the foundry trade has begun to feel the market for pig iron seriously.

WEST SHORE ELECTRIFICATION PLANS

It is announced that the contracts soon to be let for the construction work upon the electrification of the portion of the West Shore Railroad between Syracuse and Utica will be made with the Oneida (N. Y.) Railway Company, which has already built as far west as Canastota. According to the latest plans the electric cars will not come all the way into Syracuse on the West Shore, but near Eastwood, connection will be made with the Eastwood line of the Syracuse Rapid Transit Railway Company. One reason for this plan, it is understood, is that when the New York Central Railroad takes up the matter of eliminating grade crossings in the city of Syracuse, there is a strong probability that the West Shore tracks will be elevated through the city. Power for the electrified West Shore will be secured from the Hudson River, and will be supplemented by the power house now being built near Utica. Syracuse is to be the dividing point between the zones using Niagara and Hudson power.

PHILADELPHIA & WESTERN AWARDS CONTRACT FOR ELECTRICAL EQUIPMENT

A contract has been awarded by the Philadelphia & Western Railroad, which is constructing a double-track line from Philadelphia to Parkesburg, for its entire electrical equipment to the General Electric Company, involving an expenditure of over a million dollars. The contract involved the complete equipment of both a temporary and a permanent power house and all of the passenger cars now under construction by the St. Louis Car Company. The location of the permanent power house has not yet been definitely determined upon, but it will be at a point on the line convenient to water and fuel supply. The temporary power house will be located on Cobb's Creek, about three miles beyond Sixty-Third and Market Streets, Philadelphia. Contracts for the power house, which are not embraced in the General Electric contract, will be awarded in a few days, as it is the purpose to push this work, especially upon the temporary power house, as rapidly as possible.

The constant speculation and rumors as to this or that interest said to be back of the Philadelphia & Western Railroad, has led L. N. Downs, the treasurer of the company, to make the following statement regarding the control of the enterprise:

"None of the various railroads—the Pennsylvania, Wabash, Reading or Lehigh Valley—mentioned at various times as identified with the road are in any way interested, nor have they a dollar in the property. The only persons interested are George J. Kobusch, president of the St. Louis Car Company, and W. T. Van Brunt, president of the St. Joseph & Grand Island Railroad, and who is also president of the Philadelphia & Western, and their financial friends."

Since the construction of the Philadelphia & Western was started, the plans of the Pennsylvania Railroad for a low-grade freight line between Fifty-Second Street and Atglen have developed so far as to show that the two lines will be parallel and probably not far apart. The building of these two roads, which will be of the most modern and up-to-date character, is expected to have a very marked effect on a territory which at present is without adequate railroad facilities, but which in the near future will be brought into close touch with the city.

THE HAVANA (CUBA) CENTRAL RAILWAY SYSTEM

The Havana Central Railway Company, of Havana, Cuba, has placed orders with the foreign department of the General Electric Company, of Schenectady, N. Y., for complete electrical equipment of a network of interurban electric railway lines radiating from Havana and covering an extensive territory inland.

The system will consist of a central power house in Havana and eight outside sub-stations, together with line material for about 125 miles of trackage and rolling stock for passenger and freight service over the entire system.

The power house in Havana will furnish 5000 kw of 19,000 volts, 25-cycle three-phase alternating current, generated by two 2000-kw generators and 1000 Curtis steam turbine generators at 2200 volts and stepped up through air blast transformers to line voltage. The transmission lines will parallel the various lines of the railway to the sub-stations, where step-down transformers supply low voltage to rotary converters, furnishing 600-volt direct current to trolley lines and feeders.

From Havana one branch will run southeast through Cuatro Caminos, Lomas de Candela, Guines, Providencia to Rosario, a distance of about 40 miles. Sub-stations will be located at Cuatro Caminos Lomas de Candela and Providencia. A second line will run from Havana 17 miles south to Bejucal, with a sub-station on the line at Santiago de las Vegas. A third line, running southwest from Havana to Mariel, will have a length of 37 miles, and branch lines, running north and south to El Carmelo, Santiago de las Vegas anl Tuira de Malena, amounting to about 30 miles in addition. Sub-stations on the line to Mariel will be placed at Mariano, Hoyo Colorado, Guanagay and at San Antonio Melena.

The rolling stock for passenger service will consist of twenty-four 30-ton cars seating fifty passengers and equipped with four GE-74 motors, geared for a maximum speed of 40 m.p.h. The freight service will be handled by ten 40-ton General Electric locomotives equipped with four GE-55 motors geared for a speed of 17 m.p.h. when hauling a 300-ton train. The entire system will have double overhead trolley both in Havana and on the interurban lines. The high potential transmission lines will be designated for a future potential of 30,000 volts to provide for extensions. The transformers in the Havana power house and in the sub-stations are also suitable for use on the increased potential. It is expected that the entire system will be in operation inside of eighteen months, and that portions of it will be giving service before that time.

MORE POWER FOR THE B. R. T.

The Brooklyn Heights Railroad Company has closed contracts with the Westinghouse Companies for two steam turbo-generator sets, each of 10,500 brake hp, and a guaranteed overload of 50 per cent, or a maximum guaranteed capacity of about 16,000 hp each. The turbines will operate on dry steam at 175 lbs. pressure, and a vacuum of about 28 ins., and the turbo-generators will deliver three-phase, 25-cycle current at 11,000 volts.

CLEVELAND TRACTION AFFAIRS

Mayor Johnson and the Cleveland Electric Railway have exchanged drafts of agreements relative to the operation of cars on the Central Avenue and Quincy Street lines pending the decision of the courts as to the matter of the expiration of the companies' franchises on these routes. The company offers, in event of its losing the case, to refund to the city the net profits from the operation of this portion of the system, in determining which there shall be deducted from the estimated gross earnings: the operating expenses and taxes, the depreciation charges and 6 per cent interest upon the value of physical property used in the service mentioned. The city under this agreement would get about $250 a day from the line if the case is decided against the company.

LOS ANGELES BEGINS FIGHT TO PREVENT ELECTRIC RAILWAY FREIGHT TRANSPORTATION ON ITS STREETS

By order of Mayor McAleer, the city of Los Angeles has caused the arrest of officers of the Los Angeles Interurban Railway Company to test the right of the electric railways to carry freight in cars over their lines through the city. Warrants charging two specific offenses have been served. The defendants are General Manager A. D. Schindler, Superintendent S. B. McLenegan and Motorman H. A. Tourville. They are accused of maintaining a nuisance by running freight cars over the city streets. A police officer appears as complainant, and the move is said to be the opening of an active campaign against the street railways on the part of Mayor McAleer. Specifically, the complaints allege that Third Street was "obstructed" on certain dates by a freight car owned and run by the company, and operated by Tourville.

Several weeks ago the Mayor demanded from the City Council an ordinance prohibiting street railways from carrying freight. At the time it was said that the object of the Mayor was not so much to prevent freight-carrying as to use the ordinance as a club whereby universal transfers might be secured for the people. This was not denied, but the City Council, after considering the matter and conferring with business men, declined to pass the ordinance, sending a communication to the Mayor in which the opinion was expressed that existing laws were sufficient to cover the matter, and urging him to enforce them. This the Mayor now proposes to do.

No franchise has ever been granted to the Los Angeles Interurban Railway Company for carrying freight, and the new move is expected to provide a precedent for future action. Trial in the police court will be but a preliminary step, as it is understood that either side will carry the case to the Supreme Court if defeated. If the courts sustain the city's contention, similar action will be instituted against the other local electric railway companies engaged in freight traffic, and an attempt will be made to secure perpetual injunctions restraining them from carrying freight through the city without a franchise.

Discussing the arrest of the traction officials, City Attorney Matthews said: "We expect to determine by this proceeding whether the street railway companies may continue to haul freight over the city streets. The complaints were drawn on a section of the penal code which declares the obstruction of streets to be a public nuisance. The case for the city has been carefully prepared. We have a large number of authorities to sustain our contention, that a freight car, if operated upon a street railway line within a congested or residence district, is a nuisance, and is an obstruction. The Los Angeles Interurban Railway Company has no authority whatever to operate freight cars on its lines within the city limits of Los Angeles, and its having done so constitutes a usurpation of the public thoroughfares. We anticipate a demurrer to the complaint and a contest upon the question at issue which will probably go to the Supreme Court."

Henry E. Huntington, president of the Los Angeles Interurban Railway Company, has the following to say about the freight-carrying cases: "The question is not whether or not the hauling of produce, milk, berries and packages, in cars on the streets, is a nuisance. The people themselves have settled that question, and I think that I do not exaggerate when I say that 90 per cent of our citizens directly favor the carrying on of the local small freight and produce transportation in the manner in which we are now handling it. Our men were arrested for hauling a carload of berries along the public streets. Now which is the greater nuisance and causes the greater obstruction; a car such as this, running on a fixed track, or three or four big trucks hauling the same berries on the same street, and blocking transportation from curb to curb? Modern invention and progress have brought about this simple, convenient and speedy manner of handling local light freight and produce over streets between towns and cities. Throughout the East and in Europe these freight cars are recognized as a great convenience, if not a necessity. The freighting we do here is cheaper and quicker than by any other method. We shall continue to carry on our business in such a manner as not to offend either the artistic or substantial sensibilities of our fellow-citizens, until such time as the courts shall say we are wrong, and in that event I shall, as I have always done, yield without criticism to such judgment."

MR. CONNETTE TO REMAIN IN SYRACUSE

Edward G. Connette will remain as general manager of the Syracuse Rapid Transit Railway Company, as the directors of the company have refused to release him from his contract, which has a year and a half to run. Mr. Connette, as announced in the last number of the STREET RAILWAY JOURNAL, was offered the position of general manager of the Consolidated Street Railway Company, of Worcester, Mass., and had accepted the position conditional upon his release from his contract at Syracuse. The directors of the Rapid Transit Company met at the Grand Central Station on June 29. Both President Horace E. Andrews, of Cleveland, and Vice-President William K. Vanderbilt, Jr., were present. Mr. Connette's resignation was considered, but it was decided that his services at Syracuse could not be dispensed with.

INDIANA RAILWAY COMMISSION DEMANDS NAMES OF ELECTRIC RAILWAY PASS HOLDERS

The railway companies operating in Indiana have declined to honor the demand of the railway commission for a list of the pass holders. The commission interprets the law to prohibit officials or their deputies from receiving, and the railway and interurban roads from granting to such public officials or their deputies, passes. The companies have not taken an arbitrary stand and flatly refused to concede the commission has a right to interfere with the issuance of passes, but suggest a friendly suit to settle the question. Railway attorneys say they do not believe the commission has the right, under the law creating it, to demand a list of the pass holders, but in order to have it determined definitely, they are willing to submit an agreed statement of facts to the Supreme Court, on which the law may be construed. The members of the commission refused to state what action will be taken, or what will be their course, but it is generally believed that the matter will be submitted to the court on an agreed statement of facts as proposed.

EAST RIVER TUNNEL TO LONG ISLAND CITY SANCTIONED BY WAR DEPARTMENT

Representatives of August Belmont state that the Forty-Second Street tunnel, connecting the Grand Central Station and the Interborough subway with Long Island City, will be begun within thirty days. Robert S. Oliver, the acting Secretary of War, has approved the application of the New York & Long Island Railroad for permission to construct the tunnel and to sink a shaft on Man-o'-War Reef, immediately south of Blackwell's Island, in order to facilitate the work of building the tunnel. The shaft is authorized to be maintained for two years, indicating that the company intends to push the work with vigor. The company is owned or controlled by August Belmont and his friends. Arthur Turnbull is the president. The sinking of the shaft on the Man-o'-War Reef will enable four tunnel gangs to work simultaneously. If the State Land Commission also assents to this shaft, the tunnel will be driven in record time, it is said.

STREET RAILWAY PATENTS

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

UNITED STATES PATENTS ISSUED JUNE 20, 1905

792,634. Trolley Head for Electric Tram Cars; Samuel R. Thompson, Liverpool, England. App. filed Jan, 17, 1905. Mounted below the trolley wheel is a cylinder containing lubricating material, and a piston is spring-pressed in the cylinder to force the lubricating material upward through suitable ducts to the periphery of the trolley wheel.

792,672. Station Indicator; James H. Shepherd, Denver, Col., App. filed Aug. 22, 1903. The names of the streets or stations are indicated on panels in the end of the car, and the motorman operates a sliding contact to close circuits to glow lamps behind the panel indicating the next street or station.

792,741. Electric Railway Switch; Thomas B. Stewart, William H. Turner and Rowland E. Dixon, Leads, England. App. filed Nov. 26, 1904. A track switch having an insulated trolley section through which current may or may not be taken by the car to operate the switch in the usual way. A supplemental switch is provided on the branch line to restore the switch point to its normal position.

792,903. Trolley Stand; Frank N. Kelsey, New Haven, Conn. App. filed April 14, 1905. An arrangement of tension springs, such that the pressure of the trolley wheel upon the wire will always remain uniform regardless of the angular variations in the position of the pole.

792,907. Brake Beam Fulcrum Block; Robert P. Lamont, Chicago, Ill. App. filed Jan. 19, 1904. Comprises two forged pieces having flange portions to engage the brake beam and forwardly extending parallel jaws perforated to receive the brake lever bolt and attach outside the brake lever by means of a pin.

792,919. Car Fender; John O'Leary, Cohoes, N. Y. App. filed Nov. 7, 1904. Details of construction. Relates to means whereby a person may be picked up by the fender and not injured thereby in so doing.

792,920. Car Fender; John O'Leary, Cohoes, N. Y. App. filed Feb. 28, 1905. The fender is adjustable forward and backward to adapt it to both city and suburban traffic . Other details.

792,929. Wheel; Edward M. Roberts, Ashland, Ky. App. filed Nov. 17, 1904. A cast-metal wheel having integral rim, spoke and hub members and a separately formed chilled cast bushing around which the wheel is cast.

792,946. Car Axle; Frank M. Thompson, East Liverpool, Ohio. App. filed Jan. 10, 1905. Details of a construction of a divided car axle.

792,959. Clamp for Trolley Wires; Chris. C. Bakewell, Kaylor, Pa. App. filed March 31, 1905. A clamping device for trolley wires in which one jaw of the clamp is fixed, and the other jaw pivoted, the jaws being forced together to clamp the wire by means of a screw in the fixed jaw.

792,985. Safety Device for Trolley Poles of Electric Cars; Daniel R. W. Hardman, Liverpool, England. App. filed March 14, 1905. A spring drum device for the control of trolley poles in which a detent is controlled by a magnet normally energized by the trolley current. When the pole leaves the wire, the magnet is de-energized and the spring-drum actuated to wind up the trolley cord and pull the pole down.

UNITED STATES PATENTS ISSUED JUNE 27, 1905.

793,304. Trolley Wheels and Guard Therefor; Fridolin Koenig, Newark, N. J. App. filed Dec. 17, 1904. A pair of arms loosely pivoted in the trolley harp and normally held in an upright position by springs. When guy wires or other obstructions are encountered the springs readily yield.

793,311. Wheel; David A. Moore, Harvey, Ill. App. filed July 18, 1904. A wheel formed from plate or sheet metal and comprising a web portion and a rim portion integrally connected with the web portion and having thread and flange portions, each of which is of greater thickness than the body of the rim portion.

793,312. Automatic Trolley Pole; Alfred W. Morgan, Longbeach, Cal. App. filed Jan. 30, 1905. The trolley wheel is journaled in a supplemental frame whose movement when the wheel leaves the wire, tends to release the upward spring pressure on the pole, and the pole falls by gravity.

793,343. Car Fender; Peter Best, Elizabeth, N. J. App. filed Sept. 27, 1904. Relates to manual and automatic means for tripping the fender to allow it to drop by gravity to operative position.

793,344. Trolley Base; Peter Best Elizabeth, N. J. App. filed Sept. 29, 1904. The pole is so mounted that when it is pulled down flat upon the roof of the car, the spring tension thereon will be almost entirely removed.

793,379. Switch for Electric Railways; Carl Voss, New York, N. Y. App. filed April 1, 1905. Relates to means for throwing the switch from a moving car, and consists of a system of levers in the roadbed and suitable engaging means on the car.

793,480. Electrically-Operated Railway Switch; Bryan S. Wakeman, Scranton, Pa. App. filed Aug. 30, 1904. A pair of electromagnets control a two-arm lever by which the switch point is actuated. The lever arms are extensible, and the magnets are laterally adjustable in order to vary the leverage.

793,481. Switch Throwing Device; William J. Ward, Pittsburg, Pa. App. filed Dec. 9, 1904. A lever on the car is adapted to engage a cam-block in the roadbed which is suitably attached to the switch tongue.

793,516. Car Truck Bolster; George G. Floyd, St. Louis, Mo. App. filel Aug. 12, 1903. A T-shaped bolster whose web has a footflange increasing in thickness from the ends toward the center.

793,605. Car Seat; William M. Norcross, Philadelphia, Pa. App. filed Oct. 11, 1901. Consists of two chairs pivotally mounted upon a pivotal yoke, a reversing-arm and slot and pin connections between the arm and the chairs.

PERSONAL MENTION

Mr. CHARLES R. MORLEY, president of the Stark Electric Railway Company, has returned from a six months pleasure trip around the world, visiting European, North African and Oriental countries. The newspaper reports that this was a wedding tour was a canard. The Mrs. Morley who accompanied him was his mother.

MR. H. N. RANSOM, who has been associated for some time with the National Electric Company, has resigned to join the forces of the General Electric Company, for the present having offices at Schenectady. Mr. Ransom's many friends will be pleased to note this move which materially broadens his field of action.

MR. WILLIAM AIKINS has resigned as general manager of the Ohio Central Traction Company, of Galion, Ohio, with which he has been identified for two years. Mr. Aikins was formerly with the Western Ohio, and before that with the Cleveland & Southwestern and the Tuscarawas Traction Company. Mr. T. C. Cherry, formerly with the Lorain Street Railway, of Lorain, has succeeded Mr. Aikins.

MR. BLAKE A. MAPLEDORAN has been appointed general manager of the Northern Texas Traction Company, succeeding the late Mr. F. M. Haines. Mr. Mapledoran was formerly identified with the Memphis Street Railway Company, of Memphis, Tenn. It was the desire of the Northern Texas management to secure some one who was thoroughly familiar with Southern ideas and methods, and Mr. Mapledoran was selected accordingly.

MR. S. L. F. DEYO, chief engineer of the subway division of the Interborough Rapid Transit Company, of New York, has resigned to join the Metropolitan traction interests. Mr. George H. Pegram, who since Feb. 1, 1898, has been chief engineer of the Manhattan division of the Interborough Company, has been promoted to Mr. Deyo's place, and will hereafter bear the title of chief engineer of the Rapid Transit Subway Construction Company.

MR. JOHN MURPHY, general superintendent of the Pittsburg Railways, was the subject of an extended biographical article in the "Pittsburg Despatch" for June 11. Mr. Murphy has been connected with the Pittsburg railway system for some fifteen years. In the early days of electric railroading he took a course in the handling of electrical apparatus at the Thomson-Houston works at Lynn, and has had charge of electrical and mechanical engineering on the Pittsburg system, as well as of operation, for a number of years. Mr. Murphy has taken out a number of valuable patents in connection with railway work.

MR. F. L. FULLER, vice-president and general manager of the New York & Queens County Railway Company, with headquarters at Long Island City, N. Y., has accepted the like-named positions on the executive staff of the New York & Long Island Traction Company, which property was recently purchased by the New York Interborough and Pennsylvania Railroad interests. He will manage both companies, although each is separate and distinct from the other. Mr. Fuller began his street railway career with the St. Paul City Railway and remained with that company four years as assistant superintendent. In the spring of 1893 he resigned to accept the position of assistant superintendent of the West Chicago Street Railroad Company; this was the year of the World's Fair, and during that summer he was appointed general superintendent, which position he held until the fall of 1899. He then resigned to accept the position of assistant to the president and general manager of the Interstate Railway Company, of Philadelphia, formerly the United Power & Transportation Company. Mr. Fuller left this position in the spring of 1903, to take those of vice-president and general manager of the New York & Queens County Railway Company, which he holds at present besides his new positions.