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### Electric Freight Traction on Trunk Lines

We publish elsewhere some notes on trunk line traction, by H. Ward Leonard, that are especially instructive in their point of view. We are wont to hear electric traction discussed mainly from the viewpoint of motive power, and the gains to be made by substituting an efficient central station and system of distribution for relatively uneconomical locomotives, or as a means of quickening and improving passenger service. Mr. Leonard treats the question as involving the general principles of economical operation as applied to that class of service for which the railroads depend for their main revenue—i. e., heavy freight haulage. It is a common thing for experienced railway

managers to assert that passenger traffic, especially fast passenger traffic, does not pay, and granting this, it follows that if electric traction is to meet a really enthusiastic reception on trunk lines it must show cause for adoption on something more than a small and unprofitable fraction of the work to be done. We have always regarded the scorn of passenger traffic as somewhat hypocritical and intended mainly to forestall the frequent protests of exasperated passengers, but be that as it may, there is no denying that the freight business is the mainstay of railway earnings, and that any new methods must be applicable to that business in order to show adequate reason for existence.

Mr. Leonard takes the position that the key to cheap haulage is in the use of larger train units and greater power in the locomotive, thereby reducing the cost per ton-mile, irrespective of incidental gains in cost of motive power as such. Certainly the broad facts of the freight business bear out this point of view, showing that increased economy comes with the longer trains and the more powerful locomotives that have been in vogue in the last few years. Also the electric locomotive undeniably has a large advantage in that its whole weight is on the drivers available for adhesion, its power is easily brought up to the maximum that can be utilized with the given adhesion, and can be maintained at that maximum hour after hour, so long as may be necessary. More than this, electric locomotives can be coupled together in the same train and worked together with each held up to its full power all the time, whereas it is well known that it is difficult so to use steam locomotives, so that when two are used it is mainly for the purpose of insuring that each of them shall be pushed to full power in turn while its mate is temporarily recuperating. In point of fact, there is the best of reason to believe that the electric locomotive will enable a considerable saving to be made in the mere cost of motive power, and will have a considerable advantage in maintenance cost, owing to the far smaller number of wearing parts.

We think Mr. Leonard's points are well taken, since it is certainly feasible to provide electric locomotives more powerful than any steam locomotives now in use and to work them together efficiently. In grade climbing such machines have very material advantage, owing to their large weight on the drivers and to their capability of being forced to considerable overloads without any serious loss of efficiency. For such use of electric locomotives, it is obvious that those able to utilize high voltage on the working conductors are necessary, whether with a. c. motors or with Mr. Leonard's well-known plan of a. c.-d. c. operation. Certain it is that he has made out a strong case for electric traction in the very place where it has generally been passed over in silence. This large view of the subject is worth study on the part of railway managers. Perhaps the experience to be gained in the Sarnia tunnel, referred to in the last issue, may tend to their greater enlightenment.

### The Canadian "Coffeepot" System of Collecting Fares

We are able to print in this issue two valuable contributions descriptive of the portable fare-box system now generally used throughout Canada for collecting fares, as well as an interesting discussion of the results, after a year or so of use, of the type of car used in Montreal in which passengers pay as they pass from the platform into the car. This plan is so novel, except in Montreal, that the exposition of its merits should prove of great interest. The "coffeepot" system is general throughout Canada, and our readers are probably more or less familiar with this system in general, but so far as we know this is the first time an explanation of the method in detail has been printed in this country. The system is, of course, not new, as it has been in use for upward of twenty-five years in Canada, and to some extent in Europe, but it is believed the explanations of the workings of the system and the result secured, as given by Canadian officials on another page, will be read attentively by managers on this side of the line, in view of the gradually increasing disposition to seek remedies for some of the more glaring shortcomings in our present way of collecting fares.

Whatever may be said about the cumbersomeness of the fare-box collection and the obstacles in the way of introducing it in this country, the fact remains that with its use the Canadian companies are getting all the fares collected on their cars and the fares of practically everybody who rides. This is sufficient to mark the system as one worthy of the most careful consideration. Moreover, as a matter of fact, the portable box is really the only logical evolution from the old stationary fare box in the corner of the car, so familiar in horse car times. With the coming of the electric car and the advent of conductors, we in the States abolished the fare box altogether. Across the line they merely made the box smaller and gave it to the conductor to pass among the passengers.

Considering the matter purely from a theoretical standpoint, the box collection in many respects approaches the ideal. There is no middle man to handle the company's cash, and there are no leaks. Moreover, it is held in Canada that the system sets a high standard of integrity and encourages honest conductors. At the same time it removes temptation from the path of the weak ones. In this connection we have always tried to retain our faith in human nature, and we venture the opinion that in honesty and moral integrity, as a class, street car conductors stand as high as any large body of men in which there are as many new recruits from year to year as there are with conductors. If they did not, considering the loopholes in our present system of collecting fares, it would be impossible to run cars at all according to present methods. We hold the opinion that nine-tenths of all the trouble that occurs comes from a very small number, relatively speaking, who drift into the business of conductors as they would and do into many others. We thoroughly believe the great army of the rank and file of street railway employees are honest men, and if some of them sometimes drop away from the high plane of exact rectitude, it is the looseness of the system that is responsible. It is all so easy to find more nickels in one's pockets than are indicated on the register at the end of the run that the temptations would try character of stiffer caliber than can be secured for 20 cents an hour. Therefore the fare box encourages honest conductors and helps get rid of bad ones.

The impression in the States has always been that the fare box collection was slower than the usual method. The only competent evidence we have on the subject is the testimony of prominent officials of Canadian roads who are thoroughly

familiar with the practice in the United States as well as in their own country, and this testimony is unqualifiedly to the effect that the Canadian system is no slower. In modification of the testimony, however, it must be borne in mind that the public in Canadian cities have been educated to the use of the fare box and the people make it a custom to facilitate the work of the conductor. Whether or not the American public would do the same is entirely a matter for actual experiment.

So far as we know, the portable box has never been given a fair trial in this country. We believe spasmodic attempts have been made to introduce a few boxes in one or two cities. But American managers have appeared to take the attitude that the box collection could not be started here because either the conductors would refuse to carry the boxes or else the public would object to being compelled to deposit their own fares. But we are not so sure that either of these things would happen. Naturally, in introducing an innovation of this kind, there might be some opposition until everybody understood all the whys and wherefores, but we are inclined to believe that if any manager became convinced that the fare box would overcome the defects of the present system, he could introduce the box system with no more opposition than would come from the few chronic kickers—provided, of course, he frankly took employees, the press and the public into his confidence and let everyone know what he was doing. It is frequently true in the street railway business that public opposition comes from ignorance of what is being done. The change could not be made arbitrarily and with high-handed disregard for public opinion, but with frankness and a little educational work it could be brought about—assuming always that the game would be worth the candle.

### Improvement of Property Along Interurban Lines

There are two very significant facts which must of necessity attract the attention of every ordinarily observant person who has occasion to travel upon the long interurban railway lines in the Middle West, and who is at all interested in the development of the country and the building of this class of road. The first is the marked improvement in the appearance of the individual properties along the line, whether they are in the villages or in the open country. In some cases this takes the form of the grading of the lawns, or the planting of flowers and ornamental shrubs. In other instances, and this is true in the country, it manifests itself in the painting of buildings, the repairing of fences and outbuildings, and in other ways, which seem to show in unmistakable language that the owners and occupants of the property have awakened to the fact that they are in touch with the world and desire to let others know that they realize this fact. Although this improvement may not add directly to the actual value of the physical property of the railway company, it is one that must be gratifying to all lovers of "picturesque America," and proves conclusively that these great arteries of commerce are stimulating and benefiting to those sections of the country through which they pass.

Another feature, which is particularly marked in Michigan, is the construction at a great many of the cross roads near the line, of barns or sheds for the care of the farmers' horses during the time they are gone to the city or town. This indicates clearly the creation of a new class of business on the part of farmers and others, who, instead of driving anywhere from 6 miles to 10 miles to town, leave their horses in charge of some responsible person at the nearest point on the electric line and ride in on the car, carrying their lighter produce with them and

bringing back their purchases. In this way they save not only themselves, but their horses, from a long and tedious drive over a poor or indifferent road.

This class of business, although quite noticeable in some localities, is still in its infancy, and seems worthy of attention upon the part of the owners of electric railway lines, as it cannot fail to add largely to the popularity as well as the profits of the road. While it may be true that the companies would not be justified in the building of such barns or sheds themselves, there are no doubt many places where a little encouragement, and possibly a little financial assistance upon their part to some one living in the locality, might result in the establishment of many such stations that would bring to the company an increase in business and popularity in the farming sections.

The development of this class of business also clearly demonstrates that the electric railway is not necessarily a rival of the steam railroad, but that it occupies a distinctive field of its own; that it creates a business that the steam road could not serve, and adds largely to the comfort, convenience and benefit of the rural residents of the territories through which its line passes, by providing them with a much quicker, better and more satisfactory means of reaching their town markets.

### The Crowding of Cars

Every little while the attempt to regulate the habits of the traveling public turns up in a new form. It is ostensibly some device for preventing the overcrowding of cars, aimed apparently at the "soulless corporation," that is popularly regarded as a fair mark for anyone with a grudge against things in general. Sometimes it takes the form of a no-seat no-fare agitation; again it crops up as an ordinance regarding ventilation, and the outbreak which just now has called the subject to our mind is a call for regulations against overcrowding. Now, in the last analysis, the crowding of street cars has as its cause the determination of a large proportion of the passengers to ride between specified points within certain narrow limits of time. So long as this determination persists there will either be overcrowding or part of the crowd will have to walk. It is very easy to talk about the duties of corporations, but it is not a question of either duty or inclination. These same "soulless" corporations would greet with open arms and checkbook anyone who would tell them how to deal successfully with the conditions that embarrass them. It is a condition, and not a theory, that confronts them. When it comes to the problem of providing seats for passengers, the ordinary long closed car will seat thirty-five to forty people, and, running on a minute headway, will accommodate therefore about 2000 passengers per hour. At 30-second headway, which involves the certainty of frequent time-consuming blockades on any ordinary surface line, about 4000 passengers can be seated. This number is far less than that which will be poured out of the shops and offices of a single business block during the evening rush hour in a great many cities in this country.

Even if one could run enough cars to seat eighty or one hundred people a minute without interminable delays, during certain periods in the evening rush, the crowd swarms into the street in the business section of a large city at several times that rate and cannot be promptly taken care of by any feasible number of cars. Therefore any overcrowding ordinance means that part of the crowd must wait or walk during the rush hours. We would really like to see the Continental system of refusing passengers after the seats are filled tried in any large American

city for just about one week. It would take the whole police force to prevent a riot after the first day. If the ordinance were modified to allow standing passengers up to half the number of seats, the difficulty would be relieved only to a very minor and insignificant extent. The fact is that during the rush hours in a large American city the traffic is at times so dense that it cannot adequately be taken care of by any practicable number of cars, overcrowded or not, so long as it initiates mainly along one or a few streets, as is generally the case. In the smaller cities it would be physically possible to run cars enough to handle the crowd more successfully, but only by an enormous increase of rolling stock, and the accompanying and very serious difficulty in getting a sufficient supply of extra men. It is altogether out of the question to provide a car per minute on an ordinary urban line, since the number of cars required and of employees to run them a couple of hours per day would become preposterously great. Unthinking people often say that the profit is in the passengers who stand, but the real fact is that the conditions at the rush hours, with the demand for a great stock of cars idle most of the day, and the carrying of enough extra men to run them, together with the formidable peak on the power station load, all go to make up a combination that is very far from economical.

Almost any road would fairly tumble over itself to accept a no-seat no-fare ordinance if it could receive therewith a guarantee of uniformly distributed traffic. Any practical solution of the overcrowding problem must include not coercion of the railway company, but education of the public and co-operation in furnishing locations for car lines. The hardest condition to be contended with is the massing of traffic at certain points within the space of a few minutes. Better routing of cars in the crowded section of the city, so as to distribute the traffic over several lines from several neighboring termini, may often give considerable relief. We think, too, that there is a very decided limit to the advantage to be gained by shortening the headway. Too many cars not only lend to blocks, but also may act to maintain congestion. For example, suppose a certain line devotes its energies to securing extras enough to give a 1-minute service between 5 p. m. and 6 p. m. The result of this concentration of rolling stock is a very sudden change in the headway before and after this time, and people soon get into the way of riding at this very period in order to get a car more quickly. The same number of cars distributed over two hours more uniformly would often give better results. A service passing suddenly from 2-minute to 10-minute headway, sharply at 6 p. m., insures a jam just prior to the time of change, which could be relieved by better distribution. In other words, the habits of the riding public are somewhat susceptible to modification, and by the exercise of tact can sometimes be changed for the better. Rules about overcrowding are very difficult to enforce after one passes the actual seating limit, and we are inclined to think that they are likely to produce more harm than good. If the cars are frequent and well distributed through the busy hours of the afternoon, which they should be, overcrowding will generally tend to correct itself to a certain extent. A stern limitation on standing passengers will likewise in the long run punish the passengers rather than the transportation company. We do not think the American public can for a long time be educated up to the point of being denied access to a car in which standing room remains, and if they ever reach that point they will also be ready to exercise, on their own account, some discretion in forcing their way upon cars already well filled. At the present time the entire police force would hardly be sufficient to enforce a "no-seat no-ride" ordinance in most American cities.

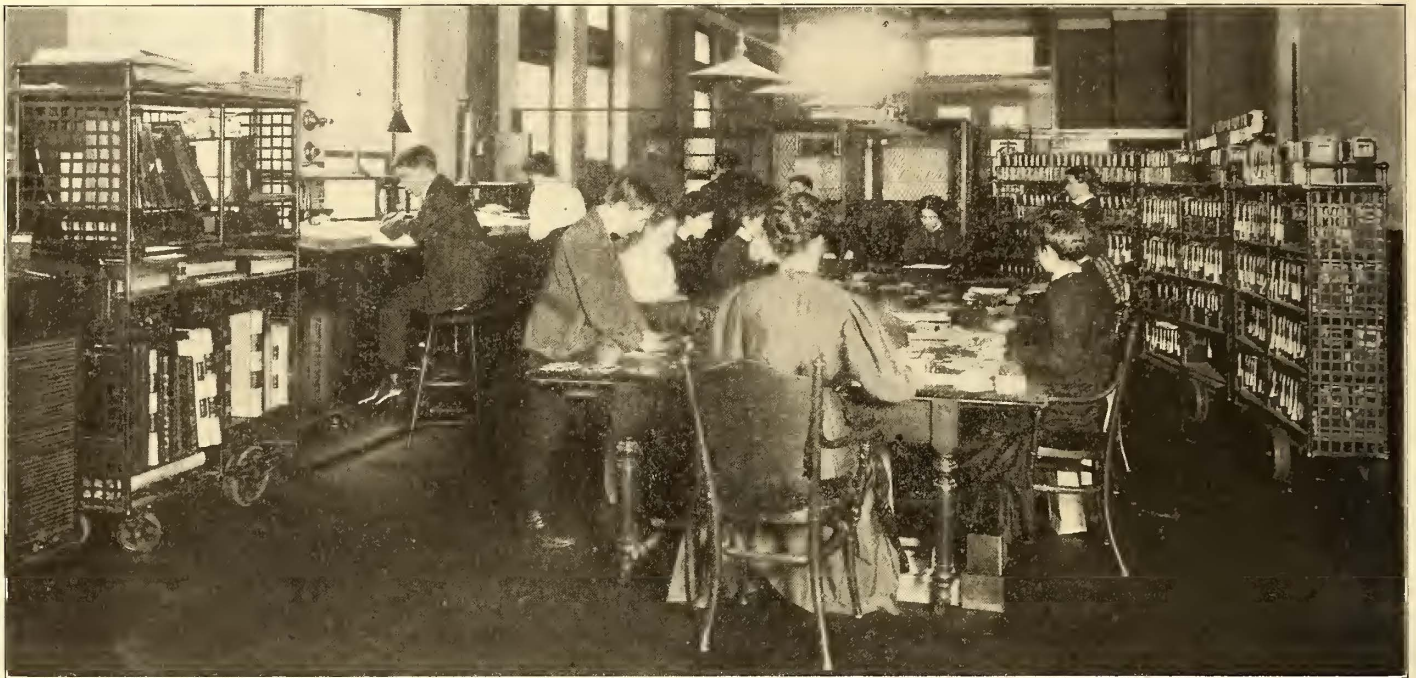
## THE CANADIAN SYSTEM OF COLLECTING FARES

As may be generally known, the electric roads in Canada have almost universally adopted a system of collecting fares that is radically different from that in vogue in the United States. The Canadian conductors do not themselves handle cash fares or tickets collected on the cars, but present to the passenger a small box or bank, commonly referred to as a "coffee pot," and the passenger deposits his own fare through a slot in the top of the box. The slot is fortified with a set of carefully poised teeth of hardened steel, which permit the entrance of a coin or a ticket, but once any article enters  $\frac{1}{3}$  in., the teeth grasp it and it cannot be withdrawn. Each box is fitted with a security lock, which cannot be tampered with or opened except with a key in the office of the company. At the end of his run, the conductor turns in his box with its contents, and does not at any time touch or handle the actual fare. On most of the roads there is no register or record made of the

the general supervision of the driver. As traffic increased, and for general convenience, the idea was developed of having the conductor pass the box among the passengers instead of making the passengers go to the box, and this is the evolution of the present Canadian system. While making no attempt or pretense to argue the superiority of the portable box system over the method of collecting fares as practiced in the United States, it is in order to say that the box system as applied in this city at present is meeting all requirements for the safe and sure collection and retention of all fares.

So far as we have record, the first portable fare box was brought to Toronto about twenty-three years ago. This was an odd looking affair, shaped somewhat like a crescent, to fit around the conductor's waist. The present box has been evolved by gradual stages from the earlier designs.

As to the details of the box itself, the form now most widely used throughout Canada consists of a small compact two-compartment bank or safe, constructed entirely of steel, covered



COMPTROLLER'S OFFICE, TORONTO RAILWAY, SHOWING DISPOSITION OF CASH AND TICKET-COUNTING CLERKS; ALSO FARE BOXES ON TRUCKS

fares as they are collected, the contents of the box alone being accepted as the indication of the number of passengers carried. One or two of the Canadian companies, however, as an aid in checking, are introducing registers in the cars, and require conductors to register each fare as it is deposited by the passenger in the box, but this practice has not yet become general.

In view of the widespread interest that attaches to suggestions for eliminating any of the short-comings of the present system of collecting fares in use in the United States, it has been thought desirable at this time to place on record a description of the Canadian system and a statement of the results secured. At the request of the STREET RAILWAY JOURNAL, Robert J. Clark, assistant comptroller of the Toronto Railway Company, and H. E. Smith, comptroller of the Montreal Street Railway Company, have courteously consented to describe in detail the methods of collecting, counting and handling fares on their respective roads. The systems in these two cities may be accepted as typical of Canadian practice:

### COLLECTING AND HANDLING FARES ON THE TORONTO RAILWAY

By R. J. Clark, Assistant to Comptroller

As a matter of fact, the Canadian fare box is a logical development of the old-time stationary box formerly used in horse cars, wherein the passengers deposited their own fares under

with leather of suitable quality and color. The dimensions are  $8\frac{1}{2}$  ins. x  $5\frac{3}{4}$  ins. x  $2\frac{1}{2}$  ins., and the cubical contents about 32 ins. The box is carried by a hollow handle at one corner. In the top surface of the box is a small opening or slot through which the coin or ticket is deposited. In the latest improved forms, this slot is guarded with a system of carefully poised teeth of hardened steel, sharpened to a chisel point, and kept in place by their own weight and fine springs. These teeth give way to allow the entrance of any article of the thickness of writing paper up to the thickness of a coin, but once the article has entered the slot for a distance equal to the smallest fraction of an inch, the teeth instantly grip the article and it cannot be withdrawn. Less than  $\frac{1}{8}$  oz. downward pressure will deflect the teeth, but by actual test they will resist 300 lbs. reverse strain. With the present box the company is absolutely certain that if the fare in the form of coin or ticket is once inserted in the slot, no matter how slightly, it cannot be withdrawn, but must pass wholly within the box.

After the coin or ticket has dropped through the slot it is caught in a small compartment forming the upper portion of the box. This receptacle is fitted with small glass windows, which enable the conductor to scrutinize the fare deposited and detect any attempt to defraud by passing spurious coins or tickets. The floor of this compartment is a tipping table or

trap, and after the conductor has satisfied himself as to the genuineness of the fare, he pushes a button in the top of the box, thereby tipping the trap and causing the fare to fall through into the lower compartment or magazine, where it remains until the box is opened by the comptroller's department. The company is thus assured it is receiving every fare collected.

The box is usually carried by the conductor in his left hand, leaving the right hand free to make change, give signals, etc. The box is presented to each passenger, who places the fare, either cash or ticket, in the opening on the top of the box. Strict injunctions are given that the conductor must not handle the fares. If a passenger requires change, the conductor must give the passenger full change and the latter then places the fare in the box. The box generally used throughout the Dominion is made by the Coleman Fare Box Company, of Tottenham, Ont. Can.

The question was asked at the Philadelphia convention of the Street Railway Accountants' Association of America if the box method of collecting fares was slow, to which question W. G. Ross, managing director of the Montreal Street Railway Company, and the writer, replied in the negative. The box system is not of itself appreciably slow, but it should be remembered that the conductors of this company are not only required to collect fares and give signals, but to sell at least five different classes of tickets and issue transfers.

Under the terms of its franchise, the Toronto Railway Company is required to sell five different rates of fares on the cars, and the conductors have to carry from \$20 to \$25 in tickets and change. In order that they may have sufficient money, the company loans each conductor \$25, taking his receipt and a bond from one of the leading insurance and indemnity corporations.

The manner of handling, distributing and accounting for the boxes is as follows: We require twice as many boxes as there are conductors operating cars. Thus, one set of boxes is always out on the road while the other set is being emptied in the comptroller's office.

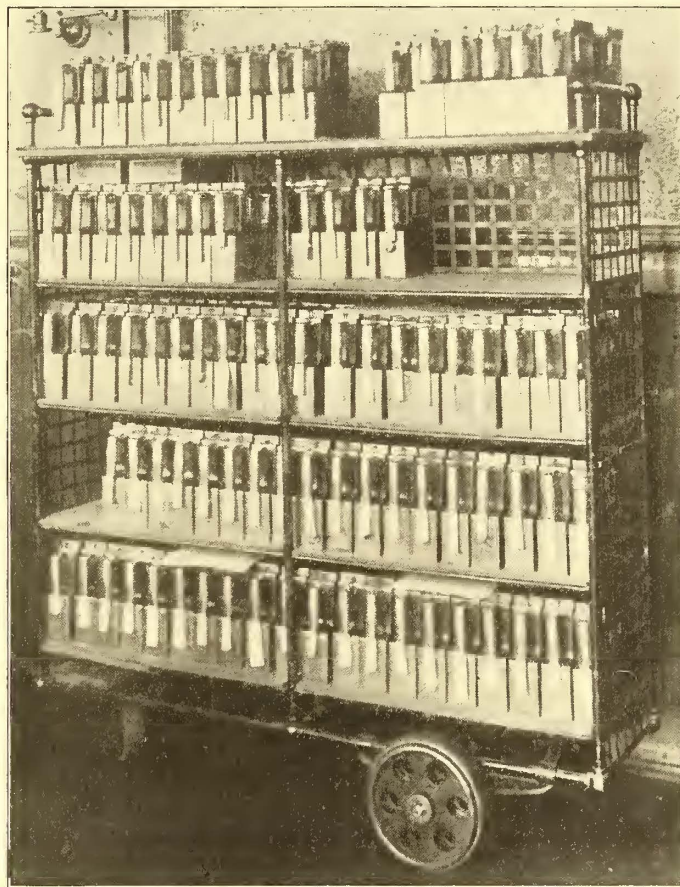
An empty box is given to each conductor when he starts on his run by the car starter at each depot, who enters on a properly ruled sheet, the conductor's badge number, the car number and the box number (each box bears a separate number). When the box is returned at the end of the run, the starter enters on the same sheet the number of trips made on the run and the number of trips lost, if any. This sheet is reproduced on the following page. It will be noticed it is divided into two divisions by a double rule down the center. The starter fills up the columns in the first division as just described, and at the end of the day the sheets are sent with the filled boxes to the comptroller's office for the additional entries, as shown in the second division, which are made as the boxes are opened and the contents counted.

As the boxes are turned in to the car starter's office at the ends of the runs, they are stacked in regular order by routes on special racks or trucks, shown in one of the illustrations. Similar trucks are used at all depots and in the comptroller's office for handling the boxes. Each truck holds about 200 boxes. The filled boxes are collected from each of the depots by two men, known as the box collectors, who use a special car fitted up for this work, and are delivered at the comptroller's office. At the end of each day, after the boxes have been opened and the contents counted by the accounting force (in the manner to be described), the empty boxes are replaced on the trucks, which are then run into a special vault in the comptroller's office, and the combination of the vault is locked.

The box collectors arrive at the office about 8 o'clock in the evening. They unlock the vault, draw out the trucks containing the empty boxes and arrange the boxes in regular order on the racks of the trucks to meet the requirements of the car starters at each of the five different car houses. They then

place the empty boxes on the special car and deliver them to the starter's office at the different car houses ready for distribution to the individual conductors in the early morning. At the same time the collectors leave the empty boxes, they collect the boxes that have been filled during the day, and they take care to bring back a filled box for every empty they leave.

When the filled boxes are brought back to the comptroller's office they are assorted and placed in order of their run number and route on the trucks. When this work is completed the trucks are again run into the box vault, the doors are locked, and the trucks remain there until the cashier opens the vault in the morning and the clerks bring out the trucks. This is the regular routine for every night. The two collectors work from 8 o'clock in the evening till about 4:30 in the morning



TRUCK USED FOR HANDLING FARE BOXES, TORONTO RAILWAY

delivering the empty boxes, collecting the filled ones and arranging them on the trucks in the comptroller's office ready for the count in the morning.

When the accounting force arrives for the morning's work the boxes are opened by two clerks at a long table, and the tickets and cash contents are separated. The coins are passed to a cash counter and the tickets to the ticket counters. Owing to predominance of ticket fares on this road, one cash counter can keep pace with three ticket counters. This is not only due to the greater number of tickets, but also to the fact that each ticket clerk has to count and record under its proper column the number of each of the seven different classes of tickets that may be contained in the box given her. The contents of each box is, of course, kept separate during the count. The result of the count is then set down opposite the individual box number in the second division of the tally sheet previously mentioned. When the contents of the boxes for each route have been counted and entered on the sheet, the sheet is summed up, and we thus obtain the earnings of each particular route.

In this connection especial attention is directed to the fact





checked later by weight, and then sent to the power house and burned.

The totals of each class of fares, as shown on the form (Fig. 1), are then transferred to the form (Fig. 2), which represents the amount of cash and tickets counted, and from which the earnings for the day are compiled.

The forms (Fig. 1) are then assorted according to lines or streets and the totals transferred to the form (Fig. 3), using a separate sheet for each line, in order to show the total number of fares collected on each line.

The totals from these sheets are in turn transferred to the

**FARE COLLECTING\***

BY D. McDONALD, M. I. E. E., Manager, Montreal Street Railway

The collection of fares is a very important and interesting subject, and too much cannot be said or written about it. If the same amount of deep thinking that is being constantly given to the less important technical questions, should be devoted to the consideration of our modes of collecting fares, the results would, I am sure, prove marvellously profitable to most companies. After more than half a century's experience in operating of street cars, it must be admitted that our so-called systems of collecting are perhaps the most defective part of our organizations.

If the losses incurred yearly by the missing and purloining of fares could be computed with any degree of precision, the revelation would prove astounding to us all. This large and expensive "X" which managers agree to call 5, 10 or 15 per cent, amounts in most cases to a larger sum than most street railways pay in dividends, and the comparison presents itself still more strikingly when we consider that whatever part of this dead loss we can succeed in saving is not only an increase of earnings but a clear net benefit.

It is hardly necessary to go into the detailed enumeration of the different ways in which our "little grains of sand" are being gathered up to the present time. Their inherent defects

**MONTREAL STREET RAILWAY COMPANY**

(Form No. 10)

CARS AND TRIPS RUN		day, 190																
ROUTE	Mileage per Round Trip	Sched. Trip per Car	CARS				TRIPS				MILES RUN			TOTAL				
			Reg.	Extra	Night	Ave. per day	Reg.	Extra	Night	Total	Regular	Extra	Night					
AMHERST.																		
...																		
...																		
...																		

FIG. 5.—DAILY TRIP SHEET FROM SUPERINTENDENT'S OFFICE, GIVING OPERATING DATA FOR USE IN ACCOUNTING DEPARTMENT

balance sheet (Fig. 4) opposite their respective lines, values computed and the total earnings of all the lines balanced against earnings, as shown on the form (Fig. 2). From the

No. F. 20

**MONTREAL STREET RAILWAY COMPANY**

Weather 190

Daily Comparison of Earnings, Etc., day, 190

L. I. N. E.	CAR				TRIPS				MILEAGE PER TRIP			MILES RUN				CAR HOURS		TOTAL EARNINGS		EARNINGS PER MILE		EARNINGS PER CAR HOUR		PASSENGERS	TRANSFERS [APPROX.]		
	Reg.	Ex.	N.	Total	Reg.	Ex.	N.	Total	Reg.	Ex.	N.	REG.	Ex.	Night	TOTAL 190	TOTAL 190	190	190	190	190	190	190					
AMHERST.																											
SPECIAL CARS.																											
TOTAL.																											
PREVIOUS YEAR.																											
INCREASE.																											
DECREASE.																											

FIG. 6.—DAILY COMPARATIVE STATEMENT OF EARNINGS FOR ENTIRE SYSTEM BY LINES (MADE UP FROM FIGS. 4 AND 5)

information contained on the balance sheet (Fig. 4), and daily trip sheet from superintendent's department (Fig. 5), the daily comparative statement of earnings, etc. (Fig. 6), is compiled.

City Treasurer Coady, of Toronto, has prepared a statement showing the city's percentage on the gross earnings of the Toronto Railway Company for last year and the preceding five years. The figures indicate the steady growth of the passenger traffic on the Toronto Railway, and as compared with the percentage of 1900, the city received over double the revenue last year. Mr. Coady also attaches a statement showing the gross earnings of the company and the city's percentage during December of last year, and for the same month during the five preceding years. An increase of over \$9,000 has been made in six years. Following are the figures:

Year	Total Percentage
1905.....	\$292,706.72
1904.....	249,511.42
1903.....	206,532.81
1902.....	165,172.69
1901.....	145,209.24
1900.....	127,128.10

FIGURES FOR DECEMBER

	Gross Receipts	Percentage
December, 1905 .....	\$243,764.78	\$19,501.18
December, 1904 .....	214,521.63	17,161.73
December, 1903 .....	191,967.52	15,357.40
December, 1902 .....	170,082.07	13,606.57
December, 1901 .....	146,615.50	11,729.24
December, 1900 .....	129,910.13	10,392.81

are so patent and publicly known that any one of our patrons, so disposed, can relate to us precise information about them, without, however, being able to suggest any effective remedy for the evil. Therefore, to save time, I will limit myself to a short mention of the different systems that you all know so well, just to help us face this difficult question in the proper manner.

First—The Register: On this Continent the register seems to have proved the most acceptable to American companies, who are far from being satisfied with its elastic guarantee. The exhaustive reports of our secret service reveal too clearly how often it is beaten and tampered with, to enable us to recommend it as anything like an ideal system, and the missing of fares, especially in crowded cars, is not diminished by its operation, although it must be said that outside of rush hours its automatic figuring does assist the conductor, to a certain extent, to keep tab on new arrivals. Owing to the increase in the use of tickets in the United States, the register is daily becoming less satisfactory. The register is, however, accepted and tolerated for want of a better method.

Second—Fare Boxes: The portable fare box (carried by conductors) is generally adopted on the Canadian side of the line, and the best argument in its favor is, perhaps, that the fare receipts, by the use of this box, are prevented to a great extent from straying into the pocket of a third party and go direct from the patron's hand to the company's office, which is a considerable advantage. Another point in favor of the box

\* A paper read before a meeting of the Canadian Street Railway Association, held at St. Catharines, Ont., Dec. 14 and 15, 1905.

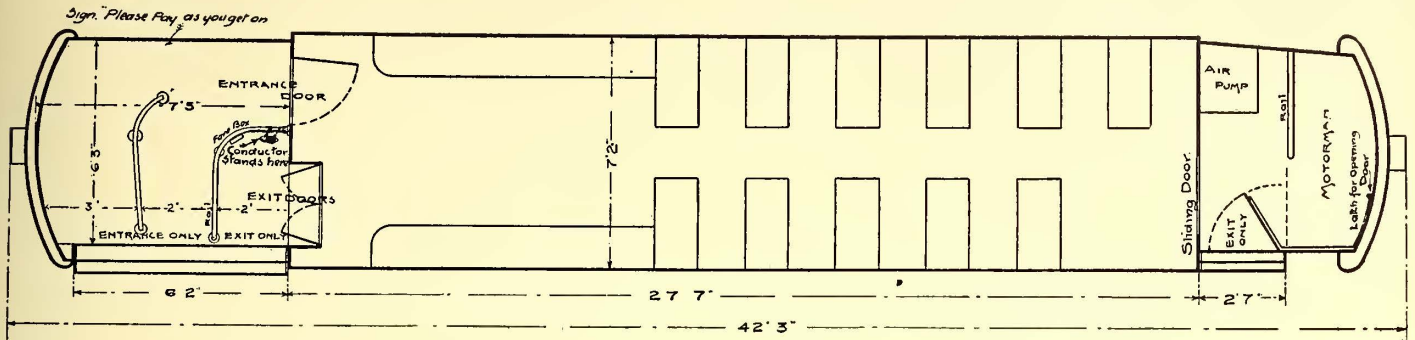


is that the fare must be deposited in the box by the passenger, and if this is not done the patron is immediately made aware of the fact that the conductor has failed in his duty. As to preventing the missing of fares, it cannot be said that the box system is any more effective in this respect than the register.

Third—Receipt System: The European system of giving a receipt to each passenger for his fare and having inspectors to control the issue of said receipts, is another mode of collecting

city service it is very much disliked by passengers who protest against being disturbed or annoyed on short trips to produce their receipts for inspection. Again, the missing of fares is not safeguarded by the use of this system, and the failures to collect in rush traffic are just as numerous as with our American systems.

Fourth—Prize Systems: The system of giving prizes to be drawn for by holders of receipt coupons is claimed to be an



PLAN OF MONTREAL "PAY-AS-YOU-ENTER" CAR, SHOWING ARRANGEMENT OF PLATFORMS AND SEATS

which has only met with partial success for many reasons. The fact that the inspector can only check a small portion of the receipts issued renders it very undesirable, and the complete checking of all receipts, which would require a very large number of inspectors, would only lead to a greater difficulty, likely to a mutual understanding between careless inspectors

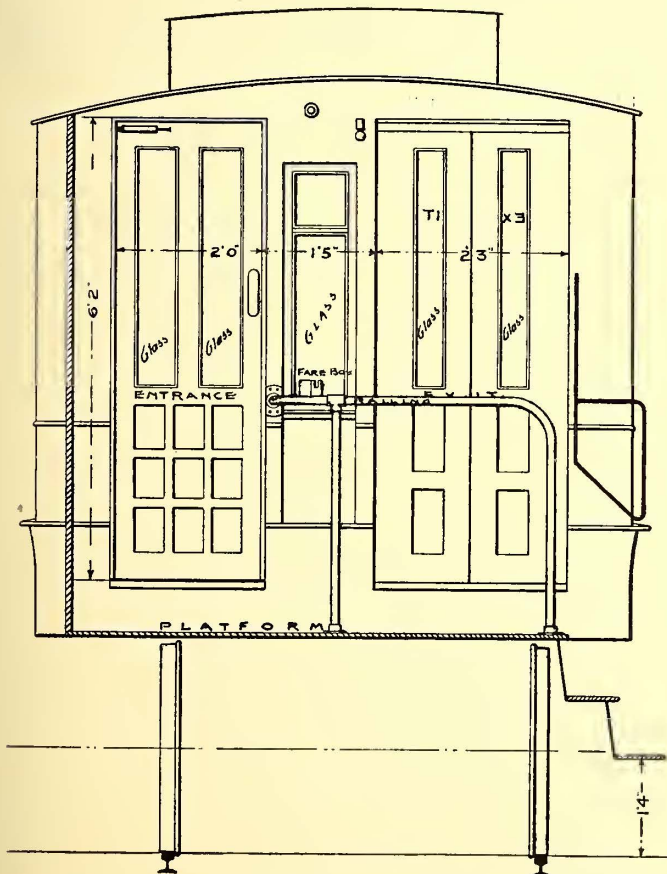
improvement on the receipt system, but even if this lottery business could be legally practiced in our country, it would only partially protect against the losses above mentioned.

These three or four different ways of collecting are the most in vogue, and we are forced to admit that they are, one and all, essentially deficient. Each and every one of them imposes a well-nigh impossible task on the conductor, who by these methods cannot be strictly held to the integral collection of all his fares. Twenty-five people enter a car and pay their fare, twenty-five more are taken on in the next few blocks, and after they have been well mingled and mixed up with those who have already paid, the poor conductor is expected to go and pick them out without missing any; a very difficult task which must, perforce, be only partly accomplished.

The above facts have forced us to the conclusion that our modes of collecting up to recently are unbusinesslike and impractical, and that to improve them we must furnish our conductors with some systematic means of following this collection of fares and prevent that doubtful and groping sentiment that places them now at the mercy of forgetful or ill-disposed passengers.

The only ideal system of collecting in vogue to-day is the positive system, as it is worked on subways and elevated railways, where passengers have to pay before entering the car on which they desire to travel. We are all thoroughly convinced that the application of this system to our surface operation, if it were practicable, would be a source of great benefit, and we would immediately cease to have tribulations on this subject. Unfortunately, it is not possible to adopt this method integrally on surface cars, but we are persuaded that the best means of improving our fare collection is to adopt the elevated system, in so far as possible.

With this idea in view, we are at present experimenting with a new make of car in Montreal, that permits of the application of a very positive mode of collecting, the nearest approach to the exemplary system above mentioned. These new cars, known as the "Pay as you enter cars," have been in operation for several months and are giving good results. Our comparative statement shows that earnings on this style of car are much higher than on other cars where collecting is done in the old way. The new car has in place of a 5-ft. platform, one of 7 ft., and instead of the ordinary door placed in the center of the end there are two doors, the brass railing leading up from the steps dividing the platform into two aisles. The door to the left is to be utilized by persons entering the car and the other solely by those who desire to leave. This is ar-



END SECTION "PAY-AS-YOU-ENTER" CAR

and conductors, which would prove equally disastrous. The reissuing of receipts already used and the difficulty of preventing this abuse is another great defect in this system.

The writer has had considerable experience in the general working of the receipt system on a large number of European roads, and is of the opinion that this mode of collecting is fairly adaptable to long suburban or interurban runs, but in

ranged and made arbitrary by the fact that while one of these doors opens inwardly only, the other opens only outward. When a passenger steps on the platform, which is amply large for thirty adults, he is met by the conductor who requests a

attention as is necessary to the passengers getting on or off the car. The conductor is also provided with a receptacle into which the fare box fits, so that he may when necessary have both hands free and at the same time not miss fares. As these cars are all provided with electric buttons as well as the usual



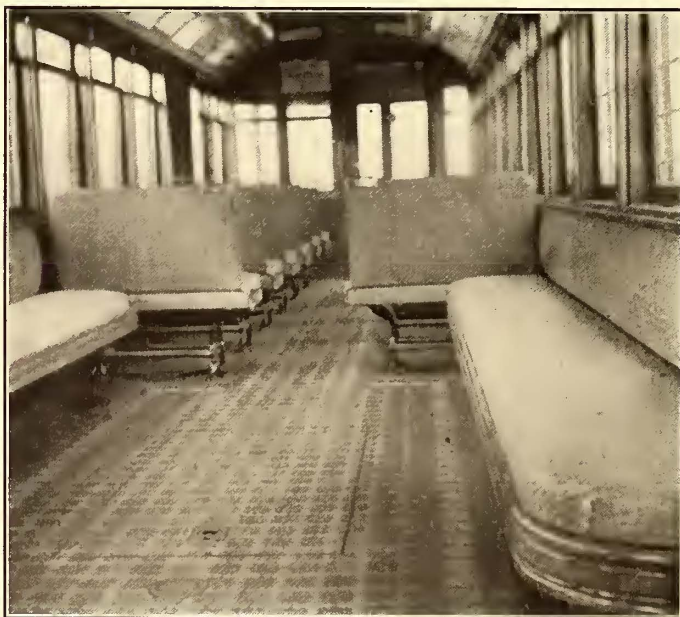
REAR PLATFORM OF "PAY-AS-YOU-ENTER" CAR, SHOWING POSITION OF CONDUCTOR AND PASSENGER WHEN PAYING FARE



REAR PLATFORM OF "PAY-AS-YOU-ENTER" CAR, SHOWING EXIT AND ENTRANCE PASSAGeways

fare before the passenger enters; in other words, the platform is the pay office on the car. The passenger then passes on through the entrance door into the car, from which he may

signal cord, the passenger can easily and at all times make his desires known without having the conductor at his elbow.



INTERIOR "PAY-AS-YOU-ENTER" CAR, SHOWING ARRANGEMENT OF SEATS; ALSO EXPERIMENTAL FLOOR OF RUBBER TILING

Another improvement in the new design is the exit from the front platform. This portion of the car being more spacious than usual, not only gives the motorman ample room, but he is also divided from the rear portion of his platform by a brass railing. At the motorman's foot is a catch which when released by pressure throws open the door automatically, thus making it unnecessary for the man in charge of the motors to even raise his hand or turn his head.

In view of the fact that serious accidents on street cars happen at the back platform when the conductor is busy collecting fares inside the car and unable to properly gage stops and starts, the new design is considered most important.

The saving of time is also a great advantage, as passengers begin to enter immediately the car stops, without having to wait for passengers getting off. The moment intending passengers are all safely landed on the platform the car is started, and in a few seconds after this fares are all collected before reaching the next stop.

A large number is painted on the front dash of the car so as to indicate to intending passengers, who can see it blocks away, that a new style of car is coming, or "Get your fare ready, please," and it is pleasing to note how quickly they do prepare and how quickly the ten, fifteen or twenty passengers can pay their fare and be served with transfers with this system.

make his exit at any time, either by the front entrance or by the rear door designed for the purpose.

The conductor having no fares to collect from passengers in the car, can remain at his post on the platform, giving such

We are of the opinion that to improve our mode of collecting fares and save our losses, a radical departure must be made from the old method, and we must, by the adoption of a positive businesslike system such as prevails in all other lines of transportation and regular business, get the best hold possible on our well-earned receipts, for, if we do say it ourselves,

"We deliver the goods every time," and where can you get better value for your money?

In connection with Mr. McDonald's paper are presented several illustrations which explain the details of the platform and interior arrangements on the new "pay-as-you-enter car." In conjunction with some of the new types of cars the Montreal Street Railway Company is trying the experiment of using rubber tiling for the car floor. This tiling is a special composition of rubber, vulcanized to a certain degree of firmness, sufficient to give slightly to the pressure of the foot. The tiling is made in the shape of male and female interlocking Maltese crosses of various colors, and gives promise of affording a non-slipping, cleanly and durable flooring. The tile is made by the Gutta Percha & Rubber Manufacturing Company, of Toronto, Montreal and New York.

### PRESENT RAIL-JOINT PRACTICE IN GERMANY

At the tenth annual meeting of the Verein-Deutscher-Strassenbahn-und-Kleinbahn-Verwaltungen (German Street and Interurban Railway Association), Arthur Busse, ober-ingenieur of the Grosse Berliner Strassenbahn, presented a summary of German rail-joint practice derived from the reports of 119 railways.

It appears that in service which does not require heavy cars operating on frequent headway, and where a hand brake satisfies normal braking conditions, the ordinary angle-plate joint is still satisfactory. However, where heavy rolling stock is used and there is considerable vehicular traffic, some special form of rail-joint is necessary. Quite a number of railways are using 15-m (49-ft.) rails, and the rail mills have been requested, though without success, to quote on 18-m (about 58-ft.) rails. Opposite joints have been used to some extent, but have not proved satisfactory, owing to the tetering of the car when the joints get low.

When laying new track, it is the almost universal custom in Germany to smooth off, by filing or milling, the heads of the rails near the joints after making the joints. It is desirable to repeat this after the track has been in use for a week or two, because at the end of this time slight inequalities develop, which should be removed promptly. It is also a common practice to machine the rails when making angle-plate joints, so as to secure a good fit.

No one type of joint is best for all conditions. Among those which have proved very satisfactory is the Melaun rail-joint, which was described in the STREET RAILWAY JOURNAL of June 25, 1904. This joint is especially desirable for use in asphalt paving on account of the minimum disturbance which it requires in the paving. Berlin is the only place where this joint has been in use for any considerable length of time (since 1901) under exceptionally severe conditions on lines with 28-second to 60-second headway. The makers of this joint guarantee to keep it in perfect condition for four years, no matter how severe the service may be. The Grosse Berliner Strassenbahn has installed a large number of Melaun joints on old track where the original Falk cast-iron joints had to be replaced. At first it was feared that the top piece of the joint would not wear at the same rate as the adjoining rail heads, but thus far no irregularities of this kind have been discovered. For new track it is customary to specify that the top piece of the joint shall be of the same material as the adjoining rails. The joint has also been successfully applied to broken rails and to rails with low joints without disturbing the rest of the track. About 25 minutes are required to mill the rail ends for the reception of the joint, and 35 minutes more for the complete installation. The cost of the current consumed by the milling machine is about 6 cents, figuring power at 2.25 cents per kw-hour.

Three German roads have employed Falk cast-welded joints, namely, Breslau, Cologne and Berlin. The two first are well

satisfied, and the Cologne management reports that of 750 joints only one was ruptured in the winter and that one rail cracked for a distance of 40 cm (about 16 ins.) from the welding point. Experiments made on the broken rail showed that the welding temperature had not changed the nature of the material. The welded joints, however, do not give perfect riding. The Grosse Berliner Strassenbahn has installed over 10,000 cast-welded joints, but they have not given the desired results. They were first applied to old grooved rails on which the original joints had worn out. Although this prolonged the life of the rails for several years, it would have been cheaper to have installed ordinary angle plates which would have given the same life. Applied to new rails, the Falk joint has not been able to prevent low joints nor the rails from working loose. It has also unfavorably influenced track repair maintenance.

The Goldschmidt thermit process has also been adopted by a considerable number of German railways. In Berlin, where the work was carefully done, the thermit joint has shown no defects whatever under most severe service.

A new electric welding process has been introduced by the Akkumulatorfabrik A.-G., Hagen-Berlin. Instead of using the alternating-current resistance method, employed in the United States and England, heat is secured by the formation of an arc between the rail and a carbon electrode. The welding apparatus is contained in two cars, one holding the storage battery and the other a motor-generator set for reducing the trolley voltage to 60 volts. The Hagen Street Railway, which was the first to use this method, thinks very favorably of it. The Grosse Berliner Strassenbahn has also tried it for 100 joints, some with soft material and others with hard material for the connections. Joints made with the former soon showed signs of wear, but the latter are giving good service under severe conditions.

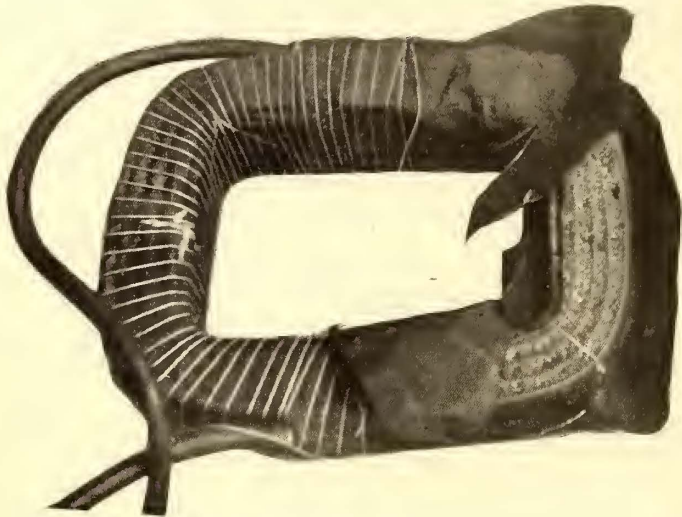
In conclusion, the report states that the wear of joints is less on a single than on double track, because on single-track roads the traffic is equal in both directions, so that the joints wear down more evenly than on double-track lines where the traffic moves in one direction. Single-track cars are more injurious to joints than double-track cars. On up grades the joint wear is less than on down grades or level track. As to the effect of sanding, observations show that if applied while braking, sanding does not tend to extra wear on the rails except in emergency stops, but the use of sand while running acts unfavorably on the rails and joints.

### SINK HOLE CAUSES TROUBLE

The South Bend & Southern Michigan Railway has encountered more trouble at Hickory Creek. The huge culvert which has bridged Hickory Creek has given away and the company has sunk a few more hundreds of dollars in the hole. When the culvert was built the contractor said that it would never hold and was reluctant to build it according to the contract. His judgment has proved good, and the culvert is sinking. It has broken in the center and a gap of 2 ins. is apparent at the tip of the structure, while one of 8 ins. can be seen beneath. The culvert is almost 100 ft. long, and it was thought by the constructing engineers that it would support the fill which would have to be placed over it. The construction gang has run a temporary bridge over it and has been dumping earth on both sides in hopes of causing the earth to settle before they began to fill. The earth has settled under the center of the culvert and the middle of the great piece of work is sinking. The route will be changed to meet this new difficulty, the new one running through a neck of solid ground so that it will be possible to fill over the new culvert. It is said by engineers in charge that the work at Hickory Creek has cost the company \$25,000 more up to the present time than the whole cost originally estimated.

## REPAIR SHOP PRACTICES OF THE MONTREAL STREET RAILWAY

By gradual growth the shops of the Montreal Street Railway Company have come to include a complete car-building plant, an extensive machine shop and foundry in which the company



PARTIALLY COMPLETED FIELD COIL, SHOWING WRAPPINGS, MONTREAL STREET RAILWAY SHOPS

makes most of the supply parts required by the mechanical departments, and a well-equipped repair shop for making repairs to cars, trucks and electrical equipment. The plant as a whole is somewhat larger than is usually found in connection

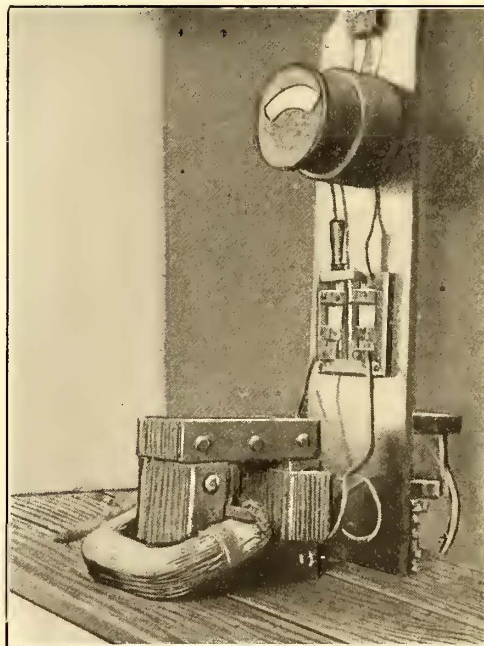
necessary to operate cars for extended periods with several inches of water over the tracks. The necessity for using salt on the track in considerable quantities makes the situation all the harder on electrical equipment. To counteract these conditions, the master mechanic, Nelson Graburn, has been giving special attention to ways and means of fortifying fields and armatures against the excessive moisture, and has developed coils both for fields and armatures that are believed to be as nearly waterproof as human ingenuity can make them. The details may prove interesting to other master mechanics who are contending with similar conditions.

The process of preparing field coils is as follows:

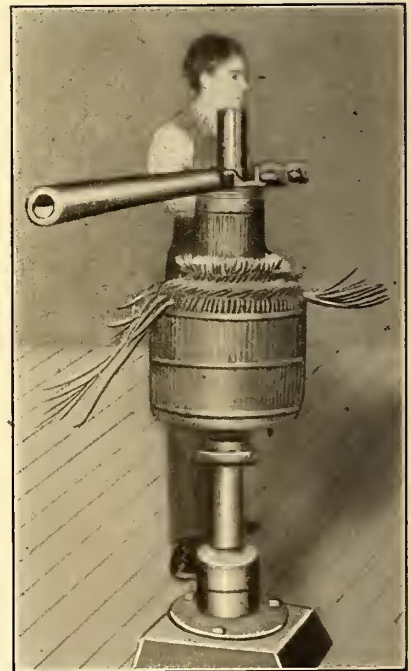
The coils are formed of triple cotton-covered wire, which is wound to form on an ordinary lathe. After the coil is wound, and before any insulating compound is applied, it is placed in an electrically-heated oven and kept in a temperature of 195 degs. F. for 5 hours. While still hot from the oven, the coil is immediately submerged in a tank of armalac compound for 5 hours. It is then taken from the tank, replaced in the oven and baked for about 2½ hours at a temperature of 195 degs. After this baking, the coil is covered with two pieces of 8-oz. canvas duck, the canvas having been previously dipped in compound and baked for 2½ hours. The two layers of duck are cut on a form and are wrapped around the coil, one on the top and one on the bottom, the two layers overlapping each other by about 1¾ ins., so that even if the field is submerged in water to three-quarters of its thickness there is no joint in the canvas wrappings for the moisture to penetrate. The canvas covers are bound in place with asbestos string. After the coil has been wrapped with the compound-soaked duck it is again placed



DIPPING FIELD COILS, MONTREAL STREET RAILWAY SHOPS



TRANSFORMER DEVICE FOR TESTING FIELD COILS, MONTREAL STREET RAILWAY SHOPS



REMOVING COMMUTATOR COLLAR, MONTREAL STREET RAILWAY SHOPS

with roads of similar size in the United States, and this is explained by the fact that owing to its location the company has been thrown more or less upon its own resources in the matter of obtaining supplies, and has therefore gone into the work of manufacturing its own supply parts on a rather extensive scale.

This article deals particularly with some of the practices and devices in the company's repair shop.

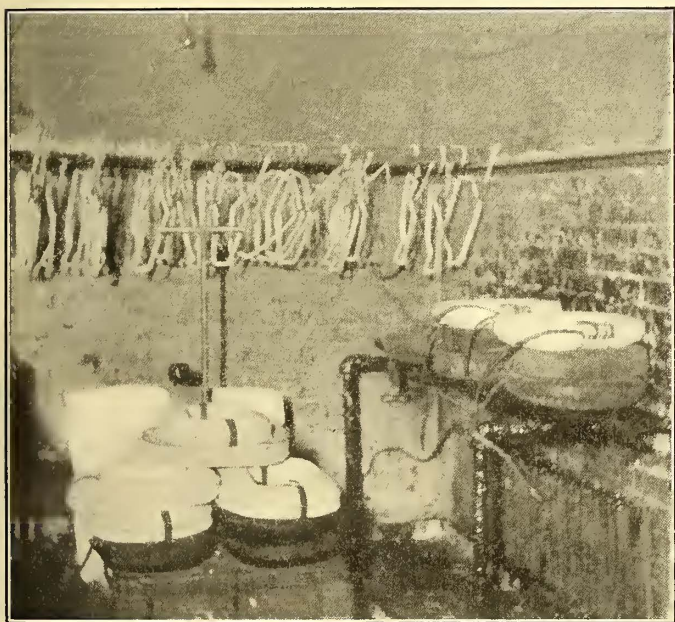
### PREPARATION OF FIELD COILS

The conditions in Montreal are exceedingly severe on motor parts, especially in the spring, when the heavy snow that lies in the streets all winter begins to melt, and oftentimes it is

in the oven and kept at a temperature of 195 degs. for 2½ hours, after which it is immediately submerged in the compound tank for 2 hours, and is then again baked in the oven for 2½ hours at the same temperature. The coil is then returned to the winding room and is reinsulated with coarse linen tape 1 in. wide. After the wrappings of tape have been applied, the coil is sent to the oven for another baking of 2½ hours at 195 degs. and is resubmerged in the compound tank. It is then returned to the winding room for a second braiding of tape, after which it is submerged in compound and finished with a heavy coating of asphaltum paint.

It will be noticed that the process includes more frequent bakings and dippings than are usually considered necessary, but the experience in Montreal has been that each step of this process is fully justified by the greatly increased moisture-resisting qualities obtained in the completed coil. A point worthy of notice is that after repeated experiment and comparison it has been found that conspicuously better results have been obtained by drying out the coil in the oven in each instance before the submersion in the compound, as the coverings of cotton and canvas appear to absorb the compound more thoroughly if the compound is applied while the wrappings are still hot. The repeated heatings also serve to drive out all moisture at each step in the process of manufacturing the coil, so that when the final coat of asphaltum paint is applied there is absolutely no internal moisture between the wrappings of wire or between the individual coats of varnish.

Summed up, it may be said that the successive dippings have the effect of thoroughly impregnating the cotton and canvas coverings with the compound, and the bakings serve not only



INTERIOR ELECTRICALLY HEATED BAKE OVEN, MONTREAL STREET RAILWAY SHOPS

to drive out all moisture but also to harden the different coatings, the process as a whole tending to give a coil that is as nearly a hard homogeneous waterproof mass throughout its entirety as it is possible to obtain. In proof of the efficacy of the process, it may be stated that since its introduction the number of fields sent to the shops for repair has decreased 75 per cent, and in conjunction with the method of treating armature coils has resulted in a reduction of about \$1,000 per month in maintenance of electrical equipment.

At first thought, it might be assumed that the somewhat lengthy process of preparing field coils as outlined would materially increase the cost of manufacturing the coils. As a matter of fact, the actual cost of turning out a completed coil has been considerably reduced. This is explained by the use of cheap cotton tape at 10 cents a yard as a substitute for rubber or other expensive makes of prepared tape which cost from 25 cents to 35 cents a yard. In proof of this reduction, the following statement is taken from the shop records:

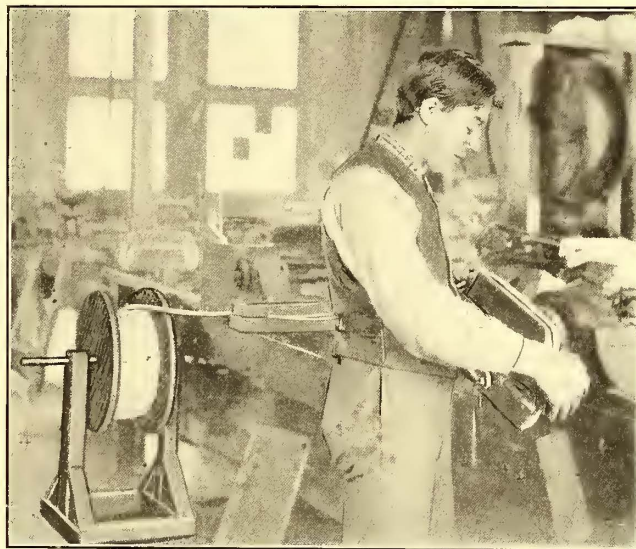
COST OF MATERIAL FOR INSULATING FIELD COIL OF GE 1000 OR GE 67 TYPE BY OLD PROCESS	
2½ lbs. rubber friction tape at 27 cents a pound (about 1 yd. to a pound).....	\$0.68
1-6 gross 1¼-in. cotton tape at \$1.50 a gross.....	.25
½ yd. .005-in. brown paper at 12 cents a pound.....	.06
Total .....	\$0.99

COST OF MATERIAL FOR INSULATING SIMILAR COIL BY NEW PROCESS

1-6 gross 1¼-in. cotton tape at \$1.50 a gross.....	\$0.25
1 yd. 8-oz. canvas duck.....	.10
Half ball twine .....	.05
Total .....	\$0.40

For the two processes, the cost of the wire, compound and labor will be practically the same. It may be that if the successive bakings and dippings are carried out as outlined that the cost of labor will be slightly higher for the new process, but even allowing for any additional labor and other expenses incidental to the new method, a far superior coil can be produced for not to exceed half the cost of the more common process, providing, of course, cotton tape is used in place of rubber.

At a recent test, a field coil prepared according to the new method described was submerged in water containing 5 per cent salt for six weeks, during which time it was subjected to a constant current of 150 amps. at 500 volts, and the coil then measured 4000 ohms on insulation test. It may be stated that the process is applied in the Montreal shops to the manufacture of coils for some eight or ten different types of motors, in-



WINDING ARMATURE COILS, MONTREAL STREET RAILWAY SHOPS

cluding most of the older and modern types of Westinghouse and General Electric apparatus.

TESTING FIELD COILS

When a field coil is received at the shops for repair, it is the practice to first test it to see if it is fit for repair. For making this test, and also for testing completed field coils, a home-made device is used. This consists of a laminated core made in the form of an inverted horseshoe, with a movable laminated section to bridge over the two ends of the shoe. The coil to be tested is placed over one leg of the shoe and the removable laminated section is placed in position, the horseshoe with the adjustable bridge thus forming the primary and the field coil to be tested the secondary of a static transformer. An alternating current at 52 volts (obtained from a 1000-volt lighting circuit through a step-down transformer) is then passed through the device and the condition of the coil is read on an alternating-current ammeter.

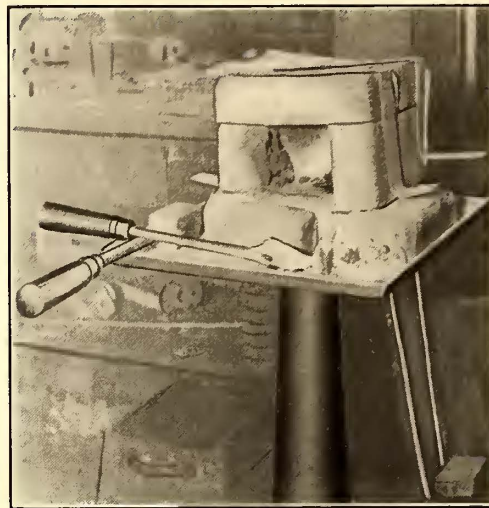
It has been the experience at Montreal that it is uneconomical as well as unsatisfactory to attempt to retape old field-coil wire in the effort to make new coils from old wire. In the first place, it has been found practically impossible to properly clean all the old insulation from the wire, and in the second place it is next to impossible to retape the old wire in a satisfactory manner. Coils that were made a few months ago from

old wire on this road are now coming into the shop with the insulation all through the coil practically ground into dust. When the turns of wire are separated, this old insulation can be easily stripped from the wire with the fingers. Mr. Graburn

consideration the labor item, this works out as follows: Taking the cost of new cotton-covered wire at 19 cents per pound, and allowing 54 lbs. to a coil, the cost of material for forming a coil from new wire will be \$10.26. Taking the scrap value of copper wire at 16½ cents, the value of the copper in an old coil will be \$8.91, but in comparing the two processes, it is necessary to add to this latter figure the cost of 4 lbs. of tape at 90 cents a pound, or \$3.60, making a total of \$12.51 as the value of material in a coil formed from old wire. This gives a balance of \$2.25 on material alone in favor of scrapping the old coils and buying new covered wire for making new coils. Of course, this calculation hinges entirely on the relative values of copper wire when new and as scrap.



TRANSFORMER FOR TESTING ARMATURES, MONTREAL STREET RAILWAY SHOPS



HANDY AIR-GAS FURNACE, MONTREAL STREET RAILWAY SHOPS

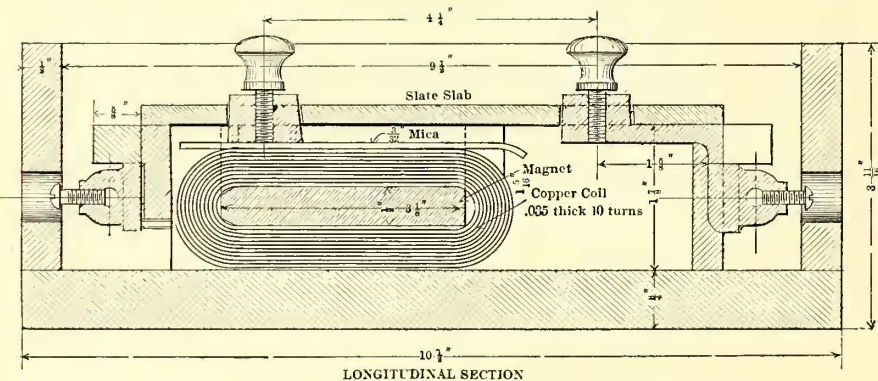
draws the conclusion that tape cannot be applied to the old wire with any degree of success.

Moreover, aside from the quality of the coil after it is finished, it is held that at the Montreal shops at least it costs

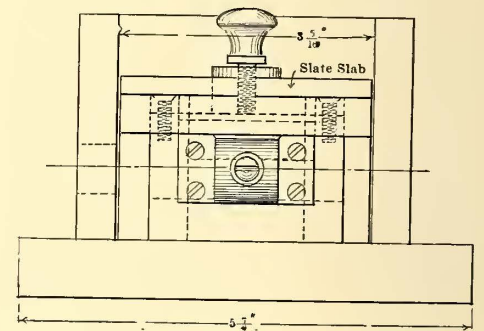
follows: The coils are formed of triple-covered cotton wire on forms in the usual manner. After the coil is formed, it is baked in the oven at a temperature of 195 degs. F., and while hot is submerged in armalac for 2 hours, after which it is returned

ARMATURE COILS

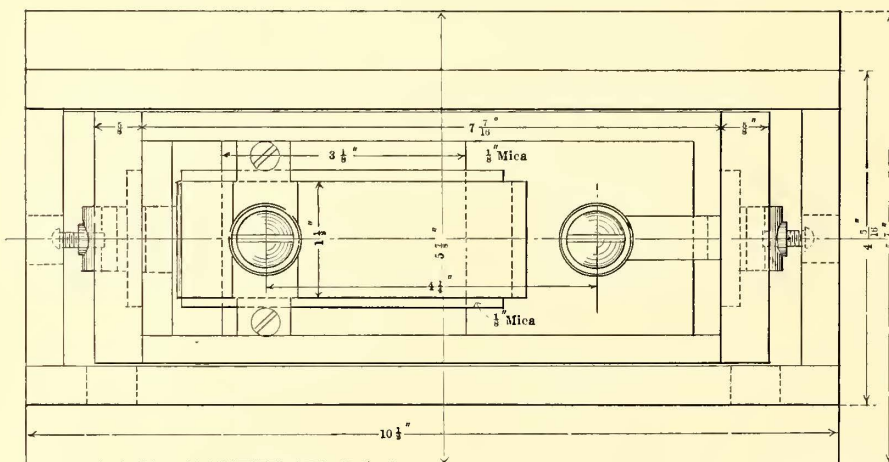
The process followed in winding coils for armatures is as



LONGITUDINAL SECTION



END ELEVATION With End of Box Removed



PLAN With Slate Removed

DETAILS OF FUSE BOX, MONTREAL STREET RAILWAY

to the oven and baked for 2 hours longer at the same temperature. The coil is then given one wrapping of "linotape" and an outside covering of cotton tape, and the process of baking for 5 hours, submerging in the compound for 2 hours, and baking again for 2 hours is repeated. The use of rubber tape in making armature coils has been entirely abandoned.

TESTING ARMATURES

For determining the electrical condition of armatures, both before and after they are repaired, a simple home-made transformer is used. As will be observed from one of the illustrations, this consists of a laminated frame built in the shape of a right angle, this form making it convenient to receive the armature. By means of detachable flexible leads, the transformer is used in conjunction

COMMUTATORS

with the same ammeter that is employed for testing field coils, as previously described.

The company is now making all of its own commutators from rolled bar copper, and Mr. Graburn states it has been his

more to make a field coil from wire that has been previously used than it does to buy new wire throughout. In support of this it is pointed out that the present scrap value of copper is about 16½ cents per pound, and new cotton-covered wire can be purchased for 19 cents per pound. Leaving out of con-

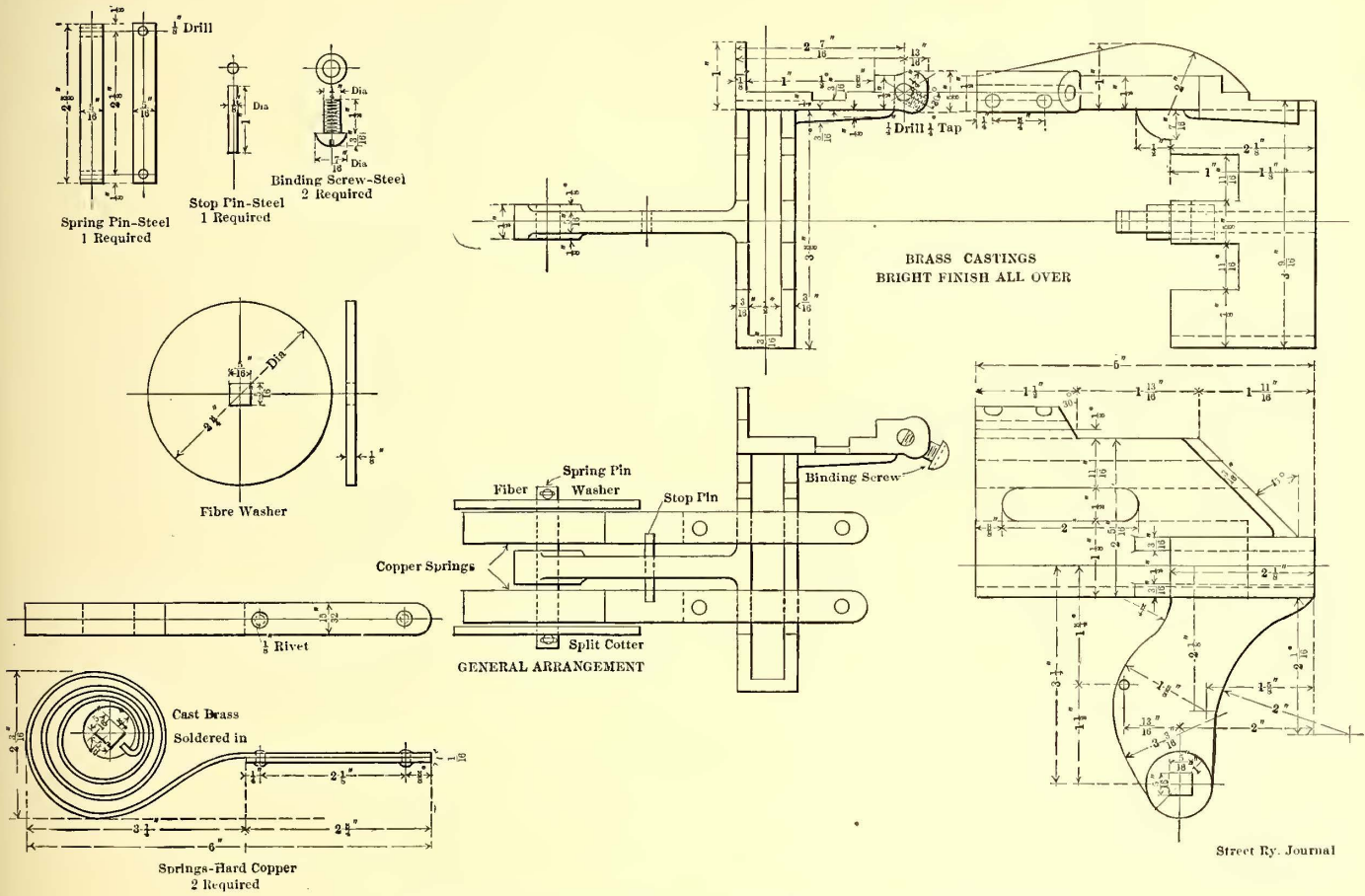
experience that a rolled commutator bar is fully 30 per cent tougher than a drop-forged bar, and the life is proportionately greater. The copper is purchased in long bars and is sawed to proper lengths. These pieces are then formed into commutators by means of adjustable rings with the mica separators in place. The partly finished commutator is then sent to a lathe and the notches are machined out to fit the commutator body.

There is in use in these shops a special device for making quick repairs to commutators that come in from service with defective bars. This consists of an iron standard bolted to the floor and having a recess to receive the end of an armature shaft. The armature shaft with armature, commutator and pinion in place is stood on end in the recess and is keyed in place so that it cannot revolve. By means of a heavy two-handed wrench, with handles about 8 ft. long, the commutator ring is then screwed off, thereby loosening the commutator so

work. As will be seen from the engraving on the preceding page, this consists of a small retort built up of loosely laid fire-brick, the whole resting upon a cast-iron pedestal. An ordinary combined gas and air-blow torch is mounted at the rear of the retort and furnishes a quick intense heat for a variety of uses.

CONTROLLERS

Like other roads, the Montreal Street Railway has had its share of controller troubles, but has now succeeded in practically eliminating the expense of burnt out controllers by the generous use of asbestos lumber inside the controller case. A deflecting shield of asbestos  $\frac{1}{4}$  in. thick is fitted between the main and reverse cylinder to prevent arcing over. The separators between the fingers are also made of asbestos lumber in place of the fibre formerly used. An important improvement has been made by lining the cover and the back of the controller case with  $\frac{1}{4}$ -in. asbestos lumber, and this lining has



PARTS OF MOTOR BRUSH HOLDER, MONTREAL STREET RAILWAY

that one of the mica separators or a low bar or a short-circuited bar can be renewed without disconnecting the other commutator connections from the armature. Before the commutator ring is screwed off, a ring made of wire is slipped down over the commutator and turned up tight so that the commutator bars cannot separate from the core. By making a sharp bend in this wire ring, the defective bar or mica segment can be drawn out and replaced without disturbing the other bars or segments. When the defective section has been repaired, the commutator ring is again screwed on by means of the long wrench and the armature is sent to the lathe for turning down the commutator. This device, which is illustrated on page 144, gives facilities for repairing defective commutators without going to the expense of removing the entire commutator or the armature from the shaft.

AIR-GAS FURNACE

A convenient appliance in these shops is an inexpensive air-gas furnace for heating soldering tools and for other small

effectually eliminated trouble caused by arcs jumping from the cylinder to the controller case. One of the photographs reproduced on the following page serves to illustrate the difference between an unlined and a lined controller case. The case shown at the right hand of the picture represents the typical condition in which a controller comes to the shops after a blow-out. Not only has the asbestos lining cut down the expense of repairing controllers, but it has also practically eliminated accident claims for damages caused by flames from arcs burning holes in the controller cases and injuring passengers and property. The use of asbestos in this connection is also extended to the reversing cylinder, and the cylinder is made entirely of asbestos lumber. The reversing contacts are imbedded in asbestos, and there is also a deflecting shield of the same material on the top and bottom to prevent the arc from jumping to the frame in cases when the motorman attempts to reverse his motors. The company punches all its own controller parts from flat copper bars.

FUSE BOX

The fuse box used by the company is shown in drawings on page 146. The feature of the box is in the increased distance between the terminals. The style of box formerly used had only a 2-in. space between the terminals, and a considerable number of boxes were destroyed by reason of arcs jumping across the terminals. With the increased air space this trouble is now avoided. Since the drawing of the fuse box reproduced herewith was made, the company has tried, with good results, the experiment of substituting asbestos lumber for the slate slab on top of the box, and all fuse boxes are now made with asbestos tops.

BABBITT BEARINGS

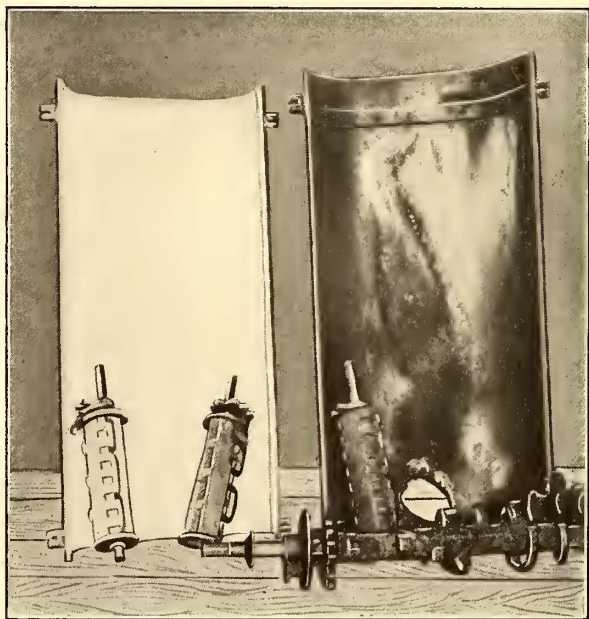
In motor bearings the company is using babbitt made from the German Navy formula, as follows:

	Per Cent.
Tin .....	16
Copper .....	5
Zinc .....	79
Antimony .....	..
Lead .....	..
	—
	100

This is the formula used by the German Navy in engine and gun bearings. With the composition, the Montreal Street Railway Company is getting from 60,000 miles to 70,000 miles out of armature bearings.

NOVEL BRUSH HOLDER

The company has formerly had considerable trouble with motor brush holders. To remedy the defects, and also to secure



CONTROLLER CASE LINED WITH ASBESTOS, AND UNLINED CASE, SHOWING EFFECTS OF BLOW-OUT, MONTREAL STREET RAILWAY SHOPS

a holder that would give better facilities for replacing the carbon brushes, Mr. Dubie, foreman of the machine shop, devised the holder illustrated on the preceding page. In this device the carbons are mounted in grooves and are held against the commutator by two spiral springs made of phosphor bronze strips, the ends of which press against the tops of the carbons and exert a constant and even downward pressure. On the outside of each spiral is a fibre washer, designed to prevent short-circuits between the brush holders and the motor frame.

A feature of the device is the rapidity with which the carbon brushes can be examined and renewed when worn out. By merely lifting the end of the spring with one finger, the carbon is exposed and can be readily lifted from its groove. If it is desired to hold the ends of the springs back away from the

carbons for any length of time, as during inspection or when renewing brushes, the ends of the springs can be made to engage small stop pins which are attached to the shank of the holder, as may be understood by reference to the drawing. This type of brush holder is adaptable to GE 67, GE 1000 and GE 800 motors.

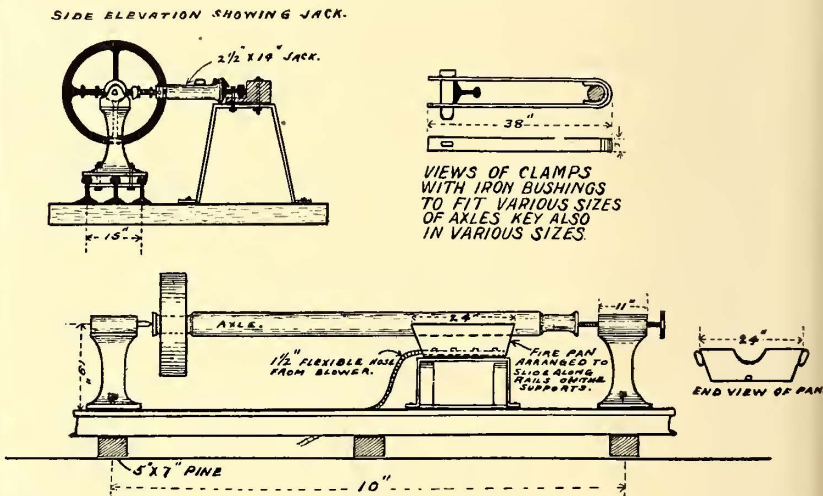
STRAIGHTENING BENT AXLES AT ROCKFORD, ILL.

What seems to be a very handy and practical device for straightening steel and iron axles has been constructed by the Rockford & Interurban Railway Company, of Rockford, Ill. It consists principally of an ordinary 2½-in. x 14-in. screw jack arranged to slide horizontally, by means of a large hook, along a 12-ft. section of 70-lb. T-rail laid flatwise on two supports of ½-in. x 3-in. bar iron or steel. The axle is held in place parallel to the rail and at the same height by two lathe heads which are securely fastened to three 12-ft. sections of rail set upright. Then by pressure of the jack against the bent portion, the axle is straightened.

For the purpose of truing the axle, a two-piece wooden pulley is fastened to the journal (which with leather bushings is adapted to the various sizes of journals), and by throwing on the belt connecting the regular shop shaft, the axle is revolved and chalked at the proper point.

To resist the pressure of the jack, suitable and adjustable clamps of ½-in. x 3-in. bar iron or steel are placed each side of the bent portion and secured to the rail with various sizes of keys in a slot. By the use of various sizes of metal bushings the clamps are adjustable to any size axle or portion of the axle.

For hammered iron axles the part to be straightened is heated to a red-hot degree by means of a coke fire made in a pan about



WORKING DRAWING, SHOWING CONSTRUCTION DETAILS OF MACHINE FOR STRAIGHTENING BENT AXLES

2 ft. square, which is movable and arranged to slide on the support of ½-in. x 3-in. material along the rails supporting the lathe heads. A 12-in. blower supplies the necessary draft through a 1½-in. flexible pipe which is attached to the fire pan at one end, and the air is admitted to the fire at the bottom of the pan through small apertures at equal distances of about 3 ins. Coke is used to prevent smoke in the shops.

Acknowledgment is due for this information to Samuel De-Camp, master mechanic, who designed this device.

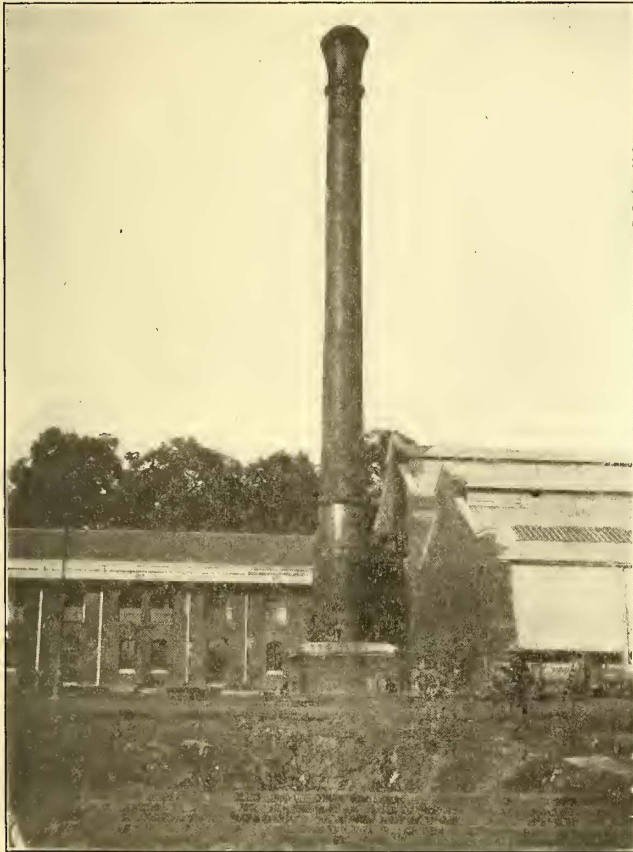
With the beginning of the new year the Jackson & Battle Creek Traction Company began running through freight cars from Kalamazoo to Jackson. Heretofore all merchandise had to be transferred at Battle Creek.



**ELECTRIC TRAMWAYS IN SINGAPORE**

With the exception perhaps of the thriving tramway enterprise in Calcutta, described in the *STREET RAILWAY JOURNAL* for April 29, 1905, the newly-equipped electric tramways in Singapore may safely be said to be the largest and most up-to-date system east of Suez.

The buildings in Singapore, like those of other places in the Far East, range from substantial brick and stone structures to the rudely made huts of the native Malays. From the illustrations shown herewith it will be seen that the streets are for the most part broad, straight and level, thus being admirably adapted for electric tramways. The total population is ap-



EXTERIOR OF STATION, SHOWING STACK

proximately 250,000, which, besides Europeans, includes Eurasians, Chinese, Malays, Indians, Japanese and many other nations and races.

The climate of Singapore is tropical; the town being almost on the equator, there is very little variation in temperature all the year round. The effect of this on the vegetation is most marked. Palms, cacti, fruits and flowers flourish in abundance, and except where clearings have been made for building or agricultural purposes, dense jungles are still in existence, affording as safe a home for their denizens as do the jungles of adjacent Burmah.

The city of Singapore (or Sincapore) was founded in 1819 by Sir Stamford Raffles, and it is owing to his sagacity that the happy choice of Singapore was made as the site of the present flourishing commercial emporium for British trade in the East Indies. In 1824 the British Government by treaty purchased from the then resident officer or chief, called the "tumangong," for 60,000 Spanish dollars (£13,500) and a life annuity to the Sultan of Johore and his resident officer of 24,000 dollars (£5,400), the sovereignty and fee simple of the island, as well as all the seas, straits and islands to the extent of 10 geographical miles around. In 1830 it was made the capital of the Straits Settlement, superseding Penang, and to-day it is undoubtedly the most important trading center in the

southeast of Asia. Its geographical position, combined with its splendid harbor, adds to its further importance as a port of call for steamship lines trading between Europe and the Far East.

The construction of the tramways was authorized by an ordinance passed by the Legislative Council of the Straits Settlements in 1902. The promoters of the scheme were the Association General, Ltd., London, and the East India Construction Syndicate, Ltd., London, which was formed for the purpose of carrying out the construction of the tramways. The consulting engineers to the company are Alfred Dickinson & Company, of Birmingham and London, who prepared all the detailed plans and specifications and superintended the carrying out of the work. The contractors for the whole of the work, which included the construction of a bridge over the Kalang River, were Dick, Kerr & Company, Ltd., of London and Preston. The work was commenced in July, 1903, and the first section of the line was opened for traffic in July, 1905.

The total length of the tramways is 16 miles of route, the length of the single track being about 26½ miles. The track is



TYPICAL STREET VIEW, SHOWING ATTACHMENT OF SPAN WIRES TO HOUSES

laid to a gage of 1 m, with rails of the girder type, weighing 95 lbs. per yard. The rail-joints are welded by the "thermit" process, so that the track forms one continuous length. During the initiation of the scheme considerable discussion took place as to the advisability of having welded joints, the question at issue being, of course, the variation in the temperature. It was finally decided, however, that this difficulty was of too slight a nature to affect the joints after having been securely welded together by this special process. In addition to the thermit joint, a single No. 000000 S. W. G. copper bond is supplied at every joint, thus insuring perfect electrical conductivity.

The roadbed throughout is of a very substantial construction. The rails are laid on a longitudinal concrete stringer 8 ins. deep x 18 ins. in width. The flange of the rails is embedded in the concrete to a depth of 2 ins., and consequently

there is a solid bed of concrete 6 ins. deep under the flange of the rails. The gage of the track is maintained in the usual manner—that is, tie-bars are spaced 8 ft. apart throughout. After the rails and concrete foundation were laid, the road surface up to the rail level was filled in with macadam, and was rolled and consolidated in the usual way.

The lines in the center of the city and those running to the docks are for the most part double-track, center-pole construction, while the two routes leading north and northeast along the Serangoon and Gelang Roads, respectively, are single lines with passing places, and are equipped with side-pole construction.

The overhead construction consists principally of side and center-pole construction, and also some 2 miles of span wire construction. The poles are of mild steel, 28 ft. 3 ins. in length, 7 ins. in diameter at the base, tapering to 4 ins. in diameter at

on the poles in cast-iron boxes and are connected directly to the trolley wire.

The feeder cables were supplied by Callander's Cable & Construction Company, and were laid by that company on its solid bitumen system. The system of feeders has been arranged with due regard to future requirements, as it is generally anticipated that within the near future the traffic will rapidly increase, both as regards passengers and the conveyance of light freight.

The power station and car house occupy a most desirable position near the Rochore Canal, from which water is obtained for condensing purposes. The depot buildings comprise the engine room and basement, boiler house, car house, machine shop, carpenters' shop, paint shop, smithy, offices of the general manager and his staff, and the usual out buildings.

The engine room is 190 ft. long x 48 ft. 9 ins. in width, and



VIEWS ON THE SINGAPORE RAILWAY

the top. They are set 6 ft. in the ground, and are embedded in a solid block of concrete, each pole being provided with an ornamental cast-iron base. On the center poles, the lengths of arms are 2 ft., while those on the side poles vary in length according to the distance from the pole to the track.

The trolley wires, which are not necessarily over the center of the track, the possible variation being about 10 ft., are divided into  $\frac{1}{2}$ -mile sections by means of section insulators. At each of these points the main feeder cables are tapped and current is conveyed to the trolley wires by means of  $\frac{37}{16}$  rubber-covered cables, which are carried up the inside of the poles and along the side of the bracket arms. Five hundred volts are used on the trolley wires. A lightning arrester is provided in each section pillar, as is also a telephone giving direct communication with the power house; and to guard against the tropical storms which are so prevalent in Singapore, the overhead system is additionally protected by heavy lightning arresters at every  $\frac{1}{2}$  mile of wire. These are fixed

contains two railway 500-kw sets, one steam lighting set, one motor-generator lighting set and the necessary switch gear.

The boiler house contains eight Lancashire boilers, arranged in two batteries of four boilers each. Each boiler is capable of evaporating 6000 lbs. of water per hour, with a working pressure of 175 lbs. per square inch. Feed-water is supplied to the boilers by four feed-pumps (two to each battery); these are of the duplex compound non-condensing type, taking water either from the hot well or storage tank. There are two Green's economizers, each containing 228 tubes, one being situated at either end of the boiler house.

The main traction engines, of which there are two in number, were built by Yates & Thom, of Blackburn, and are of their well-known horizontal cross-compound condensing type, running at 100 r. p. m., and are each capable of giving a maximum output of 927 B.H.P. per minute, with a steam pressure of 165 lbs. per square inch at the cylinders. Each engine is provided with a Worthington surface condenser, but may be worked

either condensing or non-condensing. In order to leave the engine room as free and open as possible, it has been arranged so that the condensers are fixed to the basement constructed below, as are also all the steam pipes and other usual accessories.

The generators were built by Dick, Kerr & Company, and



VIEW IN SOUTH BRIDGE ROAD

The car shed is 212 ft. in length x 138 ft. in width, and is built to accommodate eighty-four cars. Inspection pits run the entire length of each track, with the exception of the curves at the entrance to the shed.

The rolling stock consists of fifty passenger cars, three double-truck motor freight cars, fifteen single-truck freight cars and fifteen four-wheel wagons. The passenger cars are



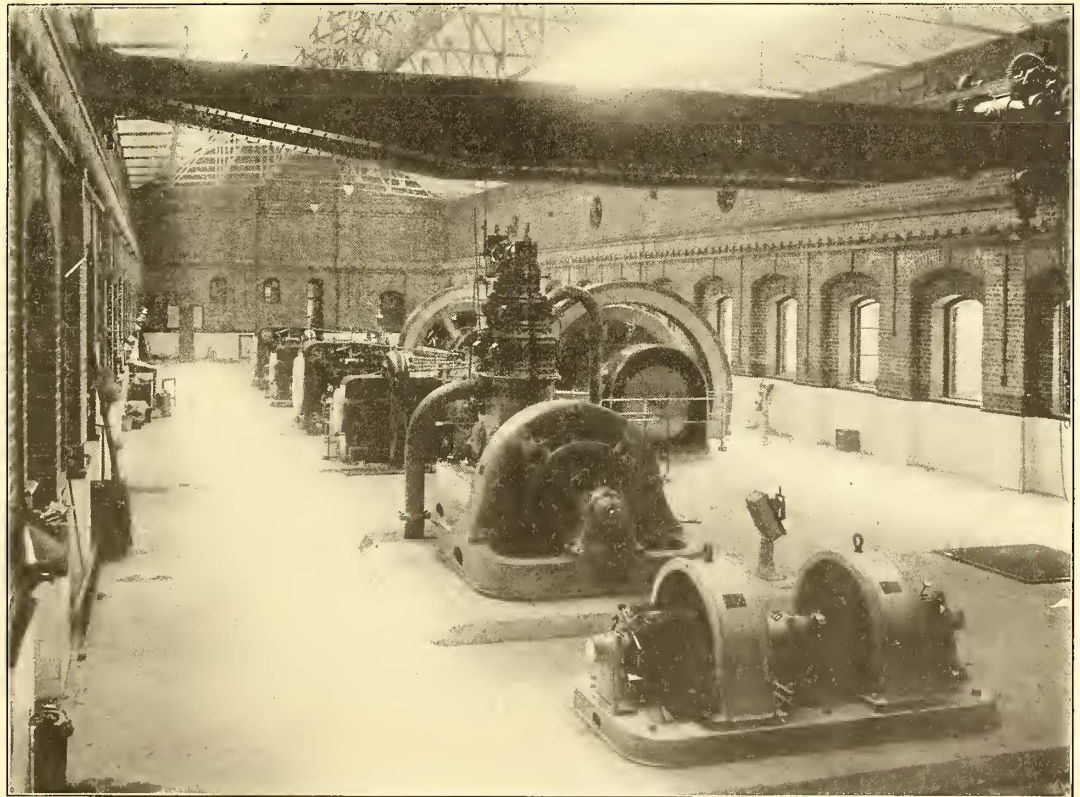
HAULING TIES

are of their continuous-current multipolar type, compound wound. Each machine is designed to give an output of 500 kw with a pressure of 550 volts when running at a speed of 100 r. p. m. The lighting sets are for lighting the city and depot by means of incandescent and arc lamps, and consist of one 150-kw Dick-Kerr generator, running at a speed of 350 r. p. m. to 400 r. p. m., designed for use either as a compound or shunt machine, and coupled to a Willans triple-expansion condensing engine with extension base; also a 50-kw Dick-Kerr motor-generator set, shunt wound, designed to give a normal output of 100 amps. at 500 volts, and a maximum of 115 amps. at 550 volts, and two balancers of the same firm's make, for use in conjunction with the above lighting dynamos, for 500-volt pressure.

The switchboard was built by the contractors, and is composed of fifteen panels, each supported independently on an iron frame. The board consists of a main station panel, two generator panels, five feeder panels, one Board of Trade panel, and six other panels for lighting, etc.

The stack, which is of steel, is 135 ft. in height and 7 ft. internal diameter, and is a notable landmark for many miles around. The base is built in a substantial manner, and is finished square on the outside, massive stone blocks being provided at the top of base to form the foundation for the circular part of the chimney.

divided into two distinct types; thirty are of the single-deck, single-truck, open type to seat thirty-two passengers, and twenty are of the single-deck, single-truck combination type to seat forty passengers. The rolling stock was built by the United Electric Car Company, of Preston. The car bodies are



INTERIOR OF POWER STATION

mounted on Brill 21-E trucks, and each are equipped with two D.K. 25-b motors. The controllers are of the Dick-Kerr DB-1, form C, metallic shield blow-out pattern. The cars are fitted with Hudson & Bowring lifeguards.

The three double-truck freight cars are each mounted on

Brill 27-G trucks, with four D.K. 25-b motors. They are intended for use of a double purpose, that of conveying freight and hauling freight cars. The general arrangement of the body is such as to provide a self-contained car with divided sliding doors on each side, which may be securely locked up, and a vestibule canopy at each end as the platform for the drivers. The fifteen single-truck freight cars are equipped in a similar manner to the passenger cars. They are 12 ft. in length and 6 ft. 6 ins. in width. These cars are for general use for the conveyance of various classes of goods up to 6 tons in weight. The frame is made of mild steel channels, stayed by longitudinal and cross stays, knees and gusset plates. The side of each car is provided with strong hinges. To protect the goods from the weather, each car is supplied with a detachable light angle-iron frame, upon which a tarpaulin is spread the full length of the car at a height of 7 ft. from the floor.

## A NOTE ON THE ELECTRIFICATION OF TRUNK LINE RAILWAYS

BY H. WARD LEONARD

For many years past, the writer has been asserting the correctness of the following propositions:

(1) The comprehensive electrification of existing trunk line railways will begin as soon as the managers of such railways are convinced that the cost per ton-mile can be reduced thereby, and not until then.

(2) The cost per ton-mile is principally dependent upon the amount of power efficiently applied to a freight train.

(3) It is impossible materially to increase the average power of the steam locomotive above that represented by the best modern locomotives, and it is impracticable efficiently to operate under multiple control a plurality of steam locomotives hauling a train.

(4) It is readily and economically possible to apply any desired power to a train by means of electric locomotives and the methods of control available to-day.

(5) The replacement of steam locomotives by electric locomotives is a paying proposition to-day, upon a large percentage of our trunk line railways, and will begin as soon as railway managers appreciate what can be accomplished by the best inventions, electrical engineering and apparatus available to-day.

There are, as yet, but few reliable data bearing upon the cost per ton-mile and the relationship of train power thereto. The first comprehensive statistics as to the locomotives in the United States were published in 1903, in the Railway Statistics of the Interstate Commerce Commission, for the year ending June 30, 1902. Since then, similar statistics for the two years ending, respectively, June 30, 1903, and June 30, 1904, have been published, so that now the statistics of three years are comparable.

The following facts are significant: (The figures are stated in round numbers.)

The duty of the average United States locomotive in 1894 was 4,000,000 ton-miles, and in 1904 it was 6.5 millions. The duty of the average freight locomotive on the Pennsylvania Railroad system is over 9,000,000 ton-miles; in the case of the Union Pacific Railroad, it is between 8,000,000 and 9,000,000.

The average weight on drivers for all United States locomotives has been increasing year by year, and in 1904 was 50 tons. The average weight on drivers of the Union Pacific locomotives for 1904 was 60 tons. The average weight on drivers of the new locomotive put in service by the Union Pacific in 1904 was 78 tons. The new locomotives added by the Southern Pacific in 1904 averaged 83 tons on drivers.

During the past seven years the average trainload of Union Pacific trains has been increased 74 per cent.

While it is not necessarily true that the power is proportionate to the weight on drivers, or to the trainload, unless the speed is maintained constant, the statistics as to the weight on drivers and trainloads are the best ones reported, from which an approximate idea of the power can be obtained.

Another close indication of the power is to be found in the heating surface of the locomotives. Statistics as to the average heating surface of all United States locomotives are now available for the three years ending June 30, 1902, 1903 and 1904, and the average square feet of heating surface per locomotive is 1562, 1659 and 1748, respectively. The average trainload for all United States railways was, in 1894, 180 tons; in 1904 it was 308 tons. The Great Northern trainload was 522 tons in 1904 and the Union Pacific trainload was 507 tons in 1904. It is well known that the railways named are leaders as regards progressive and economical management, and the fact stands out conspicuously that they have an extraordinarily high train power and are making every effort to increase the train power by replacing their old locomotives with those of the highest power practicable.

The average age of the locomotives in service in the Southern Pacific was, in 1904, thirteen years, and the maintenance charge per annum was \$3,500 per locomotive, which are fairly representative figures. Although statistics of this nature are not available as to electric locomotives, it seems altogether likely that the life of electric locomotives will be very much longer and the maintenance charge but a fraction of that of the modern steam locomotive.

The cost of electrification of steam railways will, of course, vary considerably, but it is probable that with the best systems of electrification the average cost will not exceed \$60 per horse-power in the locomotive.

One horse-power in the locomotive produces an output of about 13,000 ton-miles per annum on the existing railways.

Based upon the average revenue per ton-mile in the United States, the earning power of the average United States locomotive is about \$100 per horse-power per annum. The total railway capital at present employed in the United States railways is about \$600 per horse-power. The electrification of an average existing railway means an increase of its total capital of about 10 per cent, to provide the same total horse-power as it now uses. If it be assumed that the ton-miles per annum on United States railways will increase, in the future, at the same rate as during the past ten years, and that the railways will be comprehensively electrified by 1925, it is estimated by the writer that not less than \$1,200,000,000 of electrical apparatus will be required for this purpose alone during the next twenty years.

When the construction of a new trunk line railway is considered, there is an enormous advantage in favor of electric traction over steam traction which is not properly appreciated. This is due to an inherent defect of the steam locomotive in that its horse-power when hauling a certain train, falls off rapidly as the grade is increased. Also, simultaneously, the cost per horse-power-hour rapidly increases. While these facts are well known, their economic significance in the cost of construction and operation of a railway is not generally appreciated. It is probably true that the largest individual expenditures in the construction of a new railway, located with the highest skill, can be directly traced to this inherent defect of the steam locomotive. Enormous expenditures of capital are made in railway construction in order to escape the inefficiency of operation which would result from operating the steam locomotive on grades heavier than a certain limiting grade.

Given a locomotive whose horse-power is constant over the range of speed and tractive effort desired in practice, and whose cost per horse-power-hour is constant, independent of the variable tractive effort required in practice and a new

economic theory of railway location immediately presents itself, with possible savings of capital expenditure in the construction of the railway which will very materially reduce the total capital needed. Such a locomotive is available to-day in the type of electric locomotive in which a voltage control of the speed is employed, and in which, as a consequence, the total horse-power and the cost per horse-power-hour can be maintained constant over the range of tractive effort desired in practice.

Other features of important superiority possessed by the electric locomotive are its ability to develop, for an hour or so, a greatly increased power; also its ability to regenerate useful energy in going down grades and for breaking generally.

It is altogether likely that if two new railways were located, for the same duty, across a mountainous region, between the same terminal points, by two routes, one being the best location for steam traction and the other the best location for electric traction, it would be found that the first cost of the complete railway located for electric operation would be very materially less than the first cost of the equivalent railway located for steam traction; and the cost of operation would also be materially in favor of the electric railway.

An engineering project of such vast importance as that presented by the comprehensive electrification of a trunk line railway can only be properly dealt with by a commission composed of the ablest engineers of the world, selected from various countries. The Niagara Commission was of this type, and the perfection of its work, from an engineering standpoint, reflects the highest credit upon it and also upon the management which appreciated the impossibility of getting the best result by relying upon manufacturers of electrical apparatus or engineers from any one country. As soon as a similar international commission of the ablest engineers available considers and decides as to the advisability of electrifying one of our leading railways, the superiority of electric traction over steam traction will be promptly demonstrated.

Meantime, railway managers must content themselves with hopes as to the "systems" of the two rival manufacturers who dominate the railway field in this country, and whose interests are pooled as to patents in such a way as to effectually stifle inventions and electrical engineering in the railway field other than such as they control.

## CORRESPONDENCE

### THE ROADMASTER SYSTEM IN TAMPA

TAMPA ELECTRIC COMPANY

Tampa, Fla., Jan. 11, 1906.

EDITORS STREET RAILWAY JOURNAL:

We have been very much interested in the article headed "The Roadmaster System in Toronto," page 141, in your issue for Dec. 30, 1905. This explains the plan of the Toronto Railway Company of appointing what are called "roadmasters" from regular motormen on each division of its lines, giving these motormen regular salaries and assigning to them the special duty of looking after the proper operation of its various divisions. You will perhaps be interested to know, and so will the Toronto Railway Company, that a little over two years ago we planned out here for our little road a very much similar scheme. It was our own idea, and it has worked out very nicely.

We operate nineteen regular cars and from three to seven extra cars during the crowded parts of the day and on crowded days. We have five divisions, the largest operating five regular cars and the smallest two. A little over a year ago we appointed five of our best conductors and five of our best motormen

to what we have termed "division conductors" and "division motormen." They were given gilt badges, on which was printed their title, and small gilt stars, which were sewed on their sleeves.

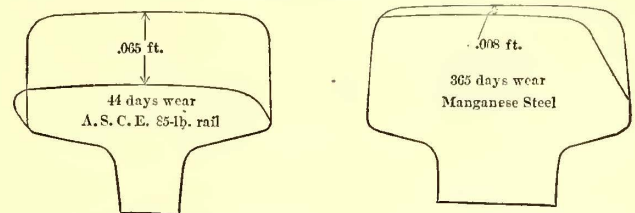
These men receive a regular salary, which is about \$5 per month more than our regular third-year men. They report to us any inattention to duty of the other men, and we look to them especially to maintain schedule and proper discipline of the other men on their various divisions. If an extra inspector is required for a short time, we pick a man from among these division men, and would also appoint an inspector from among these men should it become necessary. With very little more cost, we have helped our organization very much, have encouraged the other men to pay strict attention to duty in order to try to obtain one of these positions, and we have ten men upon whom we could rely in case of any trouble among our employees. There was one plan mentioned in your article that we had not thought of—that is, to allow a division motorman to change from one car to another with other motormen, but we think very favorably of this idea and will try it with one or two of our men.

Besides the superintendent, who operates the cars and has charge of the shops, we have one inspector in uniform, and they, together with our division men, make our organization very complete. We, of course, continue to have our troubles in maintaining discipline, and a portion of our force is continually being renewed, but these division men are a great assistance to us.

GEORGE W. WELLS, Manager.

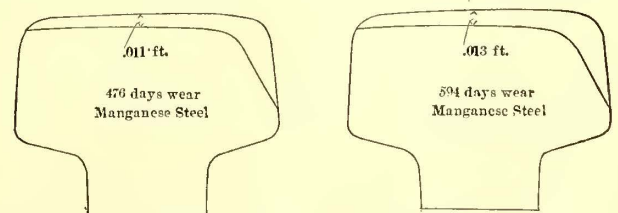
### CURVE WEAR ON THE BOSTON ELEVATED

Statistics have been published from time to time in this paper in regard to the wear on the curved rails in the subway and on the elevated structure of the Boston Elevated Railway Company. As will be remembered, the distance from Dudley Street to Sullivan Square is  $6\frac{1}{2}$  miles, and the total mileage,



FIGS. 1 AND 2.—SHOWING CHANGES OF ORDINARY 85-LB. RAIL AFTER 44 DAYS, AND MANGANESE STEEL AFTER 365 DAYS

including sidings, is 16.015 miles. Over 40 per cent of this distance consists of curves with radii varying from 82 ft. to 5000 ft. Very few of these curves have large radii, and there are eighteen curves of less than 100 ft., and sixteen others

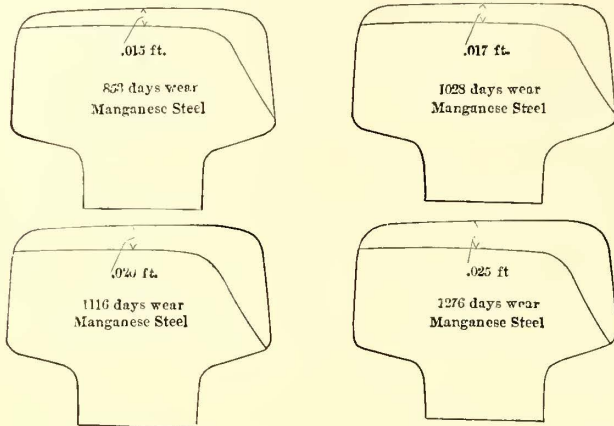


FIGS. 3 AND 4.—SHOWING CHANGES IN MANGANESE STEEL RAILS AFTER PERIODS OF 476 DAYS AND 594 DAYS, RESPECTIVELY

with less than 150-ft. radii. On the entire division the total curvature is 13.4 circles.

One of the points of most severe wear is on the outer south half of the reverse curve entering Park Street station, south bound, where the radius is 82 ft. At first, ordinary commercial rails were laid on this curve, and the wear in forty-four

days is given in Fig. 1, which shows a section of an 85-lb. rail laid March 13, 1902, and removed April 26, 1902. After considerable experimenting with nickel steel and other steel, a manganese steel rail was laid at this point April 26, 1902, and the accompanying sections show the wear of this rail at different intervals during that time up to Oct. 23, 1905, when the



FIGS. 5, 6, 7 AND 8.—SHOWING GRADUAL WEAR OF MANGANESE STEEL RAILS FOR PERIODS RANGING FROM 853 DAYS TO 1276 DAYS

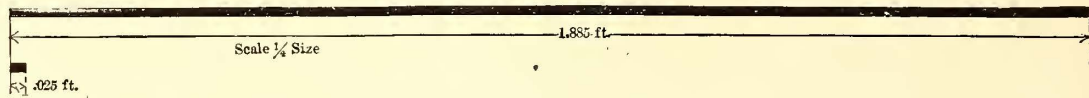


FIG. 9.—DIAGRAM SHOWING RELATIVE WEAR OF MANGANESE AND ORDINARY STEEL RAILS UNDER THE BOSTON CURVE CONDITIONS

rail was removed. Manganese rails are being used at other points of severe wear on the subway and are giving good satisfaction, and from all appearance are good for a long period of service.

### DISCUSSION ON SUB-STATIONS AT THE A. I. E. E. MEETING IN CHICAGO

A very profitable discussion of the papers, "The Relation of Railway Sub-Station Design to Its Operation," by Sydney W. Ashe, and "Some Considerations Determining the Location of Electric Railway Sub-Stations," by C. W. Ricker, occurred at the January meeting of the Chicago branch of the American Institute of Electrical Engineers, held Jan. 16. These papers were previously read and discussed at the New York meeting of the Institute. At the Chicago meeting, the papers were briefly abstracted by Prof. Woodworth.

George A. Damon, when called upon to open the discussion, said that Mr. Ricker's paper referred to the Kelvin law for proportioning conductors. He had never encountered a problem where he had been able to use this law. On one occasion, when laying out a sub-station and distributing system for a large city, he had thought the law could be applied, but found on further consideration that the location and the distribution of the loads determined at once certain critical points for the location of sub-stations without entering into any deep calculations. Mr. Damon added that the practice of tying together the d. c. sides of a system fed by several sub-stations reduced the necessity of carrying reserve capacity in each station, as in case of a break-down the section fed by the station out of service could obtain current from the surrounding stations over tie lines.

Peter Junkersfeld thought protective devices were not well standardized. Different theories existed, and there was room for much improvement in the protection of sub-station apparatus. He brought out a rather interesting phase of sub-station building design in large cities. In view of the fact that new methods of distributing current may arise or some other condition may develop, which may make it advisable to abandon

the sub-station, the buildings are now often built along strictly commercial lines. Should the station be abandoned at any time, the property ought then to be valuable for rental purposes. In some instances, in designing buildings with the idea of future occupancy for commercial purposes, the ceilings over the machinery floor have been placed so low as to prevent the installation of a crane, and a traveler is used instead. In other instances, in order to permit a crane over the machinery, the second floor has been omitted, but the walls have been so constructed that the floor can be readily inserted should occasion arise. Mr. Junkersfeld remarked that he had not found that in a sub-station a crane reduced very much the cost of installation or maintenance. Storage batteries were an important part of a large system. He agreed with Mr. Damon that Kelvin's law was not employed much in practical work, but added that in many cases the law was probably used unconsciously.

J. M. S. Waring said that one paragraph in Mr. Ashe's paper was somewhat misleading. This was the paragraph which stated that because of the slowness of the chemical action of the battery it did not always take the peak of the load in case of short-circuit, but permitted the converter to flash over. He said in almost all cases of battery installations, boosters were employed, and these would do much to obviate the trouble referred to. Mr. Waring spoke of an occasion when a battery

was installed to advantage. On an interurban line the sub-stations were 14 miles apart. At a point half-way between sub-stations there was a branch line to some amusement parks. On summer evenings and Sundays the load was unusually heavy at this junction. A line battery was installed at the junction and the booster was located in one of the distant sub-stations.

Ernest Lunn did not think the slowness of the action of a battery, in a case of short-circuit, due to the velocity of migration of the ions of the electrolyte, but rather to the internal resistance of the cell, and this, he suggested, could often be lessened by increasing the size of the terminal lugs.

Bion J. Arnold said he was quite a friend of the storage battery several years ago, when it was not as popular as at the present time. He was first under the impression that the use of batteries gave better generating efficiency, but now he was not so sure of that, but believed there were other good and sufficient reasons for their installation. The increased reliability of the system obtained by their use was the determining feature in the New York Central electrification. The plan to install inverted rotaries and storage batteries in a. c. work, he said, would decrease the reliability of the system, as there would be a revolving piece of apparatus between the battery and the line.

In reply to a question of L. M. Zapp as to why the carbon regulator described in Mr. Ashe's paper could not be connected directly in the fields of the booster instead of in the fields of the booster exciter, Mr. Waring stated that this was done in smaller installations. In the larger ones, however, the large current required by the booster fields would complicate the carbon piles of the regulator if they were made to carry the current.

Chairman Ferguson asked for a discussion of the question of "How far we should go in efforts to protect the apparatus? Were we making so much of an effort to protect apparatus by means of various safety devices as to make the system unreliable?"

W. G. Carlton, in discussing this question, called attention to the fact that a short-circuit on a low-tension direct-current

system is very different in its nature from one on a high-tension alternating-current system. The low-tension short-circuit could be frequently burned off without interruption to the service. A short-circuit on a high-tension alternating-current system could not be burned off without putting the whole system out of operation, because of the enormous amount of power flowing to such a short-circuit and the presence of the large amount of synchronous apparatus which would be pulled out of step in case of a heavy short-circuit.

Mr. Moran urged the installation of all the lightning protective apparatus as possible. He also believed in the use of reverse current relays. Prof. Woodworth asked what would happen in case an overload relay operating from a current transformer failed to act, due to a failure of the current transformer. L. M. Zapp said that the remedy was to put in two current transformers and two relays.

Mr. Junkersfeld outlined the system he considers best for protecting the service and the apparatus. Two or more independent lines are run between the power station and sub-station. The rotary converters at the sub-station are equipped with overload relays of the bellows type on the alternating-current side. Reverse current relays are placed on the direct-current side, and a speed-limit device on the converter for throwing the converter out of circuit in case the speed rises a certain per cent above normal. He called attention to the importance of providing against operating mistakes in a large system where from 100 to 150 switchboard operators might be employed. It could easily be seen that a very small percentage of mistakes on the part of the operators would count up seriously in interruptions to service.

Mr. Moran cited cases where starting from the alternating-current side of rotary converters caused much less trouble, and where it took from 15 to 20 minutes sometimes to synchronize a rotary converter started with an induction motor on the shaft.

Mr. Winslow thought that we could not do without any one of the three protective devices named by Mr. Junkersfeld, namely, overload relays on the alternating-current side of converters, reverse current relays on the direct-current side, and speed-limiting devices. He spoke of some overload time-limit relays operating in from 3 to 6 seconds with 100 per cent overload.

Mr. Carlton said that there was great difficulty in securing relays in which there would be any appreciable difference in the time taken to operate on short-circuits. Considerable investigation and testing by Mr. Eastman, of the Chicago Edison Company, had failed to discover any time-limit devices which could be placed on feeders at sub-stations and at power stations with the assurance that there would be sufficient difference in the time of operation on short-circuits so that the circuit breakers at the sub-stations could be set to open before those at the power station.

Mr. Winslow said that protective devices should be tested every seven to ten days, and that men must be employed who can be relied upon to go through these tedious routine tests faithfully and not mark things as tested O. K. simply because they tested all right the last time. Mr. Moran cited cases where the temperature had great influence on the time of operation of the bellows type of relay. Edward Schildhauer thought it was desirable to cut out a line instantly in case of short-circuit. Relays set for operation in 6 seconds at 100 per cent overload should operate instantly on short-circuits.

Chairman Ferguson, discussing the battery as a safety device to insure against interruptions of service, referred to the fact that his company now has some 12,000-kw capacity in storage batteries on a system having a maximum output of about 52,000 kw. He again asked for more expression of opinion as to how far we should go in the use of safety devices.

E. O. Sessions cited cases where reverse current relays had not given satisfaction in sub-stations where a very cheap grade

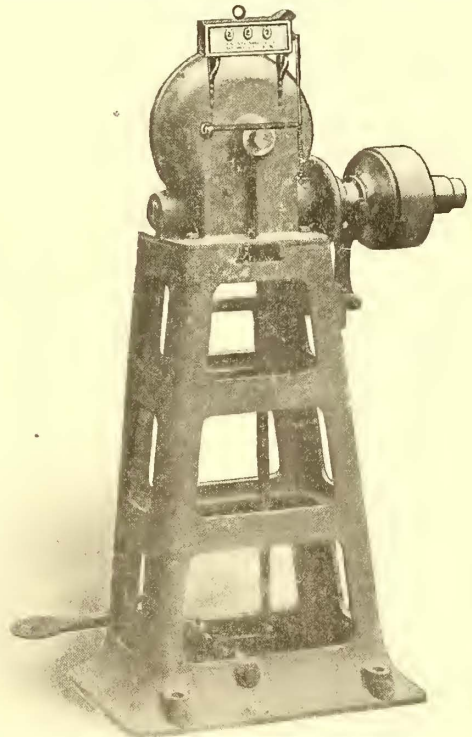
of sub-station operators was employed. Mr. Ferguson thought that the answer to the question raised by Mr. Sessions was "Don't throw out the reverse current relay, but the operator."

D. W. Roper said that the aim in designing any large distribution system should be to prevent local faults and troubles from affecting the whole system. Messrs. Hammond and Lunn spoke briefly of European practice.

Mr. Junkersfeld called attention to the fact that of all the protective devices enumerated, the one limiting the speed of rotary converters was the only one installed primarily to protect the apparatus. The other devices were for the protection of the service from interruption by preventing the spread of disturbances. After all, protection of the apparatus was not a very serious question in practice, as was shown by the fact that on a large lighting system having from fifty-five to sixty switchboard operators and aggregating about 70,000 kw in machinery capacity, only three cases of damage to rotary converters had occurred in five years of operation.

### ARMATURE AND FIELD COIL WINDING MACHINE USED IN BROOKLYN

The Brooklyn Rapid Transit Company has just installed at its Fifty-Second Street shops, Brooklyn, N. Y., eight armature and field coil winding machines, made by the American General Engineering Company, of New York. Reference to the accompanying illustration will show clearly the compact con-



ONE OF THE NEW ARMATURE AND FIELD COIL WINDING MACHINES INSTALLED BY THE BROOKLYN RAPID TRANSIT COMPANY

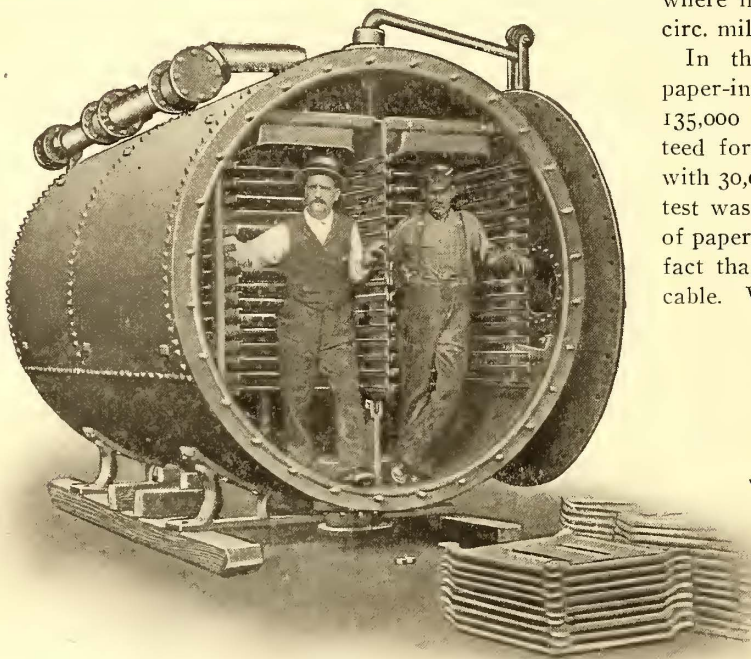
struction of this machine; in fact, it occupies only 4 ft. of floor space, making it especially suitable for installation in shops where space is valuable.

Every precaution has been taken in making this machine to prevent interruptions in operation. The gears are enclosed in a case, which prevents the dirt and dust from getting to them as well as the coils, and also perfect lubrication and general protection. The machine has absolutely no back lash and will make a positive stop on the release of the lever by the operator's foot. It is fitted with a recorder, giving the number of turns, to save the operator the necessity of counting. As a labor saver, it is claimed that this device will repay its first cost in six months' service.

## THE PHILADELPHIA RAPID TRANSIT COMPANY'S 16,000-HP FEED-WATER HEATER

With the increased size of power plants for street railway work has come the demand for larger units and a corresponding increase in the size of the auxiliaries. The size of feed-water heaters, however, is not always governed by the size of the separate units, as one heater may be made to serve two or more units. This has resulted in the installation of some very large heaters, among which is one of 16,000 hp, recently furnished by the Hoppes Manufacturing Company, 51 Belmont Avenue, Springfield, Ohio, to the Philadelphia Rapid Transit Company.

This heater is of the cast-iron type, and is known as class "R," to distinguish it from the standard heaters manufactured by this company of steel plate construction. The bottom of the heater, pans and all the working parts which come in contact with the water are of cast iron, as this material is more durable for a certain service than steel plate. To save weight, however, the shell above the water line is made of steel plate.



VIEW OF PHILADELPHIA RAPID TRANSIT COMPANY'S 16,000-HP HEATER,  
SHOWING ALSO TYPE OF PANS USED

The diameter of this heater is 7 ft. 6 ins., and the length, 15 ft.

The pans used in the heater are of the multi-trough-shaped pattern cast in one piece from a good grade of gray iron. The entire heating and lime catching surface represented by the pan aggregates over 2000 sq. ft. The shape of the pans is clearly shown in the illustration, the form being such that the water is made to flow over the sides and through the slots; following the underside of the pans in a thin film it then comes into direct contact with the exhaust steam in the heater, even when the pans are coated with lime or other solids.

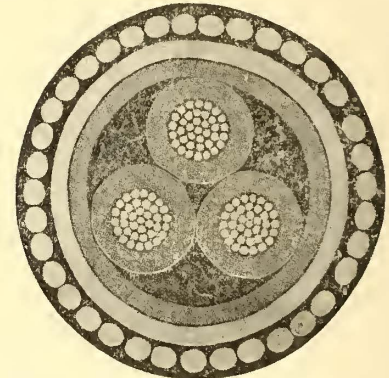
The very large amount of heating and lime catching surface, together with the settling chambers provided by the trough-shaped pans, renders a filter unnecessary, although the manufacturer furnishes filter plates when desired. A large oil eliminator is installed in the rear end of the heater where the exhaust steam enters, and an outside float box with float for regulating the feed-water by a balanced valve is also provided.

As will be seen by the illustration, the entire front head of the heater is removable, giving easy access to all parts of the machine for cleaning and inspection. In cleaning the heater, the pans only need be removed and cleaned, and this work may be done outside of the heater. This company builds heaters of this type from 100 hp to 30,000 hp.

## CABLES IN THE LONG ISLAND ELECTRIFICATION

In the account of the electrification of the Long Island Railroad, published in the STREET RAILWAY JOURNAL for Nov. 4, only a short description was given of the feeder cables and interior wiring used in the generating station and sub-stations. For the latter, about 19,000 ft. of 11,000-volt varnished cambric insulation, braided finish cable were installed. All of this cable was tested by the manufacturer with 30,000 volts for 30 minutes after it had been immersed in water for 24 hours, and was again tested with the same potential after installation. Varnished cambric insulation was selected as the best available insulating material for this use, as it is claimed that cables insulated with this material are better for withstanding high voltage than those insulated with rubber, and are not subject to deterioration from static discharges or heat. Furthermore, the fact that these cables could be used without lead sheaths avoided the installation of a large number of end bells. Varnished cambric insulation with the braided finish was also used for the low-tension wiring in the generating and sub-stations, where in all about 36,000 ft. of cable in sizes from 2,000,000 circ. mils down to No. 2 was installed for this work.

In the underground transmission circuits, lead-covered, paper-insulated cable was employed. For this purpose about 135,000 ft. of three-conductor, 250,000-circ.-mil cable, guaranteed for 11,000 volts, was used. This cable was also tested with 30,000 volts for 30 minutes by the manufacturers, and the test was repeated after the cable was installed. The selection of paper cable for this service was determined primarily by the fact that it was considerably cheaper than varnished cambric cable. While there is no question but that the varnished cam-



THREE-CONDUCTOR, 250,000-CIRC. MIL, 11,000-VOLT SUBMARINE CABLE

bric cable would have been better, it was felt that satisfactory life and service would be obtained with the paper cables, assuming that proper care was taken to preserve their lead sheaths from deterioration, due to electrolysis or corrosion.

For carrying the high-tension circuits under water, where the drawbridges interrupt the overhead circuits on the line across Jamaica Bay, there was used 3500 ft. of the three-conductor, 250,000-circ.-mil, rubber-insulated, leaded and wire-armored submarine cable shown in cross section, less than two-thirds actual size. As in the previous cases, this cable was tested at 30,000 volts before and after installation. The cable weighs 18 lbs. per foot, and is one of the heaviest ever manufactured. The armor is No. 4 B. & S. gage, and the finished diameter about 3 ins. In connection with the third-rail circuit for jumper cables at grade crossings, and in places where the third rail was shifted from one side to the other of the main track, 65,119 ft. of 2,000,000-circ.-mil varnished cambric cable, leaded, with a jute and asphalt finish, were installed. The jute and asphalt jacket was put on these cables to protect the lead from mechanical injury and corrosion, since the cables are in many cases buried directly in the earth.

To carry the third-rail circuits and also the track circuit around the drawbridges at Jamaica Bay, 5600 ft. of 2,000,000-



circ.-mil, rubber-insulated, lead-covered and wire-armored cable were installed. The submerging of these cables maintains them at a low temperature, which tends to preserve rubber and justifies its use in this case. As a reinforced feeder for the third rail, there was installed, in conduit, 9438 ft. of paper-insulated, low-tension cable, selected as the cheapest available construction for the service, since the installation was regarded as being of a more or less temporary nature, and because the ultimate life of the cable was not an important feature.

All the above cable, as well as the necessary wire and cable for the cars, was furnished by the General Electric Company. The aggregate length of all kinds of wire and cable supplied for this installation was 637,243 ft., the sizes ranging from No. 12 to 2,000,000 circ. mils.

**SEMI-CONVERTIBLE CARS FOR LISBON, PORTUGAL**

When the street railway system of Lisbon, Portugal, commenced to operate with electricity about five years ago, 120 eight-bench open cars, built by the J. G. Brill Company, were put in service. These cars were mounted on the builder's type of single truck. Two years later the same company furnished forty twelve-bench open cars mounted on its maximum-traction trucks, and within the last week or two twenty handsome cars of the grooveless-post, semi-convertible type have been shipped. These are not the first semi-convertibles of this type to be used in Portugal, as a year ago practically the same style

the chief means of transportation was a form of omnibus, and these vehicles, having the same wheel gage as the cars, made use of the company's rails, as the streets were roughly paved, and, by charging lower fares, secured enough of the traffic to



INTERIOR OF LISBON CAR

prevent adequate returns on the railway investment. This condition of affairs, although interrupted for a time by the purchase from the proprietor of the omnibuses, continued until the electrification of the lines, when, to avoid further use of the tracks by these vehicles and limit the competition, the gage was reduced from 4 ft. 8½ ins. to 2 ft. 11½ ins., too narrow for safe operation of any road vehicle of an omnibus type. The rails are of the 7-in. grooved girder type, weighing 91 lbs. to the yard, with welded joints, and laid on an excellent foundation. The power house, car houses and general equipment are thoroughly modern.

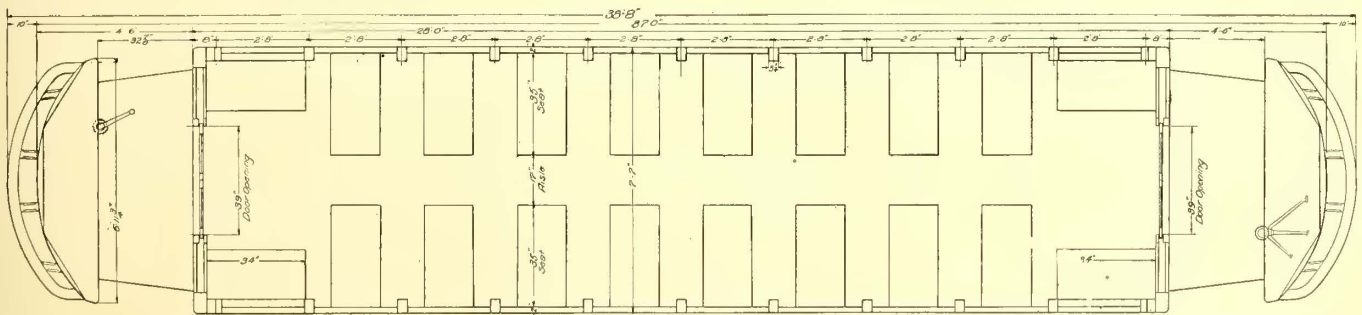
This semi-convertible type is particularly applicable to the conditions referred to, which limit the width over all to an extent which would otherwise make it impracticable to use a transverse seating arrangement. The gain of 7½ ins. in the interior width, because of having the sashes stored in pockets in the side roof when not in use instead of in the side walls, enables a 35-in. seat to be used, leaving the aisle 17 ins. wide. The seats are of the step-over type, and were manufactured by



SEMI-CONVERTIBLE CAR USED FOR NARROW-GAGE LINE IN LISBON, PORTUGAL

of car, but mounted on No. 27-G short base, double trucks, was furnished to Oporto.

Heretofore both open and closed cars have been used, but the climatic conditions of Lisbon make the semi-convertible type especially desirable, for the winters are mild, with many warm days, and during the summer the evenings are always

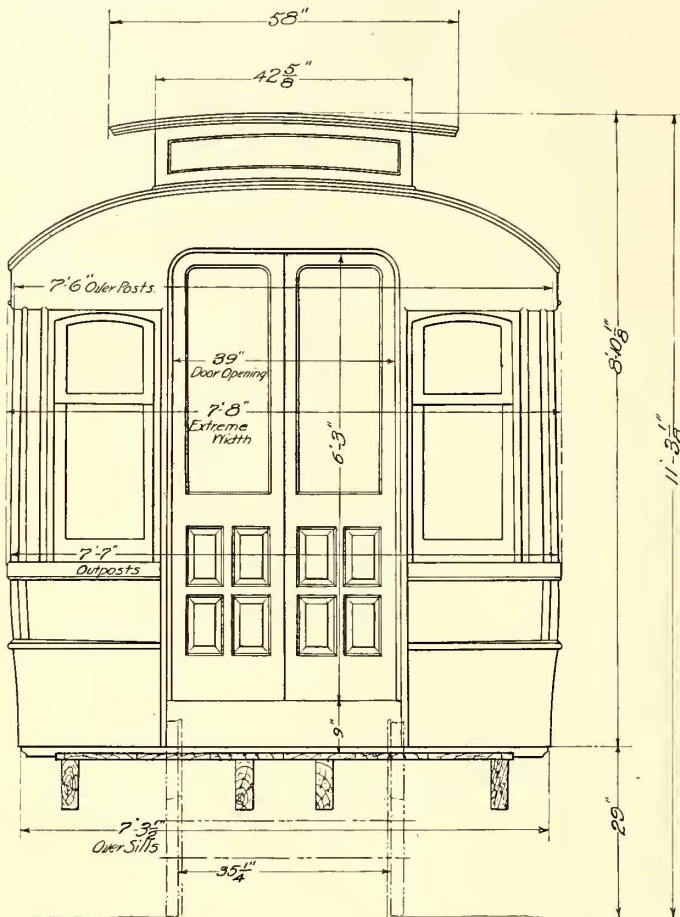


SEATING PLAN AND GENERAL DIMENSIONS OF CARS FOR NARROW-GAGE TRACK IN LISBON, PORTUGAL

cool. In the STREET RAILWAY JOURNAL of March 2, 1901, a general description of the railway system, with maps, diagrams and half-tone views, was published. It was said in this interesting article that the street car lines were first operated in 1873. Most of the cars, which were drawn by mules, were built by the John Stephenson Company, and many of them are still in service. The type of vehicle which had previously been

the Brill Company. The interior finish consists of cherry in the natural color, and the ceilings are of decorated birch veneer. The usual form of bottom framing is used, which includes 4-in. x 7¾-in. side sills, 12-in. x 3/8-in. sill plates and 5¼-in. x 67/8-in. end sills. Two 4-in. x 3-in. x 1/2-in. angle irons support the platforms at their centers. These angle irons extend 4 ft. 4 ins. back of the centers of the body bolsters. The

general dimensions need not be given, as they will be found in the accompanying plan and section. The angle-iron bumpers, radial draw-bars, ratchet brake handles, platform gongs, signal bells, sand boxes, folding gates and other specialties are of the builder's manufacture, and the cars are mounted on the build-



END VIEW OF LISBON CAR FOR NARROW-GAGE SERVICE, SHOWING PRINCIPAL DIMENSIONS

er's maximum-traction trucks, which have 4-ft. wheel base and have 33-in. x 20-in. steel-tired wheels. The motors are of 37-hp capacity each.

### FREIGHT BUSINESS ON THE LANSING & SUBURBAN

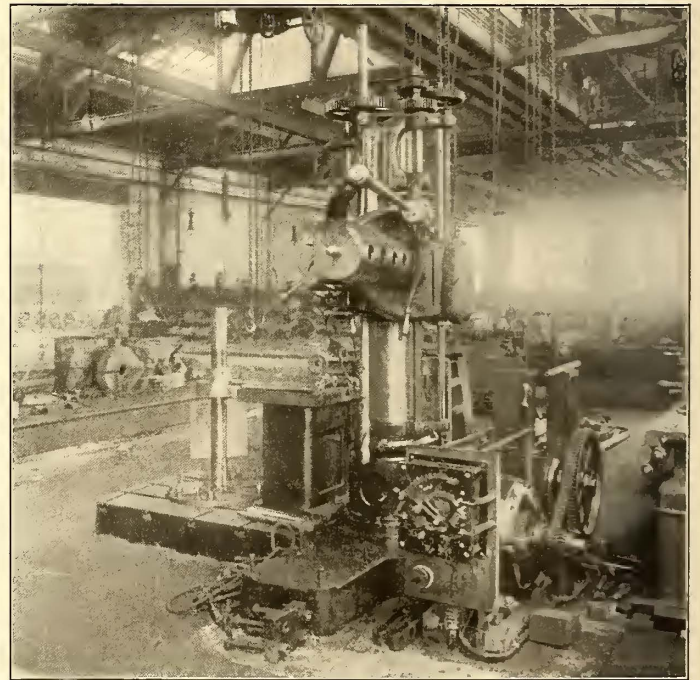
The Lansing & Suburban Railway has found it necessary to establish a freight station at Lansing in order to care for its growing freight traffic. Within the last year the traction company's freight business has grown to extensive proportions. That class of traffic on the St. John's line has been steadily increasing ever since the road was opened. In fact, it has exceeded the expectations of the company. Considerable freight is also handled on the Pine Lake line, and that road's business will undoubtedly increase this year. During the coming season the line to Jackson will be completed. Freight business over it will undoubtedly be larger than over the other lines.

Niagara Falls, Tonawanda, Lockport, Hamburg, Kenmore, Williamsville and other towns that are directly connected with Buffalo by electric railway will profit greatly in time of fire and when the aid of the Buffalo fire department is necessary, by an arrangement which the Board of Fire Commissioners has recently entered into with President Henry J. Pierce, of the International Railway Company. The company, in case these towns need the services of apparatus from the Buffalo fire department, will transport it on flat cars, the transportation charges to be borne by the town calling for aid.

### RADIAL DRILL IN PHILADELPHIA SHOPS DRIVEN BY INTER-POLE MOTOR

The Philadelphia Rapid Transit Company has been using in its repair shops since May, 1905, a motor-driven radial drill, which represents an interesting application of the inter-pole motor to a machine tool whose work involves frequent variations in speed. It is worthy of note that the drill was equipped with a speed-changing mechanism to adapt it for a constant-speed motor, but owing to the ease with which the inter-pole motor can be made to vary its speed, it was adopted in place of the constant-speed motor generally employed. The driving mechanism consists of a Renold silent chain, which transmits power from a 3-hp, 525-volt, type S, "inter-pole," variable-speed motor, made by the Electro-Dynamic Company, of Bayonne, N. J. The motor is geared for 575 r. p. m., the ratio being 3 to 1, or 575 r. p. m. to 1725 r. p. m. A Bickford drill is used.

The drill arm is attached to a column 11 ins. in diameter, and is made in pipe section to overcome the combined stresses of twisting and bending. It is raised and lowered by power under the control of a lever within the operator's reach. The back gears are fitted with friction clutches, which give four changes of speeds for each position of the driving belt or set of driving gears. The spindle has sixteen changes of speed, arranged in geometrical progression, and is provided with both hand and power feed, quick advance and return, safety stop, automatic

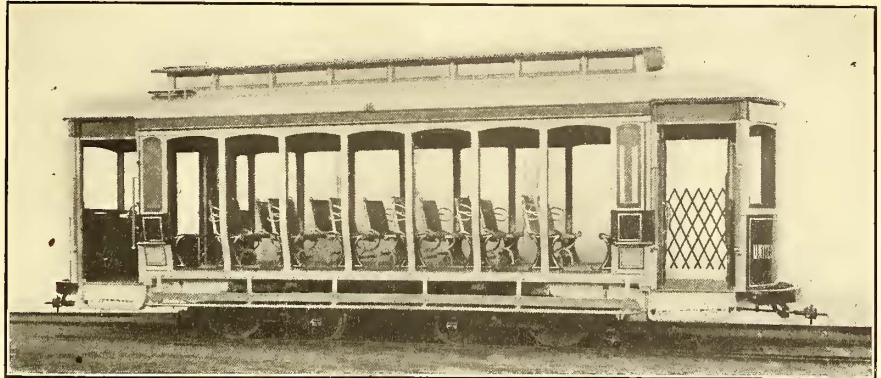


INTER-POLE MOTOR DRIVING RADIAL DRILL IN SHOPS OF THE PHILADELPHIA RAPID TRANSIT COMPANY

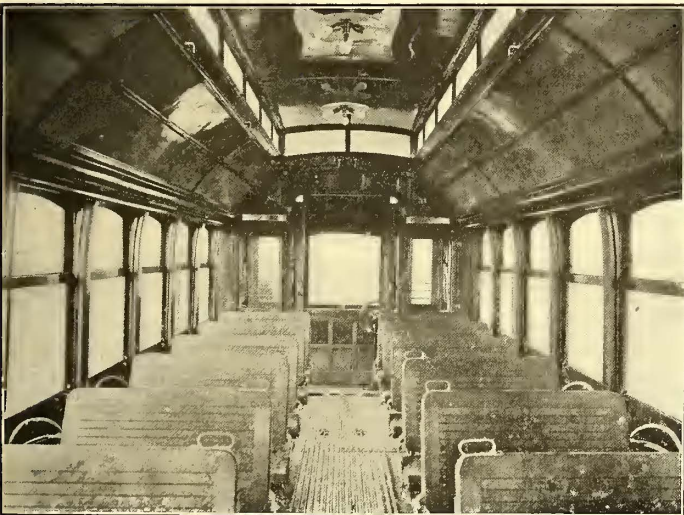
trip, dial depth gage and hand lever reverse. An engraved plate attached to the arm shows the operator how to obtain the proper speeds for different metals and diameters of drills. The depth gage answers a double purpose—besides enabling the operator to read all depths from zero, which does away with the usual delays connected with scaling or calipering, it supplies a convenient means for setting the automatic trip, as the graduations show exactly where each dog should be located in order to disengage the feed at the desired points. The feeding mechanism furnishes eight rates of feed, ranging in geometrical progression from .007 in. to .064 in. per revolution of spindle, each of which is instantly available. The tapping mechanism is located on the head, and permits the backing out of taps at any speed with which the machine is provided, regardless of the speed used in driving them in.

**CONVERTIBLE CARS FOR THE UNITED RAILWAYS OF CHATTANOOGA**

The United Railways Company, of Chattanooga, has within the last week or so added to its equipment four new cars of the Brill convertible type, built by the American Car Company, of St. Louis. The cars are for use on a line which runs from one of the main streets out to a new residence section which has not built up as rapidly as was expected, and the new cars were purchased with the view of attracting travel in that direction. Pleasure riders will doubtless make much use of the cars because of their comfort and the fine views to be had along the line. R. W. King, the general manager, is well acquainted with the Brill convertible type, as he was formerly with the Newcastle (Pa.) Traction Company, which was among the first to use them. Subsequently he became manager of the Montgomery & Chester (Pa.) Railway Company, and purchased a number of convertibles for that system. He expects at least to double the receipts from the line on which the new cars are operated, and at a cost much less

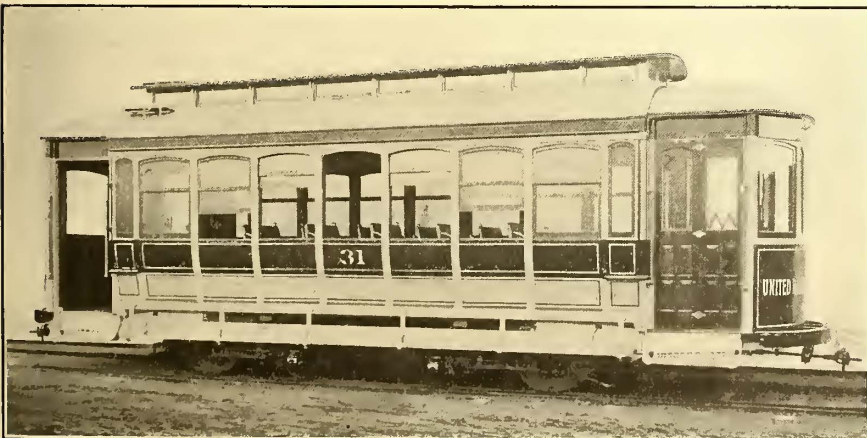


THE CHATTANOOGA CONVERTIBLE CAR READY FOR WARM WEATHER



INTERIOR OF CHATTANOOGA CAR READY FOR WINTER SERVICE

than with the old rolling stock, which consisted of open and closed cars. The company's system connects with the Chatta-



ONE OF THE NEW CONVERTIBLE CARS FOR CHATTANOOGA, SHOWING PANELS INSTALLED, BUT WITH PART OF THE WINDOWS RAISED

nooga & Lookout Mountain Railway, the Lookout Point Incline Railway and the North Side Consolidated Street Railway, which it owns and has improved. Its lines on the top of Look-

out Mountain run to the different points of historical and scenic interest. Chattanooga has a population of over 30,000, and is an important commercial, railway and manufacturing center.

The cars make a very attractive appearance when open or closed, as will be seen by the accompanying views. The interiors are finished in cherry, with birch headlinings neatly

decorated. Step-over back cherry slat seats are of the Brill manufacture. A very interesting feature in connection with these cars is in the fact that, although they measure but 20 ft. 7 ins. over the end panels, they are mounted on double trucks of the "Eureka" maximum-traction type, the reason being that some of the track curves are of shorter radius than would be practical for a single truck with wheel base suitable to this length of car.

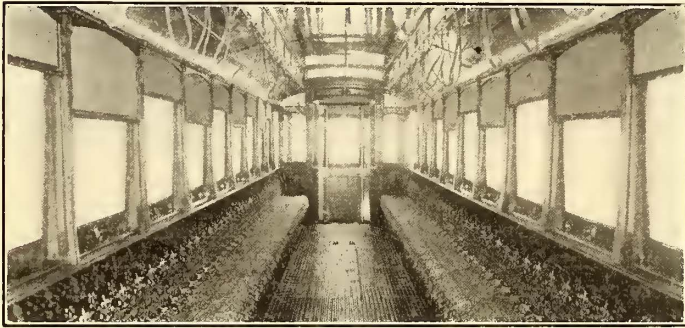
The general dimensions are as follows: Length over the vestibule sheathing, 30 ft.; width over the sills, 7 ft. 6½ ins.; width over the posts at the belt, 8 ft. 4 ins.; sweep of the posts, 4¾ ins.; distance between the centers of the posts, 2 ft. 7 ins.; height from the floor to the ceiling, 8 ft. 6⅞ ins.; height from the track over the trolley board, 9 ft. 4¾ ins.; height from the track to the platform step, 15¾ ins.; from the step to the platform, 12 ins.; height from the track to the running board, 18½ ins. The side sills are 3¼ ins. x 4⅝ ins., and the wheel pieces, 5¼ ins. x 6 ins. Instead of sill plates, Z-irons are used, the sills resting on the outward extending lower flange. The corner posts are 3¾ ins. thick, and the side posts, 3⅝ ins.; length of the seats, 34 ins.; width of the aisle, 22 ins.; truck wheel base, 4 ft.; diameter of wheels, 33 ins. and 20 ins. The car, with trucks, weighs 17,500 lbs.



Indianapolis is another city in which rebates are given passengers from out of town. In fact, the Merchants' Association of Indianapolis claims to have originated the plan. In that city, on a purchase of \$25 worth of merchandise from any one or more of the members of the association, the shopper's fare for 40 miles, coming and going, or a total of 80 miles, is refunded to one traveling on a steam road, or 75 miles each way, or a total of 150 miles, to one traveling via interurban lines. Those living a greater distance than 40 miles or 75 miles may have their fare rebated or refunded for the 80 miles or 150 miles, round trip, leaving only the minimum cost to be prepaid. During the year 1905 the Indianapolis Association paid out a sum equal to \$20,000 in rebates to Indianapolis shoppers. About one-fourth of those who apply for rebate books and secure a rebate patronize the steam lines, and three-fourths the interurbans. Ten days are allowed to make the \$25 in purchases. The rebate is paid at the association's Indianapolis office.

### NEW CARS FOR COLUMBUS, OHIO

The Columbus Railway & Light Company has just received ten new cars from the G. C. Kuhlman Car Company, like the one shown in the accompanying illustrations. They are of the standard length used by the company, 28 ft. 8½ ins. The platforms are 6½ ft. long, measured from the end panels over the vestibule sheathing, and have high folding gates, besides folding doors. The trolley boards are trussed to bring the strain chiefly upon the ends of the car. This form of trolley board is used on most of the company's cars. The length over the bumpers is 43 ft. 4¾ ins.; width over sills, 6 ft. 10 ins.; width over the posts at belt, 7 ft. 11¼ ins.; sweep of posts, 65⅝ ins.; centers of posts, 2 ft. 10 ins.; height from floor to ceiling, 8 ft.



LONGITUDINAL SEATING IN COLUMBUS CAR

1½ ins.; height from track to the under side of sills, 2 ft. 9 ins.; height from under side of sills over trolley board at highest point, 9 ft. 5½ ins. The side sills are 4 ins. x 7½ ins., with 7-in. x ½ in. sill plates on the outside; thickness of corner posts, 3¾ ins., and side posts, 2¼ ins. The cars are mounted on "Eureka" maximum-traction trucks, carrying 40-hp motors, and having 4-ft. wheel base, 33-in. and 20-in. wheels and 4½-in. axles.

Besides being an important steam railroad point, Columbus is the operating center of eight large interurban systems. It has a population of over 125,000 and a large transient population, due to its manufacturing interests and the fact that it is the capital of Ohio. The system of the Columbus Railway & Light Company covers the entire city, the lines radiating in all directions from the city's center, with a total trackage of about 100 miles. In addition to the city system, the company operates a 14½-mile interurban road from Columbus to Westerville. Minerva Park, owned by the company, is on this line, and is 9¼ miles from the center of the city. The lines also reach Oletangy Park, which is operated by the company, and which covers 37 acres of ground. It is situated on a branch of the Scioto River and has a large theater. Both parks are popular and secure a large amount of traffic to the lines which reach them. A number of large cars for the Westerville division were furnished two years ago by the American Car Company. Most of the company's standard 28-ft. closed cars were furnished by the J. G. Brill Company.

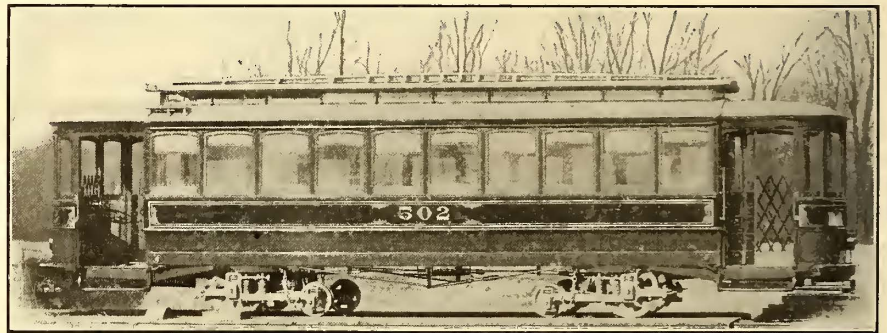
During October, November and December the United Railways Company, of St. Louis, carried 44,241,395 passengers and made 1,235,524 trips. In the months of July, August and September there were 44,435,325 passengers carried and 1,269,032 trips made. In 1904, the last quarter of the year, there were 1,537,150 trips made and 53,695,829 passengers carried. In 1905, 170,009,691 passengers were carried, and in 1904, 201,316,532, a falling off of 31,306,842. There was a gain in 1905 over 1903 of 22,868,262.

### ELECTRIC RAILWAY AT SHANGHAI

The Shanghai Electric Construction Company, Ltd., of London, has been organized with a capital stock of £320,000, divided into 320 shares of £1,000 each, to construct an electric railway in the foreign settlement at Shanghai. There will be 23½ miles of track, of which 6 miles will be double track. The Shanghai Company will pay the authorities 5 per cent of the gross receipts, and has a perpetual franchise, but with the right reserved to the authorities of purchasing the enterprise as a going concern at the end of thirty-five years. Power will be purchased from the municipal lighting plant. The contract for the construction has been let to Bruce Peebles & Company for £277,000. Among those prominently interested are Sir Alfred Dent, of Dent Brothers & Company, London, and Alfred Dent & Company, of Shanghai; R. S. Porthem, managing director of Bruce Peebles & Company; Col. Thys, of La Compagnie Internationale d'Orient, and the Electric Conversion Syndicate, of London. The consulting engineers are Sir Douglas Fox & Partners, and Harper Brothers & Company, of London.

### 9700-HP HYDRAULIC TURBINE FOR CALIFORNIA GAS & ELECTRIC CORPORATION

An interesting point in connection with the recent purchase by the California Gas & Electric Corporation, San Francisco, of a 9700-hp, single horizontal, spiral case, reaction hydraulic turbine, is contained in the fact that this turbine will operate under a 550-ft. head at a speed of 400 r. p. m., said to be the highest head under which a turbine of this type has ever been installed. Until recently, manufacturers of secondary machinery have avoided the operation of their apparatus on high



DOUBLE-TRACK CAR FOR THE COLUMBUS RAILWAY & LIGHT COMPANY

speeds. This prejudice, however, has, to a great extent, been overcome, and it is only a question of time when this type of hydraulic turbine will be constructed for still higher heads than the present practice will allow. This turbine and accessories will be furnished by the Allis-Chalmers Company, of Milwaukee, and is destined for installation at Chico, Cal.

The entertainment given to the employees of the Brooklyn Rapid Transit Company by the Brooklyn Rapid Transit Employees' Association at the clubhouse of the association in East New York was concluded on Saturday evening of last week. George W. Edwards, the secretary of the association, said that at each performance the hall was well filled, and that on Thursday evening, which was officers' night, the attendance was very large. At the Saturday matinee a novelty was introduced in the distribution to the little girls present of some thirty dolls. There was on the bill a sketch in which was introduced a baby, and advantage was taken of this to dispose of the products of the "farm." On Saturday evening Newton W. Bolen, superintendent of transportation of the Public Service Corporation of New Jersey, and several of his associates in that company were the guests of the Brooklyn Association.

## FINANCIAL INTELLIGENCE

WALL STREET, Jan. 24, 1906.

### The Money Market

There has been a further material improvement in the monetary situation during the past week. Not only have rates for all classes of accommodations been forced to a lower level, but the offerings of funds at the new quotations have been considerably larger than at any time for several months past. The volume of business also has been larger, particularly in the time loan branch, many of the maturing contracts having been renewed at the current quotations. The easier conditions prevailing in the local market were due almost entirely to the continued heavy arrivals of funds from the interior and by further substantial gains in cash by the local institutions on their operations with the Sub-Treasury. The position of the Clearing House banks is now stronger than for a long time, and while the influx of funds from out-of-town sources is likely to continue for some weeks to come, it is not expected that rates will go much below the present level so long as the stock market maintains its present activity and strength. During the week moderate amounts of gold have been shipped to Mexico and to South America, and further shipments of the precious metal may be expected in the near future. Foreign exchange has ruled decidedly firm throughout the week, but gold exports to Paris have again been averted by a further advance in the Paris cheque rate on London. The European markets have been somewhat easier, discounts at all the principal financial centers being quoted slightly below those prevailing at the close a week ago, as evidenced by the action of the Imperial Bank of Germany in reducing its official discount rate, and similar action is expected to be taken by the Bank of England later in the week. The statement of the associated banks published on last Saturday made another extremely favorable exhibit. The increase in cash amounted to \$11,906,700. The reserve required was \$8,040,775 larger than in the preceding week, resulting in an increase in the surplus of \$3,955,925. Loans increased \$20,553,900 and deposits increased \$32,163,100. The surplus reserve on Jan. 20 last was \$16,764,475, as against \$12,808,650 in the previous week, \$23,733,800 in the corresponding week of last year, and \$26,072,675 in 1904.

Money on call has loaned at 6 and  $3\frac{1}{2}$  per cent during the week, the average rate being  $4\frac{1}{2}$  per cent. Money for sixty days to six months was obtainable in quantity at  $4\frac{3}{4}$  per cent, as against 5 to  $5\frac{1}{4}$  per cent in the week preceding. Commercial paper was easier, prime endorsements being discounted at  $4\frac{3}{4}$  per cent.

### The Stock Market

The past week in the stock market has witnessed periods of reaction, some of which have been quite pronounced. These had resulted in the main from selling on the part of pools which had previously bought stocks heavily at materially lower prices than those now current, although selling by operators for the fall contributed not a little to the declines reported. There is more than a suspicion that some of the larger interests liquidated a portion of their holdings, presumably for the purpose of preventing the market from developing into a runaway affair, such as it threatened to do at intervals. It must be said, however, that the combined selling movement noted served only to demonstrate more clearly than ever, perhaps, the great power of absorption which the present stock market possesses. This naturally leads to the conclusion that the public is in the market to a much greater extent than at any time for a year or more past, and that, despite the decided advance in prices of late, is convinced that values are still in line for further improvement. This reasoning would appear to be perfectly sound, as practically all the elements that go to make up a big bull market are now strongly in evidence. The money market, both here and abroad, has returned to a normal condition, and from all indications will remain in that state permanently. The exceptionally open winter has greatly benefited many lines of industry, more particularly the transportation companies, and this is bound to be reflected in increased earnings, as well as in a considerable reduction in operating expenses, consequent upon the lack of the usual severe snowstorms. In only one industry, perhaps, that of copper, has there been any evidence of a reaction, the week having developed quite a decline in prices from the recent very high level. In this instance the reactionary tendency resulted from selling of speculative holdings of copper

metal, and did not by any means indicate the beginning of a permanent downward move in the market for that product. However, the bears in the stock market made use of this as a subterfuge, and at one time made a sharp drive against the stock of the Amalgamated Copper Company, which it was plain to be seen was done for no other purpose than to influence adversely the balance of the list. It is safe to say that the copper metal industry is sound in every particular, otherwise the directors of the Amalgamated Copper Company would not have placed the stock upon a permanent 6 per cent dividend basis, which they did during the week by declaring  $1\frac{1}{2}$  per cent for the quarter. Notwithstanding the reactionary tendency spoken of in the stock market, many issues scored very considerable advances in response to the several encouraging factors referred to, which were supplemented by the favorable result of the English elections and by a belief that nothing harmful was likely to come from the conference of the Powers regarding Morocco. Not the least important among the stocks which reported decided advances was Reading. However, the sensational rise in this stock created fears of a corner in it, and its influence was rather against an improvement in the general list. Other notably strong features included St. Paul, Colorado Fuel, Southern Pacific, Federal Mining & Smelting, National Lead, American Smelting, Anaconda, American Linseed, Atlantic Coast Line, Great Northern preferred, the Pacific Coast issues, some of the Gould properties and the United States Steel stocks.

The only thing new in connection with the local traction stocks during the week was in the nature of a report of some new terms to govern the proposed merger of the Belmont-Ryan companies. The fact that there was no substantiation of this report, and that official announcement of the details of the new plan were withheld, acted as somewhat of a deterrent to an active speculation in the shares of the local traction companies and, comparatively speaking, dealings in them were smaller than of late and fluctuations in prices narrower. It must be said in connection with these companies, however, that their earnings at present are piling up in an unprecedented manner. Moreover, all of them are being benefited in an exceptional degree by the extreme mildness of the weather. All of this, in the ordinary nature of events, is bound to be reflected sooner or later in the prices for these securities.

### Philadelphia

Increased activity characterized the market for the local traction issues during the past week, and although prices displayed more or less irregularity as a result of profit taking, the general trend of values was toward a higher level. A conspicuous feature of the dealings was an advance in Consolidated Traction of New Jersey stock, the price making a net gain of 2 points to  $82\frac{1}{2}$ , the highest price recorded in several months. Upwards of 800 shares were dealt in. Other strong issues included Union Traction, which rose  $\frac{3}{4}$  to  $63\frac{1}{2}$  on the purchase of about 1500 shares, and Fairmount Park Transportation, which moved up a point further to 20. American Railways was comparatively quiet but decidedly strong, about 600 shares changing hands at from  $52\frac{1}{2}$  to  $53\frac{3}{8}$ , a net gain of  $1\frac{1}{8}$ . Philadelphia Rapid Transit was the active leader of the list, upwards of 20,000 shares of the stock changing hands. During the early part of the week the stock was under pressure, the price receding from  $32\frac{3}{4}$  to  $32\frac{1}{2}$ , but subsequently there was renewed buying by the New York interests which lifted the stock to  $33\frac{3}{8}$ . Commission houses were also free buyers. Near the close there was some profit taking and a reaction to  $32\frac{3}{4}$  resulted. Philadelphia Company was active and strong, about 18,000 shares changing hands at prices ranging from  $53\frac{7}{8}$  to  $53\frac{1}{8}$ . Small amounts of the preferred brought  $50\frac{1}{2}$  and 51. Rochester Railway & Light advanced 3 points to 100 on the purchase of 10 shares. Other transactions included Railways General at 7 and  $7\frac{1}{8}$ , Union Traction of Pittsburg preferred at 51, Second & Third Street Passenger at  $300\frac{1}{2}$ , Thirteenth & Fifteenth Street Passenger at  $301\frac{1}{2}$ , United Companies of New Jersey at  $269\frac{1}{4}$ , and Philadelphia Traction at from  $101\frac{1}{8}$  to  $101\frac{1}{2}$ , an advance of  $\frac{1}{2}$  point.

### Baltimore

Trading in tractions at Baltimore continued active, with United Railway issues again constituting the leading feature. In the early dealings the stocks and bonds of this company displayed moderate activity and firmness, but later on the announcement that the deal was premature caused rather heavy liquidation, which was re-

flected in materially lower prices. Of the 4 per cent bonds, about \$100,000 changed hands at from 94½ to 94. The free incomes, after selling at 70¼ at the opening ran off to 69 and closed at 69½ on the exchange of nearly \$500,000 bonds, while the pooled incomes, after rising from 68 to 69, reacted and closed at 68½. Transactions in the latter aggregated about \$375,000. Both the free and pooled stocks were considerably less animated, about 2500 of the first named selling at 16 to 16½ and back to 16¼, while upwards of 11,000 of the deposited stock changed hands at from 18 to 17 and back to 17½. Washington City & Suburban 5s were conspicuously strong, \$10,000 selling at 112¾ and 113, an advance of 1¾. Other sales were: \$19,000 Norfolk Railway & Light 5s, at 97½; \$5,000 Richmond Traction 5s, at 105½; \$3,000 Macon Railway & Light 5s, at 99½ to 99¾; \$1,000 Atlanta Street Railway 5s, at 105½; \$4,000 Virginia Railway & Development 5s, at 99½, and \$5,000 Charleston Consolidated Electric 5s, at 97¼.

#### Other Traction Securities

Intense dullness prevailed in the market for street railway issues at Chicago. Trading was confined largely to odd lots and price changes were unimportant. Transactions included Chicago City Railway at 199, North Chicago at 80, West Chicago at 51 and 50, Metropolitan Elevated common at 28, Chicago & Oak Park common at 7¾ to 7¾, the preferred at 28 to 28¼, and South Side elevated at 96. The Boston market was fairly active and generally strong. Boston Elevated, after selling at 160 at the opening, declined to 157½ and later recovered to 159, a net gain of a point Massachusetts Electric issues, although somewhat less animated than in the previous week, were strong, about 2000 shares of the common bringing 18¼ to 19¼, while about 1500 of the preferred sold at prices ranging from 67¾ to 69½ and back to 68½. Other transactions were: Boston & Suburban common at 20, the preferred at 65; Boston & Worcester common, from 25 to 28, the preferred at 72½ to 74½; West End common at 100 to 99, and the preferred at 114¾ and 114. In the New York Curb market, Interborough Rapid Transit developed considerable activity, upwards of 14,000 shares being dealt in. From 235 at the opening, the price dropped to 230¾ on moderate selling, but subsequently there was a sharp advance to 236. At the close there was a reaction to 234¾. The new common stock to be issued by the Interborough-Metropolitan Company was also actively traded in, when issued about 8000 shares in all changing hands. At the opening the delay in announcing the details of the merger caused some selling, which carried the price from 59 to 53, but later, upon a report that holders of Interborough and Metropolitan stocks would be offered a larger amount of common stock in the new company, the price advanced to 60. The final transaction was made at 57¾. Of the new preferred stock, 400 shares sold at 98½ and 99, while upwards of \$425,000 of the new 4½ per cent bonds brought prices ranging from 95¾ to 95. New Orleans Railway common sold at 39½ and the preferred at 85, while \$23,000 of the 4½ per cent bonds brought 91¼ to 91¾. Washington Railway common sold at 41¾ and 41, while the preferred changed hands at 87½ to 87.

#### Security Quotations

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

	Jan. 17	Jan. 24
American Railways .....	52½	53¾
Boston Elevated .....	158	159
Brooklyn Rapid Transit .....	90¾	91¼
Chicago City .....	197¾	—
Chicago Union Traction (common) .....	10	10¾
Chicago Union Traction (preferred) .....	40	—
Cleveland Electric .....	83	83½
Consolidated Traction of New Jersey.....	81	82
Consolidated Traction of New Jersey 5s.....	107½	107½
Detroit United .....	94¾	97½
Interborough Rapid Transit .....	234	234½
Interborough-Metropolitan Co. (common), W. I.....	57½	55½
Interborough-Metropolitan Co. (preferred), W. I.....	98½	97½
Interborough-Metropolitan Co. 4½s, W. I.....	95	94½
International Traction (common).....	37	37
International Traction (preferred) 4s.....	75	75
Manhattan Railway .....	160	160½
Massachusetts Electric Cos. (common).....	18½	18¾
Massachusetts Electric Cos. (preferred).....	69	68
Metropolitan Elevated, Chicago (common).....	28	—
Metropolitan Elevated, Chicago (preferred).....	71	—

	Jan. 17	Jan. 24
Metropolitan Street .....	126½	124¼
Metropolitan Securities .....	74¾	71¾
New Orleans Railways (common) .....	39	39½
New Orleans Railways (preferred) .....	85½	85
New Orleans Railways, 4½s.....	91	91¼
North American .....	101½	103¾
North Jersey Street Railway .....	25	25
Philadelphia Company (common) .....	53¾	53¾
Philadelphia Rapid Transit .....	32½	32½
Philadelphia Traction .....	101	101½
Public Service Corporation 5 per cent notes .....	95½	95
Public Service Corporation certificates .....	70	70
South Side Elevated (Chicago) .....	96	—
Third Avenue .....	138	138
Twin City, Minneapolis (common) .....	119	119¾
Union Traction (Philadelphia) .....	63	63¾
West End (common) .....	99	99
West End (preferred) .....	113	113

W. I., when issued.

#### Iron and Steel

The "Iron Age" says the open winter thus far has encouraged consumption and has kept it at an enormous rate. The pressure for prompt deliveries continues, and it is only old material which has suffered, since scrap is coming out much more freely than it ordinarily does at this season of the year. Despite a strenuous effort to maintain values, old material is weak. Negotiations are reported as pending between valley makers and the Steel Corporation for a large tonnage of pig iron for the second quarter, the requirements not having been covered as yet. In the East steel makers are urging shipments. Founders are in the market constantly, but it is a noteworthy fact that the Southern producers are not as firm as they have been and that increasing quantities of Southern iron are available at \$14 at Birmingham for No. 2.

#### UNITED TRACTION FORMALLY TRANSFERRED

Control of the United Traction Company, of Albany, formally passed to the Delaware & Hudson Railroad at a meeting held in Albany last week. The directors and the officers all resigned, and a new board and new officers were chosen. The new board of directors is composed of David Wilcox, of New York City, who is president of the Delaware & Hudson Company; Abel I. Culver, second vice-president of Delaware & Hudson Company; W. J. Mullin, assistant to the second vice-president; T. B. Dixey, assistant to the second vice-president; Lewis E. Carr, attorney of the Delaware & Hudson Company; Alex Ekstrom, consulting electrical engineer of the Delaware & Hudson Company; Charles H. Sabin, vice-president of the National Commercial Bank, of Albany; James F. McElroy, president of the Albany Chamber of Commerce, and J. H. Caldwell, president of the Troy Chamber of Commerce. The new officers are: David Wilcox, president; Abel I. Culver, vice-president; Abel I. Culver, chairman, and W. J. Mullin and Alex Ekstrom, associate members of the executive committee. The directors who retired are: A. Bleecker Banks, Anthony N. Brady, Thomas Breslin, Charles Gibson, Albert Hessberg, George P. Ide, William Kemp, Francis N. Mann, Jr., James H. Manning, William McEwan, John W. McNamara, Edward Murphy, second; James O'Neill and Robert C. Pruyne.

The directors organized by electing the new executive committee and new officers as given above. The membership of the board was reduced to nine, and that of the executive committee to three. Abel I. Culver will direct the policies of the road under its new management.

The Delaware & Hudson Company has called a meeting of stockholders for Feb. 19, to consider increasing the capital stock by \$7,000,000, in 70,000 shares of the par value of \$100 each. The stock issue is to take up a proposed issue of \$14,000,000 of 4 per cent ten-year debentures, to be offered to the stockholders pro rata at par. The exchange is to be made at the rate of five shares of stock for each \$1,000 debenture, and within five years of the date of the debenture. In an official statement it was announced that the proceeds of the forthcoming issue will be used for the following purposes:

Ten million dollars for the cost of the United Traction Company, of Albany, and a half interest in the Schenectady Railroad Company.

Two million four hundred thousand dollars for new equipment. One million six hundred thousand dollars for the construction of a cut-off around Wilkesbarre, Pa., to overcome the difficulties of congested tracks and high grades under which business now received from the Pennsylvania Railroad at South Wilkesbarre is now being handled.

## ALLIANCE AGAINST ACCIDENT FRAUD

In the Nov. 4 issue of the *STREET RAILWAY JOURNAL* a notice was published of the preliminary organization in New York on Oct. 25 of an association of street railway, steam railroad and other transportation companies and casualty companies against barratry, unfounded and exaggerated claims for injuries and fake accident cases in general. At that meeting a committee was appointed to consider the subject. This committee was composed of the following: Edson S. Lott, chairman, general manager, United States Casualty Company, New York; James L. Quackenbush, general attorney, New York City Railway Company, New York; Charles C. Paulding, attorney, New York Central & Hudson River Railroad Company, New York; Russel A. Sears, attorney, Boston Elevated Railway Company, Boston; Robert B. Armstrong, president, Casualty Company of America, New York. The secretary was Chauncy S. S. Miller, secretary, Casualty Company of America, New York.

On Jan. 8 a circular was issued by this committee, stating that a second meeting would be held at the Hotel Astor, New York, on Jan. 17, for the purpose of forming a permanent organization, and inviting the attendance of all interested in the subject. The circular stated that the object of the alliance would be "to protect and defend its members against fraudulent claims; to prosecute all persons engaged in presenting and promoting such claims; to collect and disseminate information to its members concerning fake claimants, shyster lawyers, unprincipled physicians, ambulance chasers, false witnesses and others engaged in such practices; to insist upon fair dealing with honest claimants, and, generally, to impress upon the public these principles." It was also voted that the membership be limited to such casualty and liability insurance companies, common carriers, public service companies, large employers of labor and others as shall be approved by the committee on membership.

Among those who responded to the roll call at the meeting on Jan. 17 were: Robert B. Armstrong and Chauncy S. S. Miller, president and secretary, respectively, of the Casualty Company of America; Edson S. Lott, general manager, United States Casualty Company; R. S. Sears, Boston Elevated Railway; R. C. Richards, Chicago & Northwestern Railroad; C. C. Paulding, New York Central Railroad; F. J. Moore, General Accident Corporation, Philadelphia; J. L. Quackenbush, New York City Railway; J. B. Lackey, secretary, Washington (D. C.) Railway & Electric Company; James R. Pratt, acting general manager, United Railway & Electric Company, of Baltimore; W. C. Wilson, Delaware, Lackawanna & Western Railroad; Robert Walker, Chicago, Rock Island & Pacific Railroad; H. V. Drown, the Rhode Island Company, Providence, R. I.; J. G. M. Hamilton, Atchison, Topeka & Santa Fe Railroad; James J. Cagney, Montreal Light, Heat & Power Company; L. L. Gilbert, Pennsylvania Railroad lines west of Pittsburg, of Pittsburg; Jackson E. Reynolds, Central Railroad of New Jersey; George D. Yeomans, Brooklyn Rapid Transit Company; C. B. Orcutt, Hudson River Day Line. Proxies for several express companies, steam railroad and traction companies were handed in, and applications for membership from some half dozen others arrived too late for action by the committee.

The committee on legislation, of which Mr. Sears is the chairman, reported at its meeting early in the day that copies of the bills to stop barratry have been introduced by the Alliance into the Legislatures of Massachusetts, Maryland and other States, and that it had been unanimously decided to have a similar measure introduced into Congress as soon as it could be drafted.

The secretary read the bill that has been introduced in Massachusetts, which reads as follows:

An Act to Prevent the Malicious Promotion of Litigious Claims.

Be it enacted by the Senate and House of Representatives in general court assembled, and by the authority of the same, as follows:

Section 1. Whoever, for his own gain, and having no existing relationship or interest in the issue, directly or indirectly, solicits another to sue at law or in equity, or to make a litigious claim, or to retain his own or another's services in so suing or making a litigious claim, or whoever, being an attorney-at-law, knowingly prosecutes a case in which his services have been retained as a result of such solicitation, or whoever, being an attorney-at-law, directly or indirectly, agrees to procure another to be employed in consideration of his soliciting litigious business, or undertaking to solicit it, or in any other way compensates or agrees to compensate another for so doing, shall be punished by a fine of not more than five hundred dollars (\$500), or by imprisonment for not more than three months, or by both.

Section 2. This act shall take effect upon its passage.

The report of the treasurer was presented and accepted, and showed that the organization has a large unexpended balance on hand with which to prosecute its aim. It was reported that steps are now to be taken to give full publicity to the conviction and imprisonment in Missouri of an attorney named Johnson, who had committed barratry, and of the report in the official series of the Supreme Court of New York State, reported Jan. 13, wherein an

attorney named Clark, of Buffalo, was held subject to disbarment by reason of having entered into an arrangement with a man in the same city whereby he, Clark, was to solicit telephone and telegraph cases.

The committee on medical associations outlined the steps that are being taken to have reputable physicians punished and suspended from membership in the local and national medical associations when their complicity in litigious and fraudulent claims has been made clear.

Mr. Quackenbush, the chairman of the committee on bar associations, reported that he had conferred with the chairman of the grievance committee of the city of New York, to whom charges against a certain lawyer of this city, recently committed for perjury, had been made, the man being sent to prison for seven years, and the entire credit for this action was given to the Alliance Against Accident Fraud.

The permanent officers elected were: President, Russel A. Sears, attorney, Boston Elevated Railway Company; first vice-president, James R. Pratt, attorney, United Railways & Electric Company, Baltimore; secretary and treasurer, Chauncy S. S. Miller, secretary, Casualty Company of America, 52 William Street, New York. It was also decided to appoint a vice-president to represent every State, Territory and country, except those represented by the president and first vice-president, in which the Alliance has a subscriber or subscribers. These vice-presidents will be in charge of the work of the association in each State. Those already elected are as follows: New York, Edson S. Lott, United States Casualty Company of New York; New Jersey, Jackson E. Reynolds, C. R. R. of N. J.; Illinois, Robert Walker, C., R. I. & P. R. R.; Rhode Island, H. B. Drown, the Rhode Island Company; Kansas, J. D. N. Hamilton, A., T. & S. Fe R. R.; District of Columbia, James B. Lackey, Washington Railway & Electric Company; Canada, J. J. Cagney, Montreal Light, Heat & Power Company. The executive committee was given power to add to this list of vice-presidents.

It was decided to hold the annual meeting the third Wednesday in January, and to charge an initiation fee of \$100 and annual dues of \$100.

It was also decided to establish a central bureau from which information as to all such claims will be distributed to the members of the Alliance. A card index will be kept of such reports, and if the same person has at any time made a claim against any other member, the fact will be reported. The same plan will be followed in relation to doctors, lawyers, ambulance chasers or runners, witnesses and others. The Alliance will have permanent committees upon bar associations, medical associations and legislation, to call to the attention of reputable lawyers and doctors the improper practices of their fellows and to try to bring about such legislation as may tend to defeat the crooks. Such committees are to be made up from the membership, and the members are to serve without pay.

In accepting election as president, Mr. Sears said, in part: "We have begun in the right fashion, and when one casts his eye over the list of corporations which are met here to-day, it is imposing and impressive when we consider what it means, and will undoubtedly bear fruit with the public. I believe the theory we are practicing now is that this national bureau should be the center point from which branches shall reach out—that the local organizations will have platforms on the plans of the Boston organization. There we have every public service and corporation, every transportation company, gas company, casualty company, accident company and great employees of labor all banded together. We have what we call a common index, which goes by the name of the Index Bureau, to which we all subscribe. Each one of us sends to that bureau every day the list of claimants on our respective records. We have this month 50,000 names for that card index, and without doubt in the next six months we shall have card indexed more than 100,000 names of persons who have had claims against our respective companies.

"It will then be almost impossible for any man to run that gauntlet with the same name, for the cards contain the name of the claimant, any alias he may have used, his physician's name, date and place of the alleged accident, and the attorney representing him, together with some short abstract of the claim and the name of the company sending the report. \* \* \* The action is automatic. Where I have had to go round and inquire of the various railroads, public service corporations and large employers whether some John Smith ever had a claim before, it has taken a long time and has consumed a lot of energy; whereas in this way the information is already collated and the system is as nearly automatic as it can be.

"It has been demonstrated that localities never before dreamed of as harboring claimants, of involving claims and claiming damages, have been brought to light. We have had as many as nine claims from one house. Again, I may say that the aliases covered are a great help. The man making a claim may be John Smith, of

38 Washington Street, but the card index will develop the fact that his name is William Smith, and that he lived at another location."

Mr. Sears went on to illustrate how the same system was followed with regard to physicians who make a practice of giving testimony for the alleged victims of street accidents, and that the information supplied through the Central Bureau indices was proving of great value in the cross-examination of witnesses. He concluded by saying: "It will exercise great weight before our Bar Association that all you men met here to-day, representing so many interests and such wide influences, have indorsed this barratry bill. \* \* \* Our Bar Association, I am glad to say, is composed of reputable lawyers, and they want to see the old confidence restored as fast as it can be, and such action as we have taken here to-day cannot help but be of benefit all over the country."

Among the street railway companies which have joined the Alliance are the Boston Elevated Railway Company; Philadelphia Rapid Transit Company; Boston & Northern Street Railway Company; Brooklyn Rapid Transit Company; United Railways & Electric Company, Baltimore; Washington Railway & Electric Company; Public Service Corporation of New Jersey; New Hampshire Electric Railways Company, and the Boston & Suburban Electric Companies.

### IMPORTANT BILLS IN MASSACHUSETTS

The special recess committee on railroad and street railway laws of the Massachusetts Legislature, appointed a year ago, has decided to recommend to the Legislature the passage of a law to permit street railways and railroads to consolidate after the approval of the Railroad Commissioners has been granted. This practically put the whole matter into the hands of the Railroad Commission, and is exactly in line with all the other railway and railroad legislation passed in Massachusetts in recent years. In all other matters concerning the construction and development of street railway systems, the law requires primary action before local authorities as a matter of course; but power of approval and vital control rests with the Railroad Commission, which is the State board. It is worth noting, too, that the Legislature has shown no disposition whatever since starting out on this policy to divide or restrict the authority of the board; but, on the other hand, has given it constantly more and more power.

Another feature of the special committee's recommendations is the extension in limited form of the power of street railway companies to take land by right of eminent domain. This is a direct concession to the movement for interurban lines and high-speed service, which has come into Massachusetts very slowly, owing to the strict laws and the thickly settled territory that has to be traversed even by new lines. Some time ago the Railroad Commissioners, after having the matter brought up at repeated hearings, ruled that it had authority under the law to approve deviations from established highways, so far as street railway locations were concerned, only when it was shown that such deviations were necessary for the avoidance of dangerous curves or grades. That is, they could not approve of locations on private land merely for the sake of enabling the road to obtain a straighter line, and therefore provide for higher speed. This recommendation, it is expected, will meet the difficulty involved here, and a law following the committee's suggestion will undoubtedly pave the way for a considerably freer development of interurban schemes than has hitherto been possible.

The time for introducing new business under the rules in the Legislature closed Saturday, Jan. 20, and it may therefore be assumed that practically all the new bills concerning railways are now in hand, except such as may later prove of sufficient importance to induce a suspension of rules to allow their admission. It may be worth noting that a measure has been introduced which would give to cities and towns, under certain conditions, the right to acquire, lease, own, operate and maintain street railways.

The main arguments may be summed up as follows:

In connection with the plan to authorize the merger of the steam railroads and the electric railways, it is of interest to note the arguments advanced in support of the respective issues.

#### THE STEAM RAILROAD POSITION

1. The merger policy brings into the management of the street railway that special ability and knowledge which come from long experience in dealing with transportation problems, and, as well, greater financial resources.

2. The financial embarrassment of certain lines would be relieved by having these enterprises in more conservative and experienced hands.

3. The street railways are largely steam railroad feeders. They

bring people to the railroad from the different sections of the town which it serves, and distribute them again at the end of the journey. Joint management of the two would enable them to perform this service more efficiently and harmoniously.

4. The policy of the State as regards transportation is monopoly with public regulation. Competition in this service has always proved wasteful and destructive; the best policy is to allow and protect a complete but regulated monopoly. If the established policy of monopoly is to be exchanged for one of competition, then all restrictions should be removed and the steam railroads allowed to compete on an equal footing.

5. The Boston & Maine Railroad has made a very effective point of the fact that the New York, New Haven & Hartford Railroad already controls street railways in Massachusetts. It asks to be allowed, as a domestic corporation, the same rights which a foreign corporation already asserts.

#### THE ANTI-MERGER SIDE

1. Monopoly ought by no means to be allowed until the "development period" in selective transportation is over; until the electric railways are giving the genuine interurban rapid transit and light freight service which is so much needed.

2. The steam railroads, in control of the situation, will not bring about this development. Their investment is so tied up in steam equipment that it is not reasonable to suppose that they will make incursions into the field of electric railroading except under heavy pressure. Moreover, the necessity of avoiding any violent fluctuations in their securities makes it inexpedient for them to undertake any new thing involving any considerable amount of risk. It was one manifest purpose of the New York, New Haven & Hartford Railroad in buying up Connecticut electric railways to head off electric communication between New York and Boston. The Boston & Maine Railroad might adopt the same view with reference to an electric road between Boston and Portland, Maine.

3. The policy of consolidation in steam transportation has been disadvantageous to the State and has resulted in comparatively poor passenger service. Where competition has actually developed, it has resulted in lower fares, greater convenience and comfort to travelers, more frequent service and increased travel, to the great benefit of the public, and without serious loss to the steam roads themselves. Competition is ruinous only where it involves unnecessary duplication in equipment, and two different kinds of transportation, touching at the same points, may well incite each other to adequate development, the maximum of service and the minimum of charge, and a healthy spirit of enterprise, without that resulting damage to the public interests which follows direct competition on parallel lines between public service corporations rendering identical service.

4. The New Haven road is really in the same category as the Boston & Maine, both holding Massachusetts charters. In view of the doubts expressed as regards the legality of the present New Haven control, haste should not be taken to place the Boston & Maine in the same position.

5. The State cannot afford as yet to declare itself in favor of a policy of monopoly in this matter even though common control can be secured in any case by stock purchase, for such a declaration of policy would doubtless be used by the steam railroads in opposition to the granting of new electric railway charters, and would lessen that influence which otherwise might be exerted to secure better service on the steam railroads themselves.

### AURORA, ELGIN & CHICAGO RAILWAY ORDERS NEW CARS

The Aurora, Elgin & Chicago Railway Company has placed with the Niles Car & Manufacturing Company an order for ten passenger cars. The new cars will be somewhat longer than those now in service on the road, and the seats will be spaced farther apart. The cars will be equipped with the Sprague-General Electric multiple-unit control.

### PHILIPPINE CONTRACT TO J. G. WHITE & COMPANY

Secretary of War Taft has recommended to the Philippine Commission the acceptance of the bid for the construction of steam railroads in the Philippines by J. G. White & Company and associates. These bids covered 100 miles from Iloilo to Bataan; 100 miles from Escalante to Jumaymayalan, and 95 miles from Cebu to Danao. All of the lines will be of narrow-gage, single-track construction.



**NEW MERGER PLAN FOR NEW YORK COMPANIES—  
NEW COMPANY INCORPORATED**

A change has been made in the proposed Interborough-Metropolitan Street Railway merger. The terms offered on Dec. 27 for an exchange of the outstanding securities were:

To replace \$35,000,000 Interborough stock—	
New 4½ per cent bonds.....	\$70,000,000
New common stock.....	31,500,000
To replace \$52,000,000 7 per cent guaranteed Metropolitan Street Railway stock—	
New 5 per cent cumulative preferred stock.....	52,000,000
New common stock.....	26,000,000
To replace \$30,000,000 Metropolitan Securities stock—	
New common stock.....	25,550,000
According to the new plan, announced with apparent authority, the new holding company now offers the following:	
To replace \$35,000,000 Interborough stock—	
New 4½ per cent bonds.....	\$70,000,000
New common stock.....	34,650,000
To replace \$52,000,000 7 per cent guaranteed Metropolitan Street Railway stock—	
New 5 per cent cumulative preferred stock.....	52,000,000
New common stock.....	28,600,000
To replace \$30,000,000 Metropolitan Securities stock—	
New common stock.....	27,900,000

With the filing of the incorporation certificate at the office of the Secretary of State in Albany on Wednesday, Jan. 24, the Metropolitan Street Railway Company and the Interborough Rapid Transit Company took the first official step toward consolidation. The new corporation, the objects of which are set forth at length, is a holding corporation called the Interborough-Metropolitan Company. Its capital stock is \$15,000,000, composed of fifty shares of preferred and 100 shares of common stock. The articles provide that the life of this holding company shall be 1000 years. The directors of the company are John B. McDonald, Walter G. Oakman, James Jourdan, Morton F. Plant and Peter A. B. Widener.

The purposes of the new company, as set forth in the certificate of incorporation are:

(a) To subscribe for, purchase, acquire in any manner, hold as investment and dispose of, bonds and other evidences of, indebtedness of, and the indebtedness of, and shares of capital stock of, or any interest in shares of capital stock of, any corporation engaged in or holding the shares of stock of any corporation or corporations engaged in the transportation of passengers in the city of New York or its suburbs or territory adjacent thereto, or of any other corporation, domestic or foreign;

(b) To aid financially and otherwise any corporation engaged in the transportation of passengers in the city of New York or its suburbs or territory adjacent thereto, and whether in the extension of the lines of such corporation and in their operation or otherwise, and to aid in the formation, organization and operation of other corporations in which the corporation may be or become interested as the holder of shares of stock or otherwise;

(c) To make provision, either directly by the purchase, leasing, and improvement of real estate, or indirectly by the acquisition of capital stock of other corporations.

(d) To do each and every thing necessary, suitable, desirable or proper for the accomplishment of any of the purposes hereinbefore enumerated, to the same extent as a natural person might do as principal, agent, contractor, or otherwise, either alone or associated with other corporations or natural persons, and to receive and exercise all the rights, powers and privileges of natural persons in connection therewith.

Article III. of the certificate tells thus the privileges of the preferred stock:

The holders of the preferred stock shall be entitled to receive from the surplus or net profits of the corporation dividends from the first day of April, 1906, at the rate of 5 per cent per annum and no more, payable quarterly on the first days of January, April, July and October in each year, without deduction for any tax or taxes which the corporation may be required to pay thereon, or to deduct or retain therefrom, under any present or future law of the United States or any State, county or municipality therein. The dividends on the preferred stock shall be cumulative and shall be payable before any dividend on the common stock shall be paid or set apart, so that if in any quarter year a dividend amounting to 1¼ per cent shall not have been paid on the preferred stock, the deficiency, with interest, shall be payable before any dividend shall be paid upon or set apart for the common stock.

Whenever all cumulative dividends upon the preferred stock, with interest as aforesaid, shall have been paid, the board of directors may declare dividends on the common stock, payable out of the then remaining surplus or net profits.

In the event of any liquidation or winding up (whether voluntary or involuntary) of the corporation, the holders of the preferred stock (before any amount shall be paid to the holders of the common stock) shall be entitled

to be paid in full the par amount of their shares and interest thereon at the rate of 5 per cent per annum from the date of such liquidation or dissolution or winding up, the unpaid dividends accrued on their said shares until said date, with interest on such dividends at said rate from the respective times at which the same accrued, and the proportionate part of the dividend accruing at said date, with interest thereon at said rate from said date. After such payment in full to the holders of the preferred stock the holders of the common stock shall be entitled to receive the remaining assets and funds in proportion to the shares held by them respectively.

The power to fix the amount to be reserved as a working capital for the corporation is given to the board of directors, and all rights to dividends from profits shall be subject thereto.

The corporation cannot create or issue stock having rights in priority to the rights of the preferred stock; nor, without the consent of the holders of two-thirds in amount of the entire preferred stock at the time issued and outstanding, can the amount of the preferred stock be increased.

The certificate provides that as long as dividends at the rate of 5 per cent a year are paid on the preferred stock no voting power shall be vested in the holders thereof, but if there is ever any default in the payment of dividends they shall have full voting rights. If, however, the directors so request, the holders of preferred stock may cast votes in proportion to their holdings.

The directors will designate an executive committee to exercise between directors' meeting the powers of the board in the management and business of the corporation. The directors are empowered to decide when and to what extent the books of the corporation or any one of them, except the stock book, shall be open to inspection of stockholders. No stockholder shall have the right to inspect any books or documents except as he is empowered to do so by the statutes of the State or by the board of directors.

In behalf of the Interborough-Metropolitan Company directors it was said on Wednesday that the present earnings were sufficient to meet the interest on the \$70,000,000 4½ per cent bonds that will be issued. The 5 per cent dividend on the new cumulative preferred stock, they say, can also be paid out of present earnings, and there will still be left revenue for dividends on the common stock of the consolidated company. The Metropolitan Street Railway Company, the officials said, is now earning at the rate of 6 per cent on its capital stock, while the Interborough is earnings from 12 per cent to 14 per cent on its \$35,000,000 capital stock, after the 7 per cent guaranteed dividend on Manhattan Elevated stock is deducted. Since Jan. 1 the gross earnings of the Interborough Company have increased more than 10 per cent. It was stated that the Interborough-Metropolitan Company is now prepared to accept any fair offer for new subways. It is willing to proceed at once to construct and operate the Lexington Avenue subway extension from Forty-Second Street north, and the subway extension down the west side of town from Times Square to the Battery. The company wants to build a third track on the Third Avenue elevated. The Interborough has been wanting to do this a long time.

The managers of the new company think that the congestion will be well-nigh unbearable in a few months if permission to build the express track all the way down Third Avenue is not given. They point out that a new subway cannot be built and put into operation in less than four years, and that traffic to the Harlem River and across is increasing rapidly all the time.

**A MUNICIPAL OWNERSHIP EXPERT'S EXPERIMENT IN CHICAGO**

Dr. M. F. Doty, one of Mayor Dunne's "traction experts," tried an experiment on the Wabash Avenue line in Chicago last week, which resulted in much delay to passengers, and would have ended seriously had not President Mitten of the company countermanded the orders given by the doctor. Dr. Doty's idea was to increase the capacity of the Wabash Avenue loop, upon which cars are now being operated under a headway of 28 seconds. His plan was to have the trainmen close the gates on the right-hand side of the cars between Randolph and Madison Streets and close them on both sides between Adams and Jackson Boulevard, allowing no person to get aboard in this block.

As during the rush hours there is not more than 30 seconds' headway on this loop and it takes at least a minute to change the gates, and under Dr. Doty's plan this had to be done twice in two blocks, the cars naturally became blockaded. As a result, he had cars piled up all around the loop. President Mitten, of the Chicago City Road, came over to see how the experiment was progressing, and had to take the management of the road out of Dr. Doty's hands to get the cars running. A second attempt by Dr. Doty the following day resulted in the loop becoming blockaded again, and traffic was restored only by the interference of President Mitten.

## MUNICIPAL OWNERSHIP ORDINANCE PASSED BY THE CHICAGO CITY COUNCIL—STREET RAILWAY AFFAIRS IN GENERAL

The traction situation in Chicago took a sudden turn on Jan. 18, when the City Council, meeting in a committee of the whole, passed Mayor Dunne's \$75,000,000 Mueller certificate ordinance. The traction franchise ordinances, upon which so much time has been spent, were not voted upon.

At the opening of the meeting a motion was made to substitute the minority report of the transportation committee for that of the majority report, thereby substituting the Mueller ordinance for the extension franchise ordinances. Alderman Cullerton, a former supporter of the franchise ordinances, seconded the motion. After several hours of argument the Mueller ordinance was passed. The passage was effected only by the votes of about fifteen Aldermen, who heretofore have opposed the Mayor and the municipal ownership ordinances.

The more important sections of the ordinance passed read:

Be it ordained by the City Council of the city of Chicago:

Section 1. That for the purpose of acquiring street railways either by purchase, construction, condemnation, or otherwise as provided by law, and for the equipment of such street railways in and upon the streets of the city of Chicago hereinafter described, so as to provide for a first-class street railway system, the city of Chicago may issue and dispose of its interest bearing "street railway certificates" in the manner provided by law, not to exceed the sum of \$75,000,000.

Sec. 2. That said street railway certificates or the proceeds arising from the issuance and sale thereof shall be used by the city of Chicago for the purpose of acquiring either by purchase, construction, condemnation, or otherwise, street railways, together with the equipment thereof, in and upon and along the streets upon which street railway tracks are already located.

The second portion of the ordinance, providing for the municipal operation of the street railway systems, is:

Be it ordained by the City Council of the city of Chicago:

Section 1. That the question of the operation of street railways by the city of Chicago as provided in the aforesaid act be submitted to popular vote at the next election, to be held in the city of Chicago on the third day of April, 1906.

Sec. 2. The question to be voted on at said election shall be, "Shall the city of Chicago proceed to operate street railways?"

Sec. 3. This ordinance shall be in force from and after its passage.

Alderman Cullerton, who seconded the motion to adopt the minority report of the committee and thereby throw the franchise ordinances out of consideration, said:

It is useless to pass the majority report and submit it to the people for approval when we have been informed that the Chicago City Railway Company will not accept it. The traction question has been in politics as a municipal issue for eight years. While Mr. Harrison was Mayor he declared the traction question would not be settled until it was settled right. But Mr. Harrison never confided to any one what he believed to be the right way to settle it. The traction question carries with it the lowering of the tunnels. Real estate values in the southwest section of the city have decreased 100 per cent in the last few years because of the failure of the city to lower the tunnels. The commerce which made Chicago what it is to-day is being rapidly driven to the Calumet River and South Chicago.

The Chicago Union Traction Company is bankrupt, and the Chicago City Railway, which is solvent, refuses to accept what the committee has offered. Even if the city wins the ninety-nine-year litigation in the Federal Supreme Court, it will bring no real relief. The owners of these traction bonds are attempting to use this City Council to sell their bonds. I am opposed to the passage of the majority report.

The street railway companies were not represented at the meeting. President Mitten, of the Chicago City Railway, refused to discuss the action of the Council, but it is said he and others believe that should the ordinance be passed at the spring election, a test case would raise not only the general question of whether the Mueller law certificates are legal, but the point raised by the opponents of the ordinance, that it is contradictory to the intent of the Mueller law, as the ordinance does not provide for applying the certificates to the purchase or construction of a single system of street railways in one transaction.

James H. Eckels, one of the receivers of the Union Traction Company, said in regard to the action of the Council:

There is no possibility, in my opinion, that the end aimed at in the Council action will ever be realized. The final test will come on the validity of the Mueller certificates, and the Mueller certificates will never stand the test of the courts. I doubt that a majority of the citizens of this community would vote for an appropriation of the magnitude which will be required to purchase the properties.

At a meeting of the City Council Monday night, Jan. 22, no attempts were made to amend the Mueller ordinance. The minutes

of the meeting at which the measure was passed were approved unanimously. After the meeting Mayor Dunne stated that he had until next meeting to make any amendments.

At the meeting of the Chicago City Council, Monday, Jan. 22, an ordinance was passed commanding the commissioner of public works to remove at once all the turnstiles in the elevated stations on the Union loop.

A severe sleetstorm Sunday night resulted in almost a complete tie-up of several of the elevated roads. Traffic was not restored to normal condition until late Monday morning. The surface lines also experienced difficulty in operating cars, but the service on these was not so much affected as was that of the elevated lines.

Suit has been brought by the city against the railway companies, charging them with having disobeyed the public comfort ordinances of the city in respect to heating cars, furnishing seats and providing frequent cars. One suit is brought against the Chicago Union Traction Company for \$1,500,000, and another for \$500,000 against the Chicago City Railway Company.

Regarding the bringing of the suits, Julius G. Grossberg, special legal adviser for the administration, said:

"The suits are ordinary actions in debt, and the cause of action is the claim that both companies have disobeyed the 'public comfort' ordinances and rendered themselves liable to the amount of fines claimed in the suits.

"It is a new form of action, and I do not know that it will hold, but the idea is to stop a multiplicity of suits by consolidating all the cases brought before the justices which may be brought into one. It will also forestall a suit for injunction to stop our suits in the justice courts."

"It has been held," said Col. E. R. Bliss, for the Chicago City road, "that a suit in debt can be brought to collect a fine under a penal ordinance, so I guess Mr. Grossberg is all right on that proposition. I am afraid, however, he will find he must set up in his pleading specific instances of violation, and the common counts will not do. As for stopping an injunction suit, that cannot be done if there is any cause for bringing one."

## MR. VREELAND ON WELFARE WORK

The National Civic Federation, of New York, has just issued in pamphlet form the address on "Welfare Work," delivered two or three months ago before the New England Cotton Association at Atlantic City, N. J., by Herbert H. Vreeland, president of the New York City Railway Company. Mr. Vreeland is chairman of the welfare department of the National Civic Federation, and has given a great deal of attention to this subject. In this address he described the welfare work among some of the progressive mills in New England, Vandergrift, Pa., Dayton, Chicago, and elsewhere, many of which are conducted by special superintendents called welfare managers, superintendents, or secretaries. He also described in detail some of the work of the Metropolitan Street Railway Employees' Association in New York, including the library, relief association and recreation rooms. He emphasized the importance of the employer or president taking an active interest in any work of this kind which may be started, and stated that there is a tendency in the average foreman to oppose any such plan until thoroughly acquainted with the result.

As to the attitude of the employees toward welfare work, he said: "It may be stated generally that employees will welcome all efforts properly introduced to provide for their physical, mental and moral welfare. An employer who is noted among his employees for fair dealing need have no fear in introducing welfare work after a careful study of conditions has been made. That is to say, after recognizing the first needs of employees to be steady work, an equitable wage, and hours as short as competitive conditions will permit, the employer may successfully install welfare work, if proper attention is given to its introduction."

In conclusion, he said: "The motive of the employer is one which comes before us constantly. While the economic value of welfare work must be admitted, it is pleasant to find that the average employer promotes welfare work from the humanitarian standpoint. It is not difficult to prove that it is desirable from a mercenary point of view. One may enumerate such advantages as the attracting of skilled employees who will seek work where the conditions are best; good discipline and self-respect, which may be secured through opportunities for cleanliness; a permanent set of employees, as against a constantly changing force which requires effort to train, and necessitates the loss of much material wasted; and a happy, contented class of workers."

## BOSTON TRANSIT COMMISSION ISSUES SPECIAL REPORT

Acting by the authority of the Massachusetts Legislature of 1905, the Boston Transit Commission issued a report on Jan. 20, presenting the results of an exhaustive study of the transportation problem in Boston. The Commission summarized its conclusions as follows:

1. The subways already authorized will provide sufficiently for the future so far as concerns the traffic to the south.

2. The subways already authorized will provide for a considerable increase in the traffic capacity toward the north. The capacity of the bridges across the Charles River will limit the traffic in this direction.

3. In order that all tracks may be used to their full capacity, the East Boston Tunnel tracks should not be permanently connected at grade with the present subway tracks at Scollay Square, thereby diminishing by one-half the capacity of its own tracks and that of the through tracks in the present subway north of that point; but eventually these East Boston Tunnel tracks should either end in a loop under Scollay Square station or be extended to the west as a part of some east and west through line.

4. The act providing for the East Side subway (for surface cars east of the Washington Street Tunnel) should be amended so as to allow that subway to be built at a greater distance from Washington Street, so that it may pass over, rather than under, the East Boston Tunnel.

5. The Cambridge Street subway should not be connected at grade with the Tremont Street subway, but should either end in a loop or form part of some through line to the east. If ending in a loop, further study may indicate that it is desirable to carry this subway toward the neighborhood of Park Street.

6. Additional provision should be made without delay for the traffic toward the west. The Commission recommends that the present subway under Boylston Street and the Public Garden be extended immediately to Copley Square, or to some other point or points farther west, as further study may determine, separating the grades of the Boylston Street and Huntington Avenue tracks. A new line should also be constructed from a point near the junction of Commonwealth Avenue and Beacon Street to a new station at Park Street.

7. In laying out any comprehensive subway or elevated transportation scheme, grade crossings should be avoided as far as possible. Every such crossing reduces the traffic capacity of the tracks involved. The construction of a subway or an elevated road is so expensive that the capacity should be kept if possible at a maximum. Stub ends should be avoided if practicable, and loops should be provided, which do not reduce the capacity of the tracks.

8. The danger to surface structures now erected or to be erected is not such as to be a barrier to the further construction of subways. It is not probable that in the future greater difficulties will have to be surmounted than have already been overcome in the construction of the East Boston and Washington Street Tunnels.

The Commission estimates that in 1915 the Boston Elevated Railway Company will carry 394,000,000 revenue passengers, and in 1925, 628,000,000. It appears probable that in the next ten years the street-car traffic in Boston will increase normally some 60 per cent, and will double in from fifteen to twenty years. Additional facilities are needed for the traffic already existing. The Commission states that while the transportation facilities have been doubled within the past ten years, yet the cars are now uncomfortably crowded in the rush hours and not infrequently in the middle of the day. The Commission proposes that the cars now running on Washington Street be diverted into the Tremont Street subway when the Washington Street Tunnel begins operation. The Washington Street Tunnel will not be completed in less than a year and a half. The Commission believes that the business district will be well provided for with the Atlantic Avenue elevated, the Tremont Street subway, the Washington Street Tunnel and the East Side subway in operation. South Boston and Dorchester can be cared for if necessary by an extension of the Atlantic Avenue elevated. The report states that the present congestion on Boylston Street and on Massachusetts Avenue cannot be avoided while the trackage is limited as at present. On Boylston Street from the entrance of the subway to Berkeley Street there are now scheduled in the maximum hour 220 cars. The Commission suggests that the reasonable capacity of a surface track should be about 160 cars per hour. By utilizing both the surface trackage on Boylston Street and by extending the subway, the Commission believes that 400 cars per hour could be handled on and under Boylston Street.

Several routes are suggested for the Back Bay subway work; the Commonwealth Avenue line, the new Charles River embank-

ment route, and a subway loop from Columbus or Huntington Avenue to the South Station, and a Park Street-South Station subway under Winter and Summer Streets. A loop is planned beneath the surface at the North Station for cars using the present subway. This would enable the easy extension of the subway northward in the future and would give a higher traffic capacity than a surface loop hampered by grade crossings.

## DATES SET FOR SALE OF APPEYARD PROPERTIES

The decrees have been entered in the United States Court for the sale of the Dayton, Springfield & Urbana Electric Railway; the Urbana, Bellefontaine & Northern Railway, and the Columbus, London & Springfield Railway, respectively, at Springfield, Bellefontaine and Harmony, on Feb. 16, and of the Central Market Street Railway and the Columbus, Grove City & Southwestern Railway in Columbus on Feb. 17. These several properties will probably be turned over to the new owners about March 1. The upset prices are fixed as follows:

For the Dayton, Springfield & Urbana, \$300,000, subject to bonds of \$750,000; for the Urbana, Bellefontaine & Northern, \$175,000; for the Columbus, London & Springfield, \$250,000, subject to bonds of \$1,500,000; for the Central Market, \$150,000, subject to bonds of \$500,000; for the Columbus, Grove City & Southwestern, \$35,000, subject to bonds of \$208,000. No competition is expected generally, except in the case of the Dayton, Springfield & Urbana. The chief bidder, if not the only one, it is thought, will be A. E. Locke, of Adams & Company, Boston, chairman of the reorganization committees, who holds practically all of the floating indebtedness, having purchased it from the creditors of the roads.

The liabilities of the various companies over and above the bonded indebtedness are substantially as follows, namely: For the Columbus, London & Springfield, \$1,100,000, including 208 Columbus, Grove City & Southwestern bonds guaranteed, but not including 500 Central Market bonds guaranteed; for the Dayton, Springfield & Urbana, \$1,300,000, including 500 Urbana, Bellefontaine & Northern bonds guaranteed, and 155 Springfield & Western bonds guaranteed, but not including 600 Kenton & Southern bonds; for the Urbana, Bellefontaine & Northern, \$35,000 of notes issued are included in the Dayton, Springfield & Urbana liability; for the Columbus, Grove City & Southwestern, \$117,000, and for the Central Market, \$362,000. These liabilities in each case are exclusive of the bonded indebtedness, except that of leased companies as hereinbefore described.

## CHANGES IN CLEVELAND COMPANY

At the annual meeting of the Cleveland Electric Railway, held last week, several important changes were made in the personnel of the company. J. J. Stanley, general manager, was given the additional office of vice-president and will be the active head of the company, as it has been announced that President Horace Andrews will in the future spend the greater portion of his time in New York, managing the affairs of the New York Central traction properties. C. F. Emery was made second vice-president. All other officers and directors were re-elected, except that W. D. Rees was elected a director in place of the late L. W. Prior. George Radcliffe, heretofore division superintendent, was made general superintendent, and A. E. Doty, another division superintendent, was made assistant general superintendent.

## THE MILAN CONVENTION OF THE INTERNATIONAL STREET & INTERURBAN RAILWAY ASSOCIATION

The committees to report on two more questions to be considered by the International Street & Interurban Railway Association (Union Internationale de Tramways et de Chemins de Fer d'Intérêt Local) at its Milan convention next September, have been announced by the secretary. They are as follows:

Ninth Question.—Track construction for urban tramways. Committee: Messrs. Dubs, manager of the Marseilles Tramways, and Busse, chief engineer of the Grosse Berliner Tramways.

Eleventh Question.—The use of wattmeters on city cars. Committee: Mr. Wattman, manager of the municipal tramway system in Cologne.

A complete list of the topics to be considered was published on page 837 of the STREET RAILWAY JOURNAL for Nov. 4, 1905.

## LINE PROJECTED BETWEEN DENVER AND LEADVILLE

An electric railway is projected between Denver and Leadville, a distance, by the route proposed, of 115 miles. H. T. Herr, formerly with the Denver & Rio Grande Railroad Company, who is interested in the new project, says there is a distinct field for the new line in the territory it is proposed to traverse, more especially as the distances between the terminal cities by steam railroad are 151 miles for the Colorado & Southern, 209 for the Colorado Midland and 275 for the Denver & Rio Grande. There is a part of the old Denver & Rio Grande survey that is to be used, and it is also said that a portion of Platte canon will be utilized. Lines will radiate from Leadville to various mines and the tunnel through the range will open the Alma and Fairplay districts and many low-grade mines so that ore shipments can be made much lower than the present compared \$4 a ton rate. From Leadville the lines will extend to the Horseshoe district and Twin Lakes. Mr. Herr is now negotiating with the Westinghouse Company, of which his brother, E. M. Herr, is first vice-president, for the equipment of the line with the single-phase system.

## THE PENINSULAR RAILWAY

The Peninsular Railroad Company, which has filed articles of incorporation at San Jose, Cal., with a capital stock of \$5,000,000, and \$205,000 subscribed, purposes to build 204 miles of electric railway. O. A. Hale, president of the San Jose & Los Gatos Interurban, is president and chief stockholder and manager of the company, and F. E. Chapin, of the Interurban Company, is treasurer. Lines are to be built from San Francisco to San Jose through Stanford University, Palo Alto, Redwood City and San Mateo. Branch lines will extend to Los Gatos, Sempervirens Park, Alviso, Oakland, Alameda, Alum Rock Park and the Lick Observatory on Mt. Hamilton. It is said that the new road is backed by the Southern Pacific, and that the first lines constructed will be from San Jose to San Francisco and to Oakland, one on each side of the bay. The report is that the main coast line of the Southern Pacific will be shortened by a cut-off from Mountain View, and that the trains for Los Angeles and points beyond will go via Santa Cruz, while San Jose will be served by the new electric lines of the Peninsular Company, which will enter San Francisco through the Mission, using the tracks that are to be abandoned by the steam cars as soon as the Bay Shore cut-off is completed on the line to San Jose. One of the reasons given for the early construction of the new system is the completion of the Hanchett-Martin companies in and around San Jose. It is reported that the United Railroads, which has an electric line from San Francisco to San Mateo, had a compact with the Southern Pacific not to build south to San Jose if the Southern Pacific would not build another line north from San Jose to San Francisco. O. A. Hale recently said: "We intend to sell not only transportation, but power for irrigation and for illumination."

## PENNSYLVANIA'S PROPOSED WORK IN NEW YORK

The Pennsylvania Railroad, through President Cassatt, has made public its plans for developing its facilities in and about New York. It intends to spend at least \$100,000,000. The plans are set forth in detail in a letter President Cassatt has written to Mayor McClellan, and to President Orr, of the Rapid Transit Commission, of New York. Mr. Cassatt appeals strongly against overtaxation, especially against payment for the right to carry freight to and from the city, which charges were suggested at a recent hearing of the Commission by the engineer in charge of the Bureau of Franchises. The proposed charges are: \$250,000 gross on signing the franchise, \$50,000 a year for ten years, and \$100,000 a year for the next fifteen years, the rates to be subject to indefinite readjustment at the end of twenty-five years.

The company, Mr. Cassatt says, intends to build a huge freight terminal, to be called Sunnyside Yard, between Jackson and Thompson Avenues, in Queens Borough. It will be a mile long, nearly one-third of a mile wide, and will include an area of about 8712 city lots, or about 400 acres.

The elimination of grade crossings on the railroads of the Long Island Company is the second of the company's plans. Next come local delivery yards for freight in Brooklyn and Queens. The sites and areas of the proposed new yards are as follows:

Freight terminal at Bay Ridge, between Sixty-Fourth and Sixty-Sixth streets, extending from Fourth Avenue to the bay, 790 city lots.

Delivery yard at Fifth Avenue and Sixty-Fifth Street, Bay Ridge, 35 city lots.

Delivery yard at Fifteenth Avenue and Sixtieth Street, Bath Junction, 44 city lots.

Delivery yard on Gravesend Avenue (Parkville), 98 city lots.

Delivery yard at Manhattan Beach Junction, East Sixteenth Street and Avenue I, 150 city lots.

Delivery yard, Vanderveer Park, Flatbush Avenue, 90 city lots.

Delivery yard at Paerdegat Basin, near Canarsie, 95 city lots. This is convenient to the contemplated municipal improvement of Jamaica Bay, set forth in the late communication by Comptroller Groat to the Commissioners of the Sinking Fund.

Delivery yard at Rockaway Avenue, 80 city lots.

Freight terminal at East New York, 566 city lots.

Delivery yard at Bushwick Junction, 96 city lots.

The construction of a new freight terminal at Third Street and Hunter's Point Avenue, and of a freight delivery yard north of Hunter's Point Avenue, to occupy an area of 109 city lots.

The connecting railroad, which is to be 12 miles long, will cross the East River by a bridge at Ward's and Randall's Islands. This railroad will be connected with the tunnel line by a short, direct line, giving Manhattan, as well as Queens and Brooklyn direct communication with the north.

The execution of these works, says President Cassatt, depends largely on the fairness with which New York will treat these interests.

The right to cross streets is asked, Mr. Cassatt says, only where the company shall own both sides of the street.

## ANNUAL REPORT OF AMERICAN LIGHT & TRACTION

The American Light & Traction Company's annual report for the year ending Dec. 31, 1905, shows net increased earnings over the previous year of \$203,657, or 17.98 per cent. The company's earnings for the last two years compare as follows:

Year—	1905	1904
Earnings on stock of subsidized companies owned by this company.....	\$1,222,785	\$1,007,001
Miscellaneous earnings, interest, etc....	150,835	144,502
Gross earnings .....	\$1,373,620	\$1,151,503
Expenses .....	37,452	18,993
Net earnings .....	\$1,336,168	\$1,132,510
Dividends .....	747,328	669,132
Surplus .....	\$588,840	\$463,378

The company's condensed balance sheet as of Dec. 31, 1905, compares with the previous year as follows:

Assets—	1905	1904
Investment account .....	\$24,103,177	\$23,472,283
Treasury stock (102,469 shares common stock).....	I	I
Furniture and fixtures.....	1,299	1,039
Undivided profits subsidized companies..	1,468,156	1,260,759
Bills receivable subsidized companies..	1,625,904	1,024,887
Accounts receivable .....	24,413	51,898
Stocks held for temporary investment..	2,976	95,885
Cash on hand and in bank.....	409,738	209,211

Total .....

Liabilities—	1905	1904
Preferred stock .....	\$9,633,200	\$9,396,900
Common stock .....	15,000,000	15,000,000
Bills payable .....	500,000	2,147
Reconstruction reserve .....	179,205	.....
Dividends accrued and payable Feb. 1, 1906 .....	192,029	.....
Undivided earnings .....	2,131,230	1,716,916

Total .....

During 1905 the dividends paid on the preferred stock was at the regular rate of 6 per cent per annum. Beginning with Aug. 1, 1905, the dividend on the common stock was increased from the rate of 3 per cent annually to 4 per cent annually.

During the year the company added to its list of properties those of the Quebec-Jacques Cartier Electric Company, of Quebec, Canada; the Muskegon Traction & Lighting Company, of Muskegon, Mich., and the Lacombe Electric Company, of Denver, Col.

The item of \$500,000 in the bills payable balance sheet of 1905 represents money borrowed when the Muskegon property was acquired. This will be paid off from funds to be received from the sale of the recently authorized issue of stock, the subscriptions to which are payable Feb. 5.

## RAILWAY LEGISLATION IN IOWA

Governor Cummins, of Iowa, in his message to the Thirty-First General Assembly, made certain recommendations affecting the steam and interurban railways which are quite likely to be acted upon. Of these recommendations the one of primary import to the electric railway interests has to do with the passage of an act which would allow one railroad company to make the same rate between competitive points within the State as does any other railroad. Under what is known as the "long and short haul" clause in the statutes of Iowa, a railway company cannot charge a smaller fare for a long distance than it does for a short distance. The Governor says, "The general justice of such a provision is unquestionable, but I believe that there are circumstances under which the railways should be permitted to meet competition without effecting intermediate points. You will better understand what I mean through an illustration. A passenger desiring to travel from Des Moines to Marshalltown has the option of several routes. The Chicago & Great Western line is the shortest route, and the fare which the company is permitted to charge is three cents per mile. I can see no good reason why the Chicago & Northwestern, for instance, should not be permitted to carry the passenger for the same fare that is allowed to the Chicago & Great Western line, without affecting the charge to intermediate points between Des Moines and Marshalltown on the Chicago & Northwestern line. I therefore recommend such an amendment to the law as will authorize the Board of Railroad Commissioners, under such circumstances, and after due investigation, to relieve the railways from the effect of the long and short haul clause in the statute. I do this not only because I believe it is just to the railways, but because it will greatly convenience the traveling public."

The passage of such a law will probably bring on a competitive rate war in Iowa between the interurban and the steam railroads. Under the provisions of such an act the steam roads could put interurban service on their lines which touch competitive points along the interurban lines, just as the Rock Island did last year between Iowa City and Cedar Rapids, and make the same rate or a lower rate than the interurbans maintain between the said points. The Rock Island was compelled to abolish the interurban service maintained between those points above mentioned on account of the long and short haul provision of the statutes, under which it could not charge a less rate between Iowa City and Cedar Rapids than between Iowa City and Ely, a point on the line between Iowa City and Cedar Rapids.

## LOUISVILLE & NORTHERN RAILWAY & LIGHTING COMPANY

To secure the payment of \$2,500,000 5 per cent bonds when they become due in December, 1925, a mortgage from the Louisville & Northern Railway & Lighting Company to the American Trust & Savings Bank, of Chicago, and Frank H. Jones, trustee, has been filed in the office of George W. Stoner, Recorder of Clark County, Ind., at Jeffersonville. The instrument is signed by Samuel Insull, president, and J. O. English, secretary. It is set forth in writing that the action was authorized at a meeting of the directors and stockholders held on Dec. 28, 1905.

It is stipulated that \$500,000 of the amount is to be used at once for building electric lines in the counties of Clark, Floyd, Harrison, Washington, Orange, Jefferson, Scott, Jennings, Crawford, Perry, Spencer, Farrick, Vanderburg and Jackson. According to this the eastern terminus would be at Madison, and the western at Evansville, the southern being Jeffersonville, and the northern at Seymour, a line from the former place to Indianapolis having been in operation for some time.

A second road, seeking a northern outlet, the Louisville & Indianapolis Traction Company, has already been surveyed to Seymour, 49 miles north of Jeffersonville, and considerable of the right of way has been secured. A road from Jeffersonville to Sellersburg, which is to pass through Watson, 6 miles north of Jeffersonville, is now being graded by the Louisville & Southern Indiana Traction Company, there being a likelihood this may go on to Charlestown, 7 miles north of Watson, but the inducements so far offered have not been sufficient to cause the promoters of the road to give out officially that the road would go to Charlestown.

It is thought that Louisville is to be the junction point for a line from Evansville to Cincinnati in one direction, and from Louisville to Chicago in the other. Extensive preparations that have already been made in and around Jeffersonville show there is something more than a road from New Albany to Louisville to be built and that at once. As rapidly as possible the road now operating under the name of the Louisville & Southern Indiana Traction

Company is being double-tracked and the rails are down from Court Avenue and Spring Street, in Jeffersonville, to the western limits of Howard Park. There is another good stretch of double track west of the Baltimore & Ohio Southwestern Railroad, which leaves a short piece of single track to Glenwood Park, from which place on down to the end of the line in New Albany there is a double track.

## ACCIDENT ON BROOKLYN ELEVATED

One man was killed and thirteen persons were injured in an accident on the Lexington Avenue elevated line of the Brooklyn Rapid Transit Company, at Fulton and Chestnut Streets, Brooklyn, shortly after noon Friday, Jan. 19. One car of a three-car train bound for Cypress Hills, left the tracks, plunged over the guard rail and shot into the street, about 20 ft. from the structure. At Fulton Street, near Chestnut Street, there is an incline about a block long, running from the elevated structure to the surface tracks of the Long Island Railroad Company, which is used in summer for operating the elevated trains from Broadway Ferry to Rockaway Beach. As it was the company's plan to run a test car over the tracks on Friday, an employee was ordered to remove the switch pins at the point where the incline begins. About the time the test car was due, a three-car train en route to Cypress Hills came along at a moderate rate of speed. The first car passed safely over the switch, but the second car took the switch. The coupling between the first and the second car broke and the front wheels of the second car swerved over the westbound tracks, carried away the guard rail and plunged over the incline. The coupling between the second and third cars broke and the last car swung diagonally across the tracks, being kept on the structure by the other guard rail. In the third car there were about a dozen passengers.

## AN EFFORT TO SECURE FREIGHT RIGHTS IN PENNSYLVANIA

An organized effort is to be made to have the next Pennsylvania Legislature pass a bill to give the electric railway companies the right to carry freight. Farmers and shippers throughout the entire State are in accord with the plan that has been evolved, and organizations are now being perfected to lend aid to the movement. The Chester County Agricultural Association is one of the bodies foremost in the agitation, and the Grangers throughout the State, at their recent meeting in Sunbury, adopted resolutions favorable to it. J. J. Sullivan, president of the American Railways Company, is reported to be foremost among railway men in urging the need of legislation. It is said that in an effort to check the movement for the support of the bill among Chester County farmers, the Pennsylvania Railroad Company has offered to give the West Chester Street Railway Company a right of way through property owned by the railroad between Gallagherville and Coatesville. This is after opposing the electric railway company for more than two years. The committee appointed at the recent convention of West Chester farmers has sent to Governor Pennypacker a copy of the resolutions which were adopted.

Several delegations from various sections representing the electric railway interests called upon the Governor last week and solicited his favorable action in the matter. In response to a telegraphic call from Philadelphia, a conference of electric railway officials was held at the Commonwealth Hotel, Harrisburg, on Monday, Jan. 22, to consider the matter. If the call is issued such a bill will be promptly introduced and is certain to be supported almost unanimously by the representatives from districts outside of the cities of Philadelphia and Pittsburg. Representative Creasy, of Columbia, has been fighting for years for the passage of such a bill, and proposes to offer a resolution at this special session authorizing the Governor to amend his call so as to include this subject.

## PROPOSED LINE FROM LANSING TO GRAND LEDGE

A. A. Piatt, president of the Piatt Light & Heat Company, of Lansing, Mich., is authority for the statement that a company will be organized to build an electric railway from Lansing to Grand Ledge, with probable extensions connecting it with Ionia and Charlotte. The Piatt Company will build a concrete dam at Grand Ledge this spring, and in connection with the flowage rights has secured a large part of the right of way for the proposed road, and it seems very probable that the line will be built during the coming season.

## NEW PUBLICATIONS

Report of the Third Annual Meeting of the American Railway Mechanical and Electrical Association, held at Philadelphia, Sept. 25-26, 1905. Published by the Association; 295 pages.

This report is the first to appear of those conventions held at Philadelphia last fall, and will be read with interest, not only by those who were not present at the meetings, but by those who were. The Philadelphia convention of this association was particularly valuable this year and the discussions and papers will well bear rereading. The report includes a portrait of President Baker and a statement that the association will hereafter be known as the American Street & Interurban Railway Engineering Association. The front cover shows a representation of the official badge used as Philadelphia.

Earth and Rock Excavation. By Charles Prelini. New York: D. Van Nostrand & Company; 357 pages; illustrated. Price \$3.

The chief objects of this book, as described by the author in his preface, are "first, to concentrate in a small volume descriptions of the different operations which are required for planning and executing any work of excavation in either earth or rock; and, second, to classify and describe clearly the various implements and machines used for excavating and hauling away the material." With these objects in view, the author first presents a discussion of the methods of calculating earthwork. Succeeding chapters consider the various methods of planning and executing works of excavation, and describe methods for deducing the cost of such work in any particular case. Finally, a chapter is devoted to brief descriptions of a number of large works of excavation. The book is illustrated by diagrams and views of earthwork appliances.

## STREET RAILWAY PATENTS

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

## UNITED STATES PATENTS ISSUED JAN. 16, 1906

809,956. Amusement Device; Charles H. Jaeger, New York, N. Y. App. filed Oct. 10, 1905. An amusement device consisting of a stationary body representing a vehicle in which the occupants may be seated to face either forward or rearward, and connections for imparting rocking movements to the stationary body.

809,999. Railway Signaling; Samuel D. Strohm, Philadelphia, Pa. App. filed Aug. 29, 1891. Mechanism arranged to automatically set danger signals and to apply the air brakes on a following train in case it passes a danger signal.

810,027. Electric Signal; Charles C. Blake, Brookline, Mass. App. filed Aug. 19, 1905. A selective signal system consisting of a transmitting station having a series of pendulums adapted to send electric impulses of different periodicity over a line wire when connected thereto, a series of way stations, each provided with a pendulum device adapted to respond to the vibrating of one only of said transmitting pendulums, an electric lamp signal and a semaphore arm which becomes operative when the unison of vibrations is established between the transmitter and receiver.

810,069. Overhead Trolley Harp and Shoe for Electric Railways; John Miller, Jr., Amesbury, Mass. App. filed March 17, 1905. A pivoted shoe mounted in the trolley harp in place of the usual wheel, has anti-friction rollers at each end thereof. Means for lubricating the shoe.

810,240. Electric Motor Controller Regulator; Paul A. Weyland, Maywood, Ill. App. filed June 14, 1905. An attachment for ordinary car controllers, having a plate movable with the controller arm upon which is a freely pivoted lever. The lever co-operates with stationary cam grooves and ratchet teeth in such a way that the controller arm must be moved step by step to its "on" position, but can be swung to its "off" position from any one notch without resistance.

810,316. Emergency Rail Brake; Powell O. Adams, Cameron, Tex. App. filed July 6, 1903. Consists of a plurality of levers arranged in pairs and each pair having a transverse swinging movement and adapted to grasp a rail and pneumatic-pressure-regulated pistons connected to said levers, each lever being provided with a bearing roller.

810,323. Switch-Operating Device; William A. Chun, Houston, Tex. App. filed July 18, 1905. Details of construction.

810,326. Car Fender; Joseph B. Connor, Liverpool, England. App. filed Sept. 19, 1905. A vertically suspended gate having such connection with a scoop mounted in the rear thereof that when the gate encounters an obstruction it will swing backward and throw the scoop to operating position.

## PERSONAL MENTION

MR. E. G. MCGAW has resigned from the Portland Railway Company, of Portland, Ore., to enter other business. Mr. McGaw was for fifteen years superintendent of the east side lines of the City & Suburban Railway Company, of Portland.

PROF. ALBERT S. RICHEY, head of the department of electric railroading at Worcester Polytechnic Institute and formerly connected with the Indiana Union Traction Company, of Indianapolis, is bereaved by the sudden death of his wife at Worcester, Jan. 15. Mrs. Richey was the only daughter of Mr. John Neely, of Muncie, Ind., at whose home the funeral was held.

MR. E. A. TURPIN, chief clerk to General Manager A. L. Drum, of the Chicago & Milwaukee Electric Railroad, has been appointed purchasing agent of the company. Previous to his connection with the Chicago & Milwaukee Electric Railroad, Mr. Turpin was acting superintendent of freight and express traffic of the Indiana Union Traction Company and chief clerk to the general manager.

MR. WARREN BICKNELL has retired as president of the Lake Shore Electric Railway to become president of the Cleveland Construction Company, with offices in Cleveland, succeeding Mr. Will Christy. The company makes a business of building and financing properties, and it is now identified with several important projects. Last week Mr. Bicknell was surprised at his home by motormen and conductors of the Lake Shore Electric Railway, who presented him with a magnificent grandfather's clock. Mr. Bicknell's efforts in building up the Lake Shore Electric have met with remarkable success. A year ago the property showed a deficit of \$18,000, while the past year there was a surplus of \$115,000. The percentage of cost of operation to gross receipts was reduced from 65.73 in 1904 to 54.37 in 1905.

MR. WARREN P. BRISTOL, general manager of the Meriden Electric Railway, of Meriden, Conn., has been appointed acting general manager of the Hartford lines of the Consolidated Railway Company, to succeed Mr. Frank Caum, who has accepted the position of general manager of the Scranton Railway. Mr. Bristol has been manager of the Meriden line since November, 1895, when he succeeded Mr. W. C. Gray. He was born in Cheshire, April 18, 1873, and went to Meriden Oct. 13, 1893, with the engineering corps under Mr. Norman McD. Crawford, formerly manager of the Hartford Street Railway Company, when the corps was laying out the line between Meriden and Wallingford. When the line was completed Mr. Bristol remained in Meriden as assistant to Superintendent Gray and became his successor when the road was bought by the New York, New Haven & Hartford Railroad Company.

MR. JAMES C. ERNST, president of the Cincinnati, Newport & Covington Railway, was pleasantly surprised at his office in Covington, Ky., a few days ago, by the receipt of a letter of thanks, in folder form, for the recent gifts of cash to the employees of the company. The frontispiece of the folder contains a likeness of Mr. Ernst surrounded by four views of the power station. Inside is the letter of thanks, to which are attached the signatures of the employees. The letter read: "Mr. James C. Ernst and Board of Directors. Gentlemen—We the undersigned employees of the power station wish heartily to thank you for your Christmas remembrance. We appreciate the fact that in extending this gift to us you were moved alike by a desire to raise the morale of the force and to show your personal interest in each of us. We can only thank you and endeavor by faithful and diligent service to merit your confidence." Mr. Ernst will have the letter framed and hung in his private office.

MR. FRANK CAUM, who, since Mr. Norman McD. Crawford retired as general manager, has been the acting general manager of the Hartford lines of the Consolidated Railway Company, operating the electric railway properties owned by the New York, New Haven & Hartford Railroad, has resigned to become the general manager of the Scranton (Pa.) Street Railway Company. Mr. Caum came to Hartford Aug. 1, 1894, as engineer at the power station and was made superintendent of the Hartford Street Railway Company in October, 1897. He succeeded Mr. Crawford in June last year. Mr. Caum formerly lived in Meriden, and in 1889 went to Rochester, N. Y., where he was engineer of the power station of the street railway system. From there he went to Jersey City, N. J., as chief engineer of the power station of the Consolidated Traction Company. He left that post to come to Hartford. While in Rochester he was associated with Mr. Crawford, who was general manager of the system. He was also associated with Mr. Crawford in New Jersey.