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CONSOLIDATION IN CHICAGO The operating consolidation of the surface lines in Chicago which has just been accomplished has resulted in the largest surface electric railway system in gross earnings in the world. The Chicago Railways Company was the largest earner in the combine, having gross receipts during the year ended Jan. 31, 1913, of slightly more than \$18,000,000. The lines concerned in the consolidation controlled by the Chicago City & Connecting Railways earned during the same period about \$12,000,000, making a total of about \$30,000,000. The only city railway by which this total is exceeded is the Interborough Rapid Transit Company of New York, whose subway and elevated lines earned during the year ended June 30, 1913, \$32,497,870. Consequently the Chicago system is the second largest in gross receipts among the city railways and the largest among the surface railways. It may be interesting in this connection to mention the receipts for the last year reported of the five other largest electric railway companies in the order of their gross receipts: Brooklyn Rapid Transit Company, \$24,152,288; Philadelphia Rapid Transit Company, \$23,927,179; Boston Elevated Railway, \$16,808,909; Public Service Railway, \$15,259,794, and New York Railways, \$14,065,158. The first three roads in the list have elevated and subway lines. The Brooklyn Rapid Transit Company is represented in the subway group through its use now of a part of the new loop connecting the Williamsburg Bridge and the original Brooklyn Bridge—a line which will be completed shortly.

THE FASCINATION OF RAILROADING One cannot be long in touch with the transportation industry without realizing that, despite the increasing burdens and complex problems constantly demanding attention, railroading has a fascination for those engaged in it which never seems to diminish. This is peculiarly true in the electric railway field, where problems are ever-changing in character and where the progress of electrical engineering and of operation, the broad yet close relations with the great public and the mechanical aspects of the industry demand the most careful analytical study. At the same time they yield full opportunity for co-operative endeavor. The "call of the rail" is as real a challenge to men of red blood and keen minds as the sustained impulse to employ one's talents in pioneer work on the fast-disappearing frontier of civilization. Once it is heard, it stays with one for a lifetime, and a sympathetic interest in railroad problems is never lost, no

matter how far afield one's personal fortunes may carry him. The recent dinner of the New England Street Railway Club furnishes an instance of this. All but one of the nine past-presidents in attendance are still actively engaged in electric railway work, and every one discussed either entirely new problems or new aspects of old issues of large interest. The rewards of ability and loyalty are still sufficient to hold the devotion and interest of the leaders of the profession—the men who recognize new problems as they arise and who advance by their attempts to solve them in the interests of the industry as a whole.

THE RIGHT JOB FOR THE MAN To find the right man for the job is an old and ever-pressing problem in spite of parades and mass meetings of the unemployed. It now appears, however, from the results of investigation and observation that the search should be directed toward finding the right job for the man. In other words, employers have found that, instead of the old policy of "hiring and firing" until the right man is discovered, it is worth while to give some study to individual adaptability with a view to discovering what work a given man can do best. Excluding drones who are beyond redemption, it has been found that men who were a failure and who would not, even if allowed to do so, stay in one line of work have made valuable employees in some other line. Individual peculiarities, likes and dislikes are worth considering in this connection, and with employments so varied as those found in electric railroading it should be possible to avoid the loss of useful workers by putting them where they can do their best work. One industrial concern believed it worth while to investigate this theory and asked every man who left its shops or who was recommended for dismissal to say why he was resigning or why he was not doing better work and whether there was work that he would like to do and felt that he could do well. A majority of the replies indicated that dissatisfaction or unsatisfactory service was due to a misplacement of men rather than to shiftlessness or actual inefficiency. No doubt, these matters were easily adjusted among the small bodies of employees that were the rule in former days, but there is something in the idea outlined above that applies to the building of a permanent, contented and efficient railway organization on the large scale that is required to do to-day's work. In perhaps no other industry does teamwork mean more than it does with the electric railways or do the departments have to rely upon each other for efficient co-operation to as great a degree.

RESULTS OF THE A. I. E. E. MIDWINTER CONVENTION

In this and the preceding issues of the *ELECTRIC RAILWAY JOURNAL* considerable space has been devoted to a report of the meetings held recently in New York by the American Institute of Electrical Engineers. The field of this organization differs from that of the American Electric Railway Engineering Association, which cannot, in the limited time at the disposal of its members in conventions, devote much attention to subjects like those taken up at the Institute meetings. The railway association must concern itself primarily with problems immediately affecting electric railway operation. These cover a very wide field of civil, electrical, mechanical, highway and other branches of engineering. The function of the Institute meetings is to permit the discussion of those more technical electrical subjects upon the proper understanding of which success in solving engineering problems depends.

The winter meeting of the Institute differs from the summer meeting in that fewer subjects are discussed and a determined effort is made to exhibit the present state of the art and science of one particular branch of the industry. The 1913 meeting, which was the first of these midyear meetings, was taken up with the problems of electrical machinery design. This year the most timely topics were considered to be those connected with power generation and transmission. Two important recent developments have imposed new problems along this line upon the electrical engineer. These are the aggregation of great numbers of large generating units in single power stations and the tendency to use very high voltages in power transmission lines.

The problem incident to the concentration of power generating capacity is the safeguarding of the service from the effects of short-circuits. The solution lies in the correct application of reactance coils in addition to the circuit-breaking devices already standard. While this development is comparatively new, there appear to be no serious obstacles at present in sight. The case is different with the transmission line. Here large power capacity and high voltage have produced difficulties which tax the ability of engineers and manufacturers to the limit. The manufacture of porcelain which will permanently resist electric stresses appears to be difficult. The production of apparatus to protect equipment from the effects of line surges resulting from switching and atmospheric lighting is also by no means standardized. In fact, as was emphasized by Dr. C. P. Steinmetz, it is very difficult to secure data on the subject. The mobility of the theory as well as the practice is evident from Dr. E. E. F. Creighton's statement that lightning appears now not to be an oscillating discharge but a unidirectional one.

The New York discussion was of a practical rather than a theoretical nature in spite of the highly technical topics above suggested. The operating engineers insisted that the way to solve the problems is not to restrict the operators in the legitimate use of apparatus but for operators and manufacturers to get together in the effort to make it better. For example, Mr.

Osgood stated that there is no use in recommending a limitation of switching operation to prevent surges. Switching is an every-day necessity. It is better rather to construct the lines so that they will stand switching surges.

GETTING THE TECHNICAL SCHOOL AND THE ELECTRIC RAILWAY BUSINESS CLOSER TOGETHER

Twenty years ago the graduate of a technical school was taken as a joke when he entered a shop to show what he could do. He was made the butt of certain standard jests, which, in general, he took in good part. There was some reason for this attitude on the part of the shopmen who had earned their places through hard, dirty work and who naturally resented the "high-brow" element which had been having a good time in school while they toiled. The much-schooled lad, also, was apt to assume an air of superiority which did not improve his standing as a "mixer."

The hard knocks of the old days were not without their compensations, for they served to bring out the staying and fighting qualities of some of the recipients and to discourage others who were not fitted by temperament and training for railway work. As a consequence, the condition of twenty years ago does not exist to-day, and the youngsters who stuck are now, in many cases, master mechanics, superintendents, general managers and presidents. They have, by ability and tact, created an atmosphere in the business which is more congenial to the beginner.

In spite of the fact that they are more welcome than formerly, there is a strong tendency on the part of technical graduates to keep away from electric railway work, and this condition is unfortunate. The reason for this seems to be a lack of opportunity to secure a reasonable salary after a fair probationary period as compared with the possibilities in commercial lines. As we have remarked before, it is the future in a job rather than the immediate recompense that makes it attractive. There is a great lack of this future in the engineering and mechanical departments of electric railways. The salaries of most master mechanics and superintendents are so low compared with what the incumbents of the positions would earn in business that it is going to be increasingly difficult to get and to hold good men in them unless the men are paid more and understand that if they more than "make good" there is sure promotion ahead. If the electric railways want technically trained men, they can get them, and to insure continued progress such men must be had. Sales work needs them, too, and at present is making the higher bid. If the attractions of the railway business are really greater than they seem, it is up to the railway companies to make this fact more generally known and to get a little closer to the technical schools. The manufacturing, telephone, telegraph, lighting and other companies are, at this season, sending responsible representatives to the leading schools of this kind to study the student body. If electric railway organizations are doing this, the fact has not yet come to our notice.

ACCOUNTING FOR DEPRECIATION

An inspection of a number of recent electric railway reports does not show any provision for accounting for depreciation, although depreciation is just as positive a charge against the property as any other. In fact, it is one of the few items of expense which cannot be escaped, and any attempt to ignore its existence is illusory. Even those roads which are striving in every direction for "economy" cannot afford to neglect this item. Thus, on the New York, New Haven & Hartford Railroad, the establishment of a recent arbitrary depreciation charge for equipment increased the December equipment expenses of that company 15.73 per cent. Yet this expense, far from being unjustifiable, is absolutely necessary if the accounts are to show the real condition of the property.

It is true that until a comparatively short time ago accounting practice paid little attention to the element of depreciation. But, thanks to considerable litigation and the efforts of regulatory bodies, the recognition of its existence has become more general. The average electric railway official should now know that depreciation in theory means the decrease in value of an asset due to deterioration through the lapse of time, wear and tear, inadequacy or obsolescence. He should also know that depreciation, having theoretically to do with the ultimate deterioration of the whole property, is something more than the ordinary maintenance expenses needed to keep the property in good current operating condition. He should then appreciate the fact that depreciation reserves should be set up for the purpose of spreading the cost of final renewals of the deteriorated property as equitably as possible over the period during which the property is expected to render efficient service. Finally, he should realize that the income from operation during a period should pay all items of operating cost, including administrative expenses, taxes, repairs and renewals of original and supplementary investment currently made, and also a proportionate cost of final renewals and replacements. This estimated cost of future or final renewals—depreciation, in other words—is clearly as much a part of the cost of operation as the expense for power or the wages of the train crews, and if it is not included in any electric railway report the net profits are incorrectly stated.

Boards of directors seem sometimes to forget that they are acting in a dual capacity for the stockholders. They are not only in charge of the operation of the road and thus must develop its net earning capacity to the fullest extent but they are also guardians of the investment and should not allow any shrinkage of the assets. The duty to renew and replace the plant rests upon them, and the establishment of depreciation reserves is evidence that this duty is being recognized and that everything possible is being done to provide against any impairment of the investment and a lessening of service efficiency. The depreciation charge should be sufficient to maintain the property in such condition as will enable it to render the most efficient service to the public at all times. No property, of course, can

be kept at 100 per cent of its value. To attempt so to maintain it would mean a deliberate waste of materials and equipment.

The plea is often made that stockholders suffer through decreased dividends when depreciation reserves are set up, because the apparent net profits applicable to dividends are less. But if the same stockholders see from the report that their capital is being dissipated to pay unearned dividends the credit of the company will suffer much more than if the report showed the company's true net profits. Moreover, the public will also then understand the real condition of the property, and if a reasonable return is not being earned, the company can fairly ask for increased rates.

SELLING SECURITIES DIRECT TO THE PUBLIC

The plan of the Third Avenue Railway of New York to offer \$4,000,000 of bonds directly to private investors is a development of considerable interest. This is not an unheard-of proceeding, but it is sufficiently uncommon and yet contains sufficient promise to make it worth watching. Its outcome, whether favorable or otherwise in this particular case, will not, of course, prove its adaptability or non-adaptability to all cases, for much depends upon the credit of the individual company, the absorbing power of the local market and other factors.

The popular objection to bankers' commissions is not always, or even often, justifiable. If an issue is sound, the bankers who take it over in bulk for distribution to individual investors make no exorbitant profit, except in the rare cases of collusion to mulct a company for the enrichment of a favored banking house. The banker is worthy of his hire, just as is the broker who has facilities for distribution and receives a generous commission for marketing the entire output of a mill. When an issue is not a good investment the banker may get a larger commission, but he usually earns it by his assistance in marketing securities that from one point of view should not be marketed at all. Even with bankers' commissions eliminated, no company can sell its securities without expense, and, when due allowance is made for this, possibly no better return can be obtained by direct sale than from the bankers.

In the case of the Third Avenue issue it is required by the Public Service Commission only that the bonds shall net the company 82. This raises the question of what the company would get from the bankers for this issue. A price of 82 is not particularly low for a 4 per cent first mortgage bond. The present bonds of this issue now outstanding are selling in the market for about 83. On the other hand, the first real estate and refunding fours of the New York Railways since Jan. 1, 1914, have ranged from 75 to 79 $\frac{1}{8}$.

There is another phase of the matter, however, besides that of dollars and cents. The most logical and useful investors in public utilities in small communities are the local inhabitants—in other words, the customers. If a public utility is marketing an amount of stocks or bonds not in excess of the investing power of its locality, why should not the people of the neighborhood where it

operates have a chance to buy these securities directly and possibly to get the advantage of at least a part of the commissions and discounts that usually go to bankers? From the point of view of a favorable answer to this question, it is to be hoped that the Third Avenue experiment will be tried out under circumstances that approximate average conditions more nearly than does the New York attempt to eliminate the financial middleman. If investors in sufficient numbers would buy public utility securities over the local company's counter, it would be better for all concerned—except the bankers. General but localized distribution of utility securities would mean a degree of desirable public ownership that should both directly and indirectly bring good results. It might in some cases change local opinion as to the profits of public utility operation, but that, too, would be in the line of sound public education. No company, however, would be justified in trying the experiment of a direct sale of securities to the public unless it was reasonably certain of a successful outcome of the attempt, for in the case of failure it would have only a discredited issue with which to go to the despised but very useful banker.

THE SWISS REPORT ON ELECTRIFICATION

Few documents on the subject of railway electrification will be found of greater interest than the report of the Swiss Electrification Commission which is published elsewhere in this issue. It is true that Switzerland is a small country, but a decision which relates to the possible electrification of 1875 miles of track is worth the attention even of our own great railroad systems. The Swiss federal government has already voted a preliminary credit of \$8,000,000 for the electrification of the Gothard line, detailed studies of which form a part of the commission's report. This first work is to cover 67 $\frac{3}{4}$ miles of track between Erstfeld and Bellinzona, and it is to be completed in the year 1918. Thus the recommendations of the commission, at least as to the order of electrification, are being followed. However, the system of contact wire transmission and of motor propulsion for the Gothard line has not yet been fixed absolutely in favor of single-phase despite previously published statements to that effect which were based upon the commission's strong advocacy of that system for general electrification.

Referring now to the report itself, it is of interest to note that, although the studies of the commission were begun before the present high-tension d. c. developments, it did take into consideration the use of direct current at 3000 volts, and even the ultimate use of a 6000-volt, three-wire system. It was equally progressive in assuming the possibility of an 8000-volt, three-phase contact line, although the neighboring Italian State Railways use but 3300 volts. The same liberal point of view is indicated in the permissible motor voltages, which were assumed at 1500 volts per commutator for direct current and 6000 volts for three-phase induction motors. Furthermore, the commission had no doubt of the practicable operating qualities of any of the three systems. The question, in short, was

not what system would do the work, but what system would do the work required for the least ultimate cost.

The commission compares the efficiency of each system from the point of energy use and finds that while each system is better than the others in individual parts, the total efficiencies do not differ enough to manifest marked superiority of any one so far as this feature is concerned. A much more important problem was the equalization of energy requirements, and here it was found that the cost of accumulators as equalizers was prohibitive even with d. c. operation throughout. Another factor which adversely affected the choice of direct current was that, in the opinion of the commission, regenerating equipment was not justified on d. c. cars, although it might be considered for a. c. equipment. Curiously enough, the commission finds that regeneration in mountainous Switzerland would save only 4 per cent in energy because of the moderate grades and broken profile of the main railway lines.

Perhaps the most astonishing feature of the report is the complacent attitude taken with regard to the much-mooted effect of single-phase traction current on telephone, telegraph and signal circuits. The commission, from tests made on an experimental line in conjunction with the Federal Telegraphs and a manufacturing company, concludes, first, that ground return for weak-current circuits must be abolished, no matter what system of electric traction is used, and, second, that while single-phase current does cause somewhat more trouble than high-tension direct current, remedies are available in either case. Another factor in favor of 15,000-volt, single-phase trolley operation was that the railways could either generate their own power from new single-phase plants or purchase it from existing plants under favorable conditions of transformation. Still another factor which led to the recommendation of single-phase was that this system was the only one that permitted unlimited speed regulation without rheostatic losses.

The decision of the Swiss Electrification Commission is not binding, of course, on the federal government. But as the Lötschberg railway seems to be operating very successfully, as shown by another article in this issue, the chances seem to be in favor of the adoption by Switzerland of the report of its commission.

COMPANY SECTIONS IN A. E. R. A.

The article by T. C. Martin, secretary of the National Electric Light Association, in this issue, describing the educational value of the company sections in that organization, should be helpful to those railways which are considering the establishment of company sections in the American Electric Railway Association. There is no doubt, as Mr. Martin says, that the meetings of these sections form a rallying place for social forces and that the acquaintanceship thus obtained creates a sentiment of comradeship, a closer touch between officer and employees and a higher degree of loyalty. This is entirely apart from the undeniably great advantages from a technical standpoint which the meetings provide. We referred recently to the lack of any system

of training and systematic promotion for men on most of our electric railway systems and to the dangers which follow ignorance on the part of the company's higher officials as to the character of the work of the men who are being trained to take positions of responsibility. This apathy on the part of the higher officials is nearly always followed by apathy in regard to their duties on the part of the men who report to them in the organization.

We contend that electric railways have failed to take advantage of the splendid tool which the company section places at their disposal. That there is no reason why they cannot equal or even surpass the educational work of their electric lighting brethren is proved abundantly by the "logs" of the Newark and Milwaukee A. E. R. A. sections which are published elsewhere in this issue. Since its organization the members of the Public Service Railway section have listened to papers and participated in discussions on ten distinct features of the railway business, from car derailment and prevention to the excellent paper on storekeeping which was published in our last issue. In addition to the strictly business part of each monthly meeting, some company executive or outside speaker is usually invited to deliver an inspirational address on a topic broad enough to interest all attendants. The Milwaukee section also has monthly meetings at which more than twenty topics have been considered since the section was organized in March, 1912. The features of the November and December meetings at Milwaukee were talks by employees on what they had seen and heard at the annual convention of the American Electric Railway Association. At the February, 1913, meeting the members enjoyed a talk on electric railway practices in other lands, and at the May, 1913, meeting, they were addressed by a member of the Wisconsin Railroad Commission. It is interesting to note that of the 342 members of the Public Service section the attendance at the meetings averages from 150 to 200, despite the great extent of the Public Service Railway's territory, and that in Milwaukee the attendance averages as high as ninety to 110 out of a total of 120 members. The present Milwaukee membership is 120, compared with forty-five only one year ago, and the present membership comprises 75 per cent of the class of men who might be expected to take an interest in company section work. The Denver section has the broadest scope of all, as indicated by the fact that at its last monthly meeting even motormen and conductors were present in good force to discuss the problems of their work.

Surely the foregoing citations are enough to show that company section work has great possibilities for developing that get-together spirit called teamwork which brings each man so close to his fellow-workers that he feels himself bone, blood and flesh of a living organism, rather than an automatic cog or wheel in some relentless mechanism. Up to last week the members of the American Electric Railway Association had organized only three company sections compared with about fifty in the National Electric Light Association, but the news that the Capital Traction Company

of Washington has become the fourth in the band of pioneers is a happy omen that the increase in A.E.R.A. company sections will show more encouraging progress in the future.

THE PLACE OF THE TECHNICAL JOURNAL IN PROMOTING EFFICIENCY

The time has passed when any electric railway employee, or any one else for that matter, expects to make progress and secure financial and other recognition without "being on the jump." When promotions are to be made the query is as to what the younger men are doing to keep up with the times.

There are some so-called geniuses whose minds produce results without external stimulation, but they are few. The average man needs all the help he can get to keep him from running in a rut. The technical journal can help him most effectively here. The editorial staff of this paper like to think of it as analogous to a convention of the American Electric Railway Association. Each of the company members of this association selects one or more of its responsible officials and sends them at considerable expense to the meeting. The expense is justified by the attention given to the papers which are presented, and particularly to the discussion. Exhibits of manufactures are examined, old friends are met and new acquaintances are made, sundry items of information are picked up, and in many ways every one feels that "it was good to be there." We believe that no better expenditure of money can be made than by sending all the men to the conventions that the company can afford. There is general unanimity of opinion on this point.

To return, however, to the analogy. The ELECTRIC RAILWAY JOURNAL has its editorial and contribution columns, which contain papers on timely subjects, analogous to the convention papers. In the communications department discussion is carried on. The personal items take the place of the greeting of old friends and introductions to new railway men. The news items are of the same variety as those picked up in and about the convention hall. The trade notes and advertisements play the same parts as do the exhibits at the meetings.

It is a great thing to be sent to a convention, and each attendant incurs a responsibility at least commensurate with the value of the time lost from work and the size of his expense account. And yet comparatively few can attend these meetings, and they can do so but once a year. The technical paper reaches or can reach each week every man in an organization who has a brain worth stimulating. As it discusses all branches of the industry, it is a combination in a sense of the conventions of all of the different electric railway associations. Each reader can select such parts for perusal as concern only his own work in the organization, or he can follow the development in all of its branches. Possibly the above analogy may not have occurred to the reader and may prove suggestive to him.

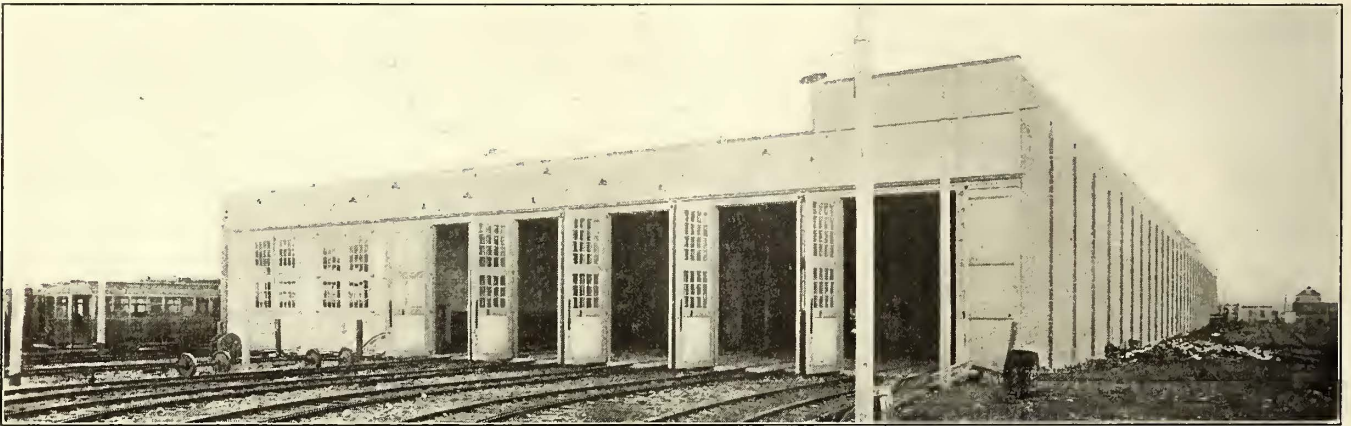
New Carhouse and Shops at Edmonton, Alberta

An Unusual Feature of the Carhouse Is the Use of a Car Anteroom or Vestibule to Avoid the Chilling of the Main Section of the Carhouse by the Opening of Doors During the Winter

BY W. T. WOODROOFE, SUPERINTENDENT EDMONTON RADIAL RAILWAY

Edmonton, the capital of the Province of Alberta, Canada, is one of the newest cities in the Northwest. Its rapidly growing population, at the time of the cen-

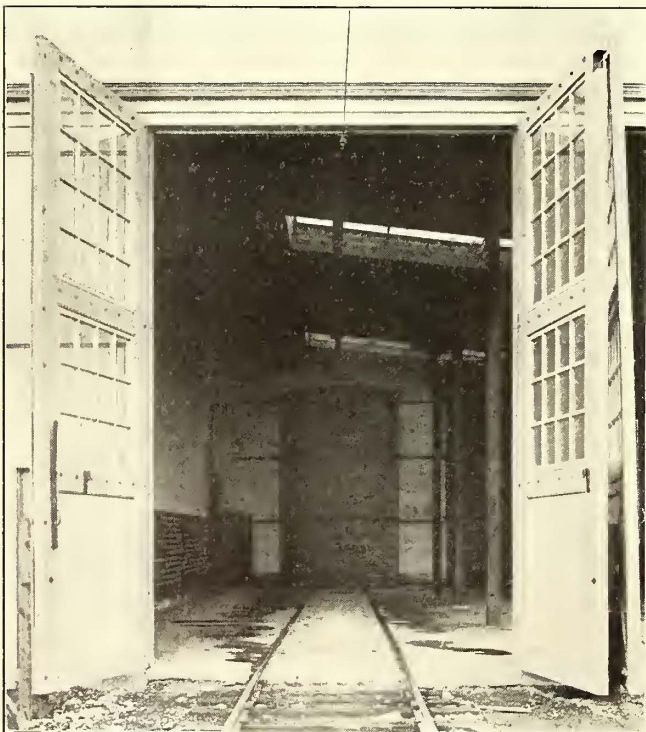
seventy-two passenger cars and eight service cars. When the system was started a temporary carhouse was built on Syndicate Avenue, with a capacity of six cars,



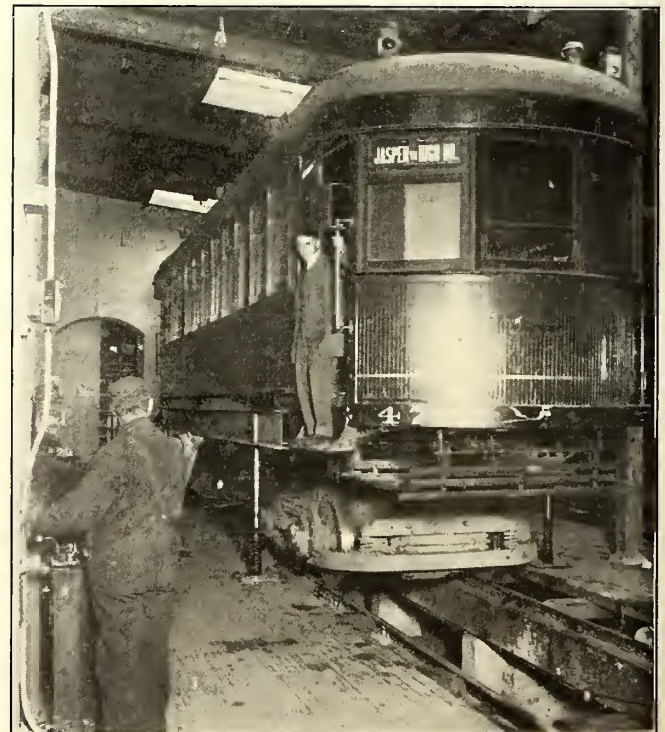
Edmonton City Maintenance—View of Carhouse (North End), Showing Fire Wall on the West

sus of May, 1913, was 63,500. The city occupies a fairly central position in the Province. Streets and avenues are laid out at right angles with each other, running north and south and east and west respectively.

but the development and growth of Edmonton very quickly rendered it necessary to provide for a new carhouse and shops. A site was purchased in the northwest portion of the city, adjacent to the Canadian Northern



Edmonton City Maintenance—View of Carhouse, Showing Vestibule



Edmonton City Maintenance—Part of Repair Track, Showing Car-Body Hoist

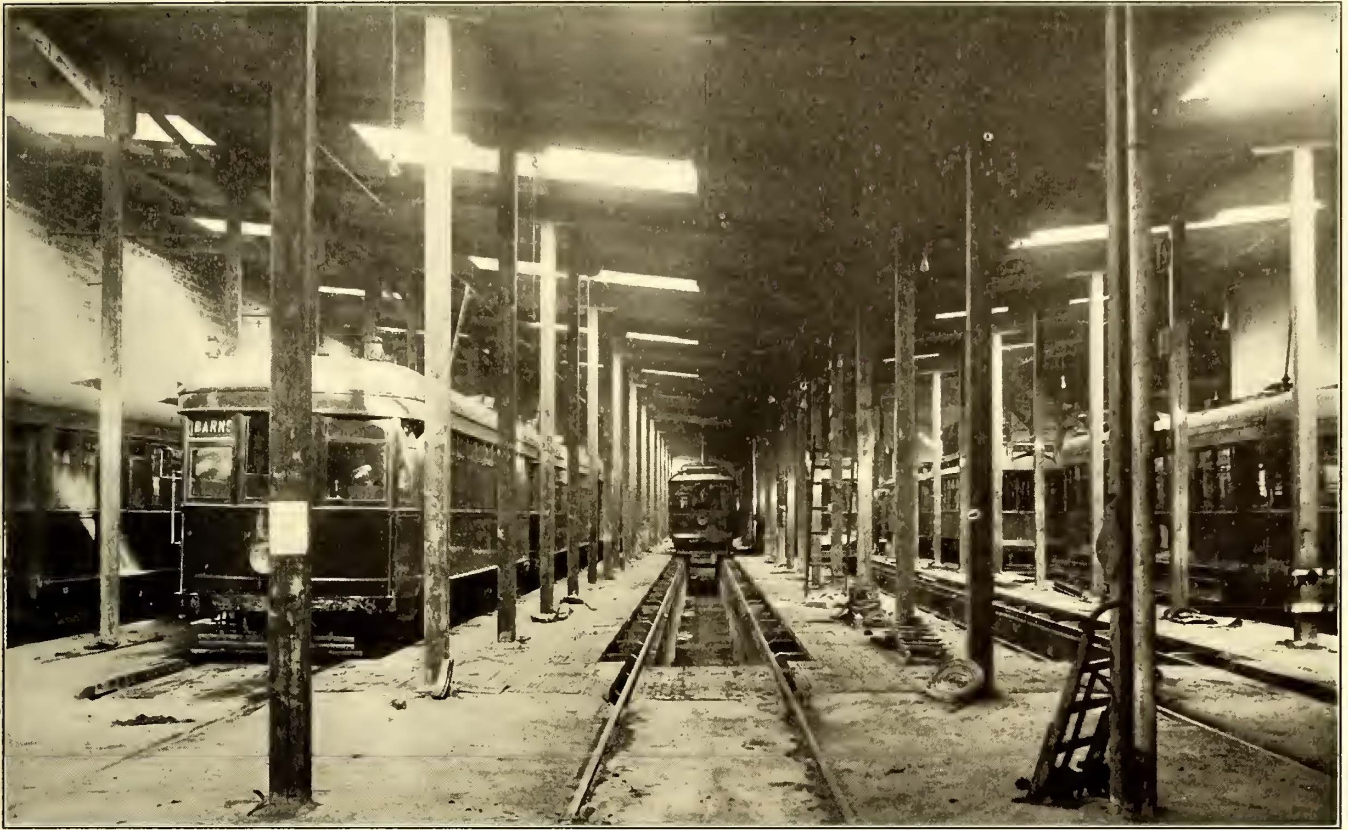
All public utilities are owned and operated by the municipality.

The street railway commenced operation in November, 1909, with five cars; at the present time it has

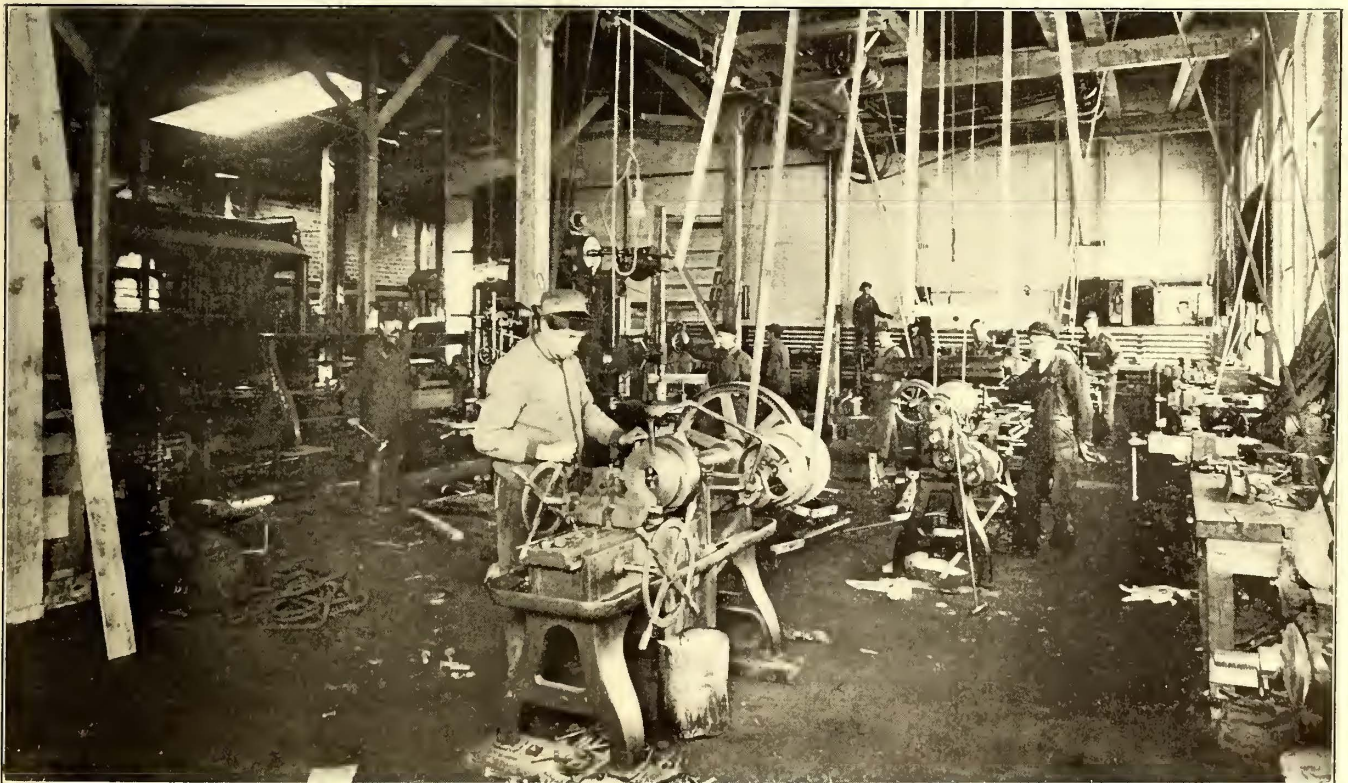
Railway's main line and conveniently situated with regard to the Exhibition Grounds and the industrial portion of the city. The property provides plenty of ground for a material yard, and provision is made for

two more sections of the same size as the existing structures. A temporary storage and operating car-house was also erected on the south side of the city to reduce dead mileage.

one story high and double-ended with special work at each end to enable cars to make any desired movement. The building has substantial concrete foundations with the main walls of brick extending above the roof to



Edmonton City Maintenance—View of Storage Section



Edmonton City Maintenance—View of Machine Shop

CONSTRUCTION, LIGHTING AND HEATING

The new carhouse and shops are combined in one building which runs north and south. The carhouse is

minimize risk from external fires. It should also be noted that windows are provided only in the main walls where necessary for the lighting of the shops. The

main wall adjacent to the track provided for external storage is devoid of windows and rendered non-inflammable, while the carhouse proper receives its light from double window skylights. Artificial illumination is carried out with 110-volt tungsten lamps which receive

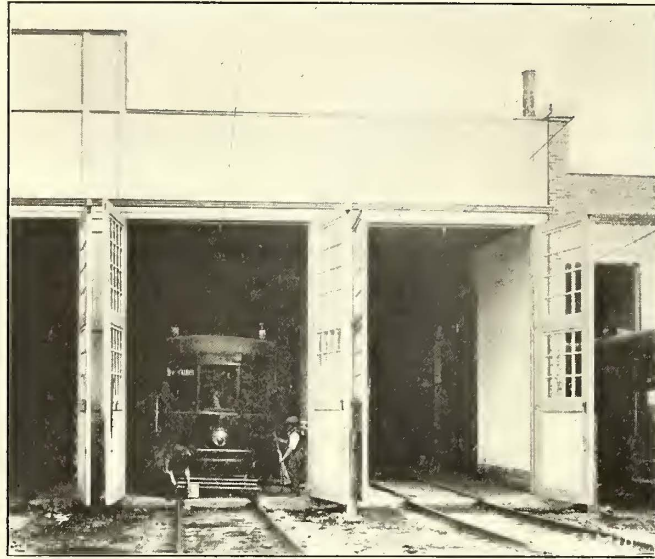
pipes and provide accommodation for the washing of the cars. The floors are of concrete and are well drained. With regard to the main body of the carhouse the heating is carried out by hot-air pipes which receive their supply from a central heating plant.

There are five pits in the carhouse, and the total inside storage is for fifty-one cars, while the provision for outside storage is approximately eighty cars. The pit foundations are of well-drained concrete. The track is laid on heavy timber supported on concrete blocks or pillars. Ample space is allowed between the rails and the sidewalks or devil-strips to enable a man to sit down alongside a car to inspect the equipment in the most accessible way, thus promoting thorough overhauling and inspection. The repair track lies along the machine shops and is provided with one Columbia car-body hoist which enables a car body to be lifted from the tracks in about ten minutes. This hoist is driven by an electric motor operated by a controller located alongside the track.

A yard for the storage of track material is provided on the east side of the carhouse. Special sheds are also installed alongside the carpenter shop and blacksmith shop for lumber and iron. On the west side the provision for external storage will be utilized with the minimum of change when the carhouse is extended. The offices and carmen's rooms are also on the west side. The shops, which are on the east side of the building, are referred to briefly in the following headings.

PAINT AND CARPENTER SHOPS

The paint shop has a capacity of six cars, is well supplied with windows on the east wall and has extra heating apparatus. It includes a separate and special-



Edmonton City Maintenance—South Entrance to Carhouse, Showing Washing Tracks

their supply from the municipal power station. All wiring is carried in conduit.

On account of the low winter temperature special care has to be exercised to keep the building warm. Cars



Edmonton City Maintenance—View of Paint Shop

when entering at either end pass through a vestibule so that cold air is not carried into the main body of the building. The outer doors of the vestibule are of wood, but the inner doors are fireproof. These vestibules serve other purposes as they are heated by steam

ly constructed fireproof room for storing and mixing paints. The floor is finished with concrete, and all arrangements are provided for washing and thoroughly cleaning the cars before painting.

The carpenter's shop, which is south of the paint

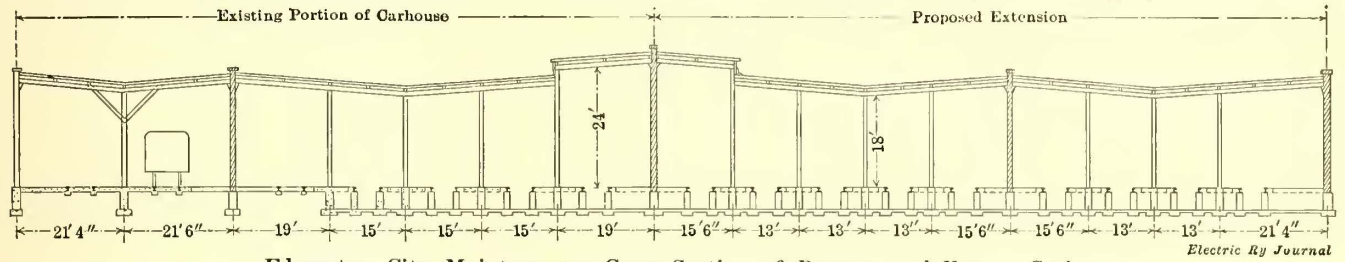
shop, holds two cars. Provision is made for five carpenters' benches, and sufficient room has been allowed for installing woodworking machinery when required. This shop carries out repair work and has built one complete line car.

MACHINE AND BLACKSMITH SHOP

The machine shop is situated in the center along the east wall and adjoining the main carhouse without any

made for heating. Two systems are in operation: first, low-pressure steam to radiators for the shops and carhouse vestibules; second, hot-air forced-draft system for the main carhouse. The blower of the latter system is driven by a low-pressure single-acting steam engine which is supplied with steam from the same boiler which feeds the radiators.

For heating the shops during the daytime only low-pressure steam is used, but at night, when the cars



Edmonton City Maintenance—Cross-Section of Present and Future Carhouse

dividing wall. The shop is provided with a wood-block floor and is equipped with the following tools:

- One 42-in. wheel-truing lathe.
- One 24-in. engine lathe.
- One 14-in. automatic lathe.
- One 24-in. shaper.
- One emery wheel.
- One bolt-threading machine.
- One 34-in. vertical drill press.
- One 250-ton wheel press.
- One forge for babbitt work.

Most of the machines are driven with individual motors. Two 3-ton jib cranes are provided so that wheels, axles, etc., may be lifted directly from the repair track alongside the machine shops and put into the various machines.

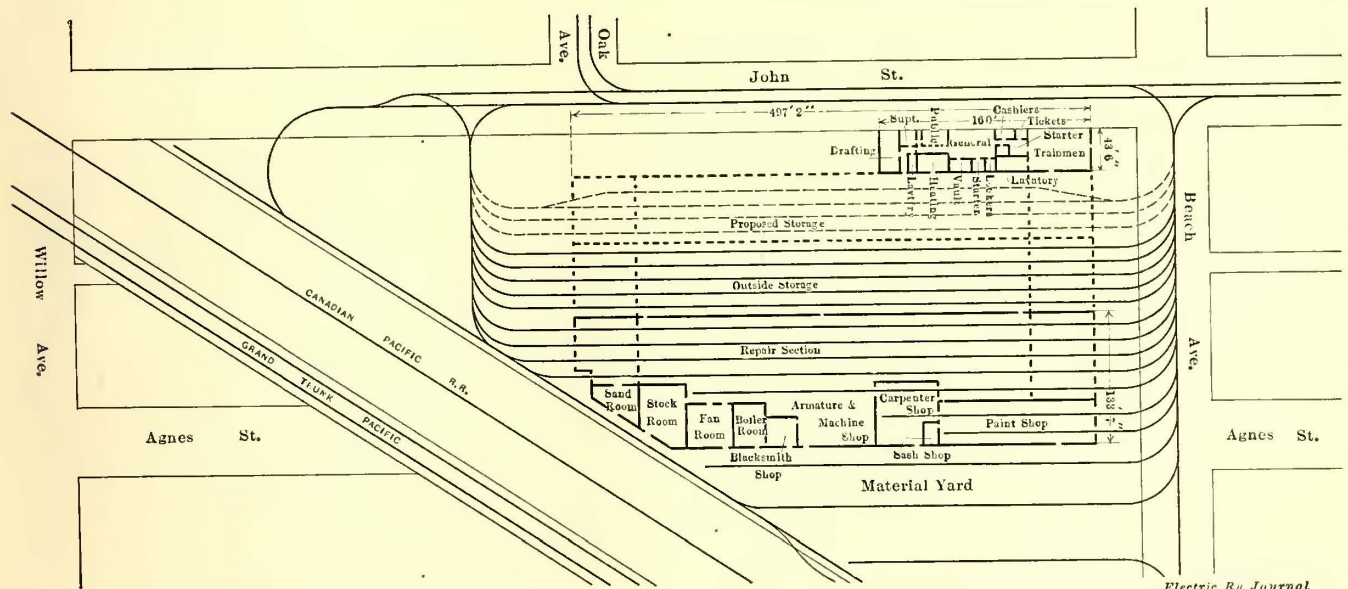
go in, the blower is started and hot air is blown under each of the cars through the system of galvanized-iron pipes.

ELECTRICAL SHOPS

The electrical shops are situated in the same room as the blower and contain a drying oven for coils, three large armature stands, three small armature stands, one controller repair outfit and the necessary equipment for rewinding armatures and rebuilding commutators. All armatures after being repaired are tested for short-circuits, grounds and insulation resistance.

STORES, SAND DRYING, FIRE PROTECTION, ETC.

The shops have a large, well-laid-out storeroom in which all department supplies are kept. Sand drying is



Edmonton City Maintenance—General Plan of Carhouse and Shop Layout, Showing Also the Location of the Material Yard and Steam Railroad Connections

The blacksmith shop is entirely separate from the rest of the carhouse and contains the following tools:

- Two forges.
- One 200-lb. motor-driven hammer.
- One drill press.
- One bolt-cutting machine.
- One emery wheel.

HEATING PLANT

On account of the low temperature which sometimes prevails in Edmonton, special provision has had to be

carried out in a separate outbuilding, the damp sand being loaded up around the center heater until thoroughly dry, when it is transferred to bags ready for the cars. In connection with the prevention of fire in the carhouse, mention may be made of the institution of a special fire squad, which is exercised weekly. Each member is appointed to a special duty so that the cars can be taken out of the building with a minimum delay and the hydrants brought into operation at a given signal. The shops and carhouse are also fully provided with Pyrene and chemical extinguishers. Seven hy-

drants, each with 100 ft. of hose, are installed inside the carhouse and five hydrants outside in suitable locations.

OFFICE BUILDINGS AND ENGINEERING

The office building is a one-story brick structure. As the accompanying plan shows, the engineering department and superintendent's office are at one end, the public and general offices are in the center, and the



Edmonton City Maintenance—Temporary Car Sheds, South Side, Edmonton

traffic department and motormen's and conductors' assembly rooms are at the left.

The buildings were designed by the city's architect under instructions from the street railway department. The track layout was designed and carried out by the department. Work was commenced in September, 1912, and the carhouse was occupied in July, 1913. All the work in connection with the carhouse was done by day labor and was continued without interruption during the whole of the winter.

IMPROVEMENTS IN ROTON PARK PROPERTY AT NORWALK, CONN.

The Roton Point property at Norwalk, Conn., has been leased by Neville Bayley, of New York City. The lease was formerly held by Capt. A. J. Smith, owner of the local steamboat line. The new lessee is under contract to spend \$75,000 in improvements, and he has already had his engineer on the ground making definite plans for the work to be begun as soon as the weather permits. Roton Point is patronized by the population within a radius of 50 miles. A large number of towns from New Rochelle east are within convenient reach of the property. The plan of the new management is to make the resort attractive for high-class patronage, and no liquor will be sold on the grounds. Already more than fifteen church excursions have selected the Point for this year's picnics, and there is every evidence that the public will show appreciation of the efforts to be made in its behalf. Among the improvements will be the remodeling of the old hotel into a large casino, the construction of 1000 new bath houses and the installation of 5000 incandescent lamps about the park. A large roller coaster also will be built and installed by the Ingersoll Engineering & Construction Company of Pittsburgh. Various other amusements will be provided.

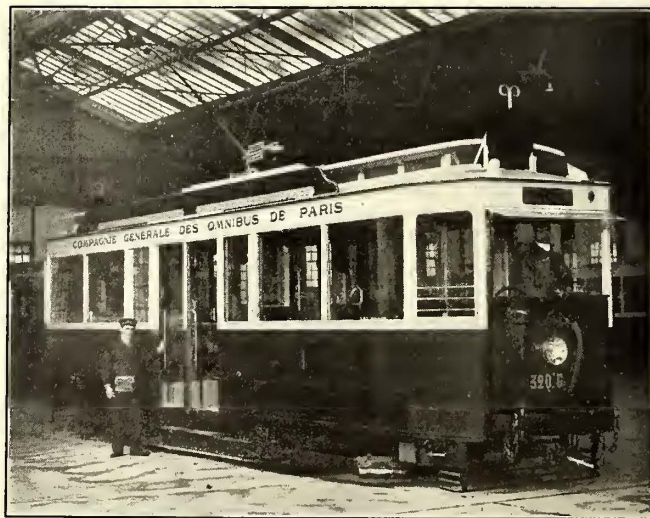
The Roton Point location is ideal for a place such as is proposed. The grounds are ample and the location on Long Island Sound makes bathing and boating on a large scale possible. Brant O'Brien will act as publicity manager for the Roton Point Company, which will operate the property.

CAR DESIGN IN FRANCE

The progress in car design which has characterized the electric railway industry in this country within the past few years has had a parallel abroad, where the same interest is being expressed not only in center-entrance cars but also in light-weight cars.

A short account was published in the issue of Oct. 4 of some new cars built by the General Omnibus Company of Paris, the principal tramway company in that city. Most of the tramway companies in Paris work under two serious handicaps in securing the best results in car design. In the first place they are limited to very narrow over-all widths, usually 6 ft. or less. This permits, with cross seats, only three transverse seats. These are usually arranged by placing a row of single seats on one side of the aisle and a row of double seats on the other. Again, as the law usually provides that no passengers shall stand in the aisle, it is the practice to arrange for other space for them up to the limit of the number of standing passengers permitted under the law. Hence some of the space which in America would be allowed for seats is left open for standing passengers, and this increases the weight of the car per seat. However, the weights per seat of a number of the recent motor cars have been brought down to 900 or 1000 lb. by the use of light frame construction and, in some cases, by the employment of sheet aluminum for side panels.

The General Omnibus Company of Paris, as stated in the issue of Oct. 4, has two new standard types of cars. One is mounted on a single truck with a wheelbase 11 ft. 10 in. in length. The other is a double-truck car, but both have center entrances. Both also are divided into first-class and second-class compartments, one being on one side and the other on the other side of the center entrance. Both also have two smoking compartments, one for each class. They are next to the center entrance with seats in the first-class compartment for two passengers and seats in the second-class compart-



Standard Single-Truck Motor Car—General Omnibus Company, Paris

ment for three passengers. The main dimensions and data of these cars are shown in the table on page 515.

The standard trail car of the company is 38 ft. 1 in. over all, weighs 17,380 lb. and carries thirty-eight seated and nineteen standing passengers. This is a weight of about 460 lb. per seat.

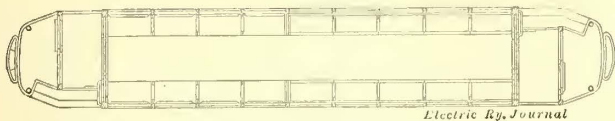
The Paris & Department of the Seine Tramway Company has also adopted the long wheelbase truck. Two wheelbases were used, 11 ft. 2 in. and 11 ft. 6 in.

There is no radial action in these trucks, yet they pass around 60-ft. curves without difficulty. The wheel has a flange 9/16 in. deep and 11/16 in. wide, and the groove in the rail on curves is 1 1/4 in. wide. Steel-tired wheels, 31 1/2 in. in diameter, are used, and the tires have a life of 50,000 to 60,000 miles. There are two

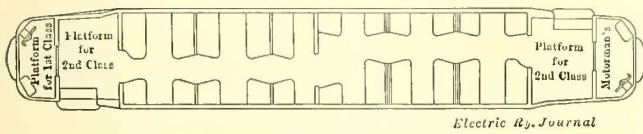
two first-class passengers and seventeen second-class passengers.

The present standard of the East Parisian Tramways Company is a car with maximum traction trucks carrying sixty-one passengers in all, of whom thirty-two are seated.

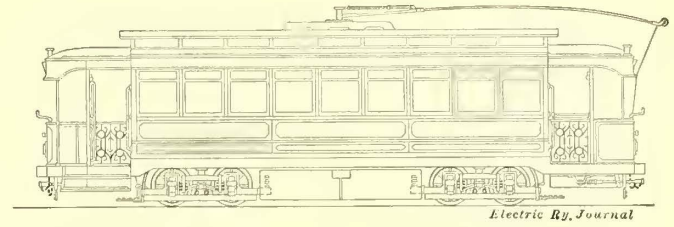
Another Paris company which has developed a center-entrance car is the Arpajon line. This car weighs 37,400 lb. and has thirty-two seats and room for twenty standing passengers. It is designed for use with a trail



Standard Double-Truck Car—Nogentais Tramways



Standard Double-Truck Car—General Paris Tramway Company



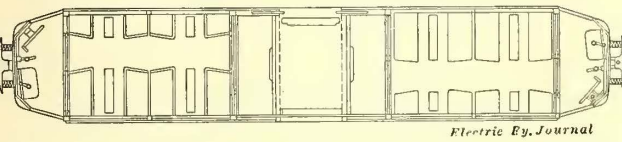
Standard Double-Truck Car—Nogentais Tramways

steps, one 11.8 in. and the other 11.5 in. to the center entrance.

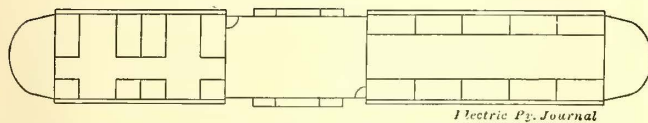
The Nogentais Tramway has two standard cars, a single-truck and a double-truck. The latter is 40 ft. over all and seats sixteen first-class and twenty second-class passengers and has standing room for fifteen second-class passengers.

car having thirty seats and standing room on the platform for thirty-two additional passengers.

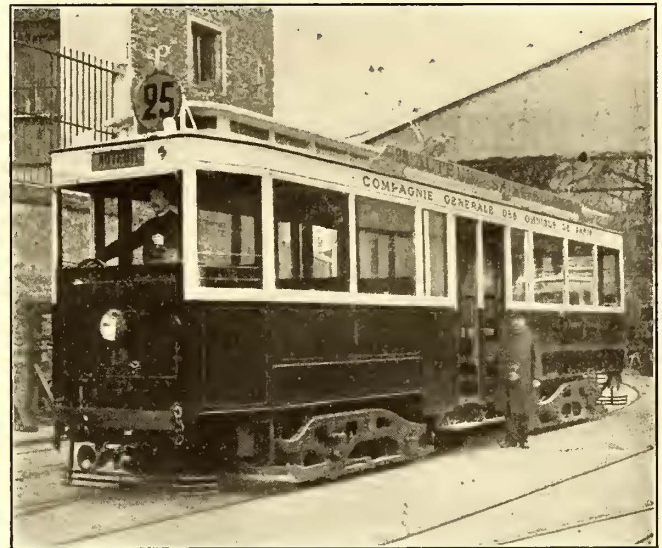
The Bordeaux Tramways Company has developed a single-ended car of novel type shown in one of the plans. This car is mounted on a truck with a 7-ft. wheelbase and has a 17-ft. body with 9-ft. 6-in. platform. These cars are intended usually to be run in trains of two cars each with the long platforms coupled together, although they can be operated separately. Each car is equipped with one motor, which when the



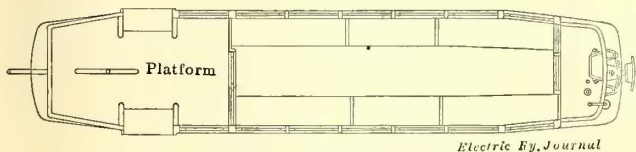
Standard Single-Truck Car—General Omnibus Company, Paris



Standard Maximum Traction Truck Car—East Parisian Tramways Company



Standard Maximum Traction Truck Motor Car—General Omnibus Company, Paris



Car for Two-Car Train Operation—Bordeaux

company, is using an end-entrance car of which a plan is shown. This car weighs 32,560 lb., or 1015 lb. per

cars are run independently is used with a resistance, but when run in trains of two cars each two motors are provided for the train. They are mounted on Brill 21-E trucks. Each car has accommodations for twenty-two seated passengers and twenty-one standing passengers.

TABLE SHOWING DIMENSIONS OF STANDARD CARS—GENERAL OMNIBUS COMPANY, PARIS

	Single-Truck Car	Double-Truck Car
Length over all	34 ft. 5 in.	36 ft. 4 1/2 in.
Width over all	6 ft. 6 1/2 in.	6 ft. 6 1/2 in.
Height of floor of car above top of rail	21 1/2 in. to 23 1/2 in.	21 1/2 in. to 23 1/2 in.
Weight with truck and electrical equipment	29,700 lb.	33,000 lb.
Weight per linear foot	863 lb.	837 lb.
Weight per seat	990 lb.	917 lb.
Number of seated passengers	30	36
Number of standing passengers	19	18

seat. It seats fifteen first-class passengers and seventeen second-class passengers and has standing room for

The British Columbia Electric Railway has just completed its first interurban car of arch-roof type at the company's shops in New Westminster, B. C. The new car is for the Fraser River Valley line. It is 55 ft. over all, has the usual steel and timber frame construction, M. C. B. trucks and a 460-hp motor equipment. The interior finish is quartered oak. It is expected that more cars of the same type will be turned out in the near future.

Fairview Park at Indianapolis

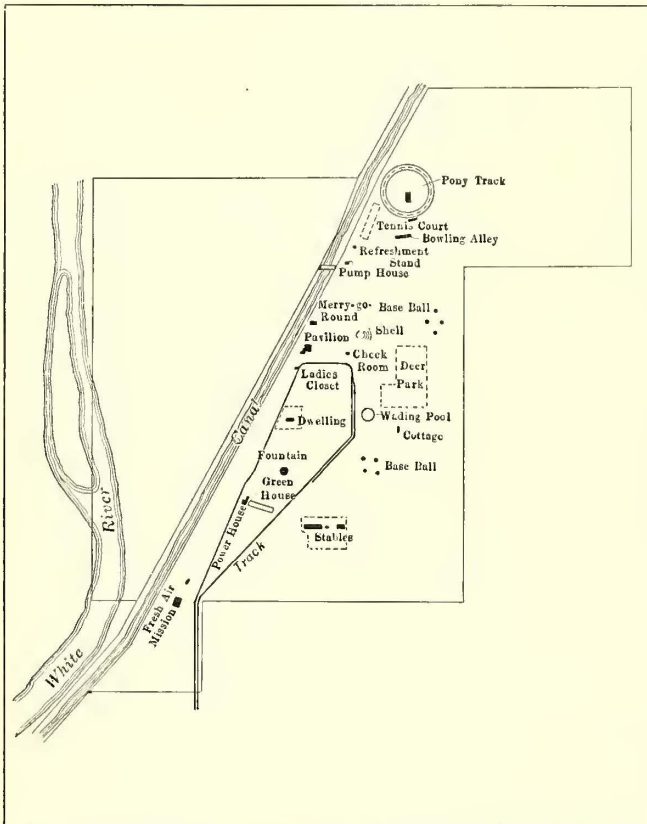
Since the Plan Was Adopted of Developing This Park as a Distinctively Family Resort It Has Proved Very Successful—It Is About 7 Miles from the Center of the City

For several years past Fairview Park, owned by the Indianapolis Traction & Terminal Company, has been passing through various stages of evolution from an amusement park to a family recreation ground. This park, situated about 7 miles northwest of the center of Indianapolis and comprising some 253 acres of ground, was purchased by the company in 1899. Attractions

It has been the experience of the Indianapolis Traction & Terminal Company that the operation of this park has been more profitable to the company since the general forms of amusement park attractions were abandoned. The change also made a great difference in the reputation of the park, which is now known as one of the most desirable places in the city as a recreation ground for children and a family picnic park. The elimination of all objectionable elements has proved to be good business policy. No automobiles or horse-driven vehicles are allowed in the park, provision being made for checking them at the entrance. This insures the safety of children in the park, as it gives them the entire freedom of the place and eliminates the danger of their being hurt when running across the paths or driveways.

Fairview Park is particularly favored with natural scenic effects, and these have been enhanced by careful landscape gardening, so that the park has become noted as one of the beauty spots of the city. A large greenhouse furnishes all the plants and flowers needed for the many flower beds during the season. An old canal with its picturesque towpaths runs through the park and forms one of the natural attractions. Especial attention has been given to furnishing amusement for children. A wading pool has been constructed with a long sloping cement floor, graduated from a depth of 1 in. at one end to nearly 2 ft. at the other end. Lake sand is spread on the floor of this pool, and a "beach" is made at the shallow end. Swings, gymnasium apparatus and a miniature merry-go-round are also furnished, with attendants in charge.

Among the other amusements which are favorites at the park are the tennis courts, pony track and three baseball diamonds which are maintained in the park and may be reserved for amateur games, without charge, by application to the park superintendent. The diamonds are not inclosed or fenced and are provided for

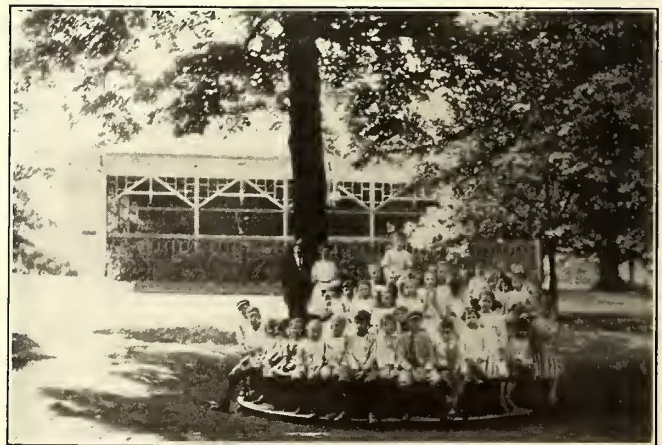


Electric Ry Journal

Fairview Park—Layout of the Grounds

of the kind usually found in amusement parks, such as a dance hall, roller coaster, toboggan, etc., were installed at first, but as these amusements drew a certain boisterous and objectionable element it was found to be impossible under such conditions to develop the picnic ground along the original plans. These attractions were therefore gradually eliminated and the company began the development of the present policy of creating a distinctively family park which would be an especially desirable place for women and children and picnic parties at all times. The plan has proved very successful from the viewpoints of both the public and the company.

The park is open to the public the entire year, but the regular season covers a period of about sixteen weeks from the middle of May to the middle of September. If the weather continues pleasant during the late fall, or if there is an early spring, a great many people visit the park to enjoy the beauties of the spring and autumn foliage. On some Sundays in the late fall the attendance has been as large as during the summer season when the attractions are in full swing.



Fairview Park—Dining Hall and Miniature Merry-Go-Round

the use of young amateurs or the amusement of organizations that may be picnicking in the grounds.

An excellent dining hall forms one of the concessions and is very popular for chicken suppers during the summer and fall. A deer park is maintained by the company, containing the finest collection of deer in the

State. The well-known high-diving horses "King" and "Queen," which were owned by the late Hugh J. McGowan, are kept at this park, and a diving pool is maintained. Large crowds are drawn to the park on the days when these horses make their remarkable dive from a 40-ft. chute. A large band shell, noted for its splendid acoustic properties, faces a grove where seats are placed for the accommodation of about 3000

from these concessions pays the entire operating cost of the park, leaving as a profit the net revenue derived from transporting passengers. Approximately 15,000 people visit the park on pleasant Sundays, about 5000 on Thursdays when there is a band concert, and from 2000 to 3000 on other pleasant days. There is a large loop with unloading and loading stations in the center of the park, and storage tracks are provided for the



Fairview Park—Entrance to the Grounds



Fairview Park—Scene on the Canal

people. Band concerts are given in the park on Thursday and Sunday evenings. During the latter part of last year the company installed a moving-picture machine as an added inducement for evening travel. A screen is erected across the front of the band shell, and free moving-picture shows are given on the evenings when there is no band concert, a change of films being made each night. The cost of operation has proved very small, and, without any advertising, the average attendance last year at these shows was 2000. It is expected this feature will draw larger crowds during the coming season.

Each year there is usually some special attraction at the park, such as the "Hiawatha" Indian players, which is staged on one bank of the canal against a natural wooded background, the high sloping hillside of the other bank forming a natural amphitheater. A charge of 25 cents admission is usually made for these special

extra cars required to handle the crowds when the concerts are over.

A small power plant furnishes current for lighting the park throughout with arc and incandescent lamps, as well as the current required for power purposes in buildings on the grounds. A large number of arc lamps are used in that portion of the park where the principal attractions are located. Several hundred incandescent lamps are used to illuminate the various walks, besides those required for the band shell and buildings. In the woods and outskirts of the park about ninety gasoline lamps with incandescent mantels are used. These gasoline lamps are mounted on the standard form of iron gas lamp post.

The line to the park is double-tracked for the entire distance. A spur track in the park approximately 800 ft. long provides storage for fifteen or twenty cars to take care of the first rush after band concerts or other attractions. The regular city fare is charged for the 7 mile ride to the park, namely, twenty-five tickets for one dollar, six for 25 cents, or a 5-cent cash fare, with the usual transfer privileges. All fare collections are made on the cars.

No special days are set aside for special assemblages at the park, but during the season if the weather permits there are Sunday school picnics and gatherings of various clubs and associations almost every day. The State organization of the Modern Woodmen of America holds its annual picnic at Fairview Park every year, and many other organizations of this character have selected the park for their annual gatherings. The only special arrangements required are for special cars and whatever reservations may be needed at the restaurant or dining hall. The company does not make any attempt to solicit this business, as it is generally known that the park is free and open at all times and that it is particularly intended for such gatherings.

The park is under the management of W. F. Milholland, secretary and treasurer of the Indianapolis Traction & Terminal Company. A park superintendent, who resides on the grounds, has direct charge of the park employees and attendants. Since the park has been operated under the present plan it has been considered a very good investment by the company. It was found when first operated with the usual "White City" form of attractions that the return on the investment was too low to warrant the company in continuing to operate it under that plan.



Fairview Park—Music Shell for Open-Air Concerts

attractions, and the attendance averages 2000 each night.

The railway company receives 15 per cent of the receipts from the pony track, merry-go-round and shooting gallery concessions and 10 per cent from the restaurant. All other attractions in the park are installed and maintained by the company. It has been found that for the heaviest four months of the season the revenue

Company Sections in the N. E. L. A.

The National Electric Light Association Now Has Nearly Fifty Company Sections, Whose Splendid Educational Work Is Described in Detail by the National Secretary

BY T. C. MARTIN, SECRETARY NATIONAL ELECTRIC LIGHT ASSOCIATION

In the course of his duties the writer has had occasion recently to visit a number of cities where the electric lighting and electric railway services are supplied by the same company and to discuss with the officers of these companies the question of the establishment of company sections, both lighting and railway, in those properties. The development of company sections among the members of the National Electric Light Association has been an important feature of its growth and of its ability to serve the industry which it represents. For this reason the writer believes that some information in regard to its company sections may be of benefit to the members of the American Electric Railway Association, among whom the company section idea has not been so widely adopted.

PROBLEMS CAUSED BY RAPID GROWTH

An industry or public utility system growing at the rate of 20 per cent per annum and maintaining that rate, with acceleration, if anything, over at least two decades has a good many problems on its hands incident and attributable wholly to rapid expansion. The central station business has been under just this strain, and no other development in the electrical field has been so fast or so sustained. It has had to work out its own salvation from within, excepting such aid as might come from bodies of regulation, and these seldom or never have done anything other than restrict. There have been the requirements of new capital to be raised and only to be secured when managers could show a good return on that already intrusted to them and turned over at an ever-falling price per kilowatt-hour. There is the incessant assimilation of new inventions and methods on a vast scale, with a consequent and corresponding scrap heap. There is, over and above all, perhaps, the stern necessity of recruiting and retaining a great army of employees, whose skill, loyalty and efficiency must be directed toward achieving the ideal of the best service at the lowest rate to the largest possible public.

It is not generally recognized how serious has become this question of personnel in the central station industry, but among those responsible for the successful operation of its large systems of public utility supply a keen realization has long existed of the condition to be met. If it had not existed, we should probably have seen something like the recent occurrence in England, when one of the large steam railroads took a manager from this country because such men were not being trained there within the industry, which has thus apparently been neglecting the educational work so necessary for self-preservation and efficiency. With its rapid expansion, the central station field has made an enormous demand on colleges and schools of every kind and degree for youthful graduates to fill not only new places but the vacancies in the old ones. The subject has many interesting and suggestive points of view as well as many hard, matter-of-fact difficulties to be dealt with wisely. Given an industry growing 20 per cent annually and a staff all told of not less than 100,000—probably much greater if all incidental construction work were taken into account—it would appear that recruits to the number of at least 20,000 were

needed each year to take the "oath of allegiance." It is very doubtful whether the increase in personnel works out at such a high ratio in an art where the whole tendency is toward automatic operation and the economies of larger units of every description. But if we took the enrolment at 10,000 the figure would certainly be conservative. That is not all. This is a restless age of much groping, and far too many young fellows with a brand new diploma take up electricity because it "sounds good" and without any peculiar or special bent for an electrical career. They can't be blamed for the airy and easy way they tackle the job offered them in the public utility, and it is partly the fault of our educational system that they have not been earlier tried out and sifted as to the work they can do best and with most zest. After all, few of us have a real mission in life. We just tail on behind the leaders, or vote against them, lest one good doctrine of progress should corrupt the world.

Hence it comes about that gathering up in its seine some thousands of new men every commencement term, and other thousands all around the calendar, the central station industry finds a large percentage escaping through the meshes or being thrown overboard. This process of elimination is staggering in its analysis of fit and unfit, and happily a large number of estimable people escape to other spheres of occupation, to be tried again for a time at least, although it may be doubted whether the average American in this respect is as fickle and variable as he was when the dynamo, motor and incandescent lamp were invented. Anyhow, the fact remains that in many of our large central station companies the personnel *en bloc* will change every three years, and seldom at a lower rate than 20 or 25 per cent yearly. Here is a serious fluctuation to be dealt with, inherent perhaps in the conditions of the times, and susceptible only to partial cure by such welfare work as the National Electric Light Association has outlined and attempted at one point or another in sick and accident relief, savings funds, profit sharing, stock ownership, long-service annuities or "pensions," and last but not least in its educational work as typified in the creation and cultivation of the company section.

EDUCATIONAL WORK OF COMPANY SECTIONS

Like the statistical work of public utility associations and companies, their educational work, while of equally extraordinary extent is little appreciated, and they still get very little credit for it. The corporation schools of this country are a most significant supplement to the institutions officially recognized as endowed or endued with the ability to teach but which leave their "finished" product in a relatively raw state. The company sections of the National Electric Light Association now numbering nearly fifty, with a membership of 10,000 officers and employees, are on such a democratic and inclusive basis that they reach from systematic education at one end of the scale for large groups of men down to small bunches of a score or two—or even much less—gathered together in the name of the National Electric Light Association to discuss some paper or topic of the hour bearing upon the art in its different aspects. Within a period of only five

or six years, the company section work of the association has opened up so many fertile possibilities that it is hardly within the ability of anyone to say what the limits of its evolution will be. Reference can be made here to only the more prominent lines of work followed up. It may be stated at the outset that about much of the section work there is no novelty. Public utility companies have had their clubs and social or educational organizations for many years past, and even in the National Electric Light Association these are still maintained without any attempt to bring them inside the sphere of National Electric Light Association direct influence. So long as the good work is done with an eye single to the common purpose, the agency really matters little. In some instances company organizations of one kind or another that were pre-existent have been "tied in" with the section, and the result is good. This would seem to be a preferable plan, as it makes everyone with ambition and outlook a member of the body that represents the industry as a whole and which serves as a great clearing house for information.

FUNDAMENTAL PLAN OF COMPANY SECTIONS

A fundamental plan in all the company sections of the National Electric Light Association is the holding of regular meetings for the presentation of papers, for discussion and for social fellowship. This has proved to be a very good thing and has brought with it one or two developments of its own. In some of the larger sections, with 1000 or more members, it was found that men were not greatly or at all interested in topics outside their own sphere—technical, commercial, accounting, etc. This has led to the creation of branches or departments within the section, so that those in a given group can get together and study their own specific problems, all groups meeting together once in awhile on some special occasion. At the other extreme are smaller sections that necessarily soon use up their available local talent and run short of authors and topics.

To meet this condition the National Electric Light Association Lecture Bureau was organized two years ago on the theatrical agency plan. It has a list of some two score lectures constantly renewed, nearly all illustrated, on electrical topics of the day, which are available free of cost to any company section on request. Each section secretary has sent to him the list of lectures, or additions to it, and makes his selection. Then the manager of the bureau fixes dates. It is not often that the author of the lecture can be present at the scheduled meeting, but some local member or officer can present the lecture and often supplement it. Text and lantern slides are thus in constant circulation all over the country disseminating information. The range of subjects is wide, from Mazda lamps to refrigeration, from the colossal Keokuk plant on the Mississippi to the operation of the Panama Canal, from sign lighting to the principles of economics and public utility finance. The authors are all well known; some of them are the great leaders of the industry. The value of the material may be inferred from the fact that universities and government institutions have applied for it. Obviously such useful work tends to foster existing sections and create new ones. It all helps the cause.

ADVANTAGES TO COMPANIES AND TO MEMBERS

As rallying centers for social forces and influences in a company, the section seems to have no superior, begetting in every organization, small or large, an *esprit de corps*, a sentiment of comradeship, a closer touch between officer and employee, a higher degree of loyalty. Unsuspected talent of many sorts is brought to notice, and so far as known the result is always good

alike to the company and the individual. One instance may be taken as typical. A young man in a not particularly large or conspicuous city managed by dint of effort to get a small company section going. It was all public-spirited work. Then he thought that the president of the National Electric Light Association could give them a boost by "stopping off" for an address between visits to much more important places. This was accomplished. The moment soon came when the two presidents whose acquaintance was thus made felt that the energetic young hustler needed a larger sphere, and now at a greatly advanced salary he is with one of them making good. There are in reality a good many such men for whom the company section has been the first chance they had to get out into the open and become known. The inference need not be pointed out.

OTHER ACTIVITIES OF COMPANY SECTIONS

National Electric Light Association company sections are versatile. One of them has a brilliant circus troupe of 400 members. Some of them have excellent bands and orchestras, or soloists of striking ability. Baseball teams are numerous, with a national cup trophy to be played for each year at the annual convention. Balls, picnics and entertainments of a diversified character, as well as annual dinners, are usual events. These are all under the management of the sections, free of any interference or dictation, and the annual elections are often most exciting affairs with brisk campaigning for two or three rival tickets. Several of the sections issue monthly bulletins devoted to section work, gossip and company news, the pages light and pleasant but with a serious purpose underlying it all, and usually with a "Question Box" department where any member may propound anonymously his difficulties and get them settled. There are Question Box prizes and other awards, such as those for the best suggestions as to improving company practice or methods of doing business. The association has a gold medal for the best paper presented each year before any company section, and this has of late been supplemented by cash or book prizes for the second and third competitors. Recently three cash prizes of \$25, \$15 and \$10 were offered for the three best sets of ten reasons for company section membership. There were no fewer than fifty-one excellent entries from eleven company sections.

HOW THE COMPANY HELPS

Frankly recognizing the good effects of the sections, the companies are universally desirous of promoting their strength and prosperity, although the methods vary. In some instances half the dues of \$5 are paid by the company to the association.

Usually provision is made for meeting rooms and sometimes for refreshments. Now and then an outside entertainer is brought in to liven up a program. Sometimes a definite annual contribution is furnished toward section expenses. In all of these matters the parent body does not make the slightest effort to dictate the policy. Its only step in that direction is to require that it shall authorize the company section to be formed and to suggest a standard but optional form of organization. In this way it has a number of experiment stations at work all aiming to help solve for it and the world at large some of the greatest social and industrial problems of the day, and all of them making a definite mark in opening a career to talent, educating the staff almost unconsciously to higher standards and assuring better return to capital while insuring better service to the public. The company section is a great institution. With all its drawbacks and shortcomings it is an admirable extension of the little red school-house.

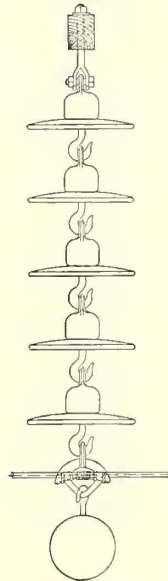
Midwinter Convention of the A. I. E. E.

A Conclusion of the Report of the Proceedings Begun Last Week and a Digest of the Discussion on the Earlier Papers—The Important Topics Related to Power Generation and Distribution

In the issue of the *ELECTRIC RAILWAY JOURNAL* for Feb. 28 the larger part of the papers delivered before the midwinter convention of the American Institute of Electrical Engineers on Feb. 25 and 26 were abstracted. In addition to those mentioned there remain the papers by Messrs. Kruesi, Buck and Hutchinson and all of those delivered on Friday.

At the end of the power station session program a paper of rather unusual type was furnished by A. H. Kruesi, who gave in outline a number of suggestions upon which discussion can be based. The topic of the outline was "Steam Versus Motor-Driven Power House Auxiliaries, from the Electrical Engineer's Point of View." He took up the subject from the standpoint of reliability of service and source of energy. The topics suggested were these: (1) excitation of generators, (2) ventilation and air cleaning, (3) choice of transformers as to type, (4) arrangement of large transformers, (5) switching systems for high-tension generating stations, (6) protective reactance coils, (7) wiring for power stations, (8) present status of outdoor substations.

At the transmission session H. W. Buck gave the results of experience with suspension insulators and demonstrated that it is possible to have excessive angular deflections with wind pressures of 15 lb. per square inch and the sleet loads ordinarily assumed. Copper conductors smaller than No. 1 and stranded aluminum cables of any size used in commercial practice are deflected more than 60 deg. at the insulators, this being the limit recommended by Mr. Buck. He gives a table showing the deflections produced in conductors of standard sizes and also the amount of "ballast" needed to reduce the deflection within safe limits. The maximum weight of ballast required is for No. 0000 aluminum cable, nearly 0.2 lb. per foot of cable. One mode of attaching ballast is shown in the accompanying illustration.



A. I. E. E.—
Ballasting
Suspension
Insulators

POWER GENERATION SESSION

Dr. Cary P. Hutchinson presented the most elaborate paper of the convention, in which he outlined and illustrated an original method of applying hydrographic data in designing hydroelectric power plants. The method was made definite by application at McCall's Ferry on the Susquehanna River. The method is a graphical one and is designed to bring together the data relating to the available water supply, the necessary auxiliary power supply and the characteristics of the load. The author called attention to the lack of systematic methods in handling problems of this kind, stating that the question presents itself in two forms: First, in the case of a proposed new development on a variable stream, for what stream flow shall the development be made? Second, assuming a plant already in operation, to what extent shall an auxiliary supply be provided in order to

convert the variable supply into a continuous supply? Both cases involve a determination of the total annual cost of an auxiliary supply adequate to supplement the deficiency in stream flow. In one case the selling price of the combined hydraulic and auxiliary supply is to be determined and the development fixed for such a stream flow that, at this price, the supply can be sold in the given market.

Under the title "The Cost of Electricity at the Source" H. M. Hobart gave the results of a study of the cost of generating electrical energy on a large scale. He stated that, under favorable conditions, electrical energy can be manufactured in bulk at a cost in the neighborhood of 0.25 to 0.40 cent per kw-hr. He called attention to the statement made by Ferranti in 1910, to the effect that on certain assumptions a station equipped with ten 25,000-kw generating sets could be built at a total cost of \$35 per kw. Mr. Hobart has made estimates which indicate that this rate is sufficient for a 100,000-kw station equipped with five 20,000-kw, 1800-r.p.m. steam-turbine-driven, three-phase generators and all the machinery required in such a plant. Of the amount stated the outlay for the turbo-generators, cables, exciters and switchgears is covered by 30 per cent.

The total cost of generating energy in a steam-driven plant is estimated to be from 0.225 cent per kw-hr. at 100 per cent load factor with coal at 50 cents per ton to 0.905 cent with 50 per cent load factor and coal at \$5 per ton. The cost must be increased slightly when the output is produced at less than 100 per cent power factor and about 5½ per cent when the pressure has to be stepped up in transformers.

Mr. Hobart recorded the results of his calculations in graphical form and the curves were published in connection with his paper. His purpose in presenting the results of the calculations is to call attention to the low price at which energy can be produced in bulk. The retail price of energy to small customers is so much greater than the figures given that there is apt to be a wrong impression as to the cost of generating it. Mr. Hobart believes that if the promoters of large manufacturing enterprises realized the actual facts there would be an increased incentive for them to locate their establishments near sources of electricity supply.

DISTRIBUTION SESSION

The report of the sub-committee on distribution was presented by the chairman, P. Junkersfeld. The report is of particular interest to electric railway men as it deals to a considerable extent with distribution for electric railway systems. After a brief introduction by the chairman, a number of appendixes were given, each containing a special article by a well-known authority.

GENERAL DISTRIBUTION PROBLEMS

Mr. Junkersfeld called attention to the advantages of the centralized generation of electrical energy and to the extension of the same principles to include transmission to substations and in some cases to the substations themselves. He concluded his section of the report with a bibliography on distribution for light and power, distribution for electric railways, cables and

underground construction, and substations and storage batteries.

The first appendix to the report contained a review of the situation in three-wire direct-current distribution, by Philip Torchio. Among the conspicuous improvements relating to distribution Mr. Torchio mentions first the development of the commutating-pole synchronous converter. This, in conjunction with graphite brushes with slotted commutators and self-lubricating copper graphite brushes for the collector rings, has made the operation of synchronous converters practically independent of attendance, except for starting up and shutting down and the periodic cleaning and setting after the machines are shut down. Other important innovations have been the split-pole synchronous converter and the synchronous booster-converter for obtaining regulation. He also called attention to the development in the storage battery situation, standby batteries consisting now of very thin plates similar to those used for electric vehicles.

The second appendix contained a discussion of alternating-current distribution by H. B. Gear. He took this up under two headings, bulk supply and general distribution. The former has largely been developed in America on the principle of radial lines. The author showed, by means of diagrams, the prevalent arrangement of direct lines and tie-lines. He stated also that the maximum-sized three-core cable for 6600 volts has a capacity of 3200 kva and for 20,000 volts one of 5000 kva. Previous to the last two or three years it was not satisfactory to operate high-tension lines in parallel at the substation end owing to the absence of reliable reverse-power relays which would permit satisfactory parallel operation.

The use of separate cables for different converters has resulted in an accumulation of surplus cable capacity amounting to from 50 to 80 per cent of the maximum substation load. At the present time, in Greater New York and Chicago, there is not far from \$1,000,000 of surplus cable investment. This condition has been recently much improved by the use of considerably larger converting units, which make possible large saving in future cable investment by permitting larger loads on the cables. Another source of relief has appeared in the development of protective relays designed to permit lines to be operated in parallel. Reverse-power relays have also been developed and are under trial at the present time. The performance of these will be watched with the most sympathetic interest by all who are interested in getting high-tension cable investment down to an economical basis.

In a third appendix, H. Goodwin took up the effect of consumer's apparatus and wiring on distribution. He called attention to the necessity for keeping up the quality of motors connected to supply systems. While it might at first appear that the manufacturer's point of view is opposed to that of the central station, a broad view will indicate that the electric art and industry will develop most rapidly and permanently if all join to keep as low as is reasonably possible the rates for electrical energy, which cannot be done if central stations are put to excessive expense on account of the poor characteristics of the apparatus used by consumers. The author called attention to the improvements which have been made in motors, particularly in the development of a type of a.c. motor which draws power of unity power factor and thereby improves the general power factor of the system.

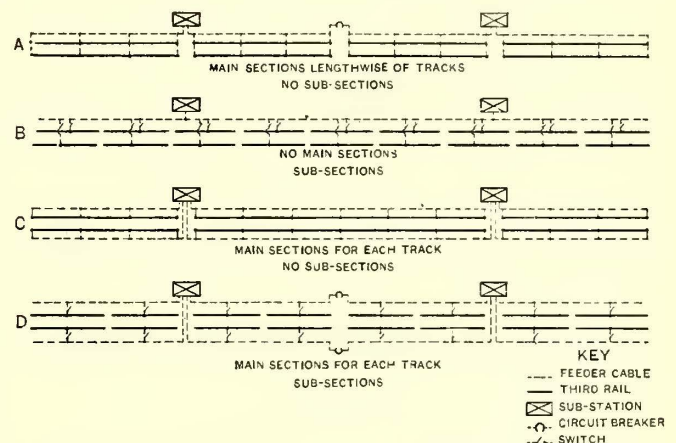
POWER DISTRIBUTION FOR RAILWAYS

Under the title "D.C. Distribution for Surface Railways' Interurban Service," R. H. Rice outlined the situation in this field, dividing it into three component

parts: (1) the converting equipment in the substation; (2) the positive system from the substation switch-board to the car, including feeders and trolley wires, and (3) the negative system, or return, which completes the electric circuit from the car to the substation negative busbar and includes the electrical features of the track. Substation equipment has become quite well standardized. The supply is practically always from three-phase high-tension lines and for railways is of twenty-five cycles. Each converter in service should preferably be served from a separate high-tension line when the machines are of large capacity and used in important city service. A few years ago 2000 kw was the limit in size, but 4000-kw machines are now in service. The cost of these large machines is less per kilowatt, and they occupy but little more space in the substation.

Mr. Rice gave in considerable detail the modern practice in distribution for electric railways, both overhead and underground. He called attention to the fact that in many cases the return circuits, except possibly the rail bonding, are almost wholly neglected, while the positive system is carefully planned and constructed. A poorly built negative system does not jeopardize life or cause delay to the same extent that similar neglect in a positive system would do, but elements of danger and loss are present which should under no circumstances be neglected.

In beginning the appendix on the subject "Direct-Current Distribution for Underground and Elevated Railways," E. J. Blair called attention to modifications of the third-rail system which are used in different parts



A. I. E. E.—Sectionalizing Railway Feeders

of Europe. In this country the third-rail construction is standard and seems to meet nearly all conditions. With the great density of traffic common in this country the distribution must be made out in such a way as to fulfil the following conditions: Action with maximum of reliability must be provided; the system must be able to care for big loads out of all proportion to the mean requirements; provision must be made for very heavy currents for train units and such close headway that extreme current energy per mile of track will obtain.

In laying out a distribution system under such conditions the problems of size and quantity of conductors are the least difficult for the engineer to solve, and the most important feature to be considered is simplicity and perfection of operation. Too little attention has been given to this feature. The arrangements and division of electrical distribution with respect to the track—that is, sectionalizing—demand attention. Several methods of sectionalizing are shown in the accompanying figures, which Mr. Blair discussed in detail.

He assumed that the last arrangement is the ideal one and raised the question as to how large the sections should be. In reply he stated that extremely large substations for elevated and subway work should be avoided. For a substation feeding two tracks and in two directions only it would seem undesirable to go much higher than 5000 kw in capacity. Where the feed is in four or six directions the capacity should not exceed 10,000 kw. The single section should be restricted in size to a mean load during heavy periods of 4000 amp and to a maximum length of 2 miles.

W. G. Carlton discussed the subject of d.c. distribution for interurban and steam railroads. He called attention to a few important historical facts in the application of electricity to heavy electric railroading. The earliest large d.c. roads used low-voltage and third-rail distribution. The majority of those now operating or preparing to operate at 1200 volts or higher use overhead trolley. In general the catenary type of construction is preferred. There are twenty-eight railroads operating or preparing to operate at 1200 volts or higher, the maximum voltage being 2400. Power for operation at 1200 volts is furnished direct from steam-driven generators in a few cases, but as a rule is supplied by synchronous converters or motor-generators. The only direct-current, 2400-volt road in operation at the present time uses motor-generators with two 1200-volt machines in series. The Butte, Anaconda & Pacific Railroad installation is an example of what can be done in handling steam railroad service.

Alternating-current distribution for interurban and steam railroads was discussed by W. S. Murray, who stated that the a.c. contact wire in general has no application in the interurban field, where equipment must be common to city and interurban operation. He offers as recommended practice the use of a single overhead wire furnishing high-voltage alternating current of twenty-five cycles as the contact system for the motive power apparatus operated thereunder. This apparatus may be single-phase, split-phase and, through the medium of a rectifier, direct-current.

DISTRIBUTION FOR LIGHTING AND INDUSTRIAL POWER

The principal problems in the relation of distribution and switching apparatus outlined by E. D. Merriam were classified by him as follows: (1) maintenance of continuous power supply; (2) protection against service interruption due to faults in the distribution system and receiving apparatus; (3) safe interruption of circuits as normally loaded; (4) "safety first" protection for all who come near the distribution system, and (5) operation of the distribution system at maximum efficiency. He gave illustrations to show that a considerable number of important distribution problems depend for their solution on the characteristics and performance of switching and auxiliary apparatus and said that strenuous efforts are being made to improve the various devices.

In discussing the subject of distribution for street-lighting service, Paul M. Lincoln called attention to the advantages of constant-current operation for street lighting as compared with constant-potential operation. He enumerated several advantages of this system and commended the series-parallel arrangement.

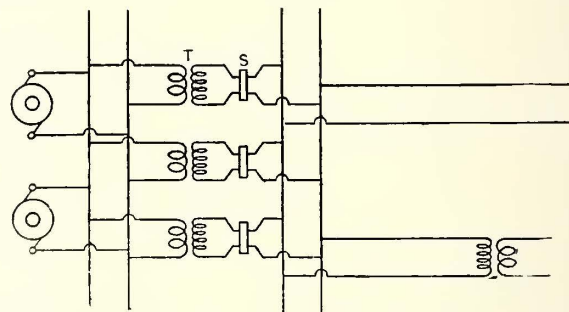
RECORDING DEVICES

Dr. C. P. Steinmetz directed attention to the importance of having automatic records of occurrences in electric circuits for the reason that circumstantial evidence regarding unusual conditions is practically worthless. He reviewed the different kinds of recording apparatus available and pointed out the field of application of each. For purposes of diagnosis of causes of trou-

ble he recommended the instrument known as the multi-recorder, devised by E. E. Creighton, and described in the A. I. E. E. *Transactions*, Vol. 31, 1912, page 825.

Dr. Steinmetz illustrated his argument by means of an actual incident. In the diagram, shown herewith, a large transformer, *T*, installed in a generating station, a high-tension switch, *S*, in the same station and a transformer at the end of a branch line were destroyed. At the same time a flash-over occurred on a transmission line. Post-mortem examination of the transformer showed numerous arc burns on coils and tank and the coils badly deformed and bent out of shape. Circumstantial evidence elicited from attendants showed "static" in the station for some time before the accident, and it was suspected that numerous short-circuits had occurred in the lines during the weeks preceding the accident. This was all the evidence that could be secured, and it was too meager to determine what actually happened.

Dr. Steinmetz then proceeded to analyze the situation from the theoretical standpoint as follows: An arcing ground occurred on the line, producing moderately high-frequency oscillations, a few thousand per second. This lasted possibly for a few hours until the breakdown occurred, either by electrostatic heating or by impact of the oscillations. The insulation in the trans-



A. I. E. E.—Diagram Used by Dr. Steinmetz in Discussing Transformer Failure

former then broke down, causing a short-circuit through transformer and line. The high-tension switch, in attempting to open, failed on account of the excessive current, and the superposed high-frequency oscillation destroyed it and caused a short-circuit at the transformer terminals. The magnetic forces in the transformer moved the coils, and the shock of the short-circuit broke down the transformer at the end of the branch line.

Another explanation of the accident might be this: Numerous flash-overs had occurred during the preceding weeks in the transmission lines, resulting in heavy short-circuits. While the transformers were strong enough to stand occasional short-circuits, the stresses involved were so numerous that they gradually impaired and finally broke down the transformer, *T*. This resulted in the destruction of the circuit-breaker, the failure of the second transformer, etc.

Other explanations might be made on the basis of lightning entering the line and starting a high-frequency, cumulative surge in the transformers, producing spark discharges, finally ruining the coils. Still again the internal oscillations in the transformer might have occurred owing to the entrance of high-frequency lightning or because of an arcing ground on the line, with consequent spark discharges leading to the destruction of the transformer. These illustrations show how many causes might have contributed to the result and yet how inconclusive is any solution without autographic records of the electrical phenomena.

ALUMINUM-CELL LIGHTNING ARRESTER

Dr. E. E. F. Creighton stated that recent investigations have shown that lightning discharges from the clouds have wave fronts of various degrees of steepness and are impulses rather than high-frequency discharges. This has an important bearing on the development of the lightning arrester. If the above conclusion is true, then the present type of arrester is correct in principle at least. Two of the main protective features of the aluminum-cell arrester are its small dielectric-spark lag and its ability to absorb high-frequency potential of less value than normal line voltage. Dr. Creighton considered that the aluminum-cell arrester is correct in principle and that its cost is justified by its performance.

DIGEST OF THE CONVENTION DISCUSSION

The discussion of the papers was most instructive and interesting. A few salient features only will be mentioned here.

POWER STATION SESSION

P. Torchio, W. S. Moody, H. G. Stott, P. M. Lincoln, V. Karapetoff, H. R. Woodrow and W. M. Davis discussed the subject of power station reactances. The work of the authors of the paper on this subject was appreciated and regret was expressed that it had not included feeder reactances more fully. The importance of including transient effects was pointed out. The plan to be used in the enlarged Interborough plant in New York was explained and shown to be different from any of those described. It is a compromise between the ideal condition and prohibitive cost.

The outdoor substation was discussed by D. C. Jackson, A. H. Kruesi, H. B. Gear, W. S. Moody, A. M. Rossman, J. C. Smith, P. W. Sothman, J. E. Kearns, H. E. Bussey, F. Osgood, K. C. Randall, D. B. Rushmore and R. E. Argersinger. The sentiment was in favor of caution in connection with this type of station. Outdoor substations are already in use to a considerable extent, but some doubt as to their real economy was raised. Indoor substations were favored by some speakers when the necessity for extreme reliability justifies the cost.

TRANSMISSION DISCUSSION

The transmission papers were discussed by D. B. Rushmore, H. W. Buck, F. W. Peek, Jr., C. E. Waddell, P. H. Thomas, William McClellan, V. Karapetoff, P. M. Lincoln, A. O. Austin, F. Osgood, J. A. Sandford, Jr., J. C. Smith, E. A. Lof, E. M. Hewlett and S. Haar. The remarks centered naturally in the faults of insulators and in the electrical and mechanical stresses sustained by insulators. An important feature upon which there was some unanimity was the belief that porcelain does not "age" but that the cause of rupture after a lapse of time was the presence of manufacturing defects temporarily masked. The relation of switching to insulator failures was taken up, and the conclusion seemed to be that switching surges are inevitable and must be provided for. According to Mr. Austin, the testing of insulators with high-frequency power is very satisfactory.

POWER GENERATION SESSION

The discussion of the subject of power generation was focused on the estimates made by Mr. Hobart of the cost of generating electrical energy. It was participated in by H. W. Buck, J. W. Lieb, Jr., H. R. Summerhayes, C. T. Hutchinson, F. A. Scheffler, H. L. Wallau, H. B. Alverson, O. K. Harlan, C. F. Scott,

H. C. Abell, A. H. Kruesi and V. Karapetoff. Mr. Hobart's estimates were severely criticised as tending to give a wrong impression of the real cost of generating energy under actual conditions. The wisdom of circulating estimates of this sort was questioned, and the possibility of misuse of the estimates was pointed out. The short life of a modern plant in view of rapid obsolescence was emphasized, amounting on the average to but six years in a prominent case cited by one of the speakers.

DISTRIBUTION AND PROTECTIVE APPARATUS SESSIONS

The discussion on distribution was participated in by H. L. Wallau, D. W. Roper, E. M. Hewlett, P. Torchio, P. S. Taylor, E. W. Trafford, A. P. Kelly, C. Schwartz and W. A. Del Mar. The field was so large that the discussion was necessarily scattered. A number of useful and practical points were brought out by the various speakers.

Dr. Steinmetz's paper brought out statements as to the operation and utility of the multi-recorder of Dr. E. E. F. Creighton. Dr. Creighton's paper was discussed by Messrs. F. W. Peek, Jr., L. C. Nicholson, C. O. Mailloux and C. P. Steinmetz. They all agreed that the aluminum-cell lightning arrester is effective and that further data in regard to its operation are desirable.

INTERNATIONAL ELECTRICAL CONGRESS PUBLICITY MEETING

On Wednesday evening, Feb. 25, a mass meeting was held in the auditorium of the Engineering Societies Building to arouse interest in the congress which will be held in September, 1915, at San Francisco. H. G. Stott, chairman of the organization committee, presided, and addresses were given by Dr. C. P. Steinmetz, honorary chairman of the congress; Dr. William Rader, of Pottstown, Pa.; W. D'A. Ryan, illuminating engineer of the Panama-Pacific Exposition; J. A. Cruikshank, of Philadelphia, Pa., and P. M. Lincoln, of Pittsburgh, Pa. Several of the addresses were illustrated with lantern slides, one with moving pictures. A successful effort was made to acquaint those present with the beauties of a transcontinental trip and the benefits to be derived from a visit to the exposition and the congress.

NORWEGIAN REPORT ON ELECTRIFICATION

The royal Norwegian commission on hydroelectric development has made a report to the Minister of Public Works favoring the electrification of the State railways. It estimates that the cost of power substation and transmission lines in southern Norway alone would be \$12,500,000. The railways which preferably should be electrified first are the following: Christiania to the Swedish border, Christiania to Gjoevik, Christiania to Drammen and three smaller sections in the vicinity of Christiania Fiord. The total cost for electric railway equipment on these lines would be \$8,000,000. Despite this high outlay, it is considered desirable to electrify these railways as part of an electric railway, lighting and power service for all Norway. Furthermore, the price of coal is tending steadily to rise, whereas the cost of electric energy will gradually decrease as the fixed charges are reduced. The electrification, of course, is also expected greatly to enlarge passenger and freight traffic through the more intensive development of the territories served. The Storting has already approved trial electrical operation on the Christiania-Drammen line.

Report of Swiss Electrification Commission

The Commission, Which Was Appointed to Determine the Best System of Electrification for Switzerland, Compares the Several Systems and Gives Its Reasons for Favoring Single-Phase Operation

The Swiss Electrification Commission, headed by Dr. Wyssling, has recently made a report to the Swiss government on the choice of electrification systems. The following is a translation in abstract of the report as contributed by J. Reyval to the Jan. 10, 17 and 24 issues of *La Lumière Electrique*:

CHOICE OF SYSTEMS

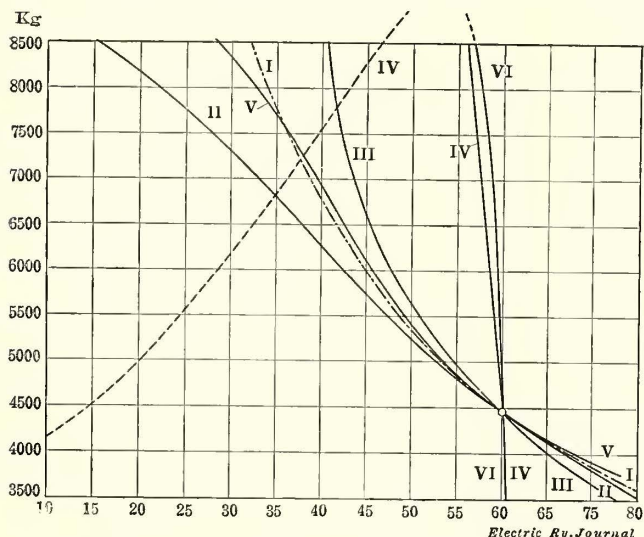
For the Swiss conditions it is important to have a system which can use water-power to greatest advantage. The following systems were studied in connection with such exploitation:

Direct current with third-rail up to 800 volts and trolley up to 3000 volts, with the possible ultimate use of a 6000-volt, three-wire system. In this case the current would, of course, be converted from three-phase lines and three-phase machinery.

Three-phase alternating current with two overhead

locomotives, the report states that any of the three systems would be capable of hauling trains of any desired length. The possibility of speed variation is then considered, and the curves (Figs. 2, 3, 4 and 5) are produced to demonstrate that the single-phase motor is the most efficient in giving the desired range of speeds and tractive efforts without loss in resistance. Further, the single-phase commutator motor is the only one which, because of transformer control, can maintain the service despite extremely heavy drops in voltage. It is superior to the d.c. motor and equal to the three-phase motor in operating at the maximum speed permissible on grades. The possibility of making up time is another advantage of single-phase apparatus, even if it is not the cheapest. It is true that an increase in speed could be obtained with d.c. field-control motors or with three-phase induction motors by using a special resistance, but the single-phase motor is the one that meets this condition to the greatest satisfaction.

Fig. 1 shows the characteristics of different motors based on the same normal tractive effort and normal speed, the output being taken on a one-hour basis. A curve has also been calculated for an ideal motor of constant output, namely, one which would exert a uniform demand on the hydroelectric plant. Table I gives some examples of tractive efforts and the corresponding energy requirements of the motors represented in the curves of Figs. 2 to 5 inclusive. Assuming that the energy required for acceleration is double that for normal running, it is found that the three types of motors are fairly equal in efficiency, but the single-phase motor calls for the least energy output from the hydroelectric station. The commission was satisfied that both d.c. and single-phase multiple-unit trains were practicable and also that the unequal division of load with three-phase equipment, due to unequal wear of wheels, could be corrected by the use of resistances.



I—Ideal motor of constant output; II—steam locomotive; III—d.c. series motor; IV—d.c. shunt-wound motor; V—single-phase motor; VI—three-phase induction motor.

Fig. 1—Swiss Report—Mechanical Characteristics of Different Motors with the Same Normal Tractive Effort and Normal Speed

lines having 5000 volts to 8000 volts between phases and a frequency of fifteen cycles, the primary distribution to be at a higher three-phase voltage.

Single-phase alternating current with line voltage at 15,000 volts and a frequency of fifteen cycles to twenty-five cycles, the transmission current, whether single-phase or three-phase, to be lowered at transformer stations to this voltage.

The following limits were considered admissible for the propulsion apparatus itself: Direct current, 1500 volts per commutator and 3000 volts per motor; single-phase, 300 volts to 500 volts for purely series motors and 6000 volts for motors without commutators. A frequency of fifteen to forty-five cycles is held admissible for three-phase motors.

COMPARISON OF SYSTEMS ON PURELY TECHNICAL GROUNDS

After reviewing the development of motor cars and

TABLE I—TRACTION EFFORT AND POWER TAKEN BY DIFFERENT TYPES OF MOTORS

	—Tractive Effort in Percentage of Normal Effort—					
	50	100	150	200	250	300
Aloth Motor, Type G.T.M. 65, 750 Volts, 65 Hp, One-Hour Basis						
Consumption in kw of the motor alone.....	2.4	4.7	7.0	9.4	11.7	14.0
Consumption in kw of the motor and resistances for acceleration at constant and normal voltage.....	10.0	14.8	16.1	18.6	22.0	24.0
Three-phase Locomotive Motor, Brown, Boveri & Company, Type D-16/6 500-320, 16 Cycles, 3000 Volts, 350 Hp, One-Hour Basis						
Consumption in kw.....	210	420	630	840	1050	1260
Consumption in kv-amp.....	320	640	960	1280	1600	1920
Power factor.....	0.655	0.655	0.655	0.655	0.655	0.655
Single-Phase Commutator Motor, Deri Type, Brown, Boveri & Company, 16 2/3 Cycles, 1000 Volts, 300 Hp, One-Hour Basis						
Consumption in kw.....	65	92	122	154	190	228
Consumption in kv-amp.....	265	395	530	670	810	950
Power factor.....	0.24	0.24	0.24	0.24	0.24	0.24
Series Commutator Motor, Oerlikon Type 12 WB, 15 Cycles, 500 Volts, 100 Hp, One-Hour Basis						
Consumption in kw.....	20	60	97.5	140	190	250
Consumption in kv-amp.....	138	280	420	560	700	860
Power factor.....	0.15	0.19	0.23	0.25	0.27	0.29

COMPARISON OF SYSTEMS ON ECONOMIC BASIS

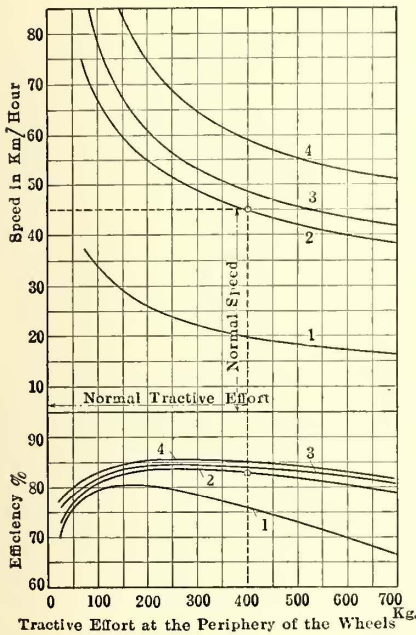
It was considered preferable to compare the motors on the basis of torque rather than horse-power because the latter varies so much with speed. Table II is a comparison of the three systems, indicating that their dead weight is much less than steam equipment. It also shows that they do not differ materially from one

another, the slightly higher weight of single-phase equipment being considered an advantage in speed regulation. The report also points out that systems of electric traction should not be compared in single parts but as entities; further, that while the efficiency of the same motor varies greatly according to the condition of service and size, the actual efficiency of motors of the same output and in the same service does not differ materially despite differences in systems of energy supply.

The characteristic curves in Figs. 2 to 5 are based on the assumption that the speed regulation of the different motors is obtained without any resistance losses. Therefore, for d.c. and three-phase operation only a

tations on the efficiency of old equipment misleading. Table III, which compares the efficiency of the three systems, shows that the average percentage of the grand totals does not vary greatly.

The possibility of equalizing the hydroelectric demands is of predominating importance for the electrification of the Swiss railways. From this point of view, the commission finds that the system to choose is the one which will best permit this equalization. According to its calculations, the ratio between minimum and maximum energy requirements is as 1 to 3.5. Excess energy can be stored either in the form of impounded water or electric accumulators. The use of batteries has been assumed to take care of a variation of 1 to 4,



1—Connected in series; 2—connected in parallel; 3—connected in parallel with 30 per cent of current in shunt; 4—connected in parallel with 60 per cent of current in shunt.

Fig. 2—Swiss Report—Characteristic Curves of Alioth D.C. Series Motor, 66.5 Hp, 750 Volts

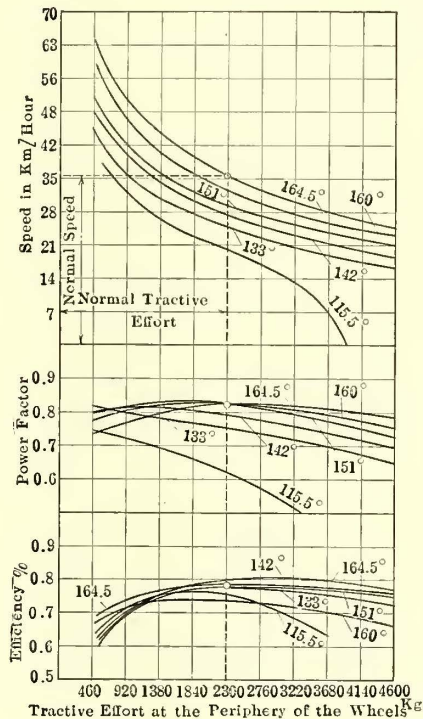


Fig. 3—Swiss Report—Characteristic Curves of Deri Type Brown-Boveri Single-Phase Motor, 300 Hp, 1000 Volts, 16 2/3 Cycles, with Six Brush Positions

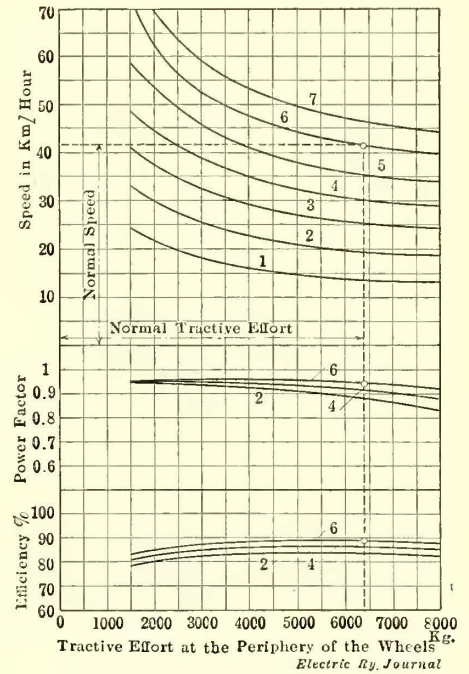


Fig. 4—Swiss Report—Characteristic Curves of Oerlikon Single-Phase Motor, 1000 Hp, 500 Volts, 15 Cycles with Seven Voltage Steps

limited number of speed steps would be obtained, and it would be impossible to avoid the use of resistance if better regulation were wanted. Thus, if the total efficiency based on complete runs is considered, the d.c., as well as the three-phase, motor loses whatever superiority it might have if a limited number of fixed speeds were permissible. The commission states that while it is difficult to make an exact comparison of the efficiencies of entire trains, the following values may be admitted: direct current, 70 to 80 per cent; three-phase current, 65 to 70 per cent; single-phase current, 68 to 75 per cent.

The efficiency of the transmission and feeder contact lines is much the same for the three systems. The substations for transforming the current exercise the greatest influence on the total efficiency. For direct current, rotating apparatus with or without storage batteries would be required, and the substation efficiency would vary from 70 to 90 per cent. As to three-phase and single-phase transformer stations, the improvements made in recent years would make the quo-

and then the energy requirements of each system have been calculated on the basis of minimum and maximum needs. The comparison for the latter case is presented by the bracketed figures in Table IV. Although these figures are only approximations, the superiority of single-phase is held to be clear. Comparisons based on the storage of water instead of electricity show no important difference.

Owing to the heavy cost of accumulators, a study was made to see whether it would not be better to design the station machinery to give the maximum output when needed, avoiding all storage. A station assumed to have a minimum output of 500 kw and a maximum output of 2000 kw, utilizing a fall of 200 m (656 ft.), was taken as an example. The installation of extra-capacity machinery proved to be much cheaper. It was concluded, therefore, that the most economical system would be that which had the least variations in maximum energy requirements. The series motor, of course, is the most desirable because instead of taking more energy on up-grades it simply decreases in speed.

In theory, regeneration would seem to be of great importance in a mountainous country like Switzerland. In reality, regeneration in the form of braking is but a very small part of the total requirements, while regeneration in the form of liberated energy is of importance only on really severe grades which do not obtain generally on the trunk lines. The estimated energy saving of 4 per cent would not be great enough to justify regenerating apparatus on d.c. rolling stock, although its application to the a.c. systems might still be considered.

COMPARISON OF TRANSMISSIONS, EFFECT ON WEAK-CURRENT INSTALLATION AND CHOICE OF FREQUENCY

The reliability of the line is considered even more important than the reliability of the propulsion equip-

ment. Numerous studies were made on the Seebach-Wettingen line by the Federal Department of Telegraphs and by the Telegraph Inspection Department of the Federal Railways in collaboration with the Oerlikon Company. The results of the tests may be summarized as follows:

The elimination of disturbances produced in telephone, telegraph block signal and weak-current circuits generally by traction currents is a little more difficult if

TABLE II—WEIGHT OF MOTOR PER HP OUTPUT AND TORQUE IN METER-KILOGRAMS

	D. C.	Three-Phase	Single-Phase
Electric locomotives for speeds of 40 to 60 km per hour.....	50-55 kg/hp 11 mkg	45-60 kg/hp 10-12 mkg	50-75 kg/hp 11-13 mkg
Motor car equipment for speeds of 40 km per hour.....	28-30 kg/hp 6-7 mkg	30-35 kg/hp 7-8 mkg	30-35 kg/hp 7-8 mkg

TABLE III—EFFICIENCY IN PERCENTAGE OF THE THREE SYSTEMS ON DAILY AND ANNUAL BASIS

	D. C.	Three-Phase	Single-Phase
Trains.....	70 to 80	65 to 75	68 to 75
Contact line and rails.....	94 to 98	94 to 98	94 to 98
Transformation in rotating equipment.....	70 to 90	94 to 98	94 to 98
Transformation in static equipment:			
Old transformers.....	70 to 90	(70 to 80)	(80 to 90)
Recent transformers.....	70 to 90	80 to 90	90 to 95
High-tension transmission lines.....	90 to 95	90 to 95	90 to 98
Net efficiency from the generating plant to the wheels of the vehicle.....	42 to 67	44 to 63	53 to 63

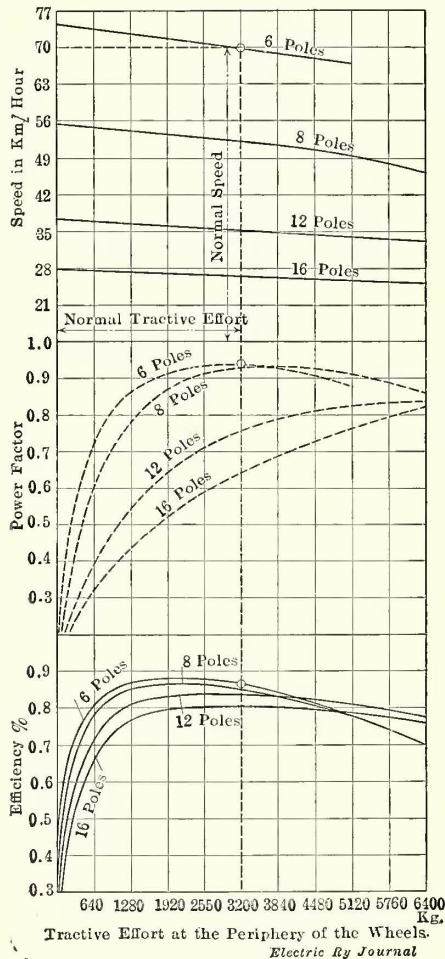


Fig. 5—Swiss Report—Characteristic Curves of Brown-Boveri Three-Phase Induction Motor, 250 Hp, 3000 Volts, 15 Cycles with Four Changes of Poles

ment because disturbances on the former cripple the entire system whereas disturbances on the latter cripple merely the individual train.

The third-rail is substantial, easily accessible, less obstructive than an aerial line and free from wind troubles; but it is difficult to maintain the third-rail covering and impossible to use it when very high voltages are employed because of the danger to employees and passengers. On the other hand, overhead lines have been developed to such a degree of reliability that their construction and maintenance for high-tension work offers no disadvantages. Finally, in comparing aerial lines themselves, the single-phase trolley is certainly preferable to the double trolley of three-phase lines.

The possible influence of propulsion currents on nearby telephone and telegraph circuits received care-

ful attention. Numerous studies were made on the Seebach-Wettingen line by the Federal Department of Telegraphs and by the Telegraph Inspection Department of the Federal Railways in collaboration with the Oerlikon Company. The results of the tests may be summarized as follows:

The elimination of disturbances produced in telephone, telegraph block signal and weak-current circuits generally by traction currents is a little more difficult if single-phase rather than d.c. traction is used, although the trouble may be cured in either case. With any system of traction whatsoever, it is necessary to eliminate stray currents by abolishing all ground return by the use of complete metallic circuits for all paralleling telephone or telegraph lines which cannot be removed out of the sphere of influence of the traction current. Telephone wires should be transposed as often as the local conditions require. For block-signal circuits, which are less sensitive, several outgoing wires may have a common return wire. To prevent static action, the capacity must be divided as equally as possible and the branching of overhead cables should be avoided. In any system of a.c. traction means must be taken to prevent the production of harmonics, but to-day this matter offers less difficulty with single-phase than with three-phase equipment. In conclusion, the commission states that there is no important difference in the influence of each system on weak-current circuits as a whole.

The choice of frequency for single-phase operation was based upon the most efficient ratio, namely, 1 to 3, which could be obtained if it was necessary to install frequency changers. From existing forty-cycle and fifty-cycle central stations a frequency of thirteen and one-third cycles to sixteen and two-third cycles, or an average of fifteen cycles, could thus be secured. For three-phase traction forty to fifty cycles is admissible. Of course, fifteen cycles is too low for lighting, but the latter service requires but a trifling percentage of the entire output and can be furnished from a separate circuit.

Considering all technical features, the commission concludes that the single-phase system is the one most advantageous for Swiss conditions.

When the first comparisons were made no definite figures were available on the unit costs of energy at the power stations, but more detailed calculations later showed that the relations between the systems were not changed by more exact generating costs.

In general, it was found more advantageous for all systems not to use a storage battery power station auxiliary. The cost of energy for single-phase operation, as shown in Table VI, is less than for direct-current or three-phase. To remove all doubt, the comparative costs of car equipment were also considered. The commission concludes that the most advantageous system is single-phase, fifteen cycles, with 10,000 to

15,000 volts on the contact wire. Switzerland, it observes, can accept this conclusion all the more confidently as the decision simply confirms that already made by the Prussian, Bavarian, Austrian and Swedish State Railways and as it is also in line with practical demonstrations made on a large scale.

SPECIAL STUDY FOR ELECTRIFICATION OF THE OLD GOTHARD TUNNEL

Although the primary object of electrification is to free the Swiss railroads from the necessity of importing fuel, it is also expected that the change will pro-

TABLE IV—LOSSES AND ADDITIONAL EXPENSES DUE TO THE USE OF ACCUMULATORS

	SYSTEM OF CURRENT		
	D. C., 3000 Volts, with Accumulators at All Stations	Three-Phase at 5000 Volts, with Accumulators at Central Stations (Without Change in Frequency)	Single-Phase at 5000 Volts, with Accumulators at the Central Stations
Kw-hr. necessary at the high-tension end to place 1 kw-hr. on the contact line.....	1.51 (1.40)	1.65 (1.55)	1.65 (1.50)
Comparative costs of kw-hr. furnished to contact line in percentage.....	100 (100)	107 (111)	107 (107)
Proportional cost of transformation in percentage.....	136 (64)	93 (50)	68 (43)
Cost per kw-hr. furnished, in percentage.....	236 (164)	200 (161)	175 (150)

Bracketed figures cover maximum requirements.

TABLE V—PROPORTION OF TOTAL ANNUAL EXPENSES FOR EXPLOITATION, MAINTENANCE, INTEREST AND AMORTIZATION OF THE POWER PLANTS WITH AND WITHOUT BATTERIES

	If No Batteries Are Used	If Batteries Are Used
Where long-distance distribution is not necessary the expenses are as.....	100	to 182
For distribution without transformation:		
To a distance of 50 km, as.....	100	to 142
To a distance of 100 km, as.....	100	to 132
To a distance of 150 km, as.....	100	to 124
For distribution with transformation at the point of use:		
To a distance of 50 km, as.....	100	to 180
To a distance of 100 km, as.....	100	to 144
To a distance of 150 km, as.....	100	to 134

TABLE VI—COMPARISON OF COSTS (IN FRANCS) FOR GIVEN TRAFFIC CONDITIONS WITH SINGLE-PHASE AND THREE-PHASE SERVICE

	A		B	
	Single-Phase, 15 Cycles	Three-Phase, 50 Cycles	Single-Phase, 15 Cycles	Three-Phase, 50 Cycles
Cost of installations:				
Central stations.....	27,150,000	24,865,000	30,450,000	27,865,000
Distribution system.....	2,531,000	6,717,000	2,531,000	6,717,000
Rolling stock, plus weak-current installations.....	28,641,000	32,211,000	28,641,000	32,211,000
Extra rolling stock due to expected growth in traffic.....	6,416,000	6,416,000	15,765,000	15,765,000
	64,738,000	70,209,000	77,387,000	82,558,000
Total Annual Expenses				
Indirect expenses comprising installations for the railway itself:				
Interest.....	1,146,000	1,289,000	1,146,000	1,289,000
Amortization.....	93,000	111,000	93,000	111,000
Renewal.....	348,000	375,000	348,000	375,000
	1,587,000	1,775,000	1,587,000	1,775,000
Increased rolling stock for greater traffic: interest, amortization and renewals.....	329,000	329,000	819,000	819,000
	1,916,000	2,104,000	2,406,000	2,594,000
Direct expenses for electric traction:				
Cost of energy as generated.....	4,689,000	4,780,000	5,491,000	5,583,000
Cost of energy at the outgoing lines from the central stations.....	2,172,000	1,989,000	2,436,000	2,229,000
Cost of distribution.....	316,000	853,000	316,000	853,000
Total.....	9,093,000	9,726,000	10,649,000	11,259,000

duce better service than is now possible. The first object will be to increase the speed of trains, especially for local mixed service and for operation on grades. Complete data along these lines were worked out for the present Gothard line. Table VII shows the daily and annual gross ton-km hauled in the years 1904 and 1907 and the estimated electric ton-km. The estimated increase compared with the medium traffic of 1904 is 185 per cent, and compared with the medium traffic of

1907 is 130 per cent; the corresponding increases in maximum traffic would be 255 per cent and 150 per cent. The electrical maxima are very near the ultimate capacity of the Gothard line.

POWER REQUIRED FOR ELECTRIC TRACTION ON GOTHARD LINE

The power requirement calculations are based upon the amount actually necessary at the wheels to meet the proposed timetable plus that required for lighting. The total requirements are based on the assumption that

TABLE VII—RECAPITULATION IN THOUSANDS OF TON-KM, GIVING GROSS WEIGHT OF TRAINS HAULED ON THE GOTHARD RAILWAY UNDER PAST STEAM AND ANTICIPATED ELECTRICAL CONDITIONS

Class of Trains	AVERAGE TRAFFIC ANNUALLY			AVERAGE TRAFFIC DAILY		MAXIMUM TRAFFIC DAILY	
	Steam, 1904	Steam, 1907	Electric, 1907	Electric, 1904	Steam, 1904	Steam, 1907	Electric, 1907
Express.....	213	296	418	1.145	643	1303	2033
Omnibus.....	122	135	226	0.620	320	558	874
Freight.....	441	670	793	2.470	1574	2504	3585
Total.....	776	1101	1437	4.242	2537	4365	6492

TABLE VIII—POWER REQUIREMENT AT THE WHEELS ON THE DIFFERENT SECTIONS OF THE GOTHARD RAILWAY

Section	Hr	
	Average Traffic	Maximum Traffic
Reuss basin.....	10,530	15,240
Tessin north.....	10,170	12,370
Tessin south.....	9,300	13,880
Tessin complete.....	13,700	20,760
Fifth district.....	21,820	31,840

TABLE IX—EFFICIENCY AND AVERAGE ENERGY CONSUMPTION OF ROLLING STOCK, GOTHARD LINE

Type	AVERAGE TRAFFIC				MAXIMUM TRAFFIC			
	Efficiency, per Cent	Power Factor	Energy, Watt-hr./Ton-km		Efficiency, per Cent	Power Factor	Energy, Watt-hr./Ton-km	
			At Wheels	At Contact Wire			At Wheels	At Contact Wire
Express locomotives.....	68	0.48	38	56	70	0.52	38	55
Motor cars.....	60	0.40	35	37	64	0.45	35	54
Freight locomotives.....	72	0.90	29	40	73	0.91	27	38
Total.....	68	0.58	32	47	70	0.62	32	46

TABLE X—EFFICIENCIES FROM TURBINES TO TRACTION WHEELS, GOTHARD LINE

Parts	AVERAGE TRAFFIC		MAXIMUM TRAFFIC	
	Daily	Daily	Daily	Daily
Rolling stock.....	0.75	0.68	0.78	0.70
Contact lines.....	0.05	0.98	0.94	0.97
Substation transformers.....	0.97	0.94	0.97	0.94
Transmission lines.....	0.93	0.98	0.90	0.96
Generators and station transformers.....	0.88	0.81	0.89	0.83
Total.....	0.56	0.50	0.57	0.51

TABLE XI—TOTAL ENERGY REQUIREMENTS, GOTHARD LINE

Section	Maximum Hp	Daily	
		Maximum in Hp-hr.	Annual Work in Hp-hr.
Reuss basin.....	27,000	250,000	58,000,000
Tessin north.....	22,000	260,000	59,000,000
Tessin south.....	25,000	180,000	43,000,000
Tessin complete.....	37,000	440,000	102,000,000
Fifth district.....	56,000	690,000	160,000,000

TABLE XII—RATING OF MACHINERY FOR ELECTRIC TRACTION, GOTHARD LINE

Section	OUTPUT AT TURBINE SHAFTS		Station
	Maximum Output Necessary, Hp	Output of Turbines Installed,* Hp	
Reuss basin.....	27,000	30,000	Göschenen
Tessin basin.....	37,000	37,500	Amsteg
Fifth district complete.....	56,000	87,500	Ritom-Piotta

*Exclusive of reserve machinery.

twelve to fifteen trains will be in operation at the same time on a headway of ten minutes for ten trains. Five-minute headways and even one-minute headways for certain short periods were also considered. Table VIII shows the estimated requirements for the different divisions of the railway. These figures cover the power applied at the wheels, and they are made up of the factors of train friction, grade climbing, acceleration and lighting. It was, of course, necessary to add to these figures the losses of the generating plants, substations, transmission lines and contact lines. Table IX shows some energy characteristics of the three classes of traction service, while Table X shows the efficiencies of each part of the electrification. In order to calculate the quantities of water for the generating equipment, the following turbine efficiencies were assumed: 73 per cent for maximum output, 68 per cent

for average daily output and 65 per cent for the average annual output.

LOCATION OF HYDROELECTRIC STATIONS FOR GOTHARD LINE

The most favorable locations for the hydroelectric stations would be at Göschenen, Amsteg and Ritom (Piotta), because they would supply energy for the tunnel from both ends. Table XI shows the total energy requirements for each division, while Table XII shows also the rating of the turbines necessary at each plant.

The Ritom station would require three flumes each of 15,000-hp capacity, seven 7500-hp turbines coupled to 6000-kw, 16,000-volt, single-phase generators and two groups of exciters. The transmission potential would be 45,000 volts. The Göschenen plant would have four turbines coupled to four 5000-kw generators and would be furnished with two groups of exciters. The Amsteg plant would contain five 7500-hp turbo-generator sets and two groups of exciters.

TRANSMISSION AND DISTRIBUTION

Part of the contact line would be supplied with energy directly from 16,000-volt, single-phase generators, and part would be supplied at the same potential from 45,000/16,000-volt transformer substations at

The changes necessary to adapt the shops for electric rolling stock have also been considered. Provision has been made to maintain the railway telegraph lines at 20 m (65.6 ft.) from the right-of-way, while the federal telegraphs would be located at a somewhat greater distance but within sight of the railway.

TOTAL COSTS

The following figures cover the electrification costs of the Gothard line on the basis of future assumed traffic as previously noted:

POWER STATIONS, HYDRAULIC PART		
Ritom-Piotta.....	6,800,000	Francs— 17,250,000
Göschenen.....	3,500,000	
Amsteg.....	6,950,000	
ELECTRICAL AND MECHANICAL PART		
Ritom-Piotta.....	1,925,000	4,120,000
Göschenen.....	920,000	
Amsteg.....	1,275,000	
Total cost.....		1,370,000
DISTRIBUTION		
Lines:		
Material, engineering, interest, contingencies, etc.....		5,994,000
Substations:		
Transformer stations, 45,000/16,000 volts, at Goldau, Giubiasco and Lugano; special installations for 16,000-volt current at Amsteg, Göschenen and Piotta, engineering, interest and contingencies.....		1,636,000
Total cost for distribution.....		7,630,000

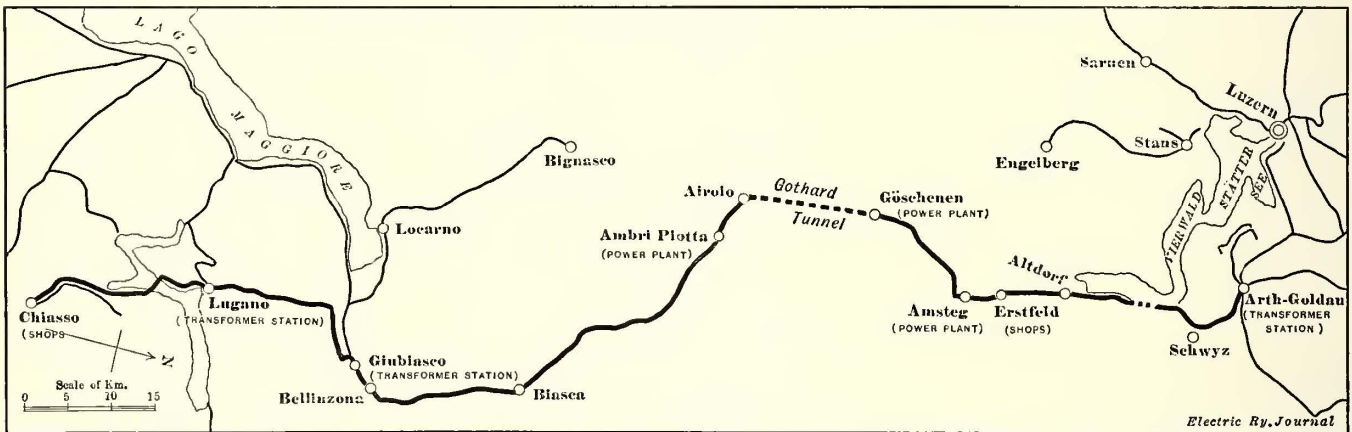


Fig. 6—Swiss Report—Map of the Gothard Line, Showing Section to Be Electrified, Location of Proposed Power Plants, Transformer Substations and Shops; also Connecting Standard-Gage Lines

Goldau, Giubiasco and Lugano. All stations would be tied together on the 16,000-volt circuit. The distribution line would be a multiple suspension comprising a copper trolley of 100-mm section (about 200,000 circ. mils), a steel catenary and lattice poles on concrete foundations. The poles would have brackets on the single-track sections and bridges on double-track and yard divisions. The feeders would be carried on the same poles as the catenary suspension. The maximum permissible drop in voltage has been fixed at 15 per cent.

ROLLING STOCK AND SHOPS—MODIFICATIONS FOR TELEGRAPHS, ETC.

Several classes of locomotives would be selected according to the different kinds of service. The "omni-bus" service of local trains would be handled with motor cars, of light and heavy types according to service conditions. Steam locomotives would be retained for switching. The increase in the number of cars due to anticipated increase in traffic has been charged against the cost of electrification. Means have also been considered for the heating and lighting of such cars as cannot be supplied with electricity.

CONTACT AND FEEDER LINES		
Contact lines, feeder lines, bonding, special construction, signals, engineering, interest and contingencies.....		9,770,000
ROLLING STOCK		
Motor vehicles:		
15 locomotives for through trains.....	3,450,000	13,132,000
38 locomotives for freight trains.....	6,840,000	
14 heavy motor cars.....	2,170,000	
7 light motor cars.....	672,000	
Reserve material.....		600,000
Heating equipment, etc.:		
Heaters on the through locomotives, ten cars with heaters, heater equipment for passenger cars (on 854 axles*), electric heaters, modifications in present cars.....		1,007,000
Total cost of rolling stock for electrification.....		14,739,000
Additional rolling stock for expected increase in traffic:		
New passenger cars (on 256 axles*).....	3,328,000	5,211,000
New freight cars (on 753 axles*).....	1,883,000	
Total cost of rolling stock.....		19,950,000
MODIFICATIONS AT STATIONS AND REPAIR SHOPS		
Modifications at depots with new installations at Erstfeld and Chiasso, tools for electric line maintenance and increase in size of shops, etc.....	1,950,000	
Total cost of stations and shops.....		1,950,000
CHANGE IN TELEGRAPH CIRCUITS		
Railway telegraph lines, including contingencies... ..	2,500,000	3,500,000
Federal telegraph lines, including contingencies.. ..	1,000,000	
Total.....		3,500,000

*There are usually four axles per car.

GENERAL CONTINGENCIES	
Miscellaneous contingent expenses (8 per cent of total)	3,330,000
RECAPITULATION OF EXPENSES	
Power station	21,370,000
Distribution	7,630,000
Total	29,000,000
Traction and feeder lines	9,770,000
Rolling stock	19,950,000
Stations and repair shops	1,950,000
Telegraphs, etc.	3,500,000
General contingencies	3,330,000
Total cost of new installations	67,500,000
Total cost, if no charge is made for extra rolling stock due to anticipated increase in traffic, say, 5,500,000 francs, less	62,000,000

WASHINGTON SECTION OF THE AMERICAN ELECTRIC RAILWAY ASSOCIATION

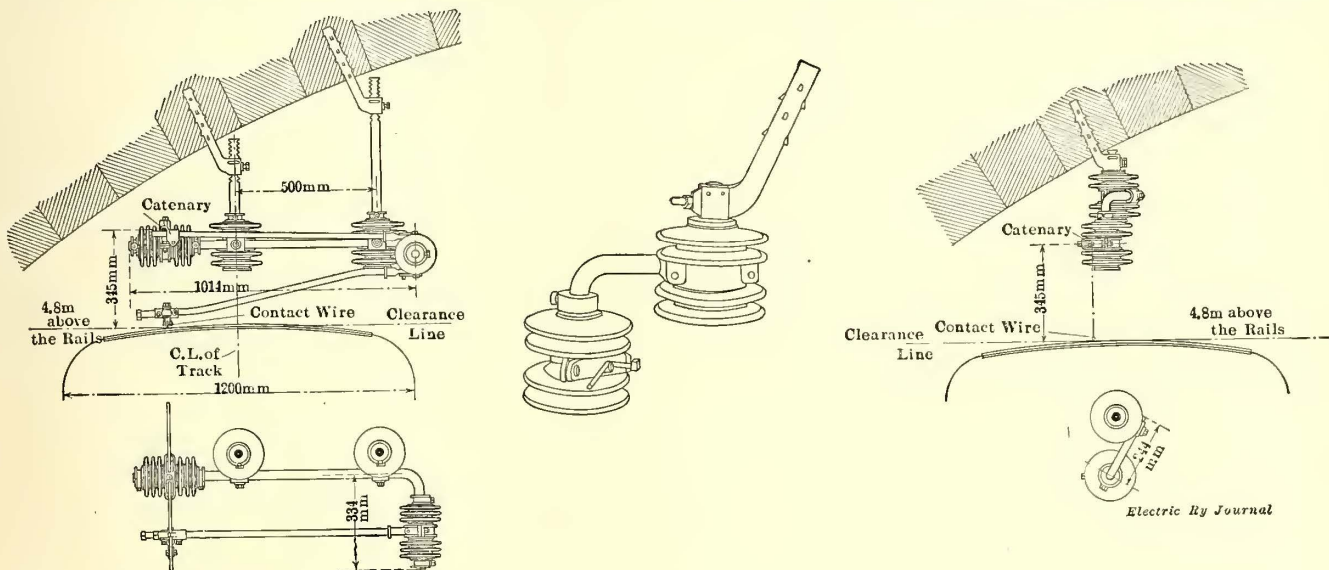
The fourth company section of the American Electric Railway Association, the Washington Railway & Electric Company section, was organized at a meeting held on Feb. 25 at the offices of the Potomac Electric Power Company in Washington, D. C. E. F. Hunter, chief clerk of the claims department of the railway company, acted as secretary of the organization meeting. The following officers were elected for a period of one year except as stated: President, George G. C. Whitney, chief clerk; vice-president, Charles S. Kimball, engineer of way;

CORRECTING DISTURBANCES ON THE LOETSCHBERG RAILWAY

In one of several articles on the electrical operation of the Lötschberg Railway written for the *Schweizerische Bauzeitung* by L. Thormann, chief engineer electric traction of this railway, some interesting data are presented on features of line construction and operation. On open sections the double catenary standard common on other European single-phase lines is used, but the construction in the tunnel is special. The tunnel catenary is of duplex wire, comprising a steel core of 6 mm (No. 3 B & S) diameter and plating of 1.25 mm (No. 11 B & S) copper. The height of the trolley wire above the head of the rails is 6 m (19.7 ft.) to 7 m (23 ft.) at stations and 4.8 m (15.7 ft.) in the tunnels. The method of carrying the double insulators and trolley in the tunnel is shown in the accompanying illustrations. The supporting points are 22 m (72.2 ft.) to 28 m. (91.8 ft.).

TELEPHONE AND TELEGRAPH CONDITIONS

Between Kandergrund and Ausserberg the telephone and telegraph wires were placed underground in paper-covered, air-insulated cables. Elsewhere these lines were placed on wooden poles, the wires being transposed



Lötschberg Railway—Details of Insulator, Showing Method of Carrying the Catenary from the Tunnel Roof

director for two years, J. P. Moffett, superintendent of transportation; director for one year, William L. Clark, assistant secretary. About eighty-five persons were elected to membership.

Addresses were delivered at the meeting by Henry L. West, former District commissioner; Clarence P. King, president of the railway company; William F. Ham, vice-president of the railway company; George Truesdell, former District commissioner, and W. F. Deмент, assistant superintendent of transportation of the railway company. In his address Mr. West declared that, notwithstanding his services as District commissioner, he did not consider that he had learned much about railway operation and was of the opinion that no District commissioner can acquire a valuable knowledge of that subject during the term of office of commissioners. He said that a study of railway problems, therefore, had confirmed him in the belief that the people of the District have little to hope for in the way of improvement in the street railway facilities under municipal ownership.

every fifth pole to minimize induction from the neighboring high-tension lines. Three telegraph lines, three telephone lines and a signal line are installed along the railway right-of-way. The telephones in the tunnel are operated from a central battery and their receivers are equipped with signal sirens. Louder sirens, which give warning of the approach of trains, are installed at the same points. The latter sirens are operated from small transformers of high periodicity.

All telephone, telegraph and signal circuits have up to the present operated satisfactorily. Induction from the railway current is not noticeable because all lines are amply insulated; nor has single-phase railway operation impaired the clearness of conversation over the telephone in any way, despite the fact that the long cable used has a large number of parallel connections and no Pupin coils. Fuses are used where the cables pass to the aerial lines. These fuses have blown a number of times, but this has not proved embarrassing because they can be quickly replaced by nearby station attendants.

THE LOCOMOTIVES

On the trial trips the locomotives met all the conditions for which they were designed. Thus far, however, they have not been operated to capacity in actual service, partly for the sake of caution and partly because a few mechanical and electrical details of the apparatus were found incapable of carrying the maximum loads. As soon as these parts are reinforced the locomotives can be operated to full capacity.

The locomotive transformers gave trouble from static discharges both between the individual turns and between the apparatus and the ground. As these very places had been insulated with particular care, the fault is held to be due to extraordinarily high voltages generated in some unknown manner. The latter may be caused by lightning disturbances since the trouble decreased on the approach of winter. It is possible, however, that the trouble is due to high-tension discharges at the line insulators. To prevent a repetition of these troubles, the insulation at the entrance turns of the load transformers has been increased appreciably. It is considered remarkable that the twelve cases of disturbance did not occur during lightning storms or high-tension line disturbances, but, nevertheless, it is believed that there may be some connection between these phenomena.

THE OVERHEAD LINE

The overhead construction has behaved very well. A number of disturbances did occur at first, but they were to be expected in the early days of operation. Both the catenary suspension and the tension take-up devices have proved entirely satisfactory. The drop in voltage confirms the calculations of theory. This circumstance is important inasmuch as the most favorably situated power station is 31 miles from the end of the line and the long tunnel prohibited super-voltage transmission lines.

The insulators in the tunnel caused the greatest difficulties. On the open section, high-voltage discharges did not take place at all, whereas in the tunnel, "spill-over" discharges, commonly across both insulators, were quite numerous. Several discharges from the cover of the insulator to the pin were also observed. At first these troubles were ascribed to defects in the insulators. This might have been true in some instances, but it was necessary to seek other causes when the short-circuits continued. It was then found that the localities most subject to this trouble were those where the moisture on the tunnel roof was sufficient to form drops of water which fell on the insulators. In time this water built up a conducting path for discharges. It was also found that some damp insulators were scarred by particles of stone which had been blown against them with great velocity through the action of trains passing at high speed. To correct this trouble, the roof near the insulators has been water-proofed with lead wool and cement, and copper shields have been placed over the insulators. These changes were made without interfering with operation. The line inspectors now clear the insulators of dust at regular intervals, for even the precautions mentioned do not prevent the atmospheric conditions in the tunnel from vaporizing the insulators to some degree.

In view of the great length (5261 ft.) of the tunnel and the fact that insulators are installed at 3500 places, it is not remarkable that a very small percentage of them should have caused trouble. As the remedies have succeeded, Mr. Thormann believes that even very long tunnel sections with unfavorable moisture conditions may be operated safely at 15,000 volts, which is the potential recommended by the Swiss Electrification Commission for single-phase overhead lines.

PAST-PRESIDENTS' NIGHT AT THE NEW ENGLAND STREET RAILWAY CLUB

At the regular monthly meeting of the New England Street Railway Club, held at the American House, Boston, on Feb. 26, nine of the twelve past-presidents of the organization were the speakers of the evening, the program consisting of five-minute addresses on various phases of the general topic "Efficiency." Past-presidents H. E. Farrington, 1903, Paul Winsor, 1907, and Franklin Woodman, 1911, were unable to be present. President Elton S. Wilde occupied the chair, and at the close of the usual dinner twelve new members were admitted. About 150 members and guests attended the meeting, and at the close an informal reception was held to the former presiding officers of the organization.

H. E. Bradford, Providence, R. I., the first president of the club, described its organization in June, 1900, at Young's Hotel, Boston, and outlined the history of the Street Railway Superintendents' Association of Massachusetts, which preceded the New England organization by eight years, but which did not survive its first winter because of the restricted membership, the limited territory covered and the demands of operating problems. The New England Street Railway Club held its first annual meeting in Boston in 1901. Touching humorously upon the efficiency with which the club was organized, Mr. Bradford said that the ideal committee consists of one "hustler," one man to act as a balance wheel and one peacemaker, and closed by congratulating the organization upon its constant growth in numbers and influence.

Col. Edward C. Spring, Lehigh Valley Traction Company, Allentown, Pa., who occupied the presidency in 1902, emphasized the popular demand for higher speeds, which, he said, was of more importance than the frequency of the service under present conditions. The prevailing idea that an interurban trolley line must pass through the center of every important town which it serves is erroneous. On the Lehigh Valley line twenty-two minutes have been cut from the running time between Philadelphia and Allentown by a study of the sources of delay. Eight miles of track have been rebuilt, twenty-three stops cut out in 56 miles, and the total trackage has been reduced 1½ miles. The result is a notable increase in patronage, and the scheme of alternating limited and local cars has worked admirably. An increased charge of 10 cents for a trip on a limited car seems to be no deterrent to patronage. The interurban freight service is also successfully competing with the parcel post and old-line express companies. The ability of the electric railway to make connections with fast trains going outward from Philadelphia has won the business in competition with other transportation agencies. Effective co-operative work is also being done with the farmers. A municipal market has lately been established in Philadelphia, and farmers' organizations with selling agents in town following shipments by electric express are helping agricultural conditions materially. Closing, Colonel Spring urged the importance of studying safety in connection with high-speed operation, commending the use of signals and first-class dispatching facilities. He also paid a tribute to the unremitting labors of the late John J. Lane, whose work as secretary of the club from its early days to the termination of his life was a fundamental factor in the success of the organization.

J. Henry Neal, 1904, Boston Elevated Railway, contrasted the growth of the club in recent years with its early membership and voiced the benefits of its meetings in a semi-humorous vein.

E. E. Potter, Stone & Webster Management Associa-

tion, Boston, president in 1905, discussed "Efficiency in the Development of the Individual," pointing out the importance of encouraging *esprit de corps* among employees and the possibility of educating the public by first training the employee. The failure to study the needs of the rank and file is responsible for much adverse legislation, dissatisfaction among employees, labor union difficulties and other troubles. The days of the small company are passing in many states, yet care must be taken not to lose in team play what is gained in departmental efficiency. Much good may be accomplished by wisely administered co-operative stores, safety and welfare committees, medical care, social intercourse, etc. Organized committee work in departmental administration is helpful in improving the temper of the employees, and it is better to make a practical start along welfare lines than to be forced to take such action as a result of outside pressure.

Henry C. Page, Worcester Consolidated Street Railway, who occupied the chair in 1903, spoke of the benefits of efficiency through consolidation. Taking the Worcester system as an example, the speaker said that the present lines serving the district were formerly split into twelve different roads, each with its own organization. One line 8 miles long had a superintendent who was paid \$2,000 per year, a treasurer and other officials, but it was added to the Worcester system with scarcely a trace of additional work for the executives of the latter. The line had no shop facilities except commercial repair establishments in Worcester, which put in high bills for rolling stock maintenance. A number of these companies would have gone into bankruptcy if they had not been consolidated into the Worcester system. The saving in official salaries alone was \$24,000 a year. Mr. Page contended that the public should be told of these advantages and brought to realize the improved service, increased transfer privileges, etc., that have resulted from the taking over of many small struggling roads and their effective centralization.

Matthew C. Brush, 1908, Boston Elevated Railway, spoke briefly upon "Efficiency in Transportation." He said that the whole secret of success in railroading is proper relations between the men composing the company organization, whatever their rank. The duty of the manager, superintendent and all executive officers is to help the men under them make a success of their work. By helping the man on the street and by giving the square deal everywhere the extra 10 per cent of effort which no money can buy can be obtained from the employee. "I would rather have a relatively inefficient man in my office who makes mistakes while doing his best," said Mr. Brush, "than one who does only that for which he is paid." In closing, he spoke feelingly of friendships formed through the club.

W. D. Wright, 1909, Providence, R. I., commented upon the importance of giving the human element due consideration and pointed out the influence of contentment on the part of employees in securing the best results in the shop and elsewhere. The odds are at present heavy against the street railway, but a better day is coming.

Charles H. Hile, Boston Elevated Railway, president in 1910, spoke upon "Efficiency in Relation to Maintenance of Way." Emphasizing the heavier burdens placed upon the road department as a result of the increasing size of cars, he urged giving greater attention to foundations and drainage, pointing out that efficiency in track maintenance depends mainly on the thoroughness of the original construction. The qualifications of the men responsible for the work are of fundamental importance. Great advances have been made in reducing troubles in rails and joints, particularly in connec-

tion with electric welding and cast-welding processes. Closing, the speaker sketched the effective patching up of special work and broken track now possible through welding, pointing out the tendency toward reduced maintenance cost accompanying such methods.

Thomas Lees, Bay State Street Railway, Lowell, Mass., who presided in 1912, was the last speaker, his subject being "Efficiency in Snow Fighting." Mr. Lees portrayed the sterling qualities necessary in the man behind the plow controller in order to keep ahead of falling snow. Preparedness is the vital point, and the importance of early inspection and renovation of equipment, the necessity of experience among crews and the advantages of full supplies of sand, salt and tools and of perseverance in the face of storms, were duly set forth.

During the meeting it was announced that the annual banquet of the club will be held at the Hotel Somerset, Boston, on the evening of March 26.

CHICAGO ELEVATED RAILWAY TRAFFIC CONDITIONS

At the noon luncheon hour of the Engineers' Club of Chicago Garret T. Seeley, assistant general manager of the Chicago Elevated Railways, recently gave an illustrated talk on traffic conditions on the elevated system. In opening he described the character of traffic on the elevated railways of Chicago, which, he said, had a worse load factor than any other rapid transit line in this country.

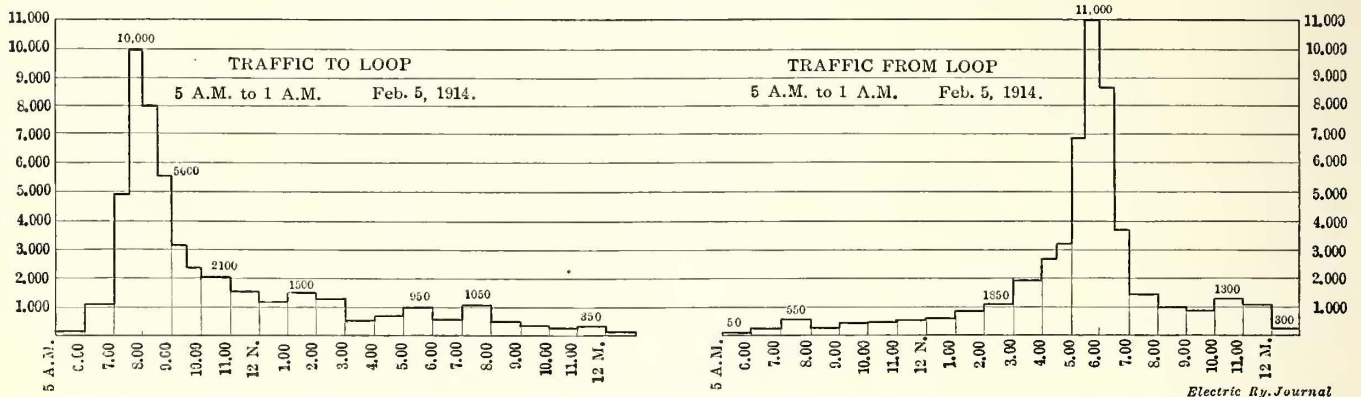
The Chicago World's Fair was the real cause of the building of the first elevated railway in Chicago. There was sufficient traffic at the time of the fair to make operation profitable, but in the period which followed there was such a marked decrease in the passenger business that the South Side Elevated Railroad passed into the hands of a receiver. Following this date, however, the traffic centers began to move out, and the districts contiguous to the various branches of the elevated railway system became more densely populated. Now the elevated roads carried practically all the long-haul traffic, or about 45 per cent of all the passengers brought into the downtown "Loop" district. They had little of the short-haul business, however, so that at present they received only about 25 per cent of the total number of street railway fares paid in the city of Chicago.

The miles of elevated track in Chicago were about the same as those of the Manhattan Elevated Railway in New York, but the Manhattan Railway served only about one-third the area served by the elevated railways of Chicago; yet it carried approximately twice the number of passengers per year. Mr. Seeley explained this by stating that, in addition to the fact that the area served in New York City was much more densely populated than that served by the elevated railways of Chicago, there is a much larger two-way business which tended greatly to improve the load-factor.

To illustrate Chicago's bad traffic conditions, Mr. Seeley showed several diagrams indicating the fares paid by hours at all stations on the Chicago system. The Metropolitan Elevated diagram is shown in one of the accompanying illustrations and is typical of the conditions on the other three lines. To meet this great increase in traffic occurring during the peak-load hours was a very difficult operating problem, especially as regards the assignment of runs. It meant an increase during a six-minute interval from the two-car train necessary to handle the average day load to two five-car trains during the rush period. As a result, on a typical day, the number of passengers entering the cars of the Metropolitan Elevated Railroad between 4:30 and 4:35 p. m. was 350. This number increased to 2700 during the five-minute interval between 5:30 and

5:35 in the evening rush, then to more than 3000 passengers between 5:35 and 5:40. This was the peak. The load dropped off even more abruptly and was at the normal day-load at 6:30 p. m.

To bring out the disadvantage under which the Chicago elevated roads are operating when compared with other similarly situated rapid transit lines, Mr. Seeley presented a comparative study of the five most important rapid transit lines in this country. In this com-



Northwestern Elevated Railroad—Count of Passengers Carried to and from Loop Feb. 5, 1914

parison the number of cars owned, the passengers carried per year and the passengers carried per car per year were shown. This comparative table is as follows:

	Cars Owned	Passengers per Year	Passengers per Car per Year
Interborough subway	1,144	327,471,000	286,250
Manhattan elevated	1,781	306,845,000	172,280
Brooklyn elevated roads	945	162,514,055	171,900
Philadelphia elevated	165	34,941,755	211,770
Chicago elevated roads	1,420	164,164,000	115,530

He stated further that probably the Brooklyn elevated lines were more nearly comparable than any other to the Chicago Elevated Railways from a traffic standpoint. In the tabulation it will be noted that approximately the same number of passengers were carried per year by the Brooklyn and by the Chicago roads, but that the Brooklyn lines required approximately 35 per cent fewer cars. This was accounted for by reason of the shortness of the Brooklyn lines. Consequently it was possible to obtain a larger number of trips per car operated, and at the same time there was a better two-way business and a better load-factor. In Brooklyn the average line is approximately 7 miles in length,

the subway to increase the earnings it must go beyond the present terminals of the elevated lines and operate surface line feeders, which in the end would only tend to increase the cost of operation.

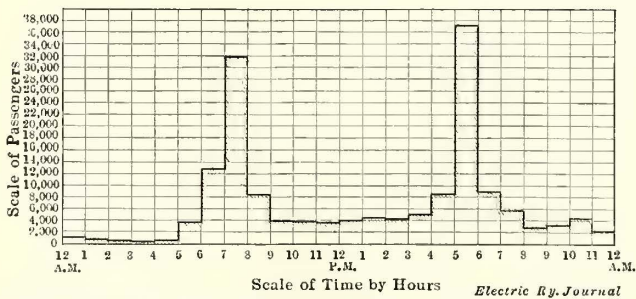
In the discussion which followed, Mr. Seeley stated that the present tendency was toward a longer and wider car for rapid transit lines. He also stated that he thought there was a possibility of increasing short-haul business on the elevated lines of Chicago by build-

ing cross-connecting lines between the existing elevated lines in the outlying district. As an evidence of this, since through-routing and universal transfers have been effected on the elevated lines, a transfer point has been established between the lines of the Metropolitan Elevated and the Chicago & Oak Park Railroads. The establishment of this transfer point, which in effect was somewhat like adding a cross-town line, had tended greatly to increase short-haul business on both lines.

EXECUTIVE COMMITTEE OF CENTRAL ELECTRIC RAILWAY ASSOCIATION

In the report of the annual meeting of the Central Electric Railway Association received by telegraph and published in the ELECTRIC RAILWAY JOURNAL of last week the names of the new officers of the association were announced. At the same meeting the following were elected members of the executive committee for the ensuing year:

- H. A. Nicholl, general manager Union Traction Company of Indiana.
- W. S. Whitney, general passenger and freight agent Ohio Electric Railway.
- C. N. Wilcoxon, general manager Chicago, Lake Shore & South Bend Railway.
- E. B. Peck, vice-president Terre Haute, Indianapolis & Eastern Traction Company.
- F. W. Coen, general manager Lake Shore Electric Railway.
- L. T. Hixson, president Central Electric Railway Accountants' Association.
- John F. Keys, general passenger agent Detroit, Monroe & Toledo Shore Line Railway.
- F. D. Carpenter, general manager Western Ohio Railroad.
- S. W. Greenland, general manager Fort Wayne & Northern Indiana Traction Company.
- R. A. Crume, general manager Dayton & Troy Electric Railway.
- S. D. Hutchins, representative Westinghouse Electric & Manufacturing Company, Columbus, Ohio.
- W. H. Bloss, representative Ohio Brass Company, Indianapolis, Ind.



Metropolitan Elevated Railways—Fares Paid by Hours at All Stations on Typical Day

while in Chicago it is 9 miles in length. Similar tables of the earnings per mile of track showed the effect of the long haul per passenger average in Chicago.

In closing Mr. Seeley stated that he thought the figures of the Chicago elevated roads showing the passengers per car per year, as well as the earnings per mile of track, indicated what might be expected if a comprehensive subway system was constructed. For

Hearing on Interstate Regulation

A Strong Protest Was Made by Interurban Railway Managers Before the Sub-Committee of the House on Interstate and Foreign Commerce Against the Proposed Increase of the Jurisdiction of the Interstate Commerce Commission

On page 487 of the issue for Feb. 28 we published a letter issued by the committee on federal relations of the American Electric Railway Association in connection with the steel car bill and other bills introduced in Washington. The letter refers to a hearing on these bills before a sub-committee of the House committee on interstate and foreign commerce on Jan. 23, 1914. An abstract of this hearing is presented below.

The representatives of the sub-committee present included R. B. Stevens of New Hampshire, chairman; W. A. Cullop of Indiana, J. H. Goeke of Ohio, C. A. Talcott of New York, J. J. Esch of Minnesota, and J. R. Knowland of California.

STATEMENT OF MR. BRADY

Arthur W. Brady, Anderson, Ind., was the first speaker among the electric railway men present. He said that those in attendance represented not only the railways with which they were connected but also the American Electric Railway Association. He regretted that he could not give the committee accurate statistics as to the number of electric railway companies or the mileage of those roads which would come within the operation of any federal bill as interstate carriers, because, while these companies had been required for six or seven years by the interstate commerce act to report to the commission, no report had been published by the commission, so far as he was aware, which gave any definite information in regard to the number or mileage of the interstate electric carriers. He represented urban as well as interurban roads, although he understood that in the Council Bluffs & Omaha case cited by the Supreme Court the jurisdiction of the commission under the existing law was held not to apply to urban electric railways even if engaged in interstate commerce. In spite of the absence of statistics, he believed that it was perfectly fair to assume that not more than 1 per cent of the business done by the interurban electric railways coming within the jurisdiction of the commission was business of an interstate character. If the urban lines were included, the amount of interstate business done by them was much less than 1 per cent. Moreover, this interstate business was not growing any more rapidly than the intrastate business of the companies. Thus his own line had shown no proportionate increase in interstate business during five years.

Mr. Esch, of the committee, said that a bill had been introduced in the House, No. 8367, to bring city railways engaged in interstate commerce under the commission and that this bill had received the approval of the commission. It had been introduced by the representative from Council Bluffs.

In continuing, Mr. Brady said that, according to the latest information, between 325 and 330 electric railway companies reported to the Interstate Commerce Commission, and most of them were small. He believed that one-fourth of the total number, representing about 17,000 miles of track, had a trackage of 50 miles or more, and of this number thirty-seven had a trackage of 100 miles or more. The remaining three-fourths of the companies had less than 50 miles. The business done by them was both passenger and freight, and all was of a local character. The speed was moderate, and as a rule single cars were run. The motorman was in front,

where he had a good view of the track ahead, and the speaker believed that the hazards of interurban electric railway operation were not equal to the hazards of steam operation, and that in the accidents which had occurred the use of steel cars would not have reduced the injuries. On his own line the average speed between Muncie and Indianapolis, 57 miles, for limited cars was 26 m.p.h. and for local cars 20 m.p.h. Theoretically it was possible to travel long distances by electric car, but practically there was very little long-distance business. It was not enough to justify the running of through car trains or to attempt to make unusual efforts to get the business. In regard to block signals, a number of the electric railway companies in Indiana had installed block signals. Two signal manufacturing companies only supplied that type of signal in which the track circuits were used. This system cost between \$2,500 and \$3,000 per mile. A third signal company had equipped certain lines with a cab signal system. The manual control system used on certain steam lines was not practicable on the electric lines because on the steam lines the meeting points were usually at stations where there were agents to control these blocks. The electric railway companies did not regard the signal question as a solved problem.

Continuing, Mr. Brady said that practically all of the interurban lines now were regulated with great detail by state commissions. The companies had no objection to the present jurisdiction of the Interstate Commerce Commission, which applied to rates, rebates, discriminations, reports of accidents and financial reports, but as the present state commissions had full power to require specific kinds of equipment, such as steel cars and block signals, regulation on these points by the Interstate Commerce Commission was unnecessary and undesirable. The state commissions were very thorough in their work and in their inspections and could judge local situations better than the interstate commission. Again, it would be very expensive for the electric railway companies to be obliged to go to Washington every time they wished to discuss matters with the authorities, whereas they could with much less difficulty attend hearings before state commissions. In reply to a question, Mr. Brady said that the operation of the commissions in Indiana and Ohio had not embarrassed the companies in the efficient operation or development of their roads, but he could not say that the commission's oversight of the securities had added financial strength to them. The question of market value of securities depended upon the profits of operation, and investors would not accept a ruling of the commission upon that matter.

Continuing the discussion of steel cars, Mr. Brady said that his company had recently installed ten steel interurban cars. They were purchased from the Cincinnati Car Company and weighed much more than the present wooden cars, thus adding to the cost of operation. These cars cost his company between \$15,000 and \$16,000 each, and the speaker understood that this was less than their cost of manufacture. The life of the steel car and its cost of maintenance were still problematical. The wooden car to which he referred was one with a steel underframe, and he believed that it would be as safe, if not more safe, for passengers. If a law was passed requiring interurban companies to

install steel cars within four years, as proposed, practically all of the interurban electric railway companies would go into the hands of receivers.

STATEMENT OF MR. SCHOEPPF

W. Kesley Schoepf, the next speaker, said that he was president of the Cincinnati Traction Company, of the Ohio Electric Railway Company and of the Cincinnati Car Company. Therefore he appeared in the dual capacity of an electric railway operator and a car builder. The Ohio Electric Railway now had 170 cars, which represented an expenditure of about \$10,000 per car. It would cost the company \$2,000,000 additional to substitute steel equipment. The company had paid no dividends since it was organized. In 1908 there was a deficit after payment of operating expenses, taxes and fixed charges of \$173,718; in 1909 there was a surplus of \$2,534; in 1910, a surplus of \$2,808; in 1911, a surplus of \$41,856; in 1912, a surplus of \$13,071, and in 1913, with December estimated, a surplus of about \$50,000. The property was owned by a syndicate of which there were ninety-two members who had invested \$7,379,905, which had now been in the property, on an average, more than three years. The syndicate owned \$4,200,000 of the company's first mortgage bonds, taken at 85, this amount being included in the total cost mentioned above. Continuing, Mr. Schoepf said: "While every possible effort has been made to dispose of the \$4,200,000 of first mortgage bonds, and although they were legally issued and the interest on them has been earned, we have been unable to find a purchaser. It finally became necessary for the syndicate, with the help of individual indorsers, to use them as collateral for loans to raise money to make extensions and complete the property, which, as above stated, has cost the syndicate \$7,379,905, of which \$3,570,000 represents the cost of the bonds at 85. We have received interest on the \$4,200,000 of bonds, but we have not had one cent on the other money invested, and it is needless to say that, while the statement shows a small surplus earning, this has all gone back into the property."

In referring to Mr. Brady's remarks on the cost of manufacturing the ten cars built by the Cincinnati Car Company for the Union Traction Company of Indiana, he said that while they were sold for a little more than \$15,000 per car, they represented a total loss to the car company above the price received for them of \$7,800. This may have been partly due to the fact that they were new models, but he would not take a contract to build the same cars to-day for less than \$17,000 each. His company had recently taken an order for the Northwestern Elevated Railroad of Chicago for 128 all-steel cars. These cars were some 16 ft. shorter than those of the Union Traction Company and had smaller motors and lighter trucks, and the contract price was about \$12,500. As a car builder, he believed that the wooden car with the steel underframe, such as had been described, was as safe in the case of collision as the all-steel car, if not safer. He assumed that such cars would be equipped with anti-climbers to prevent telescoping. He agreed with Mr. Brady as to the undesirability of the interurban railways being regulated by the Interstate Commerce Commission. He added that he was satisfied that it had cost every company \$1,000 to be represented at the present hearing.

In regard to the financial conditions of the other properties which he represented, he said that the Ohio Traction Company, which is a fairly prosperous corporation, had obtained permission about a year ago from the Ohio state commission to issue \$750,000 of preferred stock at 85, but the company had been unable to sell this stock. It had also been difficult to sell any securities of the Cincinnati Street Railway Company, although there was

no water in its capitalization. He thought that investors feared legislation at Washington similar to that now being proposed and also burdensome state legislation.

The difference of treatment by the state authorities of public utilities and of other corporations, such as manufacturing corporations, was marked. As an example, he cited the Cincinnati Traction Company, which in 1913 earned only \$462,006.67 applicable to dividends, but in the same year paid taxes of \$691,433.99. On the other hand, the Cincinnati Car Company in 1912 had net earnings applicable to dividends of \$210,247.45 and paid only \$5,674.93 in taxes. He could not give the 1913 figures of the car company, as the books had not yet been closed. Referring to the Ohio Electric Railway, he said that the company had been damaged by the flood approximately \$400,000 and that personally he had never received any salary for his services as president.

STATEMENT OF MR. PERRY

S. S. Perry, assistant to the vice-president New York, New Haven & Hartford Railroad, described the conditions on the Connecticut and Rhode Island Companies' lines. He said that both of these lines operated largely on public highways and ran at very moderate speed. They did practically no through business. The questions before them were purely local and could properly be settled by the public service commissions of the different states.

STATEMENT OF MR. WEADOCK

Bernard F. Weadock spoke for the Detroit United Railway, whose only interstate line was between Detroit and Toledo. The company owns about 800 miles in Michigan and 2 miles in Ohio. The business was almost entirely local, and every one of the 163 municipalities through which the lines ran considered that it had as much authority over the lines within its limits as the State, and was not in the least bashful about exercising this authority. The Michigan Railroad Commission could require the company to install block signals, dispatching systems and determine the kind of equipment to be used. He understood, however, that while it had this regulative authority it did not have the constructive authority to increase rates. Last year the dispatcher's office issued 255,355 orders, but only six were misconstrued and those only in a minor way. No casualties resulted. The number of passengers carried was 323,917,637. He believed that the wooden car with steel underframe was as safe as any steel cars could possibly be.

STATEMENT OF MR. FISCHER

L. E. Fischer, St. Louis, said that he was in attendance at the meeting representing the Illinois Traction Company and the Chicago, Ottawa & Peoria Railway. To illustrate the extent to which the Interstate Commerce Commission considered it had jurisdiction over electric railways, he cited the system of the Choctaw Railway & Lighting Company, 14 miles in length, with five cars, and also doing a lighting business. As this little road has a freight contract with an interstate steam railroad, the Interstate Commerce Commission would be able, if the act passed, to compel it to install steel cars. It could also regulate the issue of its securities even to develop its local lighting business, although the Choctaw company was purely a local enterprise in Oklahoma.

The Illinois Traction Company had installed block signals at all danger points on about 100 miles of main line. These were installed on account of a wreck which occurred in 1910 in which approximately thirty-six passengers were killed by a head-on collision between two

passenger cars. The speaker believed that these passengers would have been killed if the equipment had been steel cars, because of the great impact. At that time the anti-climber had not been developed. He did not think that these companies should come under the Interstate Commerce Commission, because it would then regulate 535 miles of operation merely because 3 miles of one 160-mile division was without the State of Illinois. It was almost as impossible a situation as that of the Choctaw railway already mentioned.

STATEMENT OF MR. HENRY

Charles L. Henry, president and general manager Indianapolis & Cincinnati Traction Company, also opposed the extension of the jurisdiction of the Interstate Commerce Commission over the interurban lines. All of his lines were within the State of Indiana, but through interline billing of freight and express about 1 per cent of the business of the company was interstate business. The road had been in operation for ten years. During that time only one passenger had been killed. The state commission had full power to require the company to make such improvements as were necessary. Mr. Henry also agreed with the other speakers that a single electric car could be stopped much more quickly than a long steam train.

It was financially impracticable, he said, for his company to scrap its wooden cars and install steel cars in their place. The road was not a prosperous one. The original investors in his company had put in \$1,800,000 for \$2,000,000 bonds. Later the road had gone into the hands of a receiver, and the bondholders canceled the bonds and took in their place common and preferred stock. Since Jan. 1, 1906, which was the last day on which any interest was paid on the bonds, they had received on their investment only 2¾ per cent.

STATEMENT OF MR. POTTER

A. E. Potter, general manager the Rhode Island Company, also spoke and described the business of that company, which he said was purely of a city and suburban character.

DISCUSSION ON RELATIONS BETWEEN CITIES AND RAILWAYS

A joint meeting of the Washington Section of the American Institute of Electrical Engineers and the Washington Society of Engineers was held at the Cosmos Club, Washington, D. C., on Feb. 10 when Bion J. Arnold, of Chicago, gave an illustrated talk on "Some Applications of the Principles of Conservation to the Readjustment of Relations Between Municipalities and Urban Railways."

Mr. Arnold showed slides taken from his recent reports which illustrated that the law of squares, as applied to electric railway traffic, was applicable to the thirteen largest cities of the United States and that the deviations from the law were small, although it should not be concluded that the law would hold in every case. Mr. Arnold also showed by maps that in the case of most of these large cities growth was retarded or prevented on one side by some natural topographical obstacle, and that the congested district in these cities was always on this natural city boundary. This necessitated a radial system of electric railway tracks. Mr. Arnold also discussed the problem of the adjustment of differences between municipalities and electric railways from a financial standpoint and referred to the solutions advanced by him in the cities of Chicago, San Francisco, Kansas City and elsewhere, all being plans evolved for the purpose of meeting the declared policy of these cities for municipal ownership,

at the same time providing a solution which would fairly conserve the rights of the railway properties. Some economic principles were advanced based on the theory that the present generation is better able to pay a relatively high rate of return than the future generation will be and that the present generation should pay for the depreciation on the physical properties resulting from present-day wear and tear, for the reason that they are deriving the advantage of new equipment and from the further fact that the property never can be kept up to the original cost or to the "cost to reproduce new" value.

In the Chicago, San Francisco and Kansas City settlements Mr. Arnold brought out his plan of following the principles outlined above by the creation of an amortization fund which would apply toward amortizing the intangible values of the properties in question, this amortization fund to be used to build extensions and thus increase the gross revenue of the companies without increasing the capitalization of the companies. A new electric railway, with its equipment, becomes in a sense "second-hand" after the first cars are run and, so far as the physical property goes, is worth less than the initial cost of building. An amortization fund of sufficient magnitude to build such extensions and improvements as to keep physical valuation up to the highest state that it is practicable to maintain a property in was advocated, it being claimed that an electric railway which is constantly being extended can with proper maintenance be kept in such a condition that a physical valuation based on present or depreciated value will represent about 75 per cent of the capital required to reproduce the property new. Mr. Arnold also spoke about the plan adopted in Chicago which secures a perpetual valuation or purchase price, so that the municipality can know at any day the exact amount required by it to take the road over should it decide to adopt municipal ownership.

DISCUSSION

Colonel Harding, of the District of Columbia Public Utilities Commission, asked if the reports given as examples of satisfactory settlement and the conclusions drawn from them were based on a 5-cent fare and whether universal transfers were issued.

Mr. Arnold said that, although the figures given in his reports were based on a 5-cent fare, the conclusions drawn and the economic principles advanced would hold equally well for a fare other than a 5-cent fare. Universal transfers were given in Chicago, it having been found that, while about 70 per cent of the passengers used transfers, the percentage of passengers who availed themselves of the long ride made possible by the issuance of universal transfers was very small. Because of this fact it has been argued by some that if the population was as dense between New York and Boston as it is in New York City a street railway could be built and operated on a paying basis and agree to carry passengers from New York to Boston for 5 cents, owing to the profitable short-haul passengers and the slow average speed that would be made by the surface cars, which would divert most, if not all, of the long-distance passengers to other and more rapid lines.

Clarence P. King, president of the Washington Railway & Electric Company, on being asked to comment upon Mr. Arnold's paper, stated that he had not known the real purport of the matter or that he was to be called upon to say anything. He proceeded to enter a vigorous protest against the impression created, pointing out that in the instances cited by Mr. Arnold, namely, Chicago and Kansas City, the franchises had expired. He stated that about fifty years ago the people of the District of Columbia needed some method of transpor-

tation and that the District authorities had welcomed with open arms any set of men who had red blood and courage enough to risk their money in such an enterprise. Mr. King drew an analogy by supposing that a merchant fifty years ago had bought a lot on F Street or Pennsylvania Avenue, in a favorable location, and paid, say, \$500 for it; then that he had built a building on it, which he had from time to time enlarged and improved, and, in addition, had built up and established a profitable business by expending capital and labor and taking great financial risk. Now, if some authority should come along and take possession of that property and business and pay back to the owner only his original investment and his expenditures made on the property from time to time and should not take into consideration the enhanced value as a going profitable concern, it was manifestly unfair, and such a policy would certainly throttle human endeavor and call a halt upon future undertakings. Mr. King concluded, however, with the statement that no such conditions existed in Washington for the reason that the franchises were perpetual and, all things considered, the fares were probably lower than in any other city in the United States with the exception of Cleveland, where, he understood, the fares would be higher in the near future for the reason that the 1-cent transfers would not be redeemed.

Mr. Arnold stated that Mr. King had not understood the principles he advocated, for his illustration was not in accordance with them, and he read extracts from his reports which showed that he had not only provided for conserving all proper investments but had also in some instances where the risk was great allowed a liberal promoter's share to the investors. He said that he believed that by the adoption of his principles both the municipality and the railroad interests would be treated fairly. Mr. Arnold then read from his Kansas City report an extract entitled "Fair Ordinance Provisions," which set forth clearly his position on these points. This was published on page 717 of the issue of the *ELECTRIC RAILWAY JOURNAL* for April 19, 1913.

Ralph W. Pope, honorary secretary of the American Institute of Electrical Engineers, gave a brief history of Mr. Arnold as an electrical engineer.

ELECTRIC TRACTION DEVELOPMENTS IN ARGENTINA

Several interesting features of traffic development in Buenos Aires and in Argentina generally are described in the Dec. 17, 1913, issue of the *London Times*.

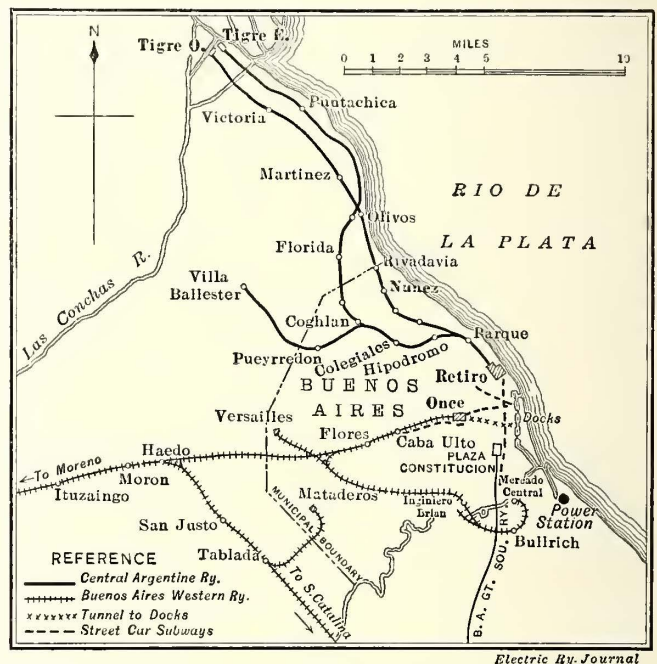
SHALLOW SUBWAY AT BUENOS AIRES

According to this paper, the population of Buenos Aires is now 1,500,000, and the city will probably have 2,000,000 inhabitants within the next few years. The Anglo-Argentine Tramway Company, which owns 370 miles out of a total of 450 miles of surface tramway, has lines laid in nearly every street. But the limits of surface expansion in the heart of the city have been reached, and a beginning has been made with shallow subway tramways. The first of these subways, 2 miles in length, has already been placed in operation beneath the broad Avenida de Mayo, which extends from the terminus of the Western Railway toward the river. Other double-track subways to a total route length of 10 miles are in course of construction or projected, the intention being to link up all the railway terminals in this way. A deep-level tunnel is also being made by the Western Railway between the up-town terminus and the docks, and that company and the Central Argentine Railway are now electrifying suburban routes up to a total of about 150 track miles.

The sub-surface tramway which has been opened for

traffic has a joint terminal station with the Buenos Aires Western Railway at Plaza Once. The subway is 25 ft. wide, and its height above the rail level 14 ft. 3 in. It has nine stations between Plaza Mayo and Plaza Once. The ventilation of the tunnel is effected by openings of about 16 ft. to the street, one or two of these being placed in each square. The trolley pole is carried at a minimum height of 13 ft. 1 in. underground and at 19 ft. 8 in. on the surface. The trains on leaving the tunnel run on the surface rails into the suburbs. These trains are made up of six to seven cars, each with a capacity of 100 passengers and run on a minimum headway of ninety seconds at a schedule speed of 14 m.p.h. In the tunnel passengers alight directly on the platforms, which are level with the floor of the carriages, but car steps are provided for surface operation. The trains are composed solely of motor cars, each car carrying two 115-hp, 1000-volt motors.

The first tunnel is now being extended from the Once station for an additional 2½ miles, and it is expected



Map of Buenos Aires, Showing Lines to Be Electrified

that this work will be completed about the middle of 1914. Another subway will connect the Retiro station of the Central Argentine Railway with the Plaza Constitucion, where the terminus of the Buenos Aires Great Southern Railway is situated, and beyond that point this line will in all probability be continued as an overhead or elevated tramway. In addition the company has powers for the construction of a subway beneath a new wide diagonal avenue which is now in course of construction, and the plans for this subway are in a fairly advanced stage.

CENTRAL ARGENTINE ELECTRIFICATION

On account of the increasing traffic and the high price of imported coal, the suburban lines of Buenos Aires are particularly suitable for electrical operation. It is anticipated that the first electrified section of the Central Argentine Company's lines will be in use before the end of 1914. The d.c. third-rail will be used. The equipment of a 22-mile section between the new Retiro terminus in Buenos Aires and Tigre, and the erection of the power house and plant are now under way. Since the amalgamation with the Buenos Aires and Rosario Railway the Central com-

pany has two routes between Tigre and Buenos Aires, but it is the company's old line via Nunez and Victoria, a route length of 18 miles, which is the first to be electrified. At a later date it is intended to equip the line via Florida and the section of main line from Coghlan to Villa Ballester. In all, including sidings and additional lines at the terminals, about 100 miles of single track are comprised in the complete scheme.

The power plant, which is being erected at Canal San Fernando about 2½ miles from the Tigre terminal, will have a maximum capacity of 18,000 kw. Babcock & Wilcox water-tube boilers will supply steam to four 4500-kw Parsons turbo-generators. The steam consumption of the turbines is guaranteed to be about 12½ lb. per kw-hr. The condensing plant and transformers are being supplied by the Westinghouse company. Three-phase current will be generated at 2500 volts, transformed to 20,000 volts for transmission, and converted at the substations for use on an 800-volt d.c. rail. The transmission to the substations will be by Henley underground cable. The substations will be located as follows: one near the power station, a second at Olivos and a third at Palermo. When the second and third sections of line are converted an additional substation will be provided near San Martin between Belgrano and Villa Ballester. The substation plant, which, except for the Westinghouse transformers, is being supplied by the British Thomson-Houston Company, will include at least three, and perhaps four, 1000-kw rotary converter sets. About 120 motor and trailer cars have been ordered from the Metropolitan and the Birmingham Carriage & Wagon companies, England. The motor cars will have steel underframes and steel flooring. Each coach will accommodate sixty-eight passengers. The normal motor-car equipment will consist of two 250-hp motors, but some of the coaches will be equipped with four motors for trailer hauling. The coaches will be of the end and central door type.

Buenos Aires Western Railway

The electrification of the Buenos Aires Western Railway is in a less advanced stage than that of the Central Argentine, but it is anticipated that electric service will be inaugurated by the middle of 1915. The intention is to equip at the outset about 22 miles of line between the Buenos Aires terminus at Once and Moreno for electrical operation, and at a later date to convert several important branch lines which are mainly devoted to freight traffic. An important part of the scheme is the tube railway between the Once terminus and the docks at Buenos Aires, a distance of about 2½ miles. The tunnel, which contains a single track of 5-ft. 6-in. gage, is intended to deal only with freight traffic going to the docks for shipment, and there will be through freight services from Haedo, a point 10½ miles distant from Once, to the docks. Electric locomotives will be employed.

The power station for the Western system has been so planned that it will be able to supply energy to the suburban lines of the Buenos Aires Great Southern Railway should that company decide to adopt electric traction. The electrical system will also be d.c. third-rail. Babcock & Wilcox boilers will supply steam to three 3000-kw Westinghouse turbo-generator sets at the Dock Sud power house. Three-phase current will be generated for transmission at 20,000 volts and supplied through underground cables to four substations. Dick, Kerr & Company, England, are the contractors for the substation plant. Neither the rolling stock nor the train equipments have yet been ordered, but as the trains have to run into the new underground terminal at Once, it is intended to use steel cars.

MR. HEGARTY RESIGNS AS PRESIDENT OF THE TRANSPORTATION ASSOCIATION

D. A. Hegarty, formerly manager of the railway electrical department New Orleans Railway & Light Company and now in charge of the Houston Lighting & Power Company, has resigned as president of the American Electric Railway Transportation & Traffic Association, a position to which he was elected at the annual meeting last October. In his letter of resignation to the executive committee Mr. Hegarty called attention to the clause in the constitution of the Transportation & Traffic Association which requires the officers of that association to be connected with a member company. This was the case with Mr. Hegarty when elected, but is not the case now because the Houston company is engaged in the lighting and power business only.

Mr. Hegarty's resignation was submitted to the executive committee for letter ballot and was accepted with regret. M. C. Brush, of the Boston Elevated Railway, who was elected first vice-president at the annual meeting, will be acting president of the Transportation Association for the remainder of the year.

A COMBINED TROLLEY STATION AND SALESROOM FOR LIGHTING SUPPLIES

The New Midland Power & Traction Company, of Cambridge, Ohio, operates twelve cars on about 15 miles of track. The power house and repair shops are located at West Cambridge. Until recently the interurban trolley station in Cambridge was situated in the lower end of the town in an out-of-the-way corner. The company has recently taken over a brick corner house in the part of the city opposite the court house and has fitted it up inside as a waiting room and also a salesroom for electrical appliances. The company does a lighting busi-



New Midland Traction—Brilliantly Lighted Waiting Room and Salesroom

ness and advertises this feature of its operations by means of attractive window displays and by a large number of lamps placed under the cornice. What was formerly a dingy corner is now bright and attractive and an excellent advertisement for the company. The interior of the ground floor of the building is fitted up with an attractive ticket booth, glass showcases, comfortable seats and desk for the manager. It is brilliantly lighted with Mazda lamps in Holophane globes.

ELECTRIC RAILWAY REPORTS OF THE BUREAU OF THE CENSUS

Preliminary figures for the forthcoming five-year report of the electric railways of twelve additional states have been given out by the Bureau of the Census, Department of Commerce. Statistics concerning electric railways of Maine, Vermont, New Hampshire and West Virginia were published in the ELECTRIC RAILWAY JOURNAL of Jan. 10, 1914. Statistics concerning the District of Columbia, Delaware and Maryland were printed in the issue of Jan. 17, 1914, and statistics concerning Connecticut, Rhode Island, Virginia, Georgia, Florida, Alabama, Louisiana, Mississippi, Oklahoma, Kansas, Minnesota, Colorado and California in the issue of Feb. 7, 1914.

The statistics given in the accompanying table relate to the year ended Dec. 31, 1912. The totals include electric plants operated in connection with electric railways and not separable therefrom, but they do not in-

clude reports of mixed steam and electric railroads or railways under construction which had not begun operations during the census.

income, 107 per cent, and operating expenses, 129 per cent. The number of companies operating electric railways in Connecticut decreased two during the decade 1902-1912. Miles of track increased 74 per cent; persons employed, 158 per cent; revenue passengers carried, 84 per cent; gross income, 110 per cent; operating expenses, 128 per cent; horse-power, 65 per cent, and output of stations, 197 per cent.

Reports from Tennessee show that the operating companies increased 50 per cent during the ten years. Miles of track increased 46 per cent; persons employed, 164 per cent; revenue passengers carried, 157 per cent; gross income, 230 per cent, and operating expenses, 202 per cent. The horse-power rating of power plants showed an increase of 378 per cent and the output of stations 550 per cent.

Electric railways in the State of Indiana showed the following increase during the decade 1902-1912: number of companies, 26 per cent; miles of track, 256 per

	Massachusetts	New Jersey	South Carolina	Kentucky	Tennessee	Indiana	Michigan	Wisconsin	Missouri	Nebraska	Montana	Oregon
Number of companies.....	60	43	7	10	12	45	23	25	19	10	6	6
Operating.....	43	24	6	.....	.....	34	22	24	19	7	.....	.....
Lessor.....	17	19	1	.....	.....	11	1	1	.....	3	.....	.....
Miles of line.....	2,328	897	168	356	259	2,038	1,139	582	579	149	82	389
Miles of single track.....(a)	3,010	1,319	202	493	370	2,301	1,507	806	996	243	99	544
Miles of single track in state.....	2,950	1,308	228	503	360	2,323	1,526	849	959	214	.....	567
Cars, number.....	9,116	3,061	276	1,010	872	2,408	2,822	1,330	2,683	548	160	1,400
Passenger.....	7,877	2,697	214	850	806	1,612	2,268	1,012	2,325	490	139	722
All other.....	1,239	364	62	160	66	796	554	318	358	58	21	678
Electric locomotives.....	5	1	4	.....	.....	6	3	3	7	.....	.....	22
Persons employed.....	23,169	9,436	794	3,591	3,304	8,553	9,500	3,762	9,550	1,579	390	3,041
Salaried employees.....	1,259	918	105	181	306	797	756	344	515	108	39	698
Wage earners.....	21,910	8,518	689	3,410	2,998	7,756	8,744	3,418	9,035	1,471	351	2,343
Power:												
Horse-power, total.....	272,796	29,098	12,110	26,460	53,367	121,920	68,280	126,652	125,940	19,125	1,520	109,450
Capacity of dynamos, kw.....	197,504	23,732	8,578	15,805	36,050	92,947	43,746	83,055	92,145	13,425	1,070	38,740
Output of stations, kw-hr. (in thousands).....	452,534	33,198	8,804	73,815	81,760	217,967	123,724	114,829	267,790	38,869	1,800	169,609
Current purchased, kw-hr. (in thousands).....	33,085	183,471	9,071	15,059	18,312	59,369	95,167	10,051	94,203	790	8,426	12,937
Passengers carried (in thousands).....	974,688	452,964	21,567	132,217	122,188	211,469	371,396	175,993	575,813	82,867	17,430	101,194
Revenue (in thousands).....	705,918	356,858	17,872	103,512	91,896	173,019	286,955	134,646	402,209	64,709	15,351	75,842
Transfer (in thousands).....	257,021	86,315	2,894	26,903	27,368	33,462	75,170	40,228	167,213	17,570	1,605	21,916
Free (in thousands).....	11,748	9,790	800	1,801	2,923	4,988	9,271	1,118	6,390	587	473	3,435
Car mileage (passenger, express, freight, etc.) (in thousands).....	125,893	60,994	4,657	22,274	19,935	47,797	61,189	26,596	72,573	12,613	2,901	19,509
Income statement:												
Gross income (in thousands)†.....	\$37,490	\$18,321	\$1,355	\$6,155	\$6,151	\$16,142	\$17,864	\$8,648	\$21,240	\$3,618	\$1,065	\$7,856
Operating expenses (in thousands).....	24,889	10,552	914	3,556	3,257	9,132	11,142	4,105	13,070	2,021	770	3,736
Gross income less operating expenses (in thousands).....	12,601	7,768	440	2,598	2,894	7,009	6,721	4,542	8,170	1,596	295	4,120
Deductions from income (taxes and fixed charges (in thousands).....	9,047	7,232	300	1,315	1,919	5,727	4,642	2,984	5,903	947	224	3,050
Net income (in thousands).....	3,553	535	140	1,282	974	1,281	2,079	1,557	2,266	649	70	1,069

†Excluding track lying outside of State of companies within State and including track in State owned by outside companies.
 ‡Number employed Sept. 16, 1912.
 ††Includes income from sale of current for light and power.
 (a) Excludes 7.82 miles not operated.

clude reports of mixed steam and electric railroads or railways under construction which had not begun operations during the census.

During the decade 1902-1912 the number of operating electric railways in Massachusetts decreased from seventy-five to forty-three. Miles of track increased 19 per cent during this period; passenger cars, 8 per cent; persons employed, 56 per cent; revenue passengers carried, 53 per cent; gross income, 58 per cent; operating expenses, 52 per cent; horse-power of power plants, 101 per cent, and the output of stations, 139 per cent.

The number of operating companies in New Jersey decreased 8 per cent between 1902 and 1912. The number of miles of track increased 53 per cent; revenue passengers carried, 89 per cent; gross income, 124 per cent, and operating expenses, 144 per cent.

South Carolina operating companies decreased in number from seven in 1902 to six in 1912. The miles of track increased 163 per cent; persons employed, 93 per cent; revenue passengers carried, 97 per cent; gross

cent; revenue passengers carried, 161 per cent; gross income, 323 per cent, and operating expenses, 311 per cent.

The number of operating companies in Michigan remained practically the same during the decade. There was an increase of 47 per cent in the miles of track, 176 per cent in the number of persons employed, 152 per cent in the number of revenue passengers carried, 174 per cent in gross income and 205 per cent in operating expenses. The horse-power of power plants increased only 49 per cent and the output of stations only 48 per cent.

The operating electric railways in Wisconsin increased 41 per cent during the decade; miles of track, 94 per cent; persons employed, 70 per cent; revenue passengers carried, 115 per cent; gross income, 120 per cent, and operating expenses, 106 per cent.

The number of operating companies in the State of Missouri was nineteen in 1912, as compared with sixteen in 1902. The following increases were made: miles

of track, 31 per cent; number of persons employed, 75 per cent; revenue passengers carried, 90 per cent; gross income, 98 per cent, and operating expenses, 115 per cent.

Increases for electric railways in the State of Nebraska during the decade are noted as follows: number of operating companies, 75 per cent; miles of track, 115 per cent; persons employed, 188 per cent; revenue passengers carried, 191 per cent; gross income, 215 per cent, and operating expenses, 208 per cent.

The number of operating companies in Montana increased one during the ten years since 1902. Miles of track increased 57 per cent during this period; number of persons employed, 103 per cent; revenue passengers carried, 124 per cent; gross income, 117 per cent, and operating expenses, 111 per cent.

No gain was made in regard to the number of operating companies in the State of Oregon during the decade, but miles of track increased 299 per cent; number of persons employed, 479 per cent; revenue passengers carried, 305 per cent; gross income, 653 per cent; operating expenses, 471 per cent, and the total horse-power developed, 2475 per cent.

COMMUNICATIONS

ENTHUSIASM ESSENTIAL TO PERSONAL PROGRESS

BROOKLYN RAPID TRANSIT COMPANY

BROOKLYN, N. Y., March 3, 1914.

To the Editors:

In a recent editorial you comment on the announcement of Mr. Thornton's leaving the Long Island Railroad to become general manager of the Great Eastern Railroad of England. I understand that the purpose of your editorial was to direct attention to the importance of training men systematically for promotion. The subject which you broach is a complicated one, and I doubt the value of any formula that might be laid down. So much depends upon the personal equation, not only in the case of those who are to be educated but of those who are intrusted with the work involved. A certain number of employees will always be indifferent to their tasks, and no great headway can be made unless each likes his work and is interested in it. Assuming that this may be the fundamental condition, much, perhaps, can be done through a careful diffusion of statistics bearing directly upon the work at hand. The results of these statistics in affecting operation, their ultimate effect upon the cost of producing such results and the effect upon the earning capacity of the corporation should be made clear.

Enthusiasm must necessarily play a considerable part, and the official, through his own personality, his enthusiasm over his work and his efforts through personal contact, can often accomplish important results along educational lines. The systematic furnishing of information and data bearing upon the man's work and the results to be expected should be stimulating to the employee, provided that he is capable of doing more than merely working for his wages. Of course, with certain men no very great effort is required. With others who are none too conscientious in reporting promptly for work but are very particular about leaving promptly for their homes or elsewhere it is difficult to see how any effort, no matter how put forth, can develop them into much more valuable assistants. A railroad official told me some fifteen years ago that when he was on the payroll for \$2 a day he endeavored to give in service at least \$3, and later, when his salary was increased, he followed the same principle of giving in work at least 150 per cent of the amount which he re-

ceived from the company. Of course, there are prominent examples of officials who obtain efficient work from an organization more through fear than through enthusiastic and kindly effort coupled with personal contact, but it is difficult to understand how employees under such a system will be benefited by any educational effort upon the part of the railroad or its higher officials.

WM. G. GOVE, Superintendent of Equipment.

PROGRESS IN APPRENTICE TRAINING

NORTHERN OHIO TRACTION & LIGHT COMPANY

AKRON, OHIO, Feb. 28, 1914.

To the Editors:

I have been much interested in the editorial in your issue of Feb. 21 on the apprenticeship system in this country and England. There is undoubtedly here a growing appreciation of the value of the modern ideas of training, especially among the large railroad companies. The Baltimore & Ohio Railroad began a school for apprentices about 1887, but the attempt failed for want of appreciation on the part of the company and of the scholars. The Lake Shore & Michigan Southern Railroad started a similar course about the same time. The Pennsylvania Railroad began its excellent work for apprentice instruction about 1905. More recently the same company has instituted school instruction in connection with the regular apprentice system and the New York Central Lines have also an extensive school course. The success of the American Locomotive Works in this line is well known. From the experience of these companies, as well as from that of others, it was found that the only practicable way to carry on the work was by means of compulsory attendance. The results have been the development of high-grade intelligent mechanics in the railroad repair shops of the country and the creation of opportunities for ambitious young men not only to obtain a technical education but to receive pay for the time they devote to the acquirement of knowledge.

The instruction in these courses comprises arithmetic, elementary geometry, mechanical drawing, practical and theoretical mechanics and standard practices. This instruction is imparted by men of ability, and the class work is supervised by equally competent men. The practical side is cared for by instruction in lathe work, vise work, blacksmithing, electrical work, pipe fitting and molding. The value of all of this work is evident in the different kind of men now found in our workshops. To-day every young man entering the service of any steam railroad knows that the presidency of the road is a possibility to him. This change is due to the efforts being made in the line of education. Due credit for it should be given to such men as C. W. Cross and W. B. Russell, of the New York Central Lines, to George M. Basford and to Dean Herman Schneider, of Cincinnati, who with many others have made heroic and determined efforts for the practical and technical education of our apprentices.

There was a time when a college diploma was rated at more than its face value, but this is no longer the case. The methods now adopted in the shops are not based on a college course but are intended to develop the ordinary apprentice, first into the skilled workman, then into the foreman, and finally possibly into the administrative officer. There is no philanthropy in this plan. It is necessary for the development of the railroads.

It was predicted that this work would not last, but it has done so, and now we have the satisfaction of knowing that our young men are seeking instruction

as the opportunity presents itself and that it is fast becoming unnecessary to enforce attendance at classes. In the schools operated in conjunction with the railroads the instructors are trying to make men by systematic work with individuals. It is a matter of personal touch in the endeavor to give a broader education. The dean of the Princeton University Graduate School recently referred to a "limitless supply of half-baked, half-trained men who can do one thing only," and his diagnosis is unfortunately supported by the facts here to some extent, but not to the same extent as in European countries. The conditions in this country now reflect the benefit of training apprentices and there are fewer "half-baked" men in the railroad business than was formerly the case.

In my early experience in the English railroad shops I knew of apprentices who started at boring out cylinders and continued on that kind of work for their whole apprenticeship and, in fact, for years after. One man, for instance, had been engaged in machining piston rods and had not moved the loose headstock on his lathe for fourteen years. Then he went out on strike, walked the streets of Leeds and finally died broken-hearted because his only means of a livelihood was gone. The realization of the all-too-limited nature of his ability killed him.

All of this is now changing, and the widespread effects of the change are felt not only on steam railroads and in electric traction circles but in all of our larger manufacturing centers. In the case of traction corporations, the training of efficient employees may help in the solution of the great problem of making both ends meet—a problem forced upon the roads by the slowly diminishing value of the purchasing power of the nickel.

WILLIAM H. ROBERTS,

Superintendent of Motive Power.

THE WESTCHESTER JOURNAL BRASS

L. B. STILLWELL, CONSULTING ENGINEER

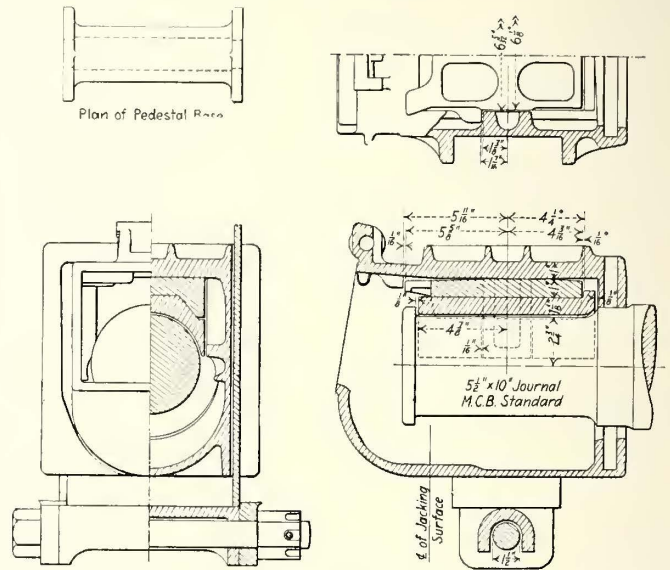
NEW YORK CITY, March 4, 1914.

To the Editors:

The interest aroused in the subject of journal brasses by your editorial of Jan. 31, 1914, seems to warrant a

journal brass and box shows the usual form of M. C. B. journal, used on the trailer or non-motor axles of the Westchester cars. The displacement of these journals when wheels are subjected to high brakeshoe pressure was well illustrated in your issue of Jan. 31. Repeated displacement of the journal brass in the manner illustrated eventually leads to distortion of the outline of the babbitted surface and to consequent heating of the journal.

In the case of the journal illustrated, the pressure on the single brakeshoe when emergency application of the



Journal Brasses—Special Westchester Brass for Motor-Driven Axles

brake is made amounts to about 150 per cent of the weight on the wheel, and regular operation has developed that the brass as designed is unsuitable for such service. This same design of brass would, however, be adequate for service with clasp-brake rigging where the pressure of the two shoes, applied on opposite sides of the wheel, practically balances and thus relieves the journal and brass of any specific pressure due to brake application.

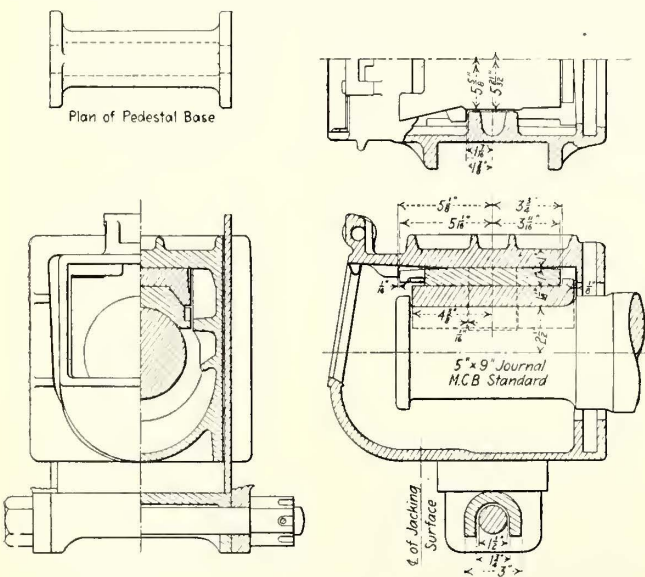
The accompanying illustration of the 5 1/2-in. x 10-in. journal brass and box shows the special form of brass used on the motor-driven axles of the Westchester cars. The details of these 5 1/2-in. x 9-in. brasses were illustrated in the article on page 224 of your issue of Jan. 31, 1914, describing the Westchester equipment. These brasses were made deeper than usual, in order to provide additional bearing area between journal and brass and between brass and box to transmit the tractive effort of the motors.

The design of deep-sided journal brass is not new, as similar brasses have been used with motor-driven axles in heavy electric traction service for many years and to the best of my information have always given satisfaction. The accurate finishing of the wearing surfaces of the journal and journal boxes, both inside and outside, and the accurate finishing and alignment of pedestal guides contribute greatly to their satisfactory operation.

The motor-driven wheels of the Westchester cars are fitted with two brakeshoes per wheel, the clasp-brake system, as the desired rate of retardation required shoe pressures per wheel in excess of what was considered good operating practice if applied to single shoes.

In my opinion, the deep-sided journal brass has distinct advantages for use with motor-driven axles and also where heavy brakeshoe pressure is to be applied with one shoe per wheel.

F. M. BRINCKERHOFF.



Journal Brasses—Standard M. C. B. Brass Used on Trailer or Non-Motor Axles

short description of the design of the journal brasses whose behavior in service on the New York, Westchester & Boston Railway motor cars excited your comments. The accompanying illustration of the 5-in. x 9-in.

SYSTEMS FOR THE REDUCTION OF ELECTROLYSIS

NEW YORK, March 5, 1914.

To the Editors:

In your issue of Jan. 3 there is an editorial on "Electrolysis Mitigation versus Elimination" in which occurs the following: "As the drainage system has been heretofore so generally commended and possibly put to wider use than any other, this conclusion must come as a distinct surprise."

It seems to me that the words "distinct surprise" are hardly proper in this case in view of the report of the committee on electricity of the American Railway Engineering Association, which was presented at the annual meeting of that association in Chicago, March, 1913, and can be found in the proceedings of that month.

GEORGE W. KITTREDGE,

Chairman Committee on Electricity American Railway Engineering Association.

A. E. R. A. SECTION WORK AT MILWAUKEE AND NEWARK

In connection with the article elsewhere in this issue on company section work in the National Electric Light Association, it may be of interest to present the following particulars of the company sections of the American Electric Railway Association formed by The Milwaukee Electric Railway & Light Company, Milwaukee, Wis., and the Public Service Railway, Newark, N. J.

THE MILWAUKEE SECTION

The Milwaukee section was organized March 18, 1912, with forty-five charter members. Meetings are held monthly except during two of the summer months. The present membership is 120. The number in attendance during the meetings of the first year averaged between sixty and seventy-five, and this year the average is between ninety and 110. The present membership forms about 75 per cent of those who from their occupation or position are interested in this work.

J. D. Mortimer, president of The Milwaukee Electric Railway & Light Company, through whose courtesy the information on the work of this section has been made available, finds that the company sections are of great value in tending to develop a strong co-operative spirit on the part of the members. This spirit strengthens as time goes on and gradually spreads to other employees who thus become ambitious to join. As Mr. Mortimer puts it, "The company section movement is a cumulative one and brings results that are apparently at first intangible, but which can later be defined." The company is more than pleased with the results achieved by the Milwaukee section and believes that as the knowledge of the results accomplished spreads the number of A. E. R. A. sections will largely increase.

The splendid educational work of the Milwaukee organization cannot be explained more clearly than by quoting the list of subjects which have been considered. The list of dates, subjects and speakers follows:

Date	Subject and Speaker
March 18, 1912...	Organization meeting.
April 4, 1912...	Construction features of Cold Spring Shops. R. H. Pinkley.
	The chain department and its relation to other departments. M. S. Rausch.
May 2, 1912....	Steel versus wooden construction of city cars. C. H. Cross.
	Transfers, their uses and abuses. J. E. White.
June 6, 1912....	Fire prevention. Mr. Glendenning.
	Welfare work. Bert Hall.
Oct. 7, 1912....	Electric railway problems. C. N. Duffy.
Nov. 7, 1912....	Observations on the annual A. E. R. A. convention. Messrs. Pinkley, Mullett, Fay, Kalweit and Stearns.
Dec. 5, 1912....	Observations on the annual A. E. R. A. convention. Messrs. Archambault, Lederer, Smith-Peterson, Groskopt, Burkholz, Witte, Austin, Hunzicker, Evans, Overholt, Hoehne, Wolf and Hinstorff.
Jan. 9, 1913....	The company's attitude on welfare work. R. B. Stearns.

Feb. 6, 1913....	Safety work. Frederick S. Hughes. The proposed reconstruction and construction of track for 1913. Mr. Childs. Our new cars. C. H. Cross and W. W. Hunzicker. Items of interest in foreign road operation. A. E. Wallace.
March 6, 1913...	Growth of the claim business. Dr. Lemon.
April 3, 1913....	Relation of the employee to the public and State. Edwin S. Mack.
May 8, 1913....	Wisconsin Railroad Commission. Commissioner David Harlowe.
June 12, 1913...	Good housing. Bert Hall. Rail and wire. C. W. Lamb.
September, 1913.	Company sections. J. D. Mortimer. University of Wisconsin. Chester Allen.
October, 1913....	Making of trainmen. Mr. Henningfeld.
November, 1913..	The printing shop. Mr. Rogers. Election-convention. Messrs. H. A. Mullett, R. H. Pinkley, Geo. Kummerlein, G. W. Kalweit.
December, 1913..	Shouldering responsibilities. C. M. Rosencrantz.
January, 1914.]	Joint meeting of A. E. R. A. and N. E. L. A. sections.
February, 1914..	Developments in electric traction. Miles Lambert.

PUBLIC SERVICE RAILWAY SECTION

The Public Service Railway Company section now has a membership of 342. The attendance at the meetings averages from 150 to 200. The wide field of the company section appears from the following departmental classifications, as prepared by C. B. McCourt, president of the section, which show the number of members from each department:

Department	Membership
Transportation	108, includes general superintendent, assistant, division superintendents, supervisors, clerks, inspectors and trainmen.
Mechanical	40, includes mechanical engineer, superintendent of shops, clerks, draftsmen, shop foremen, storekeeper.
Engineering	34, includes engineers, assistants, division engineers, clerks.
Maintenance of way	34, includes superintendent, roadmasters, clerks, storekeeper.
Distribution	14, includes superintendent, engineer and clerks.
Accounting	18, includes general auditor, assistant, traveling auditor, bookkeepers, clerks.
Claim and welfare	17, includes general claim agent, assistant division claim agents, clerks.
Legal	10, includes general solicitor, general counsel, attorneys.
Ferry	10, includes captain, engineers, firemen, pilots, deckhands.
General and executive	57, includes president, vice-presidents, comptroller, secretary, treasurer, general manager and clerks.

As at Milwaukee, the Public Service Railway section has enjoyed the benefit of papers on a great variety of electric railway subjects and, in addition, the program has usually been augmented by inviting some executive officer or outside speaker to talk about the broader problems of the industry. The following is a list of addresses and papers which have been delivered before this section at ten monthly meetings:

ADDRESS AND SPEAKER

"American Electric Railway Association Work Throughout the Country." Thomas N. McCarter, president.
"Growth of the A. E. R. A. and Its Advantages." H. C. Donecker, former secretary American Electric Railway Association.
"The Railway Business." R. E. Danforth, general manager.
"Welfare of Employees." J. J. Burleigh, second vice-president.
"Teamwork." J. M. Wakeman, general manager Society for Electrical Development, Inc.
"Organization and Teamwork." James H. McGraw, president McGraw Publishing Company.
"Accident Prevention." H. V. Drown, general claim agent.
"Car Derailment and Prevention." A. F. Thompson and D. H. Roszel.
"Operating Features Plank Road Shops. S. B. Cunningham, executive clerk mechanical department.
"Return Circuit." H. F. Burr, engineer distribution department.
"H. L. Control." A. J. Manson, Westinghouse Electric & Manufacturing Company.
"Standard Classification of Operating Expenses." C. B. McCourt, assistant to the general auditor.
"Train Operating in City Service." C. F. Bachman, engineer electrical department.
"Construction and Operation of High-Speed Interurban Railroads." D. C. MacDougall, engineer maintenance of way department, and J. W. Brown, assistant general superintendent.
"Maintaining the Way." P. F. Maguire, chief clerk maintenance of way department.
"Keeping the Company Department Store." R. S. Inglehart, general storekeeper.

The order of business at the meeting of the Public Service Railway section not only includes an address and a technical paper but written as well as verbal discussion on the topics considered. The technical papers are printed and distributed in advance of the meeting just as in a high-grade engineering society.

WORKING AGREEMENT ON T. H. I. & E. AND PERMANENT ARBITRATION BOARD

A new working agreement was entered into Feb. 24 between the Terre Haute, Indianapolis & Eastern Traction Company and the trainmen of its Terre Haute division, under which agreement the company gives its employees the same wage scale as was recently granted the car service men of the Indianapolis Traction & Terminal Company in the award of the Public Service Commission of Indiana. This new wage scale is 21 cents an hour for men in continuous service one year or less, 23 cents an hour for one year and less than two years, 24 cents an hour for two years and less than three, 25 cents an hour for three years and less than four, 26 cents an hour for four years and less than five, and 27 cents an hour for five years and over. The former rate paid the men of the Terre Haute division was graduated from a minimum of 20 cents an hour to a maximum of 25 cents an hour. The new agreement was made pursuant to what is known as the "Governor's agreement" of Nov. 11, 1913, and is to continue in effect for a period of three years from March 1, 1914. This agreement is not intended to cancel or take the place of the agreement of Nov. 11, which continues in force.

A provision contained in the new working agreement sets out that "no one now in the employ of the company or who may be hereafter employed shall be required to become a member of any labor organization. The company shall not discharge any man solely for the reason that he is a member of such organization." The paragraph also provides that there shall be no discrimination in any way among the employees either for or against any employees who may or may not be members of labor organizations. The agreement also provides for working boards for trainmen, one at the trainmen's clubroom and another at the carhouses, each of the boards to be posted not later than 6 p. m. of each day for regular work for the following day. Provision is also made that extra men working late runs shall not be required to make an early report the following day until they shall have had at least eight hours off duty.

The agreement was signed on behalf of the employees by the committee which they had appointed in December to represent them in any matters to be taken up with the company. A petition was then filed with the Public Service Commission by this committee asserting that it represented 80 per cent of the trainmen and asking that all grievances presented to the commission by the minority union men of the Terre Haute division be stricken out and that the new working agreement between the company and the men be allowed to stand. Attorneys for the union then filed appeals with Governor Ralston asking that a sweeping revision of the new working agreement be made, on the ground that it did not cover all the points which had been granted to the men of the Indianapolis Traction & Terminal Company in the decision of the Public Service Commission. Robert I. Todd, president Terre Haute, Indianapolis & Eastern Traction Company, advised the Governor of the agreement the company had made with the majority of its trainmen and stated that in case of any differences of opinion in the matter the entire situation was one for the Public Service Commission to pass upon under the terms of the agreement of Nov. 1, 1913.

Great dissatisfaction was felt among the union men over the action of the Public Service Commission in refusing reinstatement to all but three of the men whose cases have been the subject of hearings lasting for several days, both at Terre Haute and Indianapolis. These cases arose out of claims that a number of men were discharged, both by the Indianapolis Traction & Ter-

minal Company and the manager of the Terre Haute division of the Terre Haute, Indianapolis & Eastern Traction Company, on account of their affiliation with the union or activity in its cause. J. J. Thorpe, international first vice-president of the Amalgamated Association, who has been in Indianapolis and vicinity for more than seven months attempting to perfect an organization of street railway and interurban employees, made a bitter arraignment of the Public Service Commission and stated that he would never agree to arbitrate anything before that commission again, but would insist that any new arbitration board should be appointed in the way such boards are usually constituted.

PERMANENT BOARD OF ARBITRATION

In the decision recently handed down by the Public Service Commission of Indiana, which sat as a board of arbitration in the settlement of grievances arising out of the street car strike in Indianapolis last November, it was provided that an impartial board of arbitration should be named, to be composed of three disinterested parties, one to be selected by the judge of the United States Court for the district of Indiana, one by the chief justice of the Indiana Supreme Court and the third member by the chief justice of the Indiana Appellate Court. This arbitration board was to decide all matters which might arise and not be adjusted between the company and its employees during the lifetime of the award. After the award was made the Public Service Commission notified the judges of the provision which had been made and requested that they select the members for the arbitration board.

After deliberation, Judges A. B. Anderson of the United States Court, M. B. Lairy of the Appellate Court and Douglas Morris of the Supreme Court declined to name such a board of arbitration. In their joint letter to the commission the judges stated: "It is impossible to know in advance what questions might arise in the respective courts of which we are judges. It may be that one of the courts might become invested with the duties of determining some question arising out of some action of the board of arbitration. No judge should voluntarily disqualify himself from determining any question likely to come before him, nor should he do anything that might embarrass him in acting. The board of arbitration will be a quasi judicial tribunal, and should ever the occasion arise to review its act, that duty should be performed by others than those who appointed its members. The discharge of our official duties constitutes our paramount obligation, and for the reasons above stated we are constrained respectfully to decline the performance of what would otherwise be a pleasurable duty."

An attempt was then made by union officials to have the Public Service Commission reopen the decision and arrange some other method for the appointment of an arbitration board. A request was also sent to W. H. Latta, attorney for the Indianapolis Traction & Terminal Company, asking that the company agree to the naming of an arbitration board, the company to select one member, the employees one member and the two thus chosen to select a third member. The Public Service Commission took the position that it could not reopen its decision in the arbitration of the street car case unless a request was received from the company as well as the employees. Mr. Clawson, attorney for the employees, admitted that at the present time there is no question which requires to be settled by an arbitration board, but he said they desired to prepare for an emergency. Mr. Latta, for the company, stated that it would be premature for an arbitration board to be named at this time, when no question is pending.

Equipment and Its Maintenance

Short Descriptions of Labor, Mechanical and Electrical Practices in Every Department of Electric Railroading

(Contributions from the Men in the Field Are Solicited and Will Be Paid for at Special Rates)

RE-CUTTING AND TRANSFERRING WORN BRUSHES FROM MOTOR TO MOTOR

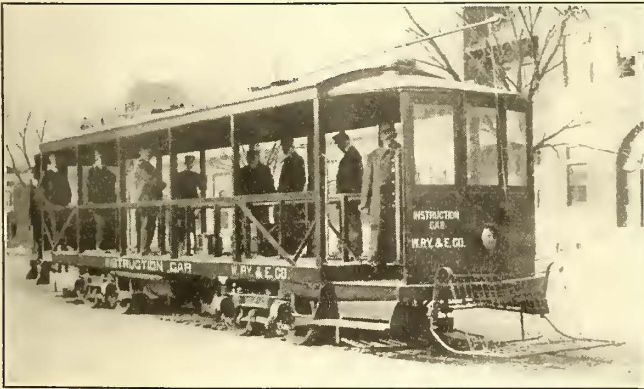
BY CHARLES A. INGLE, ASSISTANT PURCHASING AGENT
ROCKFORD & INTERURBAN RAILWAY

The Rockford & Interurban Railway, Rockford, Ill., has effected a considerable economy in the use of carbon brushes, which may be of interest to other railroads. It is our practice to use a GE-52 brush-holder on the Westinghouse No. 49 motors with a carbon brush $\frac{1}{2}$ in. x $2\frac{1}{4}$ in. x $2\frac{7}{16}$ in. in size. When these brushes are worn down to $1\frac{1}{8}$ in. they are squared up at the shops and then two of them are used on GE-88 motors. When they have worn down to $1\frac{3}{8}$ in. on the latter motors they are cut again for use as compressor motor brushes. By following this practice, we have cut our carbon brush cost to a minimum. Last year, for example, the cost of this item was only a trifle more than 2 cents per 1000 car miles.

AN OPEN-SIDE CAR FOR PLATFORM INSTRUCTION ON THE ROAD

BY W. A. WENNER, MASTER MECHANIC WASHINGTON
RAILWAY & ELECTRIC COMPANY

On Feb. 2 the Washington Railway & Electric Company placed in service the unusual open-side instruction car shown in the accompanying illustration. It is



Open-Side Instruction Car for Washington

planned to take the student platform men on this car after they have received preliminary instruction in the regular instruction room. The condition that three separate methods of current collection—namely, metallic circuit conduit, double circuit overhead and ordinary single trolley overhead—are used made it desirable to build and equip the car in the way which would best show the men what to do in going from one part of the system to another.

In general this car is equipped like our standard cars, and, like them, can be operated on any part of the system. It is built of wood reinforced with iron bracing,

as shown. Access to the main floor is obtained by way of the open vestibules and by walkways on each side of the car. All of the apparatus, except the motors, jam-cylinder and air-storage tanks, is above the floor line. The air tanks were left below the floor to permit draining the rest of the system of water and to prevent freezing in cold weather. The main dimensions and equipment are as follows: length of car over corner posts, 30 ft.; width of car over all, 8 ft. 6 in.; No. 14-B-3 Peckham trucks, with wheelbase of 4 ft. 6 in. and cast-iron wheels of 33 in. diameter; four GE-1000 motors, K-31-A double-end control, Westinghouse D-2 compressor and Parmenter fender.

The car was designed by the writer and built at the company's shops. The instruction of platform men is under the direction of J. T. Moffett, superintendent of transportation.

EQUIPMENT DEFECTS—THE TROLLEY WHEEL

BY C. W. SQUIER, B. S., E. E.

A large part of the work of an operating engineer consists of investigating the causes for the different troubles encountered in operation and of devising a means for reducing or preventing such troubles. In many cases the failure of a part destroys all evidence as to the initial cause for its breakdown, or the result of the failure may be so great as to distract attention from its real cause. Results are demanded, however, and excessive troubles must be reduced no matter how difficult the former are to obtain or how obscure the real cause of the latter may be.

In this and the articles that will follow on equipment defects some of the more frequent troubles will be enumerated, their causes will be discussed, and an endeavor will be made to point out some of the conditions that have been found to exist by those carrying on this class of work for a large corporation. The methods which they have used to reduce such troubles will also be described.

CAUSES FOR FAILURES

In analyzing the different causes for equipment failures the following are found to be the principal ones:

- Defective material.
- Faulty workmanship.
- Errors in design.
- Unsuitability for the service.
- Lack of proper care.
- Excessive wear before renewal.

The last cause is responsible for the greatest number of the troubles encountered, and its correction requires the keenest judgment on the part of the persons who are responsible for the maintenance of the equipment. It is to be expected that all parts will wear out, but the point at which the usefulness of a part ceases and at which its continued use will result in serious trouble is very hard to determine. After all has been said about the best methods for securing different results, the most important factor in this case is the human element.

CURRENT-COLLECTING APPARATUS—TROLLEY WHEELS

Three principal systems for conveying current to electric cars are in use, namely, the overhead trolley, the third-rail and the underground conduit. In the present article only the standard American trolley wheel with its harp, pole and base will be considered.

The greatest trouble with trolley wheels arises from the difficulty of securing satisfactory lubrication and of conducting the current from the wheel to the harp. Some of the most frequent defects are as follows: sides bent, broken or shipped; double groove; holes in sides; flat spots; bushing hole too large; burned wheels; sides loose and rim worn off.

BENT, BROKEN OR CHIPPED SIDES

Bent, broken or chipped sides usually result from wheels coming off the wire and striking some part of the overhead construction. The number of such troubles can be reduced by proper attention to the lubrication of the trolley stands so as to insure their free swiveling, by making sure that the wheels stand perpendicular to the car roof so as to make proper contact with the trolley wire, by keeping the side bearings properly adjusted so as to prevent the swaying of the car when operating at high speeds, by renewing the trolley bushings and axles before they become unevenly or excessively worn, and by keeping the trolley tension properly adjusted.

DOUBLE GROOVE OR HOLES IN SIDES

Double grooves or holes in the sides arise from the condition that the wheel is not following the wire properly, and this may be due to improper maintenance of the overhead construction. These defects also occur frequently on cars that are operated from one end on lines with frequent curves, caused by the wire riding the flange while rounding a curve. If the harps are not straight in the poles so that the wheel is maintained at an angle to the wire, or if the side springs are weaker on one side of the car than on the other so that the car body does not rest level when loaded, the trolley wheels are liable to wear unevenly. When a wheel is found wearing to one side it can be made to wear straight in some cases by reversing it in the harp.

FLAT SPOTS—BUSHING HOLE TOO LARGE

Flat spots are caused by the sliding of the wheel on the wire on account of imperfect rotation. Flanges frequently become slightly bent and rub against the harp, or the side springs and washers may be too tight or exert too great pressure against the side of the wheel. Flat spots usually start with a very slight slippage between the wheel and the wire, but when a spot is once started it increases rapidly.

Over-sized bushing holes are caused by lack of lubrication or by shunts and springs which have become so worn and loose that their pressure is too light properly to conduct the current to the harp. A slight burning or pitting results from the carriage of the excessive current through the bearing and axle. This causes the bushing to bind on the axle, and if it is not a very tight fit in the wheel, rotation will take place around the bushing instead of the axle. Under such circumstances only a few trips are required to wear out the bushing hole in the wheel.

BURNED WHEELS AND SLEET TROUBLES

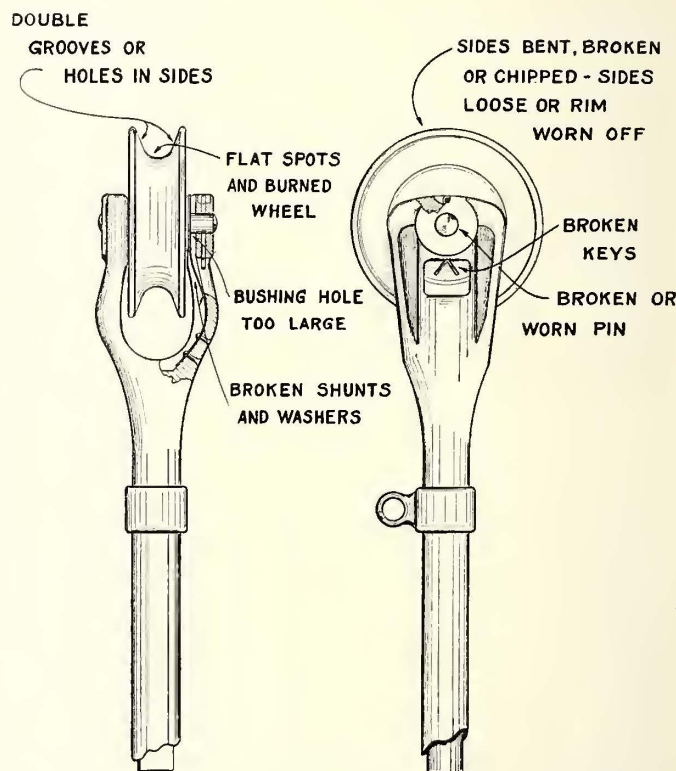
Burned wheels are caused when the wheel becomes separated short distances from the wire so that rapid arcing and destructive burning takes place. Sleet destroys the wheel very rapidly in this manner. At other times it is found that if a wheel is out of balance its

centrifugal force as it rotates will break the contact with the wire. The trolley tension on cars found with burned wheels should always be tested carefully.

In sections where sleet storms are frequent sleet cutters are used to advantage. On large systems, however, the removal of trolley wheels and the installation of sleet cutters assume enormous proportions and come as an additional task for the shop forces at the very time when they are usually busy with snow equipment. Large city roads usually prefer to depend on the frequency of the service to keep the sleet off the wire, or they install sleet cutters on but a few cars of each line, depending on these to scrape the ice clean and thus prevent excessive burning on the wheels of the other cars.

SIDES LOOSE AND RIM WORN OFF

Loosened sides and worn rims are troubles experienced with built-up wheels such as those with steel flanges and a copper center, and they usually are due to



End and Side View of Trolley Wheel and Harp, Showing the Location and Character of Possible Defects

the construction of the wheel. Their number can be decreased by the treatment prescribed in the paragraph on "double groove or holes in sides."

DEFECTS DUE TO MATERIAL, WORKMANSHIP OR DESIGN

When the troubles experienced with trolley wheels of different makes or designs are compared it will be found that some defects are confined to certain types and that the number of defects of any particular kind depends to a large extent on the design of wheel. All the troubles that I have mentioned are influenced by the material used in the wheel, and the workmanship is also an important factor. When the defects on one road were followed up it was found that the number of wheels with the bushing hole excessively worn increased suddenly. An investigation disclosed the fact that in one shipment of wheels the hole for the bushing was slightly larger than those previously used so that the bushing did not fit as tightly in the wheel as in previous wheels installed. This difference was but a few thousandths

of an inch and so was scarcely noticeable until the investigation disclosed it. The shape and size of the groove, the diameter of the hub, the weight of the wheel, the accuracy of balance and the method of lubrication are points in design that have a marked influence on the number and type of defects.

TROLLEY WHEEL BUSHINGS AND AXLES

The most common method of providing lubrication for the wheel revolving about its axle is to employ graphite paste pressed into grooves in a brass bushing, but grease or oil applied in a variety of different ways is not uncommonly used.

The use of ball or roller bearings for trolley wheels has not proved entirely satisfactory, as they soon become pitted and rough unless insulated. Unfortunately, it is necessary to depend on the bearings to carry part of the current because the shunts and washers used for this purpose often become worn or exert too light pressure against the rotating part.

The principal trouble experienced with bushings is the falling out of the graphite. This is primarily a matter of design, but the life of a bushing will be very much increased if the shunts and washers are kept in good condition.

Wheels should be tried with the hand for lost motion between the axle and bushing on each inspection. If this motion is excessive the wheel should be removed and the bushing and axle gaged. If the condemning gage enters the bushing or fits over the axle at any point the worn part should be removed. As to the diameter of the axle, many railways consider that 1/2 in. to 5/8 in. gives the best service. The growing tendency, however, seems to be to go to a larger size, like 3/4 in. to 1 in.

HARPS

Trolley harps should be as light and simple as possible, with all surfaces smooth, the edges and corners rounded and the axles and cotter pins inclosed in the harp without projections to catch in the overhead construction should the wheel leave the wire. The principal troubles are loose pins or cotter keys and worn or broken shunts and washers. Loose pins are usually the result of the wrong installation of cotter keys when changing wheels. The harps should be so constructed that the ends of the cotter keys can be clinched easily. The keys should also be so protected by the harp that they cannot catch and break.

Copper washers should be installed between the shunts and the wheel to take the wear and to provide good electrical contact. If these washers are properly maintained the shunts will not become worn. The breaking of shunts is sometimes attributable to the design of the harp. The shunts should be long and without sharp bends, and the spacing of the rivets used for fastening them to the harp should be such as to prevent the liability of their breaking through the rivet holes. Since the capacity of a trolley wheel is limited to the current that can be carried from the rotating part to the harp, the necessity of keeping the harps in the best possible condition is evident.

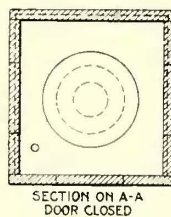
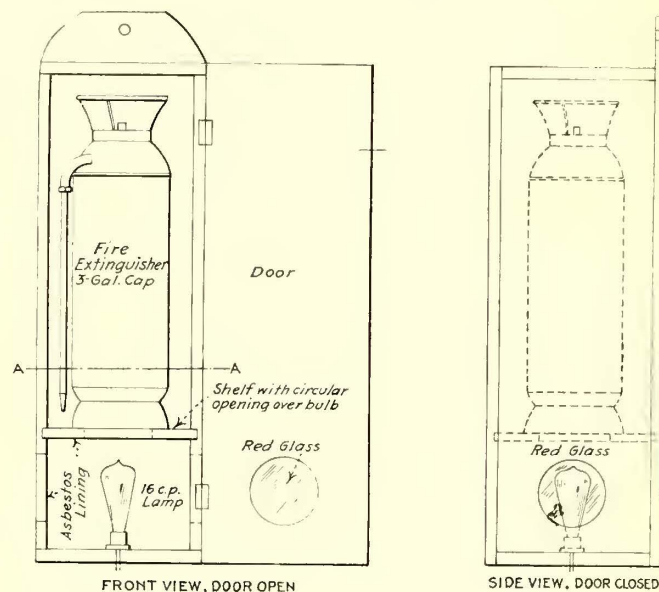
The policy of the Kansas City, Clay County & St. Joseph Electric Railway in having watches of car crews inspected weekly will be continued indefinitely, according to a recent announcement by General Manager J. R. Harrigan. Practically all of the steam roads operating in Kansas and Missouri regard two weeks as often enough for such inspections. Mr. Harrigan, however, believes too much care cannot be exercised along this line. Standard-make watches must be carried by crews.

RED LAMP USED TO PROTECT FIRE EXTINGUISHERS FROM FREEZING

BY E. L. MATHEWS, FORMERLY ENGINEER OF WAY AND STRUCTURES CONEY ISLAND & BROOKLYN RAILROAD

Among the rules and regulations of the New York Fire Insurance Exchange referring to fire extinguishers is included one to the effect that a red light shall indicate the location of each extinguisher and another one which calls for their protection from freezing in cold weather. In order to comply with these regulations, as well as to obtain a measure of protection for its buildings, the Coney Island & Brooklyn Railroad Company devised a simple method of making one electric lamp accomplish the twofold purpose of heating and locating each extinguisher.

The extinguishers in question were the usual 3-gal. type and were placed in a wooden jacket or portable



Plan, Side and End Views of Cabinet with Red Glass Windows to Show Lamp Which Locates and Warms Extinguisher

closet made for the purpose, as indicated by the accompanying sketches. The closets were built of 7/8-in. white pine and were suspended from the walls or columns of the building, according to the location desired.

The extinguisher rested upon a shelf in which was a circular opening of a little less diameter than that of the base of the extinguisher and about 8 in. above the floor of the closet. In the chamber thus created we placed an ordinary 16-cp electric light bulb and connected it in such a manner that it could burn continuously. All walls of this chamber were lined with asbestos in order to obviate any fire risk. A circular hole of about 4 in. diameter was also cut in each side of the closet and in the door immediately opposite the light bulb, and ordinary window glass was inserted in these openings. The entire outside portion of the closet was then painted red, including the glass, thus furnishing the red light called for by the Fire Insurance Exchange.

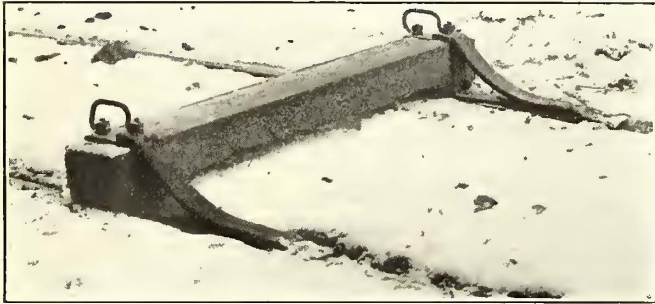
This scheme has been in operation during the past five years. It has absolutely prevented the extinguish-

ers from freezing, even in the most exposed places, and it has rendered them always accessible in case of need. It has met the requirements of the Fire Insurance Exchange, the inspectors of which have expressed their entire satisfaction with this method.

A HOME-MADE WHEEL SKID FOR BRAKING CARS ON GRADES

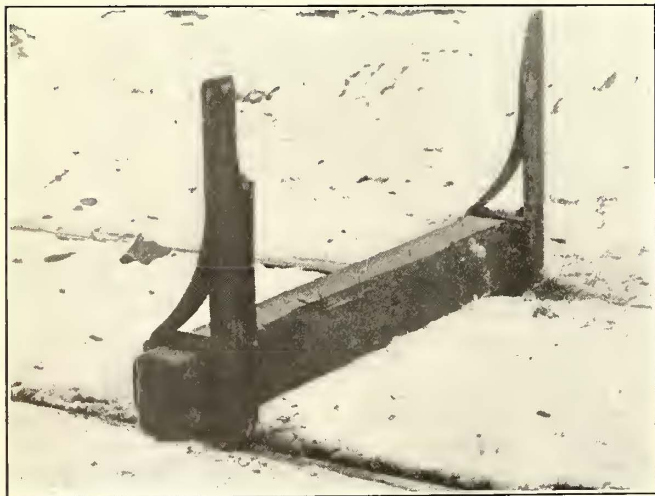
BY M. F. M. WERTH, ASSISTANT MECHANICAL SUPERINTENDENT BRITISH COLUMBIA ELECTRIC RAILWAY

When building operations were commenced on the provincial penitentiary buildings in the municipality of Burnaby, B. C., about 1 mile from the main interurban line between Vancouver and New Westminster, ar-



Wheel Skid in Position for Service

rangements were made with the British Columbia Electric Railway Company whereby a spur track was to be built from the main line so that freight cars loaded with material could be delivered on the grounds. In building this spur it was found necessary to run the line down a 7.5 per cent grade at the bottom of which a curve with a 150-ft. radius was required. The danger of such a hill was enhanced by the local atmospheric conditions and the infrequency of service, which combined to cause a very slippery condition of the rails.



Wheel Skid with Pair of Runners Raised

Only one loaded car at a time was to be taken down the hill by a locomotive, but even so it was believed that operation would not be safe because of the possibility of skidding with locked wheels. It was first proposed, therefore, to install at the top of the hill a motor-driven hoist which would be braked so that a cable to the rear end of a descending train would retard the speed as

much as desired. But this arrangement would have been expensive, and, moreover, the municipality of Burnaby was strongly opposed to allowing a cable to be operated down the center line of a street.

The mechanical department of the railway company then designed, under the supervision of the writer, the wheel skid shown in the accompanying illustrations, which has solved the problem to the satisfaction of all concerned and at an almost negligible cost. This device consists of a wooden tie to which short lengths of angle iron are bolted in such a way as to make a shoe or cradle for one pair of wheels on the loaded car. Each of the two runners of the skid was made from a



Pair of Car Wheels Resting in the Skid

40-in. piece of 3-in. x 4-in. angle iron from which a strip 2 in. wide was first cut away from the 3-in. leg, thus leaving a 4-in. width of bearing on the rail and a 1-in. flange. These runners are fixed to the tie standard-gage distance apart, with the flange inside the rail. At the end farthest from the tie each runner is welded to a 1-in. x 4-in. iron strap, which is curved to fit the tread of a 34-in. wheel and bolted through the tie to the runner underneath.

When a car is about to descend the hill this skid is placed on the rails between the locomotive and the car, and the car is then drawn forward so that its first pair of wheels rise and rest in the skid as shown in one of the accompanying views. In addition to the reactive effect of the runners, their large frictional surface tends thoroughly to clean the rail, rendering much more effective the braking power of the wheels following. When conditions are extremely bad the locomotive is attached to the rear of the loaded car so that the skid is placed at the head end of the descending train.

This device has now been in service for more than a year and has been found always to afford enough dragging effect to prevent the slightest difficulty in controlling trains on the grade. The locomotives used weigh about 35 tons and are provided with a 200-hp motor equipment. The loaded cars handled have a gross weight of about 44 tons.

The establishment of numerous factories near the harbor of Nynas and the rapid development of the town of Södertörn have led to the electrification of the Nynas-Södertörn Railway and the construction of a new electric railway between Södertörn and Stockholm, Sweden. Single-phase current of 15,600 volts, fifteen cycles, will be used. The locomotives will develop 600 hp and weigh 42 tons. The expenditure of electric energy per ton-mile is estimated at 52 watt-hours for express trains, 69 watt-hours for ordinary trains and 40 watt-hours for freight trains.

RUNNING-TIME TERMINAL CLOCK

The basis of economical transportation service is exact knowledge of the running time. In city service, especially, it is difficult to strike a fair average for given sets of conditions. One important reason for this is the fact that the reports of running time as made out by the conductors on their trip sheets are often deliberate or unintentional guesses and thus may prove of the most misleading character. For instance, the conductor's watch may not be correct; he may be unwilling to show on his trip sheet that he left the terminal three or four minutes late, and in the case of single-track or switchback lines the report will not show when the crew fails to go to the end of its run before turning back. Another defect of the ordinary penciled trip sheet is that it conceals those instances when a crew skips stops or hurries over one part of

tinctly different kinds of electric railway service as follows: the interurban service of the British Columbia Electric Railway, the street city service of the Third Avenue Railway, New York, and the elevated (and subway) high-speed service of the Interborough Rapid Transit Company, New York. All of these clocks were installed by the Railway Improvement Company, New York, whose coasting-time recorders are well known.

The terminal clock, as previously indicated, is a most useful device when operated alone, but it is still more valuable to a railway which uses coasting-time recorders because the clock will prevent crews from understating their running time for the sake of showing a larger proportion of coasting time. On lines where the terminal running-time clock is installed each motorman is provided with a running-time card or envelope which may be of any type desired by the operating



INTERBOROUGH RAPID TRANSIT CO.			
Running Time Card			
3rd	Ave. Line	Date	AUG 25 1911
Name <i>MacDonald</i>		Key No. <i>5363</i>	
Leave	07 1	Arrive	CH 826
Arrive		Leave	48 BP 738
Leave	61 2	Arrive	BP 924
Arrive		Leave	48 1/2 CH 835 36
Leave	81 3	Arrive	CH 1044
Arrive		Leave	48 1/2 BP 955 56
Leave	71 4	Arrive	BP 1146
Arrive		Leave	48 1/2 CH 1058
Leave	91 5	Arrive	CH 458
Arrive		Leave	26 106 432
Leave	91 6	Arrive	177 551
Arrive		Leave	44 CH 507
Leave	71 7	Arrive	CH 642
Arrive		Leave	43 1/2 177 558 59
Leave	81 8	Arrive	BP 738 39
Arrive		Leave	48 1/2 CH 650
Leave	71 9	Arrive	
Arrive		Leave	355 1/2
Leave	11 10	Arrive	
Arrive		Leave	

Note: Mark (X) for Local Express and (XX) for Through Express in space after trip number.



Application of Running-Time Terminal Clocks on an Outlying Line of the British Columbia Electric Railway and on a City Line of the Third Avenue Railway; Also Fac-Simile of Running-Time Card Made with These Clocks on Elevated Lines of Interborough Rapid Transit System

the line in order to loaf somewhere else, as at sidings. The employment of dispatchers does not eliminate the evil for they, too, are human and may often go so far as to make out ideal train sheets in advance. It is hardly necessary to emphasize the fact that doctored trip reports and train sheets do not help in the preparation of the best and most economical headways and in the correct payment of platform time.

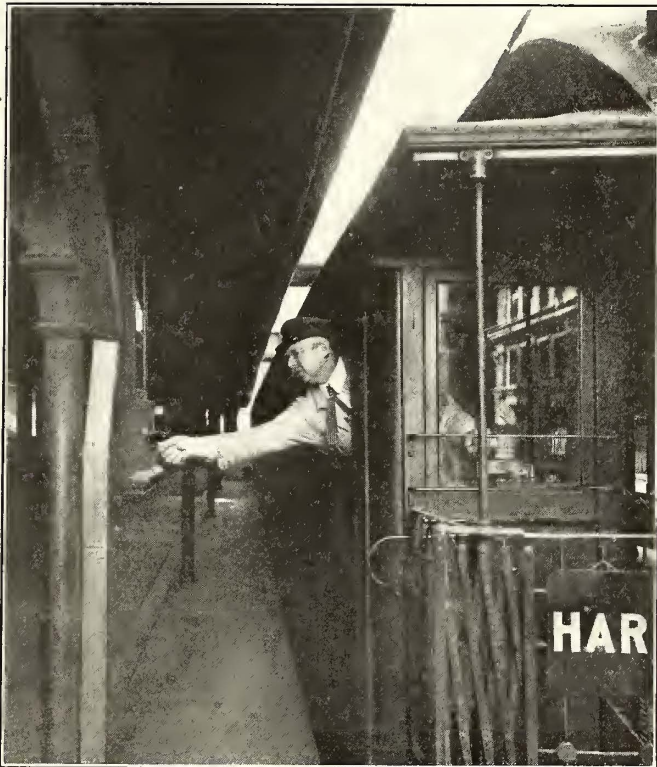
To eliminate abuses of this nature and to insure an accuracy impossible even with perfectly honest employees, it is necessary to have some means for checking the movements of a car crew, just as watchmen's clocks are used to check the movements of a caretaker. The obvious thing to do is to have the motorman or conductor register his arrival and departure times at terminals and, if desired, at any number of intermediate time points. The three accompanying halftones show how this principle has been applied to three dis-

company. The one reproduced is that used by the Interborough Rapid Transit Company. Upon arriving at the clock station the motorman inserts his record, and the clock registers thereon his arrival and departure just as it would stamp an ordinary time card. The fact that such an incontrovertible record must be shown encourages the crew to make all terminals and intermediate points on time. The clock also gives the transportation department the desired accurate record of the movement of all cars and trains, thereby enabling the company to change the runs to greater advantage and to pay the men for the true platform time.

The record reproduced is a fac-simile of one made on the elevated lines of the Interborough Rapid Transit Company. The symbols shown represent stations as follows: C. H., City Hall; B. P., Bronx Park; 106, 106th Street; 177, 177th Street. The card shows that Motorman MacDonald left Bronx Park at 7:38 a. m.

and arrived at City Hall 8:26 a. m., the actual running time being forty-eight minutes. On his fourth run he left City Hall at 10:58 and arrived at Bronx Park at 11:46½, the actual running time in this case being forty-eight and a half minutes. The card also shows that his fifth run was not made until 4:32 p. m., at which time he left 106th Street, arriving at City Hall at 4:58, the running time being twenty-six minutes. The underscored figures on the record indicate p. m. time.

One of the halftone views shows how an elevated railway motorman makes his registration. The clock is placed at the end of the station just where the leading car stops. While the passengers are entering or leaving the motorman leans out of his cab window and makes the registration just before or on receiving the starting signals. All terminals on the Interborough and the Hudson & Manhattan systems are now equipped with these clocks. The terminal clocks on these rail-



Motorman on New York Elevated Line Inserting Running-Time Card in Clock

ways act as a check on the dispatchers as well as on the motormen.

A second illustration shows a motorman on the Third Avenue Railway system registering his time at a city terminal, while a third view shows the same operation on one of the outlying lines of the British Columbia Electric Railway, Vancouver, B. C. In the last instance the clock is locked in a cabinet to avoid tampering by outsiders. As the clock is placed at the end of the line, it is impossible for the crews to turn back without that fact being shown by their records.

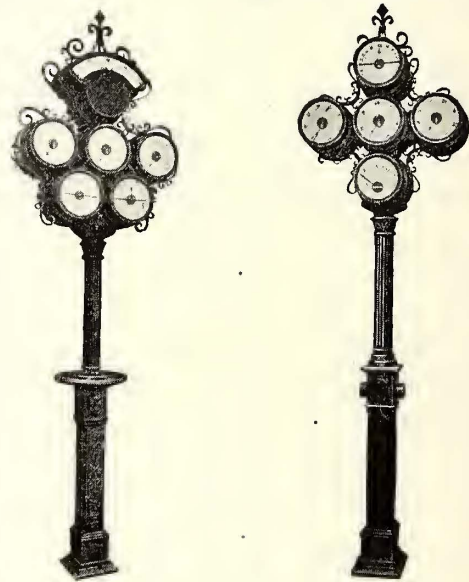
Walter Foreman, trainmaster of the Louisville & Northern Railway & Lighting Company and the Louisville & Southern Indiana Traction Company, with headquarters in New Albany, Ind., on March 3 addressed a meeting of the Boosters' Club of the companies on the subject of automatic interlocking signal systems. A system of this type was recently installed on one section of the Louisville & Northern.

FROG BROOMS OF FLAT WIRE

The J. W. Paxon Company, Philadelphia, Pa., has long made a specialty of frog brooms which constitute a small but much appreciated part of track maintenance equipment, especially at this season of the year. The wire of the Paxon broom is flat and, while specially tempered to make it pliable, is stiff enough to handle mud and slush, whether loose or frozen. If the slush is frozen, the tool-steel chisel on the other end of the broom will loosen it. The chisel can be resharpened until worn away. The broom is easy to manipulate and is well balanced. It is so strong that switches can be thrown readily by inserting the chisel point in the groove without injury to the handle. This company also manufactures all kinds of wire brooms, brushes and bristle for other railway purposes.

INSTRUMENT POSTS FOR CONTROL OUTFITS

Instrument posts are used whenever a method is required for mounting meters in a power station in place of an instrument switchboard. The wiring is concealed in the interior of the posts. The advantages of instrument posts over panel switchboards are that they permit a convenient and ornamental mounting for



Swivel and Stationary Type of Instrument Posts

meters and that they can be erected in positions where they can readily be observed without obstructing the general view of the operator.

The common arrangement is to place these posts so as to form a support for the railing of an operating gallery, each post being placed in front of its respective controlling apparatus, which is usually installed on a suitable controlling pedestal. The posts may be secured to the floor either by bolting the shank to the side of channel-iron beams under the floor or by using a bolted flange collar, secured to the post and provided with holes for holding-down bolts. When a concrete floor is provided, a socket can be supplied which may be set into the floor and which is arranged for bolting to the flange collar.

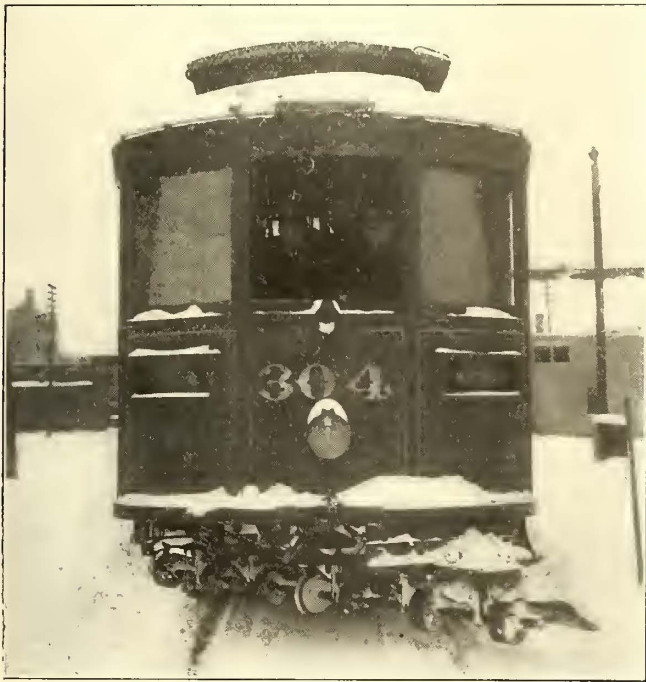
The standard ornamental posts have plates provided at the places where hand railing is usually attached, but when required hand-rail bosses may be substituted. These bosses are drilled to take a standard 2-in. pipe, 2¾ in. outside diameter. Posts with panel bases cannot be arranged for hand railing. The standard posts are finished in dead black. The posts having paneled

bases are supplied with panels of slate with black marine finish.

Two styles of pedestals are made, with ornamental bases and with paneled bases suitable for mounting control apparatus. Each of these styles is also made with stationary top and with a swivel top which can be turned about by means of a hand-wheel just above the base. These instrument posts are manufactured by the Westinghouse Electric & Manufacturing Company.

TWO-SECTION STEEL-BLADE SNOW SCRAPER USED AT GRAND RAPIDS

The Grand Rapids (Mich.) Railway has recently purchased from the Root Spring Scraper Company, Kalamazoo, Mich., a new-style snow scraper which has been applied under the front and rear vestibules of one of its



Two-Section Steel-Blade Scraper in Use

general utility cars. This scraper consists of a steel blade, 12 ft. long, divided into two sections and attached to a shaft in a manner similar to that employed with the Root spring scraper. The scraper blades and spring mounting are supported on a plank by cast-steel hangers, and this in turn is installed under the vestibules of the car at an angle of 45 deg. to the track. The blades are raised to the clear or lowered to the operating position by means of an ordinary hand-brake wheel, dog and ratchet mechanism. This mechanism is the terminal of a chain which passes over a sprocket keyed to the shaft which supports the scraper blades. By dividing these blades into two sections and lapping them where they join, the scraper is made to conform to the crown in the paving, thus insuring the removal of snow to the ball of the rail. If the blades meet an obstruction in the pavement, the supporting springs are brought into action, allowing the blade to spring back and clear itself. In operation the scraper has been found to work very satisfactorily, and it has the advantage that the railway is able to use it during the daytime without frightening horses. Further, it is not limited as to the speed at which it will operate successfully, and it will remove wet packed snow as readily as any other scraper. In the accompanying illustration the scraper is shown applied to a single-end car on the Grand Rapids Railway and raised to the clear position.

GRAPHIC METERS

A complete line of continuous-writing curve-drawing instruments has recently been placed on the market by the Esterline Company, Indianapolis, Ind. These instruments are furnished to measure all electrical quantities such as volts, amperes, watts, etc. Electric speed recorders, service recorders, pyrometers and graphic counters are also included. The meters are furnished in switchboard rear-connected type, wall or front-connected type, and portable type. Their general construction is the same except for the case and the method of making connections.

These instruments are of the direct-writing type. The pen is in contact with the paper at all times when writing. It is placed in the end of a tubular pointer which is pivoted and provided with a counterweight. The pressure of the pen on the paper is regulated by this counterweight, which is adjusted to give just sufficient pressure to hold the pen on the paper without creating heavy friction.

The ink supply is retained in a stationary well provided with a cover to prevent spilling when instruments are moved about. The ink, after being started through the pointer and pen, will continue flowing owing to

capillary action as long as the supply lasts. This construction gives a light moving element and constant friction no matter how much ink there is in the meter.

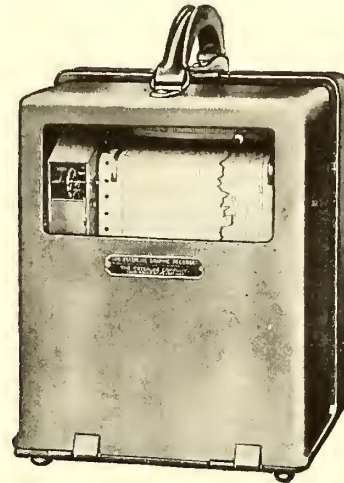
The clock is of the eight-day jewel balance-wheel type. It has two driving springs and a third spring which operates the re-rolling device provided for winding up the finished chart. On some types the re-roll is omitted and the finished record is allowed to feed through a slot in the bottom of the case. The clock is

fitted with a driving roll equipped with pins at each end which engage perforations along the margins of the record chart. The driving roll is geared through the two idlers to the clock stud which furnishes the driving power.

By putting on the proper gears, five chart feeds, $\frac{3}{4}$ in., $1\frac{1}{2}$ in., 3 in., 6 in. and 12 in. per hour, may be obtained on any clock. For rapid chart feeds a special attachment is provided on the clock, arranged so that shifting a small lever on the front of the clock case instantly changes the chart feed from a given number of inches per hour to the same number of inches per minute.

The meter elements are assembled complete in one unit and may be removed from the instrument without dismantling. For d.c. ammeters and voltmeters a powerful d'Arsonval permanent magnet-type movement is used. For d.c. and a.c. wattmeters, a.c. voltmeters and ammeters a dynamometer type construction is employed. No iron is used in the magnetic fields of the dynamometer movements so that meters of this type are accurate on all frequencies and respond promptly to voltage or load variations. The armature shaft of the meter element has a bracket which carries pivots in which rest the pointer carrying the pen.

Record charts are of the tape type, being 6 in. in width and having a ruled portion $4\frac{1}{2}$ in. wide. The

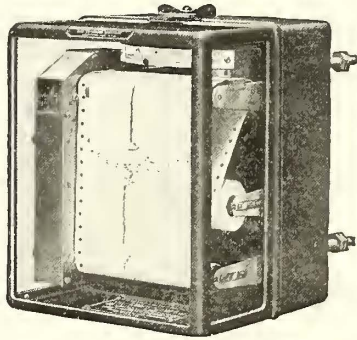


Portable Graphic Meter

time divisions are in the nature of arcs across the paper spaced 3/4 in. apart. Range numbers are provided across the chart to facilitate the interpretation of curves. Hour numbers corresponding to the gears on the clock are printed along the margin opposite the time arcs. Voltmeters are furnished with suppressed zero scales, 90-140 volts, or standard scales, 0-150 volts. D.c. ammeters are also furnished with the suppressed zero scales for special uses or may be furnished with zero center charts for battery charging or other applications where reverse currents are encountered. Indicating scales are provided so that meters may be used either for indicating or curve-drawing purposes.

A.c. instruments have adjustable damping devices which consist of a rotating vane immersed in a small cup containing oil or some other viscous liquid. The amount of damping is varied by adjusting the height of the cup, the quantity of oil or the quality of the liquid. D.c. meters do not require damping as the armature is wound on a metallic frame in which the eddy currents are induced when the armature rotates in the magnetic field of the permanent magnet.

The energy consumption of these instruments is so low that they may be operated from existing shunts or transformers. Voltmeters and wattmeters require from 4 watts to 5 watts for each voltage element on 110 volts. D.c. ammeters consisting of millivoltmeters and shunts require only about 1/3 amp for the instrument. Owing to the direct-writing construction, no extra control circuits of any sort whatever are used.



Switchboard Meter

These instruments are used on switchboards for obtaining voltage and output curves, for getting the energy consumption of machine tools and for general efficiency engineering.

COASTING TIME RECORDERS FOR THIRD AVENUE RAILWAY SYSTEM, NEW YORK

The Third Avenue Railway System through President F. W. Whitridge recently placed an order for 1000 coasting time recorders and thirty-six terminal clocks for use on all the lines of this system. The company operates under almost every kind of surface railway conditions, from the heavily blockaded streets of Manhattan to long free-running stretches on many of its suburban divisions. The order for the coasting clocks was placed after careful tests had shown that they would produce substantial savings under this range of operating conditions. The terminal running time clocks will be used to insure the correct registration of running time from terminal to terminal and, if desired, also the running time to intermediate points. In this way the reported proportion of coasting time to running time will be absolutely correct, because the running time will not depend upon guesses made by the conductor. To secure the greatest possible benefit from the installations of both types of clocks, the company has created an efficiency department in charge of J. F. Anglin, as noted in the department of "Personal Mention" elsewhere in this issue. This department will devise forms of records for making just comparisons of results obtained under different conditions and will provide for suitable rewards to encourage economical operation.

MILK TAG USED BY INTERURBAN RAILWAY ENTERING INDIANAPOLIS

In order to provide a uniform milk ticket to be used in connection with the transportation of milk on the interurban lines entering Indianapolis, the Terre Haute, Indianapolis & Eastern Traction Company, Union Traction Company of Indiana and Indianapolis & Cincinnati Traction Company have adopted a standard form of string check which was put into use last autumn. The

Opposite Sides of Milk Tag Adopted by Interurban Lines Entering Indianapolis

ticket is in two forms. The "A" form of ticket is used in transporting milk and the "AA" form for transporting cream. Each class of ticket is issued in nine denominations covering distances from 30 to 115 miles and quantities from 5 to 10 gal.

Milk Tickets			Cream Tickets		
A	5 gal.	30 miles	AA	5 gal.	30 miles
B	8 gal.	30 miles	BB	8 gal.	30 miles
C	10 gal.	30 miles	CC	10 gal.	30 miles
D	5 gal.	60 miles	DD	5 gal.	60 miles
E	8 gal.	60 miles	EE	8 gal.	60 miles
F	10 gal.	60 miles	FF	10 gal.	60 miles
G	5 gal.	115 miles	GG	5 gal.	115 miles
H	8 gal.	115 miles	HH	8 gal.	115 miles
I	10 gal.	115 miles	II	10 gal.	115 miles

The tariff established for handling milk and cream from platform at shipping point to platform at destination, including return of the empty cans by freight, is as follows:

Milk		Cream	
1 to 30 miles	1 1/2 cents per gal.	2	cents per gal.
31 to 60 miles	2 cents per gal.	2 1/2	cents per gal.
61 to 115 miles	2 1/2 cents per gal.	3	cents per gal.

The use of the new form of ticket, although it has been in effect little over three months, is proving very satisfactory, and it is expected that the forms of receipts provided by this new string check will obviate a great deal of trouble in the handling of claims for loss or damage. Both sides of the "AA" form of ticket are reproduced on this page.

LONDON LETTER

(From Our Regular Correspondent)

The London County Council, in endeavoring to fight what it considers the unfair competition of motor omnibuses, has asked the Board of Trade to sanction a by-law prohibiting omnibuses from stopping at the same places as the cars of the tramway. The tramway cars have to stop in the middle of the street and motor omnibuses have been going in between the cars and the pavement, making alighting from cars and boarding them not only difficult but dangerous. The Home Secretary has written to the London County Council stating that he proposes to instruct the commissioner of police to invite the various public bodies and companies controlling tramways and omnibuses within the metropolitan police district to confer with representatives of the commission and of the different road authorities with a view to arriving at an agreement on stopping places within the area of each such road authority. The highways committee of the Council states it is considering the use of return tickets for penny stage journeys. Return tickets have been in general use on the longer routes for some time and have undoubtedly led to an increase in the tramway traffic receipts.

The successful working of the Liverpool tramways and electric supply department has resulted for many years past in a substantial contribution annually toward the reduction of rates. This year it is announced that the committee has decided to recommend the City Council to place the sum of £125,000 to this purpose, £100,000 from the tramways and £25,000 from the electric light department. Last year the amount received from the tramways was £66,000 and from the electric light supply £30,000, so that the additional relief received this year will equal about 1½d. in the pound.

The annual report of the Paisley District Tramways shows an increase in traffic receipts of more than £4,000, but expenditures show an increase of nearly £6,000, due to increased cost of track and roadway maintenance caused by the heavy traffic of motor lorries. The question has been agitated of passing a law to compel all users of a road to contribute equally to its maintenance. This would relieve the tramways of a portion of their present burden at least.

The Bristol Tramways & Carriage Company has issued its report for the year. The gross receipts increased £54,000, and the net £12,000. This has enabled the company to increase the dividend from 4 per cent to 4½ per cent, with substantial allocation to reserve.

The Glasgow Corporation has decided to proceed as rapidly as possible with the construction of its new generating station at Balmarnock. This station will be the largest in the west of Scotland. It will have a capacity of 150,000 hp, and will carry practically the whole power load for the city every day, and help out with the other stations when necessary for lighting purposes. The stations in Govan and Partick, which were taken over recently when these burghs were incorporated in the city of Glasgow, will be used as transforming centers.

Agitation is still proceeding in Birmingham for an all-night tramway service. The attitude of the tramway committee is unsympathetic and no progress has been made. The committee has decided to run first-class cars upon the Hagley Road route, and it will be put into immediate operation. The first of the new cars for this purpose has arrived. It differs externally but slightly from the ordinary vehicles, except in color. Internally the difference is mainly in the upholstery, which is of a more luxurious character. Double the ordinary fare will be charged inside passengers.

The Colne Corporation has purchased the Colne & Trawden Light Railways, and the arbitrator has just awarded the company the sum of £92,830, the costs of the arbitration to be divided. The arbitrator for the company valued the property at £170,000, while the corporation valued the undertaking at £25,000. The company's claim included £94,000 for present value and £76,000 for prospective profits.

The Hull tramways committee has decided to experiment with halfpenny fares during the whole of the day. The uniform penny fare which has been in existence on the Hull tramways for about fourteen years, has proved exceedingly popular, but for the past year or two this universal

fare has been reduced to a halfpenny before nine o'clock in the morning. It has now been determined to experiment on one route with halfpenny stages, three halfpenny stages to cover the route and one penny to be the fare over the whole route. Halfpenny fares have been decided on in preference to transfer tickets, as the tramways manager states that tramway practice is almost unanimously against transfers, which are complicated in their issue, difficult to control, and liable to much abuse. Last year 43,000,000 people used the Hull cars, and of these 11,000,000 were the morning halfpenny passengers.

The Nelson Town Council reports that the sub-committee which inspected trolley omnibus systems in several towns has recommended such a system for part of the borough. The extension of the present system was opposed on account of the narrow roadways and the cost per car mile, while motor buses were disapproved on account of the cost of operation.

The Manchester tramways committee has decided to continue the all-night service of tramway cars with which it has been experimenting for three months. The committee reports that this service has not been a success financially and many of the people who signed the requisition for an all-night service have failed to use the cars to the extent that was expected. The committee feels, however, that the night cars have proved a great boon to workers whose duties terminate during the early hours of the morning, and has determined that there shall be no reduction in the number of cars on the all-night service. There may, however, be some slight alteration of the time on certain routes. The loss from the service has been small and the committee feels confident that the cars will in the future be better patronized.

The report issued by the tramways manager of Keighley deals with the operating expenses of trolley buses as opposed to petrol-driven motor buses. The motor buses resulted in considerable losses to the Corporation, which has commenced the substitution of trolley buses with success. The tramways manager strongly urges the commencement of the electrification of all the other routes on which motor omnibuses are at present in use. A full statement of the expense of the operation of the trolley vehicle is not available at present.

As previously stated in the ELECTRIC RAILWAY JOURNAL, the Great Eastern Railway has appointed H. W. Thornton, general superintendent of the Long Island Railroad of America, its general manager. Mr. Thornton will take up his duties the first week in April. While the chairman has stated that there is no immediate project of electrification, it would appear a certainty that the suburban routes of this railway will have to be electrified to cope with its enormous suburban traffic.

It is expected that the Midland Railway will soon announce that it has decided to electrify its lines from St. Pancras to Hendon. The directors of this company have decided to ask Parliament to grant them a further period of two years in which to formulate their scheme for the electrification of the London, Tilbury & Southend Railway.

A new type of carriage is being adopted on the underground tubes, similar in many respects to the cars which are now being operated by the District Railway. Hitherto the cars on the tubes have had only two doors, but it has been found that the congestion of passengers at interchange stations is so great that a further door has become a necessity. The new cars are fitted with hinged double doors opening inward, which can be opened by the passenger when the train is at rest, and closing automatically. The gateman can lock and unlock the doors from his platform by operating switches, and small red and green lamps tell the gateman when the doors are locked before starting the train. The cars are of steel, except for the interior finish.

The contract has been awarded for two 5000-kw turbo-alternators for the electrification of the Lancashire & Yorkshire Railway, which affects the line between Manchester and Bury. It is believed locally that further conversion in this center will probably proceed more rapidly than in the London area, and Manchester does unquestionably invite electrification on a large scale to enhance the public usefulness of the railways which serve a neighborhood containing millions of regular travelers.

A. C. S.

News of Electric Railways

Committee and Surface Lines Accept Arnold Chicago Subway Plans on Rental Basis

Following the refusal of the Chicago Surface Lines to join in the proposed plan of financing Chicago's initial subway system, the Board of Supervising Engineers at the meeting of the subcommittee of the local transportation committee of the Chicago City Council on Feb. 23 was instructed to prepare estimates along the line suggested by Bion J. Arnold which would meet the objections of L. A. Busby, president of the surface railway company. Estimates on the financing of this revised routing have accordingly been presented to the subcommittee on subways by Mr. Arnold and Mr. Weston, of the Board of Supervising Engineers, giving the revised estimated total cost as \$33,885,000. A summary of the plans and estimates recommended by the Board of Supervising Engineers follows:

Routes	Cost	Date of Completion
Clark Street, Nineteenth Street to Elm Street	\$10,500,000	Feb. 1, 1917
North leg of large U loop in Milwaukee Avenue, Randolph Street and Michigan Avenue to Adams Street.....	8,000,000	Feb. 1, 1917
Robey Street, Ashland Avenue and California Avenue connecting links.....	7,885,000	Feb. 1, 1919
South leg of large U loop in Harrison Street and Michigan Avenue to Adams Street	7,500,000	Feb. 1, 1921
Total	\$33,885,000	

If the companies contribute the 55 per cent of their net receipts which is paid to the city in quarterly instalments during 1919, instead of contributing the sum in a lump in April of the following year, the subways can be built by Feb. 1, 1920, according to Mr. Weston. He also estimated that there would be \$16,000,000 available for extensions which could be completed by Feb. 1, 1924, and \$18,000,000 for extensions to be completed before Feb. 1, 1927, leaving a balance in the city's traction fund at that time of more than \$7,000,000. Following the presentation of this estimate, it was approved by the committee and Mr. Busby of the surface lines was requested to state whether or not he would be willing to operate through the initial subways as revised and upon what terms.

On Feb. 28 Mr. Busby for the Chicago Surface Lines offered to pay to the city of Chicago as rent for the use of the revised downtown system of subways the entire amount of saving effected by subway operation. This was in line with Mr. Arnold's and Mr. Weston's recommendations to the local transportation committee as to the best course to pursue. In his statement to the subcommittee Mr. Busby estimated that this saving would range from \$387,450 in 1917 to \$565,930 in 1927. The total for this ten years being \$4,741,340, or the equivalent of 1 per cent annually on the gross receipts. This amount is lower than that estimated by the Board of Supervising Engineers, which totaled \$9,840,000 for the same period.

Some of the Aldermen insisted that the surface line companies should pay 5 per cent on the total subway investment. In reply Mr. Busby stated that the company had reached the limit in the burdens it could carry. If the companies paid 5 per cent on the total subway investment their loss would be approximately \$3,000,000. Under the arrangement proposed by Mr. Arnold and accepted by the company the latter would neither make nor lose any money by reason of subway construction.

In a letter conveying the offer of the Chicago Surface Lines to the subcommittee the company said:

"There is no question but that in the city of Chicago a 5-cent fare, if all of it is used for transportation, is sufficient to afford a fair return upon capital and give the fullest possible measure of service. That, however, is not the theory of the 1907 ordinances. The entire nickel is not used for transportation purposes. The companies under these ordinances are annually required to expend millions of dollars for public benefits which are in no way a direct transportation cost. In the seven years during which the companies have been operating under these ordinances they

have expended the following amounts: paving streets, \$7,360,435; maintenance of paving, \$1,433,657; cleaning, sprinkling and sweeping of right-of-way, \$2,691,897; 55 per cent to the city, \$13,161,391; total, \$24,647,381.

Record of Eastern Companies in Blizzard

The standard by which the severity of storms in the East is judged is the great blizzard of March 12, 1888, which so far as recollections and records go was the worst ever experienced. Second to it, it is generally agreed, is the storm which was general over the Atlantic Coast States from New York to Maryland on March 1 and 2. Early on March 1 a soft, clinging snow began to fall in large flakes. As the day advanced the temperature increased so that toward evening the snow which fell throughout the day was converted into slush. Late in the evening the wind increased and the temperature fell to a few degrees below freezing, so that the snow and water on the ground was quickly converted into ice to an average thickness of about 3 in. Meanwhile the snow continued to fall all night and during the greater part of March 2, in all about thirty-six hours. In New York the official forecaster placed the fall at 12 in. This, added to the remnant of the snow from two previous storms already in the streets, almost completely prostrated all transportation service and inflicted great damage on the light, power and telegraph systems, many of the transmission lines of which gave way under wires overburdened with the clinging ice and snow.

In the metropolitan district of New York the borough of Manhattan was the only one in which street railway service was not disrupted by the blizzard. In Brooklyn, Queens, Richmond and the Bronx the tie-up was one of the worst in the city's history. The New York Railways, warned by the Weather Bureau, kept its lines in operation and almost on schedule, using 125 pieces of snow-fighting apparatus on its 160 miles of single track. The worst annoyance encountered by the company, according to Theodore P. Shonts, president of the company, was the blocking of traffic by vehicles which took to the tracks. He said:

"The conditions are abnormal and most difficult for the street-cleaning department and the traffic officers of the police department to deal with, but it seems only reasonable to expect that trucks, delivery wagons and vehicles of all sorts should not be sent out loaded to capacity. Most of the interruptions to our service have been caused by trucks too heavily laden for the horses to draw or for motors to propel."

The Brooklyn Rapid Transit service was entirely or partially interrupted all through the borough. Thirty-eight surface lines of the company were abandoned during the storm on Sunday night and service remained to be resumed on twelve of the surface lines on Tuesday at noon. The service on the elevated lines was also paralyzed on Monday morning. It required three hours to get from East New York to Adams Street over the Lexington Avenue line on Monday morning, a trip which usually takes about forty minutes. Bridge service was very poor over all the bridges, although cars and trains ran with more regularity over the Brooklyn Bridge than over any of the other bridges. At midnight on Sunday no line in the Bronx was pretending to handle cars on schedule. All of the north shore of Queens and much of Nassau County were isolated. There were also serious delays on the trolley lines in Staten Island and in New Jersey.

Many of the steam railroads around New York canceled all outgoing trains on Sunday night. Service over the Long Island Railroad was practically at a standstill for many hours on some divisions, notably on the north shore and east of Jamaica. Even on the third-rail electric line between Brooklyn and Jamaica, one of very heavy traffic and equipped part of the way with four tracks, the company was able to keep open only the express tracks. Up to Tuesday noon the company was still operating both express and local trains between Brooklyn and Jamaica over one set of tracks, having been unable to clear the tracks used ordinarily for local trains.

In and around Philadelphia the same difficulties were experienced by the transportation interests as at New York. The Philadelphia Rapid Transit Company did not report the abandonment of service on any of its lines, but service was disrupted. The abandonment of cars was reported on the suburban lines outside the city. The Philadelphia *Ledger* said that "a remarkable record of successful operation was made throughout the city by the Philadelphia Rapid Transit Company." A car of the Lehigh Valley Rapid Transit Company which left Allentown at 4 p. m. on Sunday was marooned all night in a drift near Coopersburg. At Reading the local railway lines were forced to suspend for a time. Even in Atlantic City there was 10 in. of snow and the local trolley service was badly crippled.

In Baltimore the United Railways & Electric Company maintained its service with the greatest difficulty. The principal cause of delay reported there was from obstructions on the tracks. The wind attained a very high velocity at Baltimore and many houses were unroofed and the debris piled on the company's tracks.

Reports from New York State indicate a remarkable record by the public service companies in the face of almost impossible conditions. The Rochester, Syracuse & Eastern Railroad, which operates through sparsely settled territory for a considerable distance, kept cars running, but about two hours behind time. Sixteen inches of snow fell in twenty-four hours at Rochester. Tuesday morning saw the restoration of service on schedule on all of the local Rochester lines except the one to Sodus Bay, on which particularly trying conditions were encountered near the lake front. The Albany *Knickerbocker Press* says that the one bright spot on the weather map was the manner in which the United Traction Company kept cars on its lines close to schedule. According to James F. Hamilton, general manager of the United Traction Company, the road suffered very little on account of the storm. He reported that not a single one of the overhead wires had come down and that the only trouble from this source was from falling telephone wires becoming entangled with the trolley wires. The night service on every line of the company was doubled after midnight Sunday and all Monday night sweepers and plows were kept working on the road in an effort to bring the service up to normal. The Albany Southern Railroad, a third-rail road, experienced considerable difficulty on account of transmission line troubles caused by falling telephone and telegraph wires. The company cut its train schedule in two as a matter of expediency.

The following words of praise were meted out to the management of the local lines in Syracuse in an editorial, "A Brave Fight," which appeared in the *Syracuse Post-Standard* of March 3, 1914:

"That Manager Tilton and his men succeeded in maintaining some car movements on most of the lines Sunday night and were able to carry passengers with an approach to normal regularity Monday morning is a feather in their caps."

All of the electric railway lines in and radiating out of Syracuse had been dug out of the snow drifts late on Monday night with the exception of the Jamesville branch of the Syracuse & Suburban Railroad. The Empire United Railways, Inc., operating 138 miles of suburban and interurban electric railway, had cars on its various lines running approximately on time late Monday afternoon.

Panama-Pacific International Exposition

The management of the exposition announces that installation of exhibits may begin as early as July 1 of this year. The exhibitors will thus have nine months to devote to the preparation of their displays. Facilities have been provided for transporting material about the grounds with maximum ease, a railroad having been constructed upon the grounds and passing through all of the exhibit buildings. President Moore announces that on the opening day, Feb. 1, 1915, everything will be in place. There will be approximately 60,000 exhibits in the main exhibit palaces and over 7000 applications for concessions have been received. Two hundred and twelve national and international congresses have already voted to meet in San Francisco during 1915, and it is estimated that the total number of meetings of organized bodies will be fully 500.

The Making of a Technical Journal

The following remarks on the making of a technical journal are from an address on the subject delivered recently before the Western Society of Engineers by E. J. Mehren, editor of the *Engineering Record*, one of the papers of the McGraw Publishing Company, Inc.:

"The object of a technical journal being to gather from all parts of the country—and of the world, for that matter—data and news of value to its clientele, the collecting organization must evidently be an extensive one. The machinery for gathering this material can be classified under three heads: (1) a permanently employed editorial force; (2) correspondents and contributors, and (3) a comprehensive clipping service. The permanently employed editorial staffs of the larger engineering journals have as many as nine or ten editors, supplemented by as many trained clerical assistants. All of the editors have an engineering training. Most of the editors are located at the main office of the journal, while the character of the specialty covered governs the points at which the others are located. The staff generally includes four or five specialists, confining their attention to one, or, at most, two lines, and a number of general men. Correspondents are located in every large city throughout the country and are relied upon to furnish promptly news of special interest to the journal. The clipping service is supplied in part by clipping bureaus and in part by a department in the head office of the journal, which reads representative newspapers from every part of the country. The clippings, however, are used simply as clues, to be followed by letter or telegraphic verification, and, in the case of important matters, by personal attention of a correspondent or member of the staff. The secret of prompt and reliable news gathering lies in the development of a strong and interested clientele. Such a clientele is the chief asset of a technical journal.

"Every reader of a technical publication should be a potential contributor. Certainly at least once a year something occurs in his practice that is worth while passing on to his brothers. If he will put it in the shortest possible form, his effort will receive a hearty welcome from the technical editor. Five one-column articles are preferable to one five-column article.

"As to the editorial staff itself, no single problem in technical journalism offers so much difficulty. The men must be engineers by education and preferably by experience, must have ability as writers, and last, but not least, must have strong personalities, because only such can deal forcefully with situations and make the impression necessary to secure the confidence of the engineers with whom they deal. If some formula could be devised by which such men could be infallibly picked, the saving of time to the editor-in-chief would be very large. As it is now, only men of apparently special aptitude obtain a trial, and even then the mortality is at least 50 per cent. The work of training is laborious and long.

"Some of the difficulties experienced by the technical editor may help to a clearer comprehension of the work involved in the making of a technical journal. Probably the chief difficulty is presented by the tremendous amount of material which daily must pass over the editor's desk. This consists not only of routine letters but of contributed and staff articles, with their accompanying blueprints and photographs; special and annual reports, press bulletins, proceedings of technical societies, clippings, catalogs and a mass of miscellaneous material. It is a conservative estimate, leaving aside bulky printed reports, that fully twenty times as much printable material passes over the editor's desk as is actually used. But whatever the material, it must be examined by some one familiar with the policy of the journal and the history of each of the principal engineering specialties, in order that the new may be separated from the old, the correct from the incorrect.

"It is true that the technical journalist does not originate. It is for those in professional practice to make the advances. The journalist's duty is to observe and interpret them. While, therefore, he is likely to lose his appreciation of details, that loss is more than compensated for by the advantage of being able to stand off at a distance and to observe a movement or a new process without the

warping tendencies which come from too close attention to details. In this way the technical editor should be able to see the philosophy of the development going on under his eye and to present aspects and relations that will be an inspiration to those whose duties keep them closely confined to details or to one specialty.

"In recent years there has been a marked tendency to emphasize the news pages of the technical journal. Ten years ago these were quite subordinate. When important events occurred they were duly chronicled, because it was quite evident that the field would be interested in them. It was not appreciated, however, that a bird's-eye view of the field for the week came not from the mere reporting of the outstanding events, but from gathering up from the four corners those little items which more surely denote the general tendencies. For that reason the development has been toward a great many short items, written in newspaper style, so that they could be passed over readily, leaving the reader in an hour with a complete survey of the field for the week.

"The sentiment in the offices of technical journals is changing rapidly. More and more appeal is being made through pictures rather than through the printed word. The picture gives an immediate impression—the word is a slower medium. Moreover, the printing art itself has undergone rapid changes and standards have been erected which have raised typography to the level of an art. The changes are being made, too, without detracting from the technical excellence of the journals.

"It is hardly necessary to point out that if magazines did not have advertisers the technical journal, as we know it to-day, could not exist. It costs from \$12 to \$17 per annum to send a high-class technical journal to a subscriber, yet he pays but \$3 or \$5 for it. While the best papers from their very foundation, thirty-five to fifty years ago, have not permitted the prostitution of their reading pages by the advertiser, it is only recently that advertisers have seen the light and have concluded that a journal which does sell itself editorially cannot gain or hold the confidence of its readers and is, therefore, not a good advertising medium."

Key Route System Changes

A. W. McLimont, the new general manager of the San Francisco-Oakland Terminal Railways, which has recently passed into the hands of the George C. Moore interests, is now located in Oakland, perfecting the organization, and planning changes and betterments. Mr. McLimont is not yet ready to announce all of the changes in the officers of the company, but has announced several changes, as follows, some of which have been referred to previously in the *ELECTRIC RAILWAY JOURNAL*:

George H. Harris has been appointed general superintendent in charge of all matters pertaining to operation. Mr. Harris was formerly at Birmingham, Ala.

John Wells, former purchasing agent, has resigned and is succeeded by Pomeroy La Due, who was formerly with the Michigan United Railways.

Robert Morrison, Jr., also formerly of the Michigan United Railways, is the newly elected secretary and assistant treasurer.

J. Q. Brown, who has been mechanical and electrical engineer for the past fourteen years, is to retire. The work of Mr. Brown's department is to be divided. George W. St. Pierre, at present master mechanic, is to be made superintendent of equipment. He will have charge of the maintenance of all rolling stock and marine equipment, ferry boats, etc. The new electrical engineer has not yet been decided upon.

A coasting recording department has been established in charge of W. E. Hendley. Coasting recorders made by the Railway Improvement Company, New York, N. Y., will be installed in the 400 or more cars of the company. The company has been testing the effect of these clocks during the past eight months.

The Key System consists essentially of electric railways in the municipalities of Haywards, San Lorenzo, Alameda, Oakland, Piedmont, Emeryville, Berkeley, Albany and Richmond, with interurban lines running out on the long Key Route pier, and a steamer ferry connection with San Fran-

cisco. A twenty-minute ferry service is maintained during most of the day, with extra boats during the rush hours of commuter travel.

The first improvements to the system will be a rehabilitation of the electric railway lines. Track and roadway will be improved where found necessary, and feeder lines augmented. The old type of cars will be replaced as rapidly as possible by the semi-convertible type of pay-as-you-enter cars. A very heavy travel is expected during the Panama-Pacific International Exposition in 1915, and the efforts during 1914 will be to get in readiness for the large demands anticipated. The capacity of the pier will be greatly enlarged. At present there is one slip. Two more slips will be constructed. The company now owns five ferry boats, each with a seating capacity of 1200 and a carrying capacity of 2000. These boats will be put in excellent shape and three new ferry steamers will be purchased. These new boats will each have a normal seating capacity of 2200 people and a carrying capacity of 3000. The present pile structure of the pier will be replaced by an earth and rock fill and an entirely new electric interlocking plant will be installed with the pier. This improvement is made necessary by the increased track facilities and the rapid train movements which will be necessary for increasing traffic. The extension of the railway to San José is a project which has been proposed for some time. George C. Moore, who effected the purchase of the properties and who represents the English syndicate, is now on his way to Europe. Nothing definite as to extensions and construction of interurban lines will be decided until Mr. Moore's return.

Plans for Advertising Toledo Franchise Delayed

At the regular meeting of the City Council of Toledo, Ohio, on the evening of Feb. 25, the action on the plan of the administration was delayed by three members who voted against a resolution appropriating \$500 to pay for advertising for offers for a street railway franchise in that city. It was proposed to put the resolution through that evening under a suspension of the rules. Unless the votes are changed, the resolution may have to go through in regular order.

Councilman Kilbury offered a resolution directing the employment of an expert at a salary of not more than \$50 a day to value the property of the Toledo Railways & Light Company for the city. The matter was referred to the finance committee and laid over for a week.

In addition to Mayor Keller and Vice-mayor Hassenzahl, the members of the special committee which will have the franchise matter in charge are Councilman Ruppel, Brown, Dotson and Hein and City Solicitor Thurstin. The first meeting of the committee was scheduled for Feb. 26. It was decided to advertise for franchise bidders in the newspapers of New York, Chicago, Philadelphia, Boston, Toronto, London, Paris and Berlin. The rate of fare was not to be mentioned in the advertising and it was intended that the best bid should be submitted to a vote of the electors for approval, the city to reserve the right to purchase the property after a certain period, probably ten years.

City-Built Road to Be Operated by Private Company

Mayor W. W. Seymour of Tacoma, Wash., has informed the other members of the City Commission that the Tacoma Railway & Power Company has "practically accepted" the proposition made by the city to operate cars over a city-built car line through the tideflats district. The Mayor declined, however, to discuss the matter for publication until the agreement has been signed. Instead of dividing the earnings of the line above 6 per cent equally between the city and the company, the company asked that it be given a larger percentage. This has tentatively been agreed to. The city's proposition in detail is as follows:

"1. The city to construct the railway in South Eleventh Street, Tacoma, from Pacific Avenue to Sitcum Avenue and the eastern city limits at an expense of, say, \$35,000.

"2. The Tacoma Railway & Power Company to equip and operate the railway above mentioned and any extension thereof which the city may make in a first-class manner, with cars running at sufficiently short intervals reasonably to accommodate the travel.

"3. The company to connect its St. Paul Avenue line with the Eleventh Street line and operate cars from Pacific Avenue.

"4. The company to extend its present transfer system to and from the Eleventh Street line to and from all other lines operated by it in the city, including the Pacific Traction Company line.

"5. The time of operation to be seven and one-half years from the time when the Eleventh Street line is tendered by the city ready for equipment and operation.

"6. The company to pay to the city each six months a sum equal to 4 per cent upon the cost of the railway to the city.

"7. All net earnings in excess of 6 per cent per annum upon the company's investment of the Eleventh Street line, and over the cost of operation, maintenance of the line and depreciation of equipment, to be divided equally between the city and the company; provided, that if any difference arises between the city and the company as to the sum to be so divided, the members of the State Public Service Commission shall be a board of arbitration finally to decide the question.

"8. Operation by the Tacoma Railway & Power Company not to preclude running of cars by other licensees of the city; that is, tracks to be 'common user' tracks.

"9. Only passenger cars, express or package freight cars and repair cars to cross Eleventh Street bridge."

Municipal Railway Retrenching.—The Brandon (Man.) Municipal Electric Railway has found it necessary to curtail its expenditure on account of an increasing deficit, and hereafter the cars will be operated as one-man cars. It is also understood that the schedule will be reduced and that the program for extensions will not be carried out at this time.

Injunction Restraining Collection of Franchise Tax Dissolved.—Judge Stout, sitting in the Franklin Circuit Court at Frankfort, Ky., has dissolved the temporary injunction granted the South Covington & Cincinnati Street Railway, Covington, Ky., to enjoin the collection of its 1912 franchise tax on a valuation above \$801,000. The suit involved \$160,000 of state taxes.

Bus Line in St. Louis.—The Rapid Transit Company has placed a gasoline bus in operation between the West End and down-town St. Louis. The car is 21 ft. 6 in. long and seats thirty passengers. The seats are arranged longitudinally. Five other buses are in course of construction for the company. The new buses will have cross seats and will accommodate thirty-six passengers seated.

Important Development in East St. Louis.—The St. Louis & East St. Louis Electric Railway Company, East St. Louis, Ill., of which A. J. Purinton is general superintendent, has placed in operation its new terminal station at the west end of the Eads Bridge. The company has also started the new inverted magnetite arc lamps on the Eads Bridge. There are fifty of them, some on brackets attached to the iron poles which carry the span wires. On the east approach roadway the lamps are placed on top of iron poles.

Chicago Cannot Require Universal Transfers.—The Supreme Court of Illinois, in affirming the decision of the Cook County Circuit Court, recently decided that the City of Chicago is without authority to pass an ordinance requiring universal transfers on the lines of the Chicago Elevated Railways. The decision did not state that the city could not have universal transfers, but merely sustained the decision of the lower court in stating that the Legislature had never delegated to the city the power to enforce such an ordinance.

Plans for Opening New California Line.—The Pacific Electric Railway, Los Angeles, Cal., expects, despite the recent unprecedented floods, to place its new line between Los Angeles and San Bernardino in operation by May 1, 1914. The new line will extend from Upland through Alta Loma, Eliwanda, Wade, Fontana and Rialto to San Bernardino, a distance of 21 miles. The distance between Los Angeles and San Bernardino is 60 miles. The residents of all the towns along the line will participate in a celebration upon the occasion of the opening of the road.

Electrification of Altoona Main Line of Pennsylvania Under Consideration.—The management of the Pennsylvania Railroad is considering the advisability of electrifying that portion of the main line between Altoona, at the foot of the eastern slope, and Conemaugh, on the western slope of the Allegheny Mountains, a distance of about 35 miles, where there is a frequent and heavy train movement over heavy grades. The carrying out of this work, however, is largely dependent upon an improvement in the revenues of the company to warrant raising the new capital which will be required.

Proposed Appraisal of Cincinnati Traction Company Property.—On Feb. 26, 1914, Walter M. Schoenle, city solicitor of Cincinnati, called upon the members of the Public Utilities Commission of Ohio to arrange for the physical valuation of the property of the Cincinnati Traction Company and the Cincinnati Street Railway. He was asked to request the City Council to furnish experts, if possible, to work with the commission's experts in checking up the inventory and making a complete appraisal. W. Kesley Schoepf, president of the companies, has offered to furnish experts and have an inventory prepared for the convenience of the examiners.

Rehabilitation of Lake Burien Railway.—A resolution, introduced by Mr. Erickson of the Common Council of Seattle, Wash., authorizing the board of public works to rehabilitate the Lake Burien Railway, so that it may be put in operation by the city not later than April 15, and authorizing the expenditure of \$25,000 for this purpose, has been adopted by the Council. Superintendent of Public Utilities Valentine estimates that these repairs will cost not less than \$15,375, and that construction of a substation and equipment for a six-car service will cost an additional \$11,670. This will deplete the Lake Burien fund, which now has \$27,000 to its credit.

Ohio Public Utility Tax Law Upheld.—The United States Supreme Court on Feb. 24 handed down a decision upholding the constitutionality of the Ohio law taxing public utilities. This measure proposes at varying rates a tax on the gross earnings of all public service corporations in the State. When the latter was first enacted it placed an equal tax on all public service corporations, but a few years ago it was amended and the corporations were classified. The Ohio River & Western Railway contended that the classification was unreasonable and that the 4 per cent tax on railroads was particularly detrimental. The decision of the court involves the payment of approximately \$3,500,000 a year by the various public utilities of the State.

Motor Bus Lines Ask Franchise in Chicago.—Two motor bus companies have applied to the Public Utilities Commission of Illinois and to the park boards of Chicago for grants to operate omnibuses on the streets of Chicago. If the Utilities Commission decides that the vehicles are a necessity or a convenience, a permit in the form of a certificate will be issued to the companies, after which the park boards will decide which of the two companies shall receive the right to operate. The companies intend to charge a 10-cent fare, for a service which will include trips through the park systems and will carry passengers from their homes to the Chicago loop district. A motor bus similar to those now in use on Fifth Avenue, New York, will probably be adopted.

Allegheny Valley Employees Return to Work.—On the morning of Feb. 11, 1914, the former motormen and conductors of the Allegheny Valley Street Railway, Pittsburgh, Pa., who had been out on a strike for exactly two months to enforce their demands for the reinstatement of the president of the union, who had been discharged for insubordination, returned to work without contract and without conditions and were restored to their old places by the company. The company had been operating the road on schedule by new men employed as motormen and conductors since Dec. 16, 1913. In addition to demanding the reinstatement of their representative, the old men insisted upon the recognition of the union and a contract providing for arbitration, etc. The strike was handled under the direction of V. L. Edmunds, efficiency and labor expert of the Railway Audit & Inspection Company, Philadelphia, Pa.

Boston Elevated Railway Pays Retroactive Wages.—The Boston (Mass.) Elevated Railway distributed \$243,510 in retroactive wages to its present and many former employees on March 2, as a result of the finding of the arbitration board whose sittings in relation to various labor matters closed a few weeks ago. The payment covered wage increases extending between May 1, 1913, and Feb. 14, and 10,140 persons were affected, many of whom are not now in the company's service. Sixteen automobiles and two teams under police guard distributed the money, which was drawn from Boston banks on Feb. 28 and inclosed in pay envelopes by a special force of clerks on the Sunday following. The individual payments ranged from a few cents to more than \$100. The calculations of retroactive pay have been made under the general direction of J. Henry Neal, general auditor, and a maximum of sixty extra clerks has been at work in addition to the regular staff. The money was distributed according to the company's divisional organization.

Subway Track Material Contracts Awarded.—During the week ended Feb. 28, 1914, the Public Service Commission for the First District of New York awarded contracts for track materials for the Fourth Avenue subway, in Brooklyn, to cost \$306,923. These materials are to be used in equipping the subway with tracks, ties and roadbed from the Brooklyn end of the Manhattan Bridge to Fourth Avenue and Eighty-sixth Street, Brooklyn. The contracts in every case went to the lowest bidders as follows: open hearth rails, Bethlehem Steel Products Company, \$127,108; manganese rails, Manganese Steel Rail Company, \$43,199; splice bars, The Rail Joint Company, \$19,035; end inclines, Eastern Malleable Iron Company, Inc., \$1,032; adjustable separators, American Brake Shoe & Foundry Company, \$1,822; cut track spikes, Lackawanna Steel Company, \$3,569; screw spikes, American Iron & Steel Manufacturing Company, \$2,560; bolts and nuts, American Iron & Steel Manufacturing Company, \$6,308; washers, American Brake Shoe & Foundry Company, \$1,488; rail braces, Eastern Malleable Iron Company, Inc., \$1,524; anti-creepers, The Creepcheck Company, \$2,736. The commission has also called a public hearing for March 17 on the form of contract for the work of installing the tracks in this subway. After this hearing the contract for the installation will be advertised for bids.

PROGRAMS OF ASSOCIATION MEETINGS

Mississippi Electric Association

The annual meeting of the Mississippi Electric Association will be held at Meridian, Miss., on April 27, 28, 29, 1914.

Arkansas Association of Public Utility Operators

The seventh annual convention of the Arkansas Association of Public Utility Operators will be held in Little Rock, Ark., April 21, 22 and 23, 1914.

New England Street Railway Club

The fourteenth annual meeting and banquet of the New England Street Railway Club will be held at the Hotel Somerset, Boston, Mass., on March 26, 1914. The annual meeting will be held at 3 p. m., the reception at 6.30 p. m., and the dinner at 7 p. m. Seats for the banquet will be assigned on March 19 in the order of the receipt of the applications by H. A. Faulkner, the secretary, but the committee will, so far as possible, endeavor to consider personal preferences when expressed in writing by the applicant. The cost of tickets is \$4 each and the tables will seat six.

Illinois Electric Railways Association

The annual meeting of the Illinois Electric Railways Association was called for Mar. 6, 1914, at the Leland Hotel, Springfield, Ill. The first session was to convene at 10 a. m. on March 6, and the program included the following papers:

Paper, "Development of Water Power at Marseilles, Ill.," by C. W. Humphrey, consulting engineer, Chicago.

Paper, "The New Public Utilities Commission Law of Illinois," by William J. Norton, of Norton & Bird, engineers, Chicago.

Paper, "Railway Motors," by J. L. Layng, of the General Electric Company, Schenectady, N. Y.

The session was to close with the election of officers and the appointment of committees for the ensuing year.

LEGISLATION AFFECTING ELECTRIC RAILWAYS

MASSACHUSETTS

The committee on railroads has voted leave to withdraw the petitions providing for the purchase by the State of the New York, New Haven & Hartford Railroad, for the electrification of all railroads within the Boston metropolitan district, and for the election of members of the Public Service Commissioners in place of their appointment by the Governor. Representative McNerney has presented a set of inquiries which have been referred to the committee on rules regarding the engineering experience of members of the Boston Transit Commission, the duration of meetings and conduct of business. A hearing will be held by the committee to permit discussion of the board's composition and duties.

NEW YORK

The Assembly on Feb. 26, 1914, unanimously adopted the Murtaugh resolution to adjourn finally on March 27. It had been adopted already by the Senate.

A bill rendered by the commission and approved by Judge Hale, its counsel, is now pending before the Legislature, which if adopted will give the commission the jurisdiction to deal with proposed rate increases in advance of the rate taking effect.

A bill has been introduced in the Senate to extend for three years the time of the Frontier Electric Railway to begin the construction of its proposed road between Buffalo and Niagara Falls.

A bill has been introduced in the Senate amending the railroad law by providing that passenger cars propelled by gasoline or oil engines may be heated in such manner as approved by the Public Service Commission notwithstanding the prohibition against the use of stoves or furnaces in passenger cars on railroads. A bill has been introduced in the Senate amending the railroad law by providing that the names of railroad stations may not be changed without the consent of the Public Service Commission. The commission is authorized to restore names heretofore changed or to otherwise change the names.

A bill has been introduced in the Assembly inserting in the railroad law a new section providing that any railroad corporation organized under the laws of the State which has been placed in the hands of a receiver by the Supreme Court is to be entitled to five years' time, after the Public Service Commission shall have authorized the issuance, sale and disposition of its stocks and bonds, within which to begin the construction of its road and expend 10 per cent of its capital, and ten years within which to complete the road and put it in operation. The charter of such a railroad corporation is not to be forfeited by failure to commence and complete its road within the time prescribed if the Public Service Commission has heretofore granted it a certificate of convenience and necessity, and the time the corporation is in the hands of a receiver is not to be computed as a part of the time for commencing and completing its road.

A bill has been introduced in the Assembly inserting in the railroad law a new section extending for five years after the act takes effect the time the railroad corporations organized under the laws of the State and now in the hands of receivers shall have in which to expend 10 per cent of the amount of their capital and complete their roads. The charter of such corporations is not to be forfeited by reason of their failure to commence construction, expend 10 per cent of their capital and complete their roads within the time originally limited for such purposes. They may proceed to build and complete roads within five years provided the routes do not extend within the corporate limits of New York City.

A bill has been introduced in the Senate to amend the railroad law in relation to rates for commutation tickets on certain steam railroads operating out of New York.

Financial and Corporate

ANNUAL REPORT

Geary Street Municipal Railway

Stock and Money Markets

March 4, 1914.

By to-day prices on the New York Stock Exchange had recovered from the temporary interference caused by the storm, and gains were substantial in some of the leading issues. There was nothing, however, to indicate a material expansion in the demand for stocks. Brooklyn Rapid Transit was a strong feature. Rates in the money market to-day were: Call, 1¼ per cent; sixty days, 2¼ @ 3 per cent; four months, 3¼ @ 3½ per cent; six months, 3¼ @ 3½ per cent.

The Philadelphia trading continued light to-day, few traders being on the floor on account of poor wire service with New York.

On the Chicago exchange the volume of sales was small. Bonds were steady, Chicago Railways and Chicago City Railway figuring in small amounts in the sales.

The Boston market to-day was fairly broad and generally firm.

The Baltimore market was fairly active to-day, United Railways & Electric Company stock leading the list of transactions.

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

	Feb. 25	Mar. 4
American Brake Shoe & Foundry (com.)	97	95
American Brake Shoe & Foundry (pref.)	144	143½
American Cities Company (com.)	36	36
American Cities Company (pref.)	61¾	61¼
American Light & Traction Company (com.)	352	352
American Light & Traction Company (pref.)	106	107
American Railways Company	39	39
Aurora, Elgin & Chicago Railroad (com.)	*39¼	36¾
Aurora, Elgin & Chicago Railroad (pref.)	80¾	78¼
Boston Elevated Railway	82	82
Boston Suburban Electric Companies (com.)	7	7
Boston Suburban Electric Companies (pref.)	60	60
Boston & Worcester Electric Companies (com.)	*6¼	*6¼
Boston & Worcester Electric Companies (pref.)	39	39
Brooklyn Rapid Transit Company	92	93¾
Capital Traction Company, Washington	109	109½
Chicago City Railway	170	170
Chicago Elevated Railways (com.)	20	20
Chicago Elevated Railways (pref.)	65	65
Chicago Railways, ptcptg., ctf. 1	93	92
Chicago Railways, ptcptg., ctf. 2	32¾	32½
Chicago Railways, ptcptg., ctf. 3	7	6½
Chicago Railways, ptcptg., ctf. 4	3	2½
Cincinnati Street Railway	110	110
Cleveland Railway	105	104½
Cleveland, Southwestern & Columbus Ry. (com.)	*5	*5
Cleveland, Southwestern & Columbus Ry. (pref.)	*26	*26
Columbus Railway & Light Company	13	13
Columbus Railway (com.)	53	53
Columbus Railway (pref.)	80¼	80
Denver & Northwestern Railway	71	71
Detroit United Railway	a85	a85
General Electric Company	148	147
Georgia Railway & Electric Company (com.)	120	120
Georgia Railway & Electric Company (pref.)	85½	87
Interborough-Metropolitan Company (com.)	14½	14¾
Interborough-Metropolitan Company (pref.)	59¼	60
International Traction Company (com.)	*30	*30
International Traction Company (pref.)	*85	*85
Kansas City Railway & Light Company (com.)	*19½	*19½
Kansas City Railway & Light Company (pref.)	*35	*35
Lake Shore Electric Railway (com.)	*5	*5
Lake Shore Electric Railway (1st pref.)	*82	*82
Lake Shore Electric Railway (2d pref.)	*20	*20
Manhattan Railway	131¼	130¼
Massachusetts Electric Companies (com.)	11	11½
Massachusetts Electric Companies (pref.)	*61½	61
Milwaukee Electric Ry. & Light Co. (pref.)	*95	*95
Norfolk Railway & Light Company	*24½	*24½
North American Company	70	70
Northern Ohio Traction & Light Co. (com.)	60	63
Northern Ohio Traction & Light Co. (pref.)	98¼	98½
Philadelphia Company, Pittsburgh (com.)	43	44
Philadelphia Company, Pittsburgh (pref.)	43	43
Philadelphia Rapid Transit Company	18¾	18¾
Portland Railway, Light & Power Company	*53	*53
Public Service Corporation	112	112
Third Avenue Railway, New York	42¼	44½
Toledo Traction, Light & Power Co. (com.)	20	20
Toledo Traction, Light & Power Co. (pref.)	80	80
Twin City Rapid Transit Co., Minneapolis (com.)	106	106½
Union Traction Company of Indiana (com.)	*11½	*11½
Union Traction Company of Indiana (1st pref.)	*80	*80
Union Traction Company of Indiana (2d pref.)	*14	*14
United Rys. & Electric Company (Baltimore)	25¾	26½
United Rys. Inv. Company (com.)	21½	20½
United Rys. Inv. Company (pref.)	45	45½
Virginia Railway & Power Company (com.)	53	53
Virginia Railway & Power Company (pref.)	95	95
Washington Ry. & Electric Company (com.)	87	87
Washington Ry. & Electric Company (pref.)	87	87
West End Street Railway, Boston (com.)	71	71
West End Street Railway, Boston (pref.)	92	93
Westinghouse Elec. & Mfg. Company	70	71
Westinghouse Elec. & Mfg. Co. (1st pref.)	116	116¼

* Last sale. a Asked.

According to a report made to the Board of Supervisors of San Francisco by the finance committee, the net profits of the Geary Street Municipal Railway for the year ended Dec. 31, 1913, the first twelve months of its operation by the city, amounted to \$85,346. The total revenue for the year was \$446,076, and the total operating expenses, depreciation and interest amounted to \$360,730. More than \$77,000 of the above net profit accrued during the last six months of the year, during which time the road was in operation from the beach to the ferries.

The statement of income, profit and loss for the six months ended Dec. 31, 1913, follows:

Operating revenues	\$309,794
Operating expenses:	
Operation and maintenance	\$134,007
Depreciation and renewals	55,763
	<u>189,770</u>
Net operating revenue	\$120,024
Interest on bonds owned	1,328
Gross income, less operating expense	<u>\$121,352</u>
Interest on bonded debt	44,302
Net profit—six months ended Dec. 31, 1913	<u>\$77,050</u>

In figuring the profits the finance committee stated that it added such charges as would have been made against a private corporation, as required by the charter. These include legal and clerical services furnished by various departments of the city government and taxes. Such charges are not shown, in proportionate form, in the preceding statement of income, profit and loss, but they are included for the entire year in the balance sheet of the company.

The balance sheet as of Dec. 31, 1913, prepared in compliance with charter provisions for comparison with privately owned utilities and showing profit on operations for the year as \$45,304, follows:

ASSETS	
Cost of road and equipment	\$1,657,251
General expenditures	181,890
Municipal bonds, owned	93,300
Cash in city treasury	547,628
Other current assets	53,228
Total assets	<u>\$2,533,297</u>
LIABILITIES	
Funded debt—bonds sold	\$1,969,000
Contribution from premium on bonds sold	2,341
Contribution from taxes	238,692
Current liabilities	161,312
Obligatory charter reserves:	
Depreciation and renewals	\$80,054
Taxes	35,454
Insurance	1,137
	<u>116,645</u>
Total	<u>\$2,487,992</u>
Surplus—Profit on operations for the year	<u>45,304</u>
	<u>\$2,533,297</u>

The Geary Street Municipal Railway does not actually pay taxes, and no payment is made for services rendered to it by other departments of the municipal government. The comparison charges required by the charter are shown as follows:

Profit as shown in balance sheet	\$45,304
Comparison charge for legal and clerical services	4,588
Comparison charges for taxes	35,454
Net profit for year as per income statement	<u>\$85,346</u>

During the year the company operated 1,300,868 passenger car miles. Total passengers carried amounted to 9,723,177, including full-fare revenue passengers 8,882,996, half-fare revenue passengers 49,035, revenue transfer passengers 49,543, non-revenue transfer passengers 631,363 and non-revenue passengers 110,240. The total cars in daily operation number thirty-nine; the number of platform men is 130 and the track mileage operated is 15.08 miles (single track).

Hearing on Plans for Reorganizing Ithaca Companies

The Public Service Commission of the Second District of New York on March 3, 1914, heard the application of the Ithaca Street Railway and the New York, Auburn & Lansing Railroad for approval of the plan of reorganization proposed by the bondholders. Charles A. Hotchkiss, New York, appeared in behalf of the applicants. He stated that

the Ithaca Street Railway had been purchased under foreclosure by H. W. Fitz, the chairman of the committee representing the bondholders, who made a payment of \$50,000 on account. It was proposed to form the Ithaca Traction Corporation as soon as the deed for the property was delivered to Mr. Fitz. The latter company desired to issue \$250,000 of 5 per cent fifty-year first refunding mortgage gold bonds subject to 275 of the present underlying bonds of that system. The company also requested the commission to approve the issue of \$475,000 of capital stock of the Ithaca Traction Corporation and the acquisition by the new steam railroad of the aforesaid \$250,000 of bonds and \$475,000 of stock. Mr. Hotchkiss stated that the new steam railroad would be called the Central New York Southern Railroad Corporation. This corporation desired permission to issue \$1,450,000 of preferred stock and \$750,000 of common stock. The plan of the new steam railroad was to extend over the property of the New York, Auburn & Lansing Railroad, run south from Auburn to Renwick, and to construct from that point on its own right-of-way into the heart of Ithaca within 1000 ft. of the Lackawanna Railroad, and there build a new passenger station. Mr. Hotchkiss explained that this would permit two railroads to enter the railroad center of Ithaca. The company proposes to operate a fast passenger service at least every two hours, and has ordered two gasoline cars. The hearing was adjourned pending the receipt by the commission from Mr. Hotchkiss of certain financial information after the sale of the New York, Auburn & Lansing Railroad on March 6, 1914.

Canadian-American Power Corporation Authorized to Issue Stock

The Public Service Commission for the Second District of New York has rendered a decision on the application of the Canadian-American Power Corporation to engage in business, to issue stock and to acquire the Niagara Falls Electrical Transmission Company. The company sought to acquire a contract with the Electrical Development Company for furnishing 46,000 electrical hp produced in Canada and providing for the sale of this power in the United States, principally on or near the Niagara frontier. The company desired to issue \$3,000,000 stock on account of the contract and \$435,000 for the purchase of the Niagara Falls Electrical Transmission Company stock, bonds and debt.

The decision of the commission is that the applicant shall be restricted to a total of \$1,250,000 stock on account of the contract and the acquisition of the Niagara Falls Electrical Transmission Company, of which \$435,000 may be 7 per cent cumulative preferred, on condition that before any stock shall be issued the applicant shall secure authority for the location of its transmission and distributing systems and shall file a stipulation as follows: (1) Every contract with purchasers of energy shall provide that the price, terms and conditions affecting price and duration shall be subject to revision by the commission upon complaint or upon motion of the commission, any ruling of the commission to be subject to judicial review. (2) That charges for all of the service and customers shall not, on the average, exceed \$19 per hp sold, but this shall not prevent the commission from requiring a lower price for particular kinds of service on just cause shown. (3) Until further order of the commission the company shall reserve at least 23,000 electric hp for sale to consumers of energy for light or power. (4) Upon merger of the two companies the stock, bonds and floating debt of the Niagara Falls Electrical Transmission Company and the third mortgage bonds, floating debt and \$92,000 first consolidated mortgage bonds of the Niagara Falls Gas & Electric Light Company shall be canceled.

Commissioner Sague, in a dissenting opinion, says that the amount of securities issued is practically a capitalization of the power contract, and that the amount of tangible property of the new company will be considerably in excess of the amount of 7 per cent cumulative preferred stock authorized. He dissents from the opinion that stock may in some cases be issued for organization purposes and yet disregarded in future rate proceedings, and believes that all stock authorized by the commission for new companies must be considered as entitled to a fair rate of dividend as measured by the stocks of similar companies.

The decision follows a contest before the commission in which those who advocated the utilities contract for the 46,000 of hp at \$12.50 a year sought to capitalize and make use of that contract. First it was made part of a merger plan including the Buffalo & Lake Erie Traction and the Buffalo-Rochester trolley systems, but opposition stopped the merger. Then the plan was put before the commission a second time in the application for permission for the Canadian-American to sell stock and do business.

Proposed Reorganization of New York Crosstown Line

The Public Service Commission of the First District of New York has approved a plan for the reorganization of the Twenty-eighth & Twenty-ninth Streets Crosstown Railroad as the Mid-Crosstown Railway, which provides for the issuance by that company of \$150,000 of capital stock in payment for all the franchises, tracks, etc., of the Twenty-eighth & Twenty-ninth Streets Crosstown Railroad free from all liens and claims, the Third Avenue Railway to issue for the acquisition of said stock \$187,000 of its 4 per cent bonds, including not more than \$37,000 thereof on account of the compensation of the receiver, his counsel and the committee of bondholders. The proceeds of the remaining \$150,000 of bonds are to be applied to the liens and claims against the property and the debts of the receiver and of the Mid-Crosstown Railway, Inc., and the committee and such part of the compensation of the receiver and counsel as are not paid by the Third Avenue Railway. Any residue will be distributed pro rata among the depositing bondholders, along with the proceeds of the notes mentioned below. The balance of the purchase price will be received in the form of a 4 per cent promissory note of the Third Avenue Railway for \$250,000, payable within one year from date, with the right at maturity to renew \$166,666.66 thereof for one year at 4 per cent, and again at the second maturity to renew \$83,333.33 for another year at the same rate.

The claims which are to be paid by the committee out of the proceeds of the \$150,000 of bonds received by it amount at their face value with interest and penalties to July 1, 1913, to approximately \$106,621. It is expected, however, that some of these claims will be reduced. The committee is to have full power to adjust all claims against the New York Railways, the Metropolitan Traction Company and the persons who were at one time directors of the last mentioned company and to satisfy the claims of bondholders, creditors and stockholders of the Mid-Crosstown Railway from any moneys which may be realized on such claims. The plan will be binding on all stockholders unless within twenty days from Feb. 17 more than one-third in interest dissent in writing to the Central Trust Company, New York, N. Y., which is designated as depository under the agreement.

Binghamton Railway Sale

As noted briefly in the *ELECTRIC RAILWAY JOURNAL* of Feb. 28, 1914, page 496, the Public Service Commission of the Second District of New York has granted the application of the Scranton & Binghamton Railroad to purchase the stock of the Binghamton Railway. G. Tracy Rogers, president of the Binghamton (N. Y.) Railway, states that the officers of the Scranton & Binghamton Railroad, of their own volition, suggested that if they were allowed to secure the stock of the Binghamton Railway no further dividends would be declared on the stock of the company until two years from July 1, 1914, in accordance with the following resolution passed by both the Scranton & Binghamton Railroad and the Binghamton Railway.

"That for a period of two years the entire net receipts of the Binghamton Railway shall be applied to the payment of interest on its debt and the improvement and equipment of that road and its property, and that no further dividend shall be declared by the Binghamton Railway for a period of two years from July 1, 1914."

It is further stipulated by the Scranton & Binghamton Railroad that no contracts as to power for the Binghamton Railway, or traffic agreements, either freight or passenger, or payments of mileage for use of cars by one company to the other, are to be made except with the approval of the

Public Service Commission. The intention of the Binghamton Railway and the commission is to have the Binghamton Railway continue to be operated as a New York State company independent of the Scranton & Binghamton Railway, except as to ownership. It is understood that the entire stock of the company is to be placed in trust with the trustee under the mortgage of the Scranton & Binghamton Railroad.

Bay State Street Railway, Boston, Mass.—The Bay State Street Railway on Feb. 26 petitioned the Public Service Commission of Massachusetts for authority to issue \$281,000 of refunding first mortgage 4 per cent bonds of the Boston & Northern Street Railway and \$247,000 of similar bonds of the Old Colony Street Railway. The proceeds of these issues are to be used to pay for expenditures made on additions to property. The stockholders of the Bay State Street Railway have approved the issue.

Cincinnati (Ohio) Traction Company.—The Public Utilities Commission of Ohio on Feb. 24, 1914, authorized the issuance by the Cincinnati Traction Company of \$253,500 of equipment trust certificates, with interest at 5 per cent. These certificates are to be sold for the highest price obtainable and for not less than the par value. The proceeds arising from the sale are to be used to purchase sixty double-truck, center-entrance, arch-roof passenger trail cars of steel at a price of \$4,225 each.

Cleveland (Ohio) Railway.—According to the annual report of the Cleveland Railway, the proceeds of the sale of the stock under the last two offers of the company amounted to \$6,337,200. Of this amount, \$4,505,000 was used to retire bonds of the Cleveland Electric Railway and the remainder was taken up by bonds of the Cleveland Railway. All underlying bonds, viz., the bonds of the Brooklyn Street Railroad, the South Side Street Railroad, the Cleveland City Cable Railway, the East Cleveland Railroad and the Cleveland Electric Railway, have been paid in full, and the only bonds now outstanding are those of March 1, 1911, amounting to \$5,495,000, a part of an authorized issue of \$35,000,000 secured by a mortgage of that date.

Commonwealth Power, Railway & Light Company, Grand Rapids, Mich.—Hodenpyl, Hardy & Company, New York, N. Y., have purchased and are offering at 99 and interest \$1,500,000 of convertible 6 per cent five-year bonds of the Commonwealth Power, Railway & Light Company, dated May 1, 1913. The bonds are part of an authorized issue of \$10,000,000 which, with the present offering, are now all outstanding.

Dominion Power & Transmission Company, Hamilton, Ont.—W. C. Hawkins, managing director of the Dominion Power & Transmission Company, has announced that the company will not purchase the Brantford Street Railway.

Elmira Water, Light & Railroad Company, Elmira, N. Y.—The Public Service Commission of the Second District of New York has received an application from the Harrisburg Light & Power Company for permission to purchase from the Elmira Water, Light & Railroad Company 3148 shares of its preferred capital stock of the aggregate par value of \$314,800 and 3476 shares of the common stock of the Elmira Water, Light & Railroad Company of the aggregate par value of \$347,600, and to pay therefor the sum of \$500,000. This sum is to be paid by the issuance and delivery by the Harrisburg Light & Power Company of \$500,000 par value of its fully paid and non-assessable common capital stock. The application sets forth that in the event of permission being granted by the commission proceedings will be instituted to increase the common capital stock of the Harrisburg company from \$1,250,000 to \$1,750,000. The Elmira Water, Light & Railroad Company has an authorized capital stock of \$2,000,000, consisting of 20,000 shares of the par value of \$100 each, of which 10,000 shares are 5 per cent cumulative preferred stock, and 10,000 shares are common stock. The application further sets forth that \$683,000 par value of said preferred stock and \$1,000,000 par value of said common stock are now issued and outstanding.

Hudson & Manhattan Railroad, New York, N. Y.—The syndicate composed of Kuhn, Loeb & Company and Harvey Fisk & Sons, New York, N. Y., and Robert W. Fleming & Company, London, Eng., which was formed about a year ago to buy the new first mortgage bonds and adjustment income bonds of the Hudson & Manhattan Railroad in order

to be able to take up the outstanding collateral trust notes and participate in the readjustment plan, expired by limitation on Feb. 27, 1914, and was dissolved. It was stated that there had been no public offer on the issue on account of radical changes in conditions since the formation of the syndicate. The completion of the details in connection with the underwriting occupied several months, and by the time offering could have been made conditions were unfavorable. It was deemed best, therefore, to dissolve the syndicate and permit each member to take his share of the underwriting.

Jacksonville (Fla.) Traction Company.—A special meeting of shareholders of the Jacksonville (Fla.) Traction Company was held on Feb. 26, 1914, at which it was voted to increase the authorized capital stock by \$500,000 of preferred stock and \$500,000 of common stock, making the capital stock as now authorized \$1,000,000 preferred and \$1,500,000 common. The holders of the common stock will be offered the right to subscribe for \$200,000 of the new common stock at par in the ratio of one new share for every four old shares, as noted in the ELECTRIC RAILWAY JOURNAL of Feb. 28, 1914.

New York (N. Y.) Railways.—The directors of the New York Railways on Feb. 26 declared an interest payment of 2.345 per cent on the \$30,626,977 of 5 per cent adjustment income bonds for the six months ended Dec. 31, 1913, payable on April 21, 1914. This payment, with the 1.636 per cent paid on Oct. 1, 1913, for the six months ended June 30, 1913, makes a total of 3.981 per cent for the calendar year 1913. Swartwout & Appenzeller, New York, N. Y., brokers, have issued the following statement: "The declaration just announced will not be satisfactory to the bondholders. No interest declaration would be satisfactory based on the present method of bookkeeping under which unexpended reserves are not automatically returned to income. The bondholders have pointed out to the company and to the directors the statement of the income bond indenture on this point, and all that the bondholders expect or ask is that the terms of the indenture be followed. Some of the largest holders of the income bonds have got together with a view of having the court rule on the failure of the company to live up to the terms of the indenture." Darwin P. Kingsley, president New York Life Insurance Company, William A. Day, of the Equitable Life Insurance Company, and Haley Fisk, vice-president of the Metropolitan Life Insurance Company, have been appointed a committee by the trustees of their respective companies to investigate the interest payment. It is reported to be the purpose of the committee to carry the case up for a legal decision. The companies mentioned own, it is stated, about \$2,000,000 of the income bonds.

Northern Ohio Traction & Light Company, Akron, Ohio.—On Feb. 19, 1914, the Public Utilities Commission of Ohio authorized the Northern Ohio Power Company to sell and transfer to the Northern Ohio Traction & Light Company all its property franchises, rights and privileges. The consideration therefor is the cancellation of the indebtedness of the Northern Ohio Power Company to the Northern Ohio Traction & Light Company created by the latter's advancing and paying all the money necessary for the acquisition and development of the property of the Northern Ohio Power Company. This indebtedness amounts to approximately \$1,979,549.

Ohio Electric Railway, Cincinnati, Ohio.—On Feb. 24, 1914, the Public Utilities Commission of Ohio authorized the Ohio Electric Railway to issue \$123,800 of equipment trust certificates bearing interest at the rate of 5 per cent, to be sold for the highest price obtainable, but for not less than the par value. The proceeds arising from the sale of the certificates are to be devoted to the purchase of the following: five all-steel interurban center-entrance motor passenger cars, costing \$12,000 each; four motor express cars, costing \$10,000 each, and fourteen freight trail cars, costing \$1700 each.

Ottawa (Ont.) Traction Company.—Announcement has been made of the incorporation of the Ottawa Traction Company, with \$10,000,000 capital stock. It will take over the stock of the Ottawa Electric Railway, exchanging three shares of stock in the new corporation for one share in the old company. The Ottawa Electric Railway last year paid 12 per cent regular yearly dividends, with an extra dividend

of 3 per cent. The old stock, which has been selling around \$265 a share, at this rate would yield about 5.66 per cent on the investment. It is controlled by the same interests as the Ottawa Light, Heat & Power Company, which has a capitalization of \$2,000,000 of stock and \$1,000,000 of bonds. All the stock and \$500,000 of bonds are outstanding.

Pacific Gas & Electric Company, San Francisco, Cal.—The Pacific Gas & Electric Company has called for payment on March 25, 1914, all of the outstanding \$5,000,000 of 6 per cent gold notes dated July 1, 1913. Payment will be made in New York, London and Geneva, Switzerland.

Portland Railway, Light & Power Company, Portland, Ore.—The Portland Railway, Light & Power Company has sold to Lee, Higginson & Company, Boston, and Drexel & Company, Philadelphia, \$5,800,000 of 5 per cent first and refunding mortgage bonds due in 1942. The proceeds will be used to pay for completed improvements. They are part of an authorized issue of \$75,000,000, of which \$21,800,000 are now outstanding and \$18,000,000 are reserved for retiring underlying bonds. The remainder can be issued for not exceeding 80 per cent of cash costs of additions and improvements under restrictions of the mortgage. The issue has a cumulative sinking fund of 1 per cent annually, 1915 to 1926, inclusive, and 1½ per cent annually thereafter, figured on the total amount issued.

St. Louis, Springfield & Peoria Railroad, Peoria, Ill.—N. W. Halsey & Company, New York, N. Y., are offering at 95 and interest a block of first and refunding mortgage 5 per cent gold bonds of the St. Louis, Springfield & Peoria Railroad, dated 1909, due Dec. 1, 1939, but redeemable at 105 on any interest date. These bonds are guaranteed by indorsement on each bond, unconditionally, as to principal and interest, by the Illinois Traction Company. The interest is paid without deduction for United States taxes.

South Carolina Light, Power & Railways Company, Spartanburg, S. C.—A. B. Leach & Company, New York, N. Y., are offering for sale 6 per cent cumulative preferred stock of the South Carolina Light, Power & Railways Company at 97 and accrued dividend to yield about 6.2 per cent. This stock is free from all taxes in Massachusetts.

Springfield (Vt.) Electric Railway.—According to an appraisal of the properties of the Springfield Electric Railway recently completed by French & Hubbard at the instigation of the company itself, the replacement value of the road is shown to be \$406,162, with a present depreciated value of \$338,556. This latter amount is \$38,556 in excess of the company's entire bond and stock liability. The appraisal included a detailed examination of all the physical property of the company. The calculation of the replacement value of all was based on present market prices for material and labor. The values ascertained for the property are exclusive of such items as going concern and other intangibles.

Third Avenue Railway, New York, N. Y.—Judge Lacombe, in the United States District Court, on Feb. 23 handed down an opinion denying the motion of the Third Avenue Railroad and its receiver to increase its claim against the New York City Railways and others. Judge Lacombe said: "So long a time has elapsed since the filing of this claim, and in the interim so much has taken place with the details of the claim before all parties interested in negotiations and adjustments, that to allow it to be now amended so as to increase it to the extent of nearly \$3,000,000 seems wholly inequitable."

United Railroads, San Francisco, Cal.—The United Railroads of San Francisco offered to pay on March 1, 1914, the \$650,000 of Ferris & Cliff first mortgage 6 per cent bonds due at that time at the Anglo-London & Paris National Bank or the office of N. W. Halsey & Company. The company has already purchased \$50,000 of the bonds for retirement. The \$250,000 of Park & Ocean first mortgage 6 per cent bonds which matured on Jan. 1, 1914, have been paid and the mortgage canceled.

United Railways Investment Company, San Francisco, Cal.—The committee of stockholders of the United Railways Investment Company appointed in May, 1913, to work out a plan to liquidate the back dividends on the preferred stock has decided to recommend the exchange of the present stock

for 50 per cent new 6 per cent preferred and 75 per cent common, accrued dividends on which are to be relinquished.

Washington-Virginia Railway Company, Washington, D. C.—The Philadelphia Stock Exchange on Feb. 8 listed the stock of the Washington-Virginia Railway. This company was incorporated on Oct. 15, 1913, to take the place of a former company of the same name, which was merged with the Washington Utilities Company in November, 1912, but which was obliged to resume separate existence owing to the refusal of the subsequently created Utilities Commission of the District of Columbia to allow the corporation to issue securities in accordance with the merger agreement. The company has the same financial and corporate organization as the former one.

West End Street Railway, Boston, Mass.—R. L. Day & Company, N. W. Harris & Company, Estabrook & Company, Blodgett & Company and Merrill, Oldham & Company on Feb. 24 offered publicly for sale the issue of \$2,000,000 of 5 per cent bonds of the West End Street Railway, dated March 2, 1914, and due March 1, 1944. These bonds are sold to refund \$2,000,000 of 4½ per cent bonds maturing on March 1, 1914. The sale took place at 106 and interest, yielding 4½ per cent.

Wisconsin Railway, Light & Power Company, Milwaukee, Wis.—N. W. Halsey & Company, New York, N. Y., are offering at 88½, yielding about 6 per cent, first mortgage and refunding 5 per cent gold bonds of the Wisconsin Railway, Light & Power Company, par value \$1,000, and also certificates of \$500 and \$100 each, dated Feb. 1, 1913, and due Feb. 1, 1933. These are callable, all or in part, on any interest date at 105 and interest. The interest coupons on these bonds and certificates will be paid in full, without any deduction of the normal income tax.

Dividends Declared

Chicago (Ill.) Elevated Railways, quarterly, \$1.50, preferred participating certificates.

Monongahela Valley Traction Company, Fairmont, W. Va., 1½ per cent, common.

Northern Ohio Traction & Light Company, Akron, Ohio, quarterly, 1¼ per cent, common.

ELECTRIC RAILWAY MONTHLY EARNINGS

		BATON ROUGE (LA.) ELECTRIC RAILWAY				
Period		Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1m., Dec.,	'13	\$16,386	*\$9,541	\$6,845	\$2,100	\$4,745
1 "	" '12	14,384	*7,651	6,733	1,734	4,999
12 "	" '13	163,128	*102,382	60,747	24,775	35,972
12 "	" '12	147,381	*87,907	59,475	20,768	38,707
		BROCKTON & PLYMOUTH STREET RAILWAY, PLYMOUTH, MASS.				
1m., Dec.,	'13	\$7,689	*\$7,836	\$147	\$1,080	†\$1,226
1 "	" '12	7,849	*7,469	379	1,076	†696
12 "	" '13	124,403	*98,727	25,675	13,043	12,632
12 "	" '12	120,008	*90,872	29,136	12,554	16,582
		CAPE BRETON ELECTRIC COMPANY, LTD., SYDNEY, N. S.				
1m., Dec.,	'13	\$36,169	*\$17,632	\$18,537	\$6,367	\$12,170
1 "	" '12	34,387	*16,124	18,264	5,682	12,582
12 "	" '13	380,952	*209,953	170,999	72,913	98,086
12 "	" '12	360,177	*194,881	165,296	68,105	97,191
		EASTERN TEXAS ELECTRIC COMPANY, BEAUMONT, TEX.				
1m., Dec.,	'13	\$59,870	*\$32,903	\$26,967	\$8,244	\$18,723
12 "	" '12	483,125	*270,592	212,532	71,177	141,355
		EL PASO (TEX.) ELECTRIC COMPANY.				
1m., Dec.,	'13	\$87,721	*\$47,452	\$40,269	\$4,210	\$36,059
1 "	" '12	81,228	*40,382	40,847	3,920	36,927
12 "	" '13	896,115	*478,359	417,756	48,015	369,741
12 "	" '12	793,320	*430,217	363,103	69,661	293,442
		FORT WAYNE & NORTHERN INDIANA TRACTION COMPANY, FORT WAYNE, IND.				
1m., Dec.,	'13	\$166,503	*\$92,814	\$73,689	\$50,973	\$22,716
1 "	" '12	154,113	*86,451	67,662	47,768	19,894
12 "	" '13	1,831,040	*1,068,664	762,376	586,763	175,613
12 "	" '12	1,713,098	*1,003,649	709,449	566,523	142,926
		HOUGHTON (MICH.) COUNTY TRACTION COMPANY.				
1m., Dec.,	'13	\$24,833	*15,449	\$9,383	\$5,610	\$3,773
1 "	" '12	26,421	*15,960	10,461	5,740	4,721
12 "	" '13	296,853	*180,260	116,593	67,592	49,001
12 "	" '12	307,506	*174,735	132,771	67,592	65,539
		JACKSONVILLE (FLA.) TRACTION COMPANY.				
1m., Dec.,	'13	\$64,485	\$47,704	\$16,781	\$12,872	\$3,909
1 "	" '12	48,626	33,183	15,442	10,762	4,680
12 "	" '13	679,622	438,588	241,033	143,717	97,316
12 "	" '12	562,537	378,512	184,026	118,986	65,039

*Includes taxes. †Deficit.

Traffic and Transportation

Aurora, Elgin & Chicago Railroad Offers Prizes for Efficiency Suggestions

Edwin C. Faber, vice-president and general manager of the Aurora, Elgin & Chicago Railroad, Wheaton, Ill., addressed a letter to the employees of the company on Feb. 1, 1914, in which he offered a series of cash prizes for the best efficiency suggestions. The letter reads as follows:

"In the fiscal year ended June 30, 1913, this company spent \$1,238,641 in the operation of its property for wages, maintenance and other expenses incident to operation, not including the large amount of money expended for improvements, betterments and additions to property. We believe our employees as a class are loyal, intelligent and capable, and that practically all of them make honest endeavor to give full service for their pay.

"We also believe that our property is well managed and that the money is wisely expended; yet it is next to impossible for the general manager and the various heads of departments to follow every dollar of expenditure personally and it is, therefore, quite likely that there may be some waste of material or supplies—some money needlessly spent.

"Some of this waste, if any exists, would, in the natural course of events, come under the eyes of some of the employees.

"The purpose of this letter is to ask each one of you to assist the management in the prevention of any waste of material, supplies or property of the company. We do not ask for criticisms of persons; what we want is frank, unprejudiced criticism of such methods and practices, the improvement of which would prevent waste of money and material, and result in a saving in the operation of the property in which we are all interested. Items which in themselves seem petty may in the aggregate amount to a considerable sum. The Chicago, Rock Island & Pacific Railroad has figured that if each one of its employees who use lead pencils would wear out an additional inch of each pencil before throwing it away the saving to the railroad would amount to \$4,000 in a year. The Pennsylvania Railroad has recently issued a circular letter to the employees of its various offices asking them to close ink wells when they are not in use, because when the covers are left open the ink evaporates, dust settles in the wells and thickens the ink, and a considerable loss ensues.

"To encourage the elimination of waste, we have, therefore, decided to ask each employee to make such suggestions or recommendations as may seem to him to be likely to result in a saving to the company. On May 1, 1914, the company will distribute \$150 in prizes to those offering the most helpful and most profitable suggestions. This sum will be divided as follows: For the best suggestion, \$50; for the second best suggestion, \$25; for the third best suggestion, \$20; for the fourth best suggestion, \$15; for the fifth best suggestion, \$10; for the next six best suggestions, each, \$5.

"A committee consisting of three employees, one department head and one senior officer will be appointed to award the prizes. When writing please give your home address so that prompt acknowledgment may be made. Each individual may make as many suggestions at one time, or from time to time, as seem to him to be justified. In case of doubt as to comparative merit, preference will be given to the suggestion received first. The competition will close on April 1, 1914, and the prizes will be distributed on May 1, 1914. All letters should be addressed to Edwin C. Faber, vice-president and general manager, Wheaton, Ill."

Shore Line Electric Railway to Further Agricultural Development

R. W. Perkins, president of the Shore Line Electric Railway, Norwich, Conn., has announced a campaign on the part of the company in behalf of the farmers in the territory which the company serves. The state has \$1,000 which it is prepared to appropriate to New London County for agricultural development, provided a sufficient amount can be raised by the people of the county to defray the expense of a demonstrator or demonstrators in the field. The Shore

Line Electric Railway, through Mr. Perkins, has offered to make an unconditional annual contribution of \$500 toward the expense of this demonstrator and a guarantee of \$500 additional, provided the organization which it is proposed to create is not able to care for the full amount above the \$1,000 given by the State and the \$500 by the company.

Plans have already been made by the Shore Line Electric Railway to alter an old factory in New London into a commodious freight terminal, and Mr. Perkins has offered to furnish quarters to be used in connection with the New London County Farm Bureau, the name under which the farmers will probably organize. Permission to extend the company's tracks from the Parade to the terminal in Water Street, New London, has already been obtained from the Common Council. The company has also been granted permission to run steam cars on its Water Street line only. There will be two 44-ft. entrances to the freight terminal, one on Water Street and the other on a strip of land running from Potter to Water Street on the south side of the building. Double tracks will run into the building from the Water Street entrance and between them will be a platform for loading and unloading freight. The side entrance will be paved with granite for the use of teams which come down the private way from Potter Street. A platform will be run close to the tracks inside this entrance, making it a simple matter for teamsters to load and unload. A portion of the second floor will be removed to permit the entrance of the electric railway freight cars and steam railroad cars. Offices for the employees of the company will be located at the rear of the second floor. All space in the building not required for other purposes will be devoted to storage.

In addition to the \$1,000 which the company has offered to contribute toward the New London County Farm Bureau for the first year, with \$500 for each year thereafter, the company proposes to turn over a portion of the second floor in the new freight terminal for an electric railway express station as an assembling and distributing point for such farm produce as is brought in. There will be connections with the tracks of the Central Vermont Railroad and through them to the New York, New Haven & Hartford Railroad system.

C. D. Jarvis, of the Connecticut Agricultural College at Storrs, Conn., who is directing the farm bureau work for the State, said recently that a great opportunity had been provided for New London County, especially in the offer of the storehouse by the company and the facilities and support offered by the Shore Line Electric Railway. He saw no reason why New London County could not operate such an organization as had been suggested. Mr. Jarvis, who is also a representative of the federal government, said that an appropriation would be available from that source after July 1, and that naturally the counties that were organized would get the first allotments. A public meeting was called for March 7 for the purpose of organizing the New London County Farm Bureau.

Extending Trailer Service in Topeka.—Trailer service is to be used more generally by the Topeka (Kan.) Street Railway in the future. Three new trailers have been ordered for the Gage Park extension.

Bus Service Being Considered in Toronto.—Commissioner of Works Harris, of Toronto, Ont., is to report upon the cost to the city of purchasing ten motor buses to be run in conjunction with the Toronto Civic Car Lines, and upon the advisability of establishing a regular service with the automobiles as feeders to the railway lines.

Order Against Smoking in Atchison.—J. W. Waggener, superintendent of the Atchison Railway, Light & Power Company, Atchison, Kan., has issued an order prohibiting smoking on street cars in that city. The order took effect on Feb. 20. Smoking will be permitted on neither the front nor the rear platform. Smoking has been permitted on both platforms in the past.

Letters to Team Owners in "Safety First" Movement.—The Northern Ohio Traction & Light Company has addressed a letter to all owners of teams in Akron, Ohio, asking that they co-operate with the company to secure the greatest possible degree of safety to themselves and others while on the streets in the interest of making the movement notably successful.

Order Against Passengers Riding on Front Platforms.—At a meeting of the Public Service Commission of Pennsylvania on Feb. 20, 1914, the following order was issued: "No passenger shall be permitted to ride on the front platforms of closed cars, and on open cars the carriage of passengers on the front platforms shall be strictly limited to the number that can be conveniently accommodated upon and do occupy the seat provided on said platforms; and those occupying said seat shall be prohibited from engaging the attention of the motorman, by conversation or otherwise."

New Terminal Station in Lexington, Ky.—The Kentucky Traction & Terminal Company, Lexington, Ky., has completed its new terminal station in the heart of Lexington. The first floor is used for a general waiting station for inter-urban passengers and as a utilities sales room. The station provides both white and colored passengers with the necessary accommodations, and contains the cashier's office and the new-business department of the lighting company, all on the first floor. The second floor is used for trainmen's quarters, reading and billiard room, etc. The third floor is used for general offices of the company.

Respective Rights of Street Cars and Automobiles.—The Division Court at Toronto, Ont., held recently that a street car can stop at any place along the line, not being constrained to stop at the regular white posts, and that the driver of an automobile must be on the lookout. The case was one in which E. E. Wheeler sued the Toronto Railway for damages to his automobile, sustained in collision with one of the company's cars. The car stopped between white posts, and Mr. Wheeler, in order to avoid running down a passenger, who had just stepped off, steered his auto to one side and broke the front axle by striking the rear of the car. The court held that he had no redress.

Advertising Special Events in Topeka.—The Topeka (Kan.) Railway's advertising in connection with special events has attracted much favorable comment at the Kansas capital recently. One of the most recent examples was in connection with the appearance of Paderewski at the Auditorium in Topeka. In a two column, 6-in. advertisement the company, of which A. M. Patten is general manager, announced that it would have cars for all parts of the city in waiting on East Eighth Avenue to enable those in attendance at the concert to reach home, or their train, with the least possible delay and inconvenience. Mr. Patten announced recently that advertising all special service would continue.

New Freight Rates on the Puget Sound Electric Railways.—The Public Service Commission of Washington has authorized the Puget Sound Electric Railway to file a tariff showing reductions in practically all freight rates between Seattle and Tacoma, and has waived the long-and-short-haul clause to make this possible. The new tariff indicates that the company is prepared to enter into competition for freight business with the boats of the Inland Navigation Company, operating between Tacoma and Seattle. A feature of the proposed tariff is that it provides rates either by weights or measurements. A rate of \$2 a ton of 2000 lb. is made for packages, when a ton package occupies 40 cu. ft. or less, but if bulkier than this the charge is to be made at the rate of \$2 for 40 cu. ft. In addition, the new tariffs provide a series of commodity rates on such articles as berries and eggs at so much the case.

"Safety First" Instruction Car in Detroit.—In furtherance of the "safety first" campaign of the company a "safety first" instruction car will be taken over all of the lines of the Detroit (Mich.) United Railway. The car is equipped with a number of demonstrating devices which are used to show the safe and unsafe methods of railway operation in its various phases. Short talks and demonstrations will be made by men connected with the various departments in order that the employees may have the fullest knowledge of the proper and safe manner in which to handle their respective lines of work. Instruction in first aid to the injured will be coupled with the "safety first" educational campaign to be conducted through the medium of the instruction car. The first trip of the car was made recently over the Rapid Railway. Stops were made at Roseville, Canfield, Baltimore, Marine City, St. Clair and Port Huron.

Center-Entrance Cars in Manila.—The first of the new center-entrance cars of the Manila Electric Railroad & Light Company, Manila, P. I., was placed in operation on

Jan. 21, 1914. On its first trip the car carried a number of the officers of the company, city officials and representatives of the press. C. L. Stone, the retiring manager of the company, and C. Nesbitt Duffy, his successor, were among the officers of the company in charge of the car. The car was designed by Francis J. Tew, master mechanic of the company, and was built under his supervision in the Meralco shops by the company's employees, principally Filipinos. The cost of the car, fully equipped, is approximately \$5,500. The car has a steel frame and the body is mounted on the company's standard trucks, equipped with 50-hp motors. The company has five other cars of the same type under construction and it is expected that all of them will be ready for service by April 1, 1914.

Present Mail Arrangements to Continue in Kansas City.—The same arrangement which now exists between the Metropolitan Street Railway and the post office authorities in Kansas City, Mo., will continue in force when the new depot is put into commission some time within the next few months. The Metropolitan will provide five mail cars, as in the past, to handle mail between the depot and the post office, as well as to and from branch postal stations. Two deliveries daily are made to the latter. The Metropolitan provides the car crews, and the cars are run on schedule, just as the ordinary passenger cars are. All of the mail cars now used are of the single-truck variety, containing a big center door which expedites the handling of the mail pouches. The Metropolitan also will continue to carry some pouch mail on regular passenger cars, though the bulk will be handled by cars designed for that purpose. Just how the mail cars will get into the new depot has not yet been determined. The company has its own tracks into the post office, the mail being loaded on to platforms and run into the building with expedition under this arrangement.

New Company Publication.—The Northern Ohio Traction & Light Company, Akron, Ohio, has begun the publication of *Traction Bulletin* under the direction of James A. Braden, general passenger agent of the company. The first issue of the paper, dated Feb. 25, 1914, contained four pages of general news in regard to the activities of the company. The purpose of the bulletin as set forth in the first issue follows: "This little paper is placed in the hands of the car riders of Akron and its environs for two purposes. One is to give information concerning the electric railway lines and their operation, and to discuss street car problems in a frank and open way. The other has in view enlisting co-operation in the safety work systematically carried on by the company and its employees. These purposes, then, constitute the mission of the *Traction Bulletin*. Its only promises are a strict fidelity to truth and a spirit of frankness and fairness, granting always to the utmost all that it asks for itself—a square deal." The paper will be issued twice a month and it will be placed in boxes in the city and inter-urban cars of the company for distribution among the company's patrons.

P. N. Jones on the Abuse of Transfers.—P. N. Jones, general manager of the Pittsburgh (Pa.) Railways, conferred recently with the members of the City Council sitting as a committee of the whole in regard to the rule of the company that transfers must be asked for when a cash fare is paid. Mr. Jones stated that establishing stops and the rules regarding transfers must be in the hands of the company. If they were left to the public the cars would stop in front of every house and people would ride free. Mr. Jones read to the Council a letter explaining the position of the company, and this was followed by a general discussion. In the letter the company recited in detail the abuses of transfers by the public. The letter of the company was concluded as follows: "We feel that as soon as the Pittsburgh public becomes familiar with the requirement that transfers must be asked for when paying cash fare there will be absolutely no complaint from any well-meaning passenger. This is now a general rule in all large cities and in some cities the transfer must be paid for and a rebate is received by the passenger when the transfer is taken up by the second conductor. Until such time as some method is discovered by means of which a conductor can decide at the transfer point who is actually entitled to a transfer and who is not we do not see any better method than the one now in use here."

Personal Mention

Mr. Joseph W. Folk has resigned as solicitor of the State Department to become chief counsel to the Interstate Commerce Commission.

Mr. Hugh M. Wilson, first vice-president of the McGraw Publishing Company, Inc., sailed on the S. S. *Minnewaska* on Feb. 28 for an extended trip in Europe.

Mr. George H. Binkley has been appointed engineer of the maintenance of way department of the San Francisco-Oakland Terminal Railways, Oakland, Cal.

Mr. W. L. Wilson has been appointed assistant engineer of the maintenance of way department of the San Francisco-Oakland Terminal Railways, Oakland, Cal.

Mr. Richmond Talbot has been elected assistant treasurer of the Federal Light & Traction Company, New York, N. Y., to succeed Mr. Harvey N. Wadhams, resigned.

Mr. W. E. Mandelick, secretary of the Underground Electric Railways, Ltd., London, Eng., who has been in New York for the last few weeks, has returned to London.

Mr. W. V. Griffin, treasurer of the Chicago (Ill.) Elevated Railways, has been appointed secretary and treasurer of the Illinois Electric Railways Association to succeed C. E. Flenner, deceased.

Mr. R. S. Stangland will continue as operating engineer of W. S. Barstow & Company, Inc., New York, N. Y., with supervision of the operations of the subsidiary companies of the Eastern Power & Light Corporation.

Mr. T. Russell Robinson has accepted the position of operating engineer with W. S. Barstow & Company, Inc., New York, N. Y., and will have supervision over the operations of the subsidiary companies of the General Gas & Electric Company.

Mr. William Buchsbaum has tendered his resignation as treasurer of the Reading Transit & Light Company and the Metropolitan Electric Company, Reading, Pa., to accept the position of auditor in charge of the auditing department of W. S. Barstow & Company, Inc., New York, N. Y.

Mr. E. D. Gault has been elected treasurer of the Reading Transit & Light Company and the Metropolitan Electric Company, Reading, Pa., to succeed Mr. William Buchsbaum, who has become auditor in charge of the auditing department of W. S. Barstow & Company, Inc., New York, N. Y.

Mr. D. A. Hegarty, formerly manager of the railway and electrical departments of the New Orleans Railway & Light Company, New Orleans, La., has been appointed general manager of the Houston Lighting & Power Company, Houston, Tex., which is controlled by the United Gas & Electric Corporation.

Mr. H. M. Clark, who has been private secretary to Mr. C. J. Franklin, general superintendent of railways of the Portland Railway, Light & Power Company, Portland, Ore., has resigned from the company to become associated with Mr. Franklin in his independent consulting work, referred to elsewhere in this column.

Mr. John F. Anglin has been placed in charge of the newly created efficiency department of the Third Avenue Railway System, comprising lines in New York City and Westchester County, including Yonkers, New Rochelle and Mount Vernon. This department will have direct charge of the coasting time recorders and terminal running time clocks which are being installed on the entire system.

Mr. George H. Harris has been appointed general superintendent of the San Francisco-Oakland Terminal Railways, Oakland, Cal., in charge of all matters pertaining to operation. Mr. Harris was formerly superintendent of the railway department of the Birmingham Railway, Light & Power Company, Birmingham, Ala. A biography of Mr. Harris was published in the *ELECTRIC RAILWAY JOURNAL* of Jan. 17, 1914.

Mr. Henry E. Huntington, president of the Los Angeles (Cal.) Railway Corporation and an officer and director in many other corporations, is the subject of a character study, "A Little-Known Master of Millions—The Story of Henry E. Huntington, Constructive Capitalist," by Isaac F. Marcosson, issued in pamphlet form by E. H. Rollins & Sons,

bankers, Boston, Mass. The sketch is accompanied by a portrait of Mr. Huntington.

Mr. Robert M. Feustel has been appointed chief engineer of the Illinois Public Utility Commission. He was graduated from Purdue University in the civil engineering class of 1905, and after about two years in railroad construction work joined the engineering staff of the Wisconsin Railroad Commission. He severed his connection with that commission recently to become a member of the firm of Sloon, Huddle, Feustel & Freeman, Madison, Wis., appraisal and valuation engineers.

Mr. John Dickson has been appointed general master mechanic of the Spokane, Portland & Seattle Railway, the Oregon Trunk Railway, Oregon Electric Railway and the United Railways, with headquarters at Portland, Ore. Mr. Dickson began railway work as machinist apprentice with the Great Northern Railway. He was subsequently until 1899 machinist, air brake man and draftsman, leaving that road to become instructor in the Mechanic Arts High School at St. Paul, Minn. He remained in that position for two years, returning to the Great Northern Railway as general air brake instructor, and was successively superintendent of shops at Everett, Wash., and master mechanic of the Dakota division. He has been with the Spokane, Portland & Seattle Railway as master mechanic since the road was first put in operation.

Mr. Pomeroy Ladue, who has been appointed purchasing agent of the San Francisco-Oakland Terminal Railways, Oakland, Cal., was born in Detroit, Mich., attended the schools of Detroit and Ann Arbor, and continued to reside in Ann Arbor as a member of the faculty of the school of engineering there after he was graduated from the University of Michigan. In 1895 Mr. Ladue removed to New York City, where he remained an active member of the faculty of the school of engineering and applied sciences of New York University until 1905. In this year he returned to Michigan as an official of electric railways which later became merged into the Michigan United Railways. For three years Mr. Ladue was treasurer of the Michigan United Railways, retiring in 1908 to become connected with the Whiting Manufacturing Company, Philadelphia.

Mr. Joseph H. Brewer, who was recently elected president of the American Public Utilities Company, Grand Rapids, Mich., was born thirty-eight years ago in that city. At the age of fourteen he entered the employ of the Michigan Central Railroad as a stenographer. At sixteen he was stenographer for the general superintendent of the Chicago & Western Michigan Railroad, and in 1891 he went to Detroit and opened a stenographic office for court reporting. In 1892 he returned to Grand Rapids, associating himself with Mr. Charles H. Bender, then the leading court stenographer in western Michigan. He retired from this partnership and devoted himself to the public utility business which he had inaugurated in 1904 by the purchase of the Holland (Mich.) Gas Company. Later he purchased the Winona (Minn.) Gas Light & Coke Company and the Red Wing Gas Light & Power Company, Red Wing, Minn. His work with these properties brought about an affiliation with Mr. Charles B. Kelsey, who controlled the gas companies in Albion, Mich., and Valparaiso, Ind. The new firm acquired several other properties, and in 1912 the American Public Utilities Company was formed as a holding company.

Mr. J. G. Swain, who has been superintendent of power and shops for the Cleveland, Painesville & Eastern Railroad and the Cleveland, Painesville & Ashtabula Railroad, Willoughby, Ohio, for more than three years, has recently taken a position as general superintendent of power and shops of the Northern Ohio Traction & Light Company, with headquarters at Akron, Ohio. Mr. Swain has charge of the power houses, the substations, the lighting and power department, shops, overhead and underground distribution. He was graduated from the electrical engineering department of Purdue University in 1897, and has been active in electric power work since that time. He was connected with the Mahoning Valley Railroad as assistant superintendent for three years, and after this spent three years with the Westinghouse Electric & Manufacturing Company in various capacities. Three years more were spent with the St. Joseph Railway Light, Heat & Power Company, St. Joseph,

Mo., as superintendent of light and power previous to the term spent on the Cleveland properties. In addition to the above work, Mr. Swain has been and still is consulting engineer for the Everett-Moore interests. He has invented a number of practical devices to facilitate work in shops and has made a special study of power-house design and construction.

Mr. B. F. Wood, who recently resigned as assistant engineer of the Pennsylvania Railroad in charge of electric railway equipment to become chief engineer of the United Gas & Electric Engineering Corporation, New York, N. Y., was the guest at a dinner given in his honor on March 5. The hosts were the members of the Importation Club, of New York, and the dinner was held at the Martinique, where between fifty and sixty of Mr. Wood's friends in the electrical and railway industries gathered to wish him success in his present occupation. Mr. Frank Hedley acted as toastmaster.

Mr. W. E. Hendley, whose appointment as superintendent of economy of the San Francisco-Oakland Terminal Railways, Oakland, Cal., was referred to recently in the *ELECTRIC RAILWAY JOURNAL*, was born in Ohio forty-six years ago. He commenced his railroad career as night operator on the Lake Erie & Western Railway, afterward being promoted to dispatcher of the Cincinnati Northern Division of the Big Four Railway, at Vanwert, Ohio. In 1898 he became associated with the Central Construction Company, Detroit, as auditor and assistant treasurer. This company built the Detroit, Ypsilanti, Ann Arbor & Jackson Electric Railway between Detroit and Jackson, Mich., and in 1899 Mr. Hendley was appointed auditor of the railway, which position was held for five years. In 1904 he was appointed auditor and assistant treasurer of the Detroit & Toledo Construction Company, organized to build a double-track electric railway between Detroit, Mich., and Toledo, Ohio. During 1906 he was auditor and treasurer of Mahoning Construction Company, Youngstown, Ohio, which built the Youngstown Southern Railway. In 1907 Mr. Hendley became associated with the George G. Moore interests of Detroit, as assistant to Mr. J. Peyton Clark, then general manager of the Michigan United Railways. Upon Mr. Clark's retirement from the Michigan company Mr. Hendley was sent to Atlanta, Ga., to represent the financial interests of the Moore syndicate in the building of a 90,000-hp hydroelectric plant on the Vallulah River, which was completed on Jan. 1, 1914. As superintendent of economy with the Key System, Mr. Hendley will have charge of the coasting recording department.

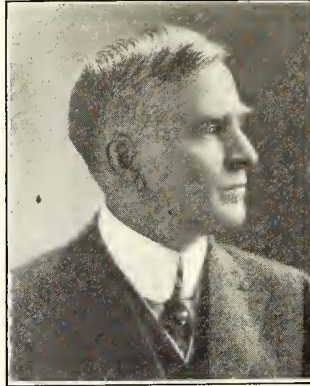
Mr. C. J. Franklin has resigned as general superintendent of railways of the Portland Railway, Light & Power Company, Portland, Ore., to open an office in the Wilcox Building, Portland, as a consulting expert in all matters embracing operating problems, construction, valuations, rate situations, etc., in connection with public utility properties. During the last two years Mr. Franklin has given close attention to methods of operation and studies of details for new business, and his services have been retained upon special occasions by some of the principal public utility companies on the Pacific Coast. Previous to becoming connected with the Portland Railway, Light & Power Company Mr. Franklin passed five years with Stone & Webster at Tacoma as general superintendent of the Tacoma Railway & Power Company and the Puget Sound Electric Railway, operating between Tacoma and Seattle. Mr. Franklin went to the Pacific Coast after he had served thirteen years with the Virginia Passenger & Power Company, Richmond, Va. He first became associated with the electric railway business in Richmond, Va., where as a boy he started at work in the shops.



C. J. Franklin

Mr. R. W. Spoffard, who has been general superintendent and purchasing agent of the Augusta-Aiken Railway & Electric Corporation, Augusta, Ga., has been appointed acting general manager of the company to succeed Mr. E. C. Deal, who, as noted in the *ELECTRIC RAILWAY JOURNAL* of Feb. 28, 1914, has retired from the company to become connected with W. N. Coler & Company, New York, N. Y.

Mr. Robert Morrison, Jr., who has been elected secretary and assistant treasurer of the San Francisco-Oakland Terminal Railways, Oakland, Cal., was born in Canada. His early life was spent in steam railroad service. Later he engaged in banking in Michigan for several years, which business he left in order to enter the service of the Michigan United Railways in 1906. He held the office of secretary and treasurer with that company until the property was leased to the Michigan United Traction Company on Jan. 1, 1912. He continued with the successor company, the Michigan United Traction Company, as secretary until July 1, 1912, when he resigned to enter the service of Mr. George G. Moore, Detroit, Mich. Mr. Morrison was elected vice-president and secretary of the Lincoln (Neb.) Traction Company in February, 1913, but resigned in November of the same year to re-enter the service of Mr. Moore.



Robert Morrison, Jr.

Mr. Morrison was elected vice-president and secretary of the Lincoln (Neb.) Traction Company in February, 1913, but resigned in November of the same year to re-enter the service of Mr. Moore.

OBITUARY

James McArdle, general foreman of the Broadway and Seventh Avenue divisions of the New York (N. Y.) Railways, died suddenly on March 1, 1914. Mr. McArdle had been connected with surface-car transportation in New York City for about twenty-five years. Before being appointed to the position of general foreman of the Broadway and Seventh Avenue divisions he held a similar position on the Sixth and Ninth Avenue divisions and on the Central Cross-town division. Mr. McArdle was forty-nine years of age. He leaves a widow, a son and three daughters.

Robert F. Cummins, one of the promoters of the Marion, Bluffton & Eastern Traction Company and the Bluffton, Geneva & Celina Traction Company, Bluffton, Ind., and general manager of the companies for a number of years, is dead. Mr. Cummins was educated in Bluffton and at Valparaiso and Terre Haute. He edited the *Decatur Democrat*, and subsequently engaged in the drug, clothing and insurance business during his residence in Bluffton. In 1894 he was elected County Clerk of Wells County, in which Bluffton is located. At his retirement from that office Mr. Cummins engaged in the oil business. He was one of the founders of the Midway Oil Company, but sold his holdings in 1901. He was also connected with the promotion of the Kokomo, Marion & Western Traction Company.

Edward J. Dunne, superintendent of overhead distribution of the Public Service Railway of New Jersey, died on March 4, 1914. He had gone to the hospital for what was considered a slight operation for a growth in the mouth and died while under the anesthetic. Mr. Dunne had been connected with the Public Service system since 1903, going there with Mr. Albert H. Stanley, on whose staff he had previously been in Detroit. For a period during his early life he had been a sailor, but about thirty years ago left the sea to engage in overhead construction with the Cleveland Telephone Company. He then went with the Cleveland Electric Company, and upon the development of the electric railway joined the forces of one of the early electric railway lines in Cleveland. From Cleveland he went to St. Louis and from St. Louis to Detroit, in each city being engaged in electric railway work. He was a member of the committee on power distribution of the American Electric Railway Engineering Association from 1909 to 1911 inclusive. He was about fifty-two years of age.

Construction News

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

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

RECENT INCORPORATIONS

***Tampa, Atlantic & Gulf Railway, Tampa, Fla.**—Application for a charter has been made by this company to build an electric or steam railway through the counties of Polk, Manatee, De Soto, Palm Beach and Dade to some point on the east coast of Florida. Capital stock, \$250,000. Officers: W. J. Epperson, Bronson, president; W. J. Boling, St. Louis, Mo., vice-president, and T. C. McEachin, Meredith, Fla., secretary and treasurer.

Caldwell County & Southern Railway, Kingston, Mo.—Application for a charter has been made by this company to build a 9-mile electric railway from Kingston to Hamilton. Capital stock, \$100,000. Directors: F. L. Bowman, H. C. Shively and S. C. Rogers, Kingston; Perry Roberts, Hamilton, and David Miller, Kansas City. [E. R. J., Feb. 28, '14.]

Columbia-Camden Railroad, Columbia, S. C.—Chartered in South Carolina to build a 30-mile electric railway from Columbia to Camden. Capital stock, \$250,000. Incorporators: B. L. Abney, F. H. Weston and W. B. Evans. [E. R. J., Feb. 17, '12.]

Baraboo, Devil's Lake & Western Railway, Madison, Wis.—Application for a charter has been made by this company in Wisconsin to build a 100-mile electric railway to connect Baraboo, Portage, Kilbourn, Plain and Devil's Lake. Among those interested are T. Edward Mead, T. F. Risley and W. H. Marriott, all of Baraboo. [E. R. J., Feb. 28, '14.]

FRANCHISES

Stockton, Cal.—The Stockton Terminal & Eastern Railway has asked the Council for a franchise on Miners Avenue and across McLeod Lake in Stockton.

Glendora, Cal.—The Pacific Electric Railway has received a franchise from the Council on Electric Street in Glendora.

***West Palm Beach, Fla.**—Edward B. Garretson and M. J. Hoenig will ask the Council and County Commissioners for a franchise in the city and county of West Palm Beach.

Middlesboro, Ky.—On April 30 a franchise providing for the construction of an electric railway within the city limits of Middlesboro will be offered for sale. J. L. Manning is Mayor.

Kansas City, Mo.—The Metropolitan Street Railway has received a franchise from the Council for a line on Twenty-fourth Street from Main Street to Grand Avenue in Kansas City.

Summit, N. J.—The Tri-County Power & Traction Company has asked the Council for a franchise to operate a trackless trolley through West Summit.

Nowata, Okla.—The Oklahoma Northern Railroad, Vinita, has asked the Council for a franchise in Nowata. This railway will connect Vinita and Nowata, Okla., and Coffeyville, Kan. J. W. Tolliver, Centralia, Okla. [E. R. J., March 8, '13.]

Morrisburg, Ont.—The Ottawa & Morrisburg Electric Railway has asked the Council for a franchise in Morrisburg.

Portland, Ore.—The Portland & Oregon City Railway has asked the Council for a twenty-five-year franchise from East Twenty-eighth Street to Hoyt Street in Portland.

Hazel Dell, Pa.—The Mahoning & Shenango Valley Railway & Light Company has asked the Council for a franchise in Hazel Dell.

Tacoma, Wash.—The City Council recently approved of the plans of the Seattle-Tacoma-Olympia Railway for a temporary monorail railway system, to be constructed along Eleventh Street, on the tideflats. The Council has given the company six months in which to construct and place in operation the temporary system, after which a franchise will be given if same is approved by the Council. This is part of a plan to build a railway between Seattle and Olympia via Tacoma.

TRACK AND ROADWAY

Birmingham-Tuscaloosa Railway & Utilities Company, Birmingham, Ala.—This company is reported to have issued \$600,000 bonds to build a central generating station and gas holder, extend its gas-distributing system and electrify and extend its steam belt line railway. It also plans to erect wharves and loading docks. [E. R. J., Feb. 14, '14.]

***Jonesboro, Ark.**—J. R. Brown and associates are considering plans to build an electric railway between Jonesboro and Paragould.

Northern Electric Railway, Chico, Cal.—The construction of the first unit of the Sacramento Eastern Railway, which will provide North Sacramento with an electric line, has been arranged in a contract between the officials of the Northern Electric Railway and the North Sacramento Land Company. The first unit will provide for 1½ miles of railway through the center of the tract from the Northern Electric Railway to the Southern Pacific Company's lines. The new line will leave the Northern Electric Railway between the Globe and North Sacramento stations, about 1/3 mile beyond the Globe Iron Works, and, extending easterly across the tract, will reach the Southern Pacific Company's main line. Work on this road will, it is expected, be begun within a month.

***Oroville, Cal.**—Paul Riecker and associates are considering plans to build an electric railway from Oroville to Wyandotte and Bangor. Ultimately this line would be extended into Sierra County.

Washington Railway & Electric Company, Washington, D. C.—This company is asked to extend its lines in Anacostia from Nichols Avenue and Good Hope Road to Benning.

***St. Petersburg, Fla.**—Edward T. Lewis, Central Avenue, St. Petersburg, and associates have begun work on the construction of an electric railway in Lewiston.

Tampa (Fla.) Electric Company.—This company is asked to consider plans to build an extension along Six-Mile Creek Road to Six-Mile Creek Bridge in Tampa.

Southern Traction Company of Illinois, East St. Louis, Ill.—The first division of this company's line, from East St. Louis to Belleville, has been completed.

Southern Illinois & St. Louis Railway, Harrisburg, Ill.—Plans are being made by this company to begin work soon on its electric line between Marion and Harrisburg, via Herrin, Benton and Johnson City. William Rothman, Chicago, is interested. [E. R. J., Feb. 7, '14.]

Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind.—This company is asked to consider plans to extend the South Wayne line to Rudisill Boulevard in Fort Wayne.

Tri-City Railway, Davenport, Ia.—A 1½-mile extension will soon be built by this company on the Iowa side of the Ohio River between the east limits of the city of Davenport and Bettendorf. Heretofore the company has been using the track of the Iowa & Illinois Railway between Davenport and Bettendorf.

Hutchinson & Northern Railway, Hutchinson, Kan.—An election will soon be held at Hutchinson to vote terminal bonds to aid this company to build its 14-mile line. Construction will begin in the spring, the first section being from Hutchinson to Burrton. From Burrton the line will be extended west to Nickerson, Sterling and Great Bend, with Dodge City as the eventual terminus. W. S. Thompson, Hutchinson, is interested. [E. R. J., Feb. 21, '14.]

***Lawrence, Kan.**—About half of the right-of-way has been secured between Eudora and De Soto, Kan., by Hoeker & Dixon, who plan to build an electric railway between Zarah and Lawrence. Construction will be begun in the spring.

Topeka (Kan.) Railway.—Grading has been begun by this company for the extension to Gage Park. The company is asked to extend its tracks from Washburn College to Mount Hope Cemetery in Topeka.

Boston (Mass.) Elevated Railway.—This company is asked to consider plans to build a new line from Medford Square to connect with the Cambridge subway in Medford. Plans are being made for an extension to Everett and Malden.

Detroit (Mich.) United Railway.—At a hearing in regard to the construction of the proposed Junction Avenue line in Detroit by this company the Michigan Railroad Commission refused to permit crossings at grade with steam road tracks. It was suggested by the commission that the city and the company decide on some other route to avoid the necessity of grade separation, and some action toward this end will be taken within a short time.

Metropolitan Street Railway, Kansas City, Mo.—This company placed in operation on March 1 its new line to Waldo on the Dodson line of the Kansas City & Westport division. The name of the new line will be the Waldo-Country Club line.

St. Louis, Lakewood & Grant Park Railway, St. Louis, Mo.—During the next eight weeks this company will award contracts to build about 4 miles of new track.

Big Horn Canyon Irrigation & Power Company, Billings, Mont.—It is reported that this company will award a contract about July 1 to build a 68-mile electric railway from the mouth of Big Horn Canyon, Mont., north via St. Xavier and Hardin to Custer on the Northern Pacific Railway. There will be one steel bridge over the Big Horn River, about 600 ft. long. The company also plans to build a dam 200 ft. high. A. W. F. Koch, Hardin, Mont., chief engineer. [Jan. 24, '14.]

Fonda, Johnstown & Gloversville Railroad, Gloversville, N. Y.—This company is double-tracking on private right-of-way its line from Fort Johnson to the west city limits of Amsterdam.

Stark Electric Railroad, Alliance, Ohio.—During the year this company plans to build about 25 miles of new track.

City Railway, Dayton, Ohio.—This company is asked to consider plans to extend its tracks east on Third Avenue to Overlook Avenue in Dayton. Another branch contemplated is the extension of its Kammer Avenue line to Westwood Plat, West Dayton and into the territory west of Kammer Avenue and north of Westwood.

Toledo Railway & Light Company, Toledo, Ohio.—Plans for several extensions of its lines in the East Side in Toledo are being planned by this company. Among the extensions will be a branch line to Cottonwood and a loop on Oakdale Avenue to East Broadway. The Woodville line may be extended to Willow Cemetery, thence via Brandville and Metzger's Corners to connect with the Starr Avenue line at Wheeling Street.

Mahoning & Shenango Railway & Light Company, Youngstown, Ohio.—An extension of the local lines in the North Hill district is contemplated by this company in the near future.

Ardmore & Western Interurban Railway, Ardmore, Okla.—Grading will be begun at once by this company from Ardmore north to within 1 mile of Springer and west via Woodford, Milo and Oil City. F. B. McElroy, Ardmore, president. [E. R. J., Jan. 31, '14.]

***Miami, Okla.**—Work has been begun on the survey for an electric railway from Miami, Okla., to Columbus, Kan. At North Miami it will connect with the lines of the Oklahoma, Kansas & Missouri Interurban Railway and enter Miami over this line.

Fort William (Ont.) Electric Railway.—The city of Fort William has applied to the Ontario Legislature to sanction a by-law to expend \$30,000 to build and equip an extension to the corporation stone quarry near Mount McKay, and also a by-law to expend \$238,000 for further improvements and extensions of its lines in Fort William.

Niagara, Welland & Lake Erie Railway, Niagara Falls, Ont.—The construction of an electric railway from Welland to Port Colborne and along the shore of Lake Erie to Fort Erie, and from there along the Niagara River to Niagara Falls, was decided upon at the annual meeting of this company held recently in Toronto. Extensions of the Welland Street Railway on North Main Street to Parkway Heights and to Rosedale are also to be built at once. C. J. Laughlin, vice-president.

***Sarnia, Ont.**—Plans are being considered to build an electric railway from Sarnia to Wallaceburg. It is also planned to distribute power along its right-of-way and operate other public utilities.

Toronto & Eastern Railway, Toronto, Ont.—Surveys have been completed for the extension of this company's line from Pickering, Ont., to a point in Scarborough, 15 miles. It is understood that this line will connect with the Canadian Northern Ontario Railway and enter Toronto over that line.

Southern Oregon Traction Company, Medford, Ore.—This company plans to build 3 miles of new track into the suburban districts during the next few months. S. S. Bullis, Medford, president. [E. R. J., Dec. 20, '14.]

Oregon Short Line Railway, Portland, Ore.—Plans are being considered by this company to build an extension of the Twin Falls line from Rogerson, Idaho, south to Valley Pass, Nev., about 85 miles.

Portland Railway, Light & Power Company, Portland, Ore.—C. J. Holloway, J. Cook and other residents of Sagnaw Heights and Cadwell Park, representing property owners in this section, recently petitioned the Portland Railway, Light & Power Company for an extension of the company's Hawthorne line into the territory named.

Pittsburgh & Butler Street Railway, Pittsburgh, Pa.—Plans are being made to build soon a 2-mile extension from Butler to East Butler.

Reading (Pa.) Transit Company.—Preliminary surveys will soon be made by this company to extend its line in De Kalb Street in Reading to North Wales, with a spur to Ambler and an extension later on to Doylestown and Willow Grove. A new line from Norristown to Doylestown is contemplated.

Wilkes-Barre (Pa.) Railway.—This company is asked to consider plans to extend its line over Academy Street and down the Old River Road to the section of the city known as Riverside.

Montreal (Que.) Tramways.—This company has informed the Outremont Town Council that it plans to begin work early in the spring on the extension of the Van Horne Avenue line to the town limits.

Sioux Falls (S. D.) Traction Company.—During the summer this company plans to build 1 mile of new track, pave about 2 miles of track and put in a lot of special work on its lines in Sioux Falls.

***Clarksville, Tenn.**—A project to build a 35-mile electric railway from Clarksville, Tenn., into southern Kentucky via Christian and Trigg Counties, Ky., and Stewart County, Tenn., is being planned. Edward Martin, Big Rock, Tenn., is one of those interested.

Jackson Railway & Light Company, Jackson, Tenn.—Work will be begun at once by this company on its 2-mile extension from Main Street and Market Street via Poplar Street in Jackson to the Country Club site.

Murfreesboro (Tenn.) Electric Railway.—Surveys have been completed by this company for its line between Nashville and Murfreesboro. G. B. Howard & Company, engineers.

***Signal Point, Tenn.**—A route for an electric railway from Signal Point Mountain, near Chattanooga, northwardly through the middle of Walden's Ridge is being surveyed, with the probable ultimate destination at Louisville, Ky. An effort is now being made by the business men of Pikeville to have the line pass through their town, as the survey has now reached Morgan Springs, on the mountain opposite Pikeville.

Ogden (Utah) Rapid Transit Company.—Assembly of material for construction of the loop for this company in the business district, including new lines on Wall Avenue and Twenty-fourth Street and improvement on the Twenty-fifth Street line in Ogden, has been begun by the J. P. O'Neill Construction Company and work will be begun as soon as the weather permits.

Yakima Valley Transportation Company, North Yakima, Wash.—Surveys have been completed by this company for its extension into the Wide Hollow District, a distance of about 12 miles. Work will be begun in the immediate future.

Madison & Janesville Traction Company, Beloit, Wis.—Preliminary corporation stock to the extent of \$25,000 has been subscribed by citizens of Madison to build an electric railway from Beloit to Whitewater and Elkhorn and from Janesville to Madison. A. W. Shoelkemp, Madison, is interested. [E. R. J., Feb. 28, '14.]

SHOPS AND BUILDINGS

Geary Street Municipal Railway, San Francisco, Cal.—This company has awarded the contract to build the new addition to the carhouse at Geary Street and Presidio Avenue to James L. McLaughlin, San Francisco.

Shore Line Electric Railway, Saybrook, Conn.—This company has opened a new passenger station at the entrance of Griswold Avenue and the Layville Road in New London.

Southern Traction Company of Illinois, East St. Louis, Ill.—This company has completed its new carhouses, yards and repair shops in East St. Louis.

Hutchinson (Kan.) Interurban Railway.—A new passenger station has been built by this company at the terminus of the new Fourth Avenue line in Hutchinson.

International Railway, Buffalo, N. Y.—This company has purchased the property at 24-30 West Avenue in Lockport on which it plans to build soon a new terminal for the interurban line from Buffalo to Lockport, Rochester and other points east. The property cost upward of \$25,000, and it is said the new passenger and freight terminal will cost between \$30,000 and \$40,000. No contracts have been awarded.

Portland Railway, Light & Power Company, Portland, Ore.—Work has been begun by this company on the new passenger station on the Mount Hood Railway at the Stanley Crossing in Portland.

Chattanooga (Tenn.) Traction Company.—This company has moved its offices to the ground floor of the James Building in Chattanooga.

Jefferson County Traction Company, Beaumont, Tex.—Work has been begun by this company on the construction of a new passenger station in Pear Ridge.

POWER HOUSES AND SUBSTATIONS

Kansas City & Western Railway, Kansas City, Kan.—This company will erect a new pumping plant at Twenty-ninth Street and New Jersey Avenue in Kansas City to replace that recently destroyed by fire with a loss of \$2,000.

Central City, Greenville & Drakesboro Traction Company, Central City, Ky.—Plans are being made by this company to build a new steam-driven electric plant on Green River about 2 miles from Central City.

Caldwell County & Southern Railway, Kingston, Mo.—This company has purchased a tract of land west of Hamilton on which it plans to build a new power plant in the near future.

Fonda, Johnstown & Gloversville Railroad, Gloversville, N. Y.—This company is installing Jones underfeed stokers on ten Springfield boilers and a new 10,000-gal. Worthington pump in its Tribes Hill power station. It is also installing a 20,000-kva motor generator set, ordered from the General Electric Company, at its Amsterdam substation.

Orange County Traction Company, Newburgh, N. Y.—This company has awarded a contract to the Central Hudson Gas & Electric Company, Newburgh, to supply the company with power for its electric railway in Newburgh.

Niagara, St. Catharines & Toronto Railway, St. Catharines, Ont.—During the early summer this company plans to install a rotary converter set at Niagara-on-the-Lake, consisting of a 750-kw Westinghouse unit, 375 volts on the alternating-current side and 600 volts on the direct-current side. Power will be supplied by a 13,000-volt line which parallels the company's track from St. Catharines to Niagara-on-the-Lake, where reducing transformers are installed.

Toronto (Ont.) Suburban Street Railway.—This company has let a contract to the Canadian General Electric Company for the substation apparatus for the line from Lambton to Guelph, Ont., 46 miles. The catenary type of overhead construction will be used, and there will be three substations, at Islington, Georgetown and Guelph respectively. Fifteen-hundred-volt rotary converters of 500-kw capacity each will be used, power being transmitted to the substations at 25,000 volts. Provision will also be made for the supply of power from a separate bank of transformers in each substation for distribution along the line for miscellaneous power and lighting purposes.

Manufactures and Supplies

ROLLING STOCK

Sioux Falls (S. D.) Traction System expects to purchase two cars.

Regina (Sask.) Municipal Railway expects to purchase eighteen garbage cars.

San Diego (Cal.) Electric Railway has ordered forty cars from the St. Louis Car Company.

Johnstown (Pa.) Traction Company has ordered two cars from the Niles Car & Manufacturing Company.

Republic Railway & Light Company, Youngstown, Ohio, is reported to be considering the purchase of ten cars.

London (Ont.) Street Railway, at its recent annual meeting, decided to take up matter of purchasing six more cars.

Stroudsburg (Pa.) Passenger Railway is reported to be considering the purchase of about five single-truck passenger cars.

Little Rock, Pine Bluff & Eastern Traction Company, Little Rock, Ark., is reported to be considering the purchase of new cars.

Northwestern Pacific Railroad, San Francisco, Cal., will add six new motor cars by installing motor equipment under cars that are now trailers.

Stark Electric Railway, Alliance, Ohio, is expecting to purchase two interurban cars, to be equipped with steps attached to the back end of the cars.

Mobile Light & Railroad Company, Mobile, Ala., is considering the purchase of several steel arched-roof closed cars, length 21 ft. over corner-posts, with 5-ft. platforms, making approximately 31-ft. car bodies.

Sunbury & Susquehanna Railway, Sunbury, Pa., noted in the *ELECTRIC RAILWAY JOURNAL* of Feb. 21, 1914, as being in the market for four cars, has ordered through W. R. Kerschner four 42-ft. all-steel interurban passenger cars from the Cincinnati Car Company.

Cincinnati (Ohio) Traction Company has received authority to issue \$253,500 of equipment trust certificates, the proceeds arising from the sale of which are to be used to purchase sixty double-truck, center-entrance, arch-roof, steel passenger cars at a price of \$4,225 each.

Ohio Electric Railway, Cincinnati, Ohio, has received authority from the Public Utilities Commission of Ohio to purchase five all-steel interurban center-entrance passenger cars, costing \$12,000 each; four motor express cars, costing \$10,000 each, and fourteen freight trailer cars, costing \$1,700 each.

Cumberland & Westernport Electric Railway, Cumberland, Md., has ordered two double-end, double-truck combination and baggage cars from The J. G. Brill Company. These cars will be 44 ft. 9 in. over bumpers and will be equipped with General Electric control and four-motor equipment, and Westinghouse combined automatic air-brake equipment, schedule AMN.

Toronto (Ont.) Suburban Street Railway is preparing specifications for cars for its line which is being built from Lambton to Guelph, Ont., and it is probable that an order for about ten 65-ft. cars will be placed in the near future. The electrical equipment will be supplied by the Canadian General Electric Company. The cars will be equipped with four 85-hp motors of the latest type, fully ventilated, and the control will be of the multiple-unit type to permit of train operation. The cars will operate on 600-volt line at approximately half normal speed, and changing from 1500-volt to 600-volt trolley or vice versa will involve no loss of time in adjustment of control apparatus.

TRADE NOTES

Railway Steel Spring Company, New York, N. Y., has appointed John P. Munn and Phillip B. Jennings as directors to fill vacancies created by resignations of William Barnum and W. H. Marshall.

National Carbon Company, Cleveland, Ohio, held its eighth annual salesmen's convention last week at the general offices in Cleveland. At the banquet Thursday night about 120 employees were present.

Westinghouse, Church, Kerr & Company, New York, N. Y., have established a laboratory for the purpose of testing concrete aggregates and waterproofing materials and investigating paints and preservative coatings for steel and concrete.

M. H. Hovey, Madison, Wis., consulting signal engineer, has arranged with the Fort Wayne & Northern Indiana Traction Company to act as its consulting engineer in connection with the installation by the company of 20 miles of block signaling on its lines this year.

Standard Paint Company, New York, N. Y., is commemorating the thirtieth anniversary of its P & B paints and compounds, the development of which has grown in a parallel manner with the development of electricity, arising and developing from the need of an efficient insulating material.

H. W. Johns-Manville Company, New York, N. Y., owing to the necessity for larger space and better facilities to handle its increased business, has obtained larger quarters for the Indianapolis, Ind., and Louisville, Ky., branches. The new address of the Indianapolis branch is 408-410 North Capitol Avenue; that of the Louisville branch, 659-661 South Fourth Avenue.

John L. Foster has been appointed chief electrician and superintendent of power of the Western Gas Construction Company, Fort Wayne, Ind., builder of gas apparatus and using electrical power throughout the plant. Mr. Foster was formerly with the Rapp & Zollinger Electric Company, Fort Wayne, Ind., and subsequently with the Terre Haute, Indianapolis & Eastern Traction Company at Lebanon, Ind.

Western Electric Company, New York, N. Y., made sales for the year 1913 amounting to approximately \$78,000,000, an increase of \$6,000,000, or over 8 per cent, over the 1912 sales of \$71,727,329. In 1911 sales amounted to \$66,211,975. The company added upwards of 4000 customers last year, bringing the number to approximately 36,000. The export business in 1913 was the largest in the history of the company, notwithstanding the conditions in Mexico.

O. P. Wilson, of the purchasing department of the Westinghouse Electric & Manufacturing Company, has resigned to accept the position of assistant general manager of the Norma Company of America, 20-24 Vesey Street, New York City, manufacturer and importer of high-grade ball bearings, roller bearings, precision instruments, etc. Mr. Wilson has been connected with the Westinghouse Company for fourteen years and for the last ten years has been one of its head buyers.

Puget Sound Traction, Light & Power Company, Seattle, Wash., has established an industrial department for the sole purpose of getting in touch with Eastern manufacturers, calling their attention to the possibilities existing in its territory, furnishing any and all kinds of information in regard to markets, transportation, labor, raw materials, power and any other essentials needed in a particular line, with the idea of eventually attracting these manufacturers to that part of the country.

McConnell, Thurman & Company, Grand Rapids, Mich., have been formed to deal in investment securities in Grand Rapids, Mich. The firm is composed of H. F. McConnell and Fred W. Langhorst, of H. F. McConnell & Company, New York, N. Y., and Allen G. Thurman and Eugene Gray, of Eugene Gray & Company, Columbus, Ohio. Direct connection will be had with H. F. McConnell & Company's New York house and that of Eugene Gray & Company in Columbus; also connections with firms in other cities dealing in public utilities and other securities.

A. M. Byers Company, Pittsburgh, Pa., manufacturer of pipe, has recently received several striking testimonials to the value of its product. One of these is from B. L. Smith, owner of a large office building in Seattle said to be the tallest office building in the world outside of New York City. Mr. Smith says: "Byers genuine wrought iron pipe was specified throughout. Every influence within reason was brought to bear upon the architects and myself to change to steel, but the more I looked into the merits of wrought iron versus steel the more convinced I became that Byers pipe was by far the best."

ADVERTISING LITERATURE

Stow Manufacturing Company, Binghamton, N. Y., has issued a catalog describing its portable electric tools.

National Tube Company, Pittsburgh, Pa., has issued Bulletin No. 15A, describing and illustrating its pipe for drilling purposes.

Sprague Electric Works of General Electric Company, New York, N. Y., has issued Catalog No. 329, describing and illustrating its various types of electric fans. Bulletin No. 49,000 describes portable ozonators.

Esterline Company, Indianapolis, Ind., has issued a folder illustrating its "Golden Glow" headlights and containing a testimonial letter in regard to the adoption of this headlight as a standard by the Detroit United Railway.

Stone & Webster, Boston, Mass., have issued their manual for 1914. This is a collection in compact and convenient form of financial information upon the properties in which the Stone & Webster Companies are interested. The book includes a map of the larger systems, a table showing when the interest and dividends of the different companies are paid, a summary of the earnings and expenses of all of the different companies, bond tables, etc. The same firm has issued a list of securities of companies managed by the Stone & Webster Management Association which are recommended for purchase at this time. Among the securities mentioned are the 6 per cent cumulative preferred stock and the common stock of the Galveston-Houston Electric Company, the 6 per cent cumulative preferred stock of the Puget Sound Traction, Light & Power Company, the 6 per cent cumulative preferred stock of the Railway & Light Securities Company and the first mortgage 5 per cent gold bonds of the Tampa Electric Company.

NEW PUBLICATIONS

Statistics of Freight Traffic. By J. H. Parmelee. 32 pages.

La Salle Extension University, Chicago.

The Industrial Traffic Department. By W. N. Agnew. 30 pages. La Salle Extension University, Chicago.

These treatises are part of the series of publications forming the basis of the La Salle Extension University course of instruction by correspondence in interstate commerce and railway traffic. While written primarily for the benefit of steam railroad traffic men, they contain general information regarding the traffic department and traffic statistics that will be interesting to the operating officials of electric railways doing freight business. Mr. Parmelee's book throws much light on the development and operation of freight traffic and the reader will secure much valuable information concerning such topics as railway mileage, equipment, capitalization, revenues and expenses. Mr. Agnew's treatise takes up such questions as the quoting of rates, routing of consignments, supervision of shipping and receiving and general traffic supervision. Each of the books contains suitable test questions at the end.

Electric Car Maintenance. By Walter Jackson. 275 pages.

McGraw-Hill Book Company, New York, N. Y. Cloth, \$3 net.

This book is a compilation from the ELECTRIC RAILWAY JOURNAL of several hundred articles on methods of electric car maintenance. It was prepared to put into more accessible form the many shorter, practical articles which are likely to be forgotten or mislaid. Republication in book form has made it possible to classify the articles, omit all material of temporary interest and use larger and clearer cuts than in a weekly periodical. In fact all of the cuts in this book were made anew, and in some cases illustrations made from drawings have replaced the original halftones. The mechanical and electrical practices described cover work done by electric railways of all sizes, but as a rule they are applicable almost anywhere. For example, the article on the seating practices of the Brooklyn Rapid Transit System gives to any user of rattan seating the valuable experiences of a company which is large enough to employ a seating expert. A special feature is the chapter on instruction prints, which contains a large number of simplified circuits of controllers, motor connections, etc. On the whole, this book is one which should be in the possession of every car equipment and maintenance man for it is a work of the kind that more than repays its cost if use is made of any one of its hundreds of kinks.