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CHOICE OF SYSTEM AT MONTREAL

The announcement last December that the Canadian Northern railway was planning to install a 2400-volt direct-current system is followed this week by an article describing the reasons for the adoption of this system. The author is the mechanical and electrical engineer of the contractors building this line, so that the reasons for the adoption of the system selected are authoritative as well as convincing, when the circumstances are considered. The description in this issue of the Butte, Anaconda & Pacific electrification, the most important 2400-volt road yet installed, adds to the interest of Mr. Lancaster's article. The success of the system for the conditions existing in Butte seems assured, and the experience developed there promises to have an important bearing on the more extended future use of high direct-current voltage for railway operation. The interpole motor has certainly effected a revolution in our ideas on the permissible limit of voltage on a commutator, and if those who are enthusiastic in regard to high d.c. operation are to be believed the limits have not been reached even in the Butte installation. As we stated in an editorial recently, we believe that where a railroad has investigated the suitability of different systems of electric traction for use under certain conditions and has reached a definite conclusion in favor of one or another it should make public its reasons for the adoption of the particular system selected. So many claims are made in favor of this system, that system and the other that the average railway manager is confused in trying to decide which is best in any particular set of circumstances, although this ought to be a matter which could be clearly set forth in terms which any engineer could understand. We hope that those responsible for the choice of system on other electrifications will be as ready as Mr. Lancaster to give the reasons for their choice.

AUXILIARY FRONT-END COLLECTION

It is a common feature of electric railway car-loading practice at terminals and other places which are congested during the rush hours to see a large number of inspectors at work trying to regulate the crushing passengers to move in orderly fashion toward the rear entrance of the cars. In the meantime, a few passengers may be leaving more or less leisurely by way of the front platform, which thereafter remains unused. One company, however, has departed successfully from the beaten path in employing its experienced men to aid the regular conductors by serving as fare

collectors at the front platforms. Such auxiliary fare collectors have now been employed on the lines of the Metropolitan Street Railway, Kansas City, for three years, so that the practice is very far from being an experiment. These front-end collectors record the fares on a register hung around their neck. They also issue and collect transfers, but always remain in the street. The saving in time which this method has achieved at Kansas City is indicated by a test in which 213 passengers were handled at the rate of 1.37 seconds per person with the aid of front-end collectors, while 2.2 seconds per person was required to handle 144 passengers on the same day and at the same place without the front-end collectors. A saving of 0.83 second per passenger is certainly worth while wherever the loading tracks are crowded to maximum capacity and where there is a possibility of thereby raising the schedule speed and reducing the number of cars. The Kansas City company now employs thirty-five collectors in the evening and half a dozen in the morning. All of these men are trained conductors. Of course, some difficulty may be met in finding good men to work but three or four hours a day, but, as previously noted, the regular traffic inspectors could be assigned to this work of doubling car-entering capacity at a greater net usefulness to the railway than if they were engaged in forming people in line to enter at the rear platform only. From the standpoint of car economics, it is surely desirable to take full advantage of the double-platform car instead of keeping the front platform idle when it can be made a most effective help.

WHERE GOVERN- MENTAL OPERA- TION FAILS

In these days of agitation on behalf of governmental operation, municipal ownership and other propaganda of delusive promise a recent editorial in the London *Daily Mail*, one of the most popular newspapers in Great Britain, strikes to the very root of the question why private ownership and operation of utilities result in the best service at the lowest cost, given a reasonably intelligent management. The editorial in question was directed against the poor quality of telephone service in Europe under government ownership and operation, but its general conclusions are equally adaptable to every field of public utility service which can be developed by private enterprise. The *Mail* says: "The broad answer to all these questions is that the alertness and enterprise that are essential to telephone development cannot be expected from a government department. The characteristics of the bureaucratic mind and temperament forbid it. The organiza-

tion of a government office, with a virtually irremovable staff, forbids it. The spirit of officialdom, with its traditions of subordination, its narrow professional outlook, its unwillingness to concentrate responsibility, its insensible stifling of initiative, forbids it. A government department cannot raise and discipline its staff to the same level of efficiency as a commercial company; it cannot act with the same freedom and directness as a private board; it cannot pursue a business object without deference to a hundred influences and considerations that have nothing to do with business; it cannot advertise with anything like the same boldness; it naturally seeks efficiency through economy instead of economy through efficiency; it has to think of politics and political reactions; its whole constitution prevents it from proving as enterprising as private initiative, as prompt to discard obsolete methods and apparatus, as quick to adopt new inventions, as skilful and aggressive in gathering in subscribers." These comments are in no sense directed against the faithful work of individuals in governmental service, but they hit the nail squarely on the head when it comes to the matter of municipal, state or national ownership and operation of utilities which will best develop under private control, subject, of course, to wise regulation by commissions or other designated tribunals capable of limiting their tasks to supervision and of avoiding the pitfalls of public management.

THE COST OF REGULATION

When the New York public service commission bill was before the Legislature it was opposed by Joseph H. Choate on the ground that nothing less than a commission of archangels could successfully administer the law that it was proposed to enact. Mr. Choate's remark is now recalled in connection with some rather uncomplimentary criticisms which have been published in certain of the daily papers in New York, based upon the fact that the commission for the First District has asked for an appropriation of \$2,200,000 for the present year. This sum is more than twice the commission's cost to the city of New York for the year 1908. In the six years 1908-1913 the commission has spent \$7,559,778, and the question is now asked, "What is there to show for the money?"

This is not a fair question if it is meant to imply that the commission has done little or nothing, for it has done much. The greater part of this sum, of course, has been spent in connection with the development of the plans for rapid transit in the city. This is the work which was formerly performed by the Rapid Transit Board of New York. Regulatory work, speaking from the standpoint of expenditure, has occupied only a comparatively small portion of the time of the commission. The trouble is not that the record of the board has been one of "futility, inefficiency and extravagance," as has been charged, but that the present critics of the commission expected too much from it in the first place. They would not listen to Mr. Choate's description of the sort of commission that would be needed to

give the people what they wanted. All that was necessary, it was claimed, was to pass a law and appoint a commission and our transportation problems would be solved.

Similar ideas have prevailed elsewhere, and similar disappointments are in store. Along with these disappointments may come realization, perhaps, that members of a public service commission are only human; that they can no more work miracles than can the officers of public service corporations, and that railway regulation is only less difficult than the most difficult of all things, namely, to run railways in a manner to satisfy an appetite for parlor-car express transportation at freight-rate fares.

THE CIRCULAR INCH VERSUS THE CIRCULAR MIL

We print in this issue a letter from Carl Hering advocating the use of the circular inch instead of the circular mil in expressing the area of wires and cables. The circular mil is a very small unit for use in connection with the large wires and cables now used. The inconvenience of the use of the term "circular mil" is evident by reference to articles appearing in recent issues of the *ELECTRIC RAILWAY JOURNAL*. In a recent discussion before a technical society the statement was made that the copper equipment of one of the steel elevated structures in New York as a return conductor is as great as 16,000,000 circular mils. It would certainly be easier to say 16 circular inches. Many references are made to large cables, of 1,000,000 circular mils area and upward. It is only necessary to compare the two expressions "The cable has an area of 1 circular inch" and "The cable has an area of 1,000,000 circular mils" to show the convenience of the larger unit. While this detail may seem insignificant, it is typical of many inconsistencies in phraseology which exist in electric railway and other lines of work and which will, in the aggregate, be sufficient to warrant careful attention. If those who see the consistency of Mr. Hering's suggestion will adopt it in spite of possible mild ridicule, this trifling reform can be speedily accomplished.

It is hardly to be expected that uniformity in a language and an industry which are alive can be secured, but there should be a consistent effort to obtain some degree of uniform practice. The circular mil is a queer unit, anyway. It is a unit of area which does not belong in any system, and of course the circular inch is no better from this point of view. However, this circular unit is so well established that it cannot be easily dislodged if, indeed, such dislodgment is desirable. It is certainly very convenient to be able to obtain the diameter of a wire by taking the square root of the area, or vice versa. If the average user of electric wires would stop to analyze his meaning when he uses the expression "the circular mil" he would probably find some difficulty in doing so. The fact is, however, that he is in the habit of associating, from experience, a certain type of cable with its area in circular mils, without evaluating the circular mil in terms of the square inch.

LABOR CONDITIONS UNDER MUNICIPAL OWNERSHIP

In a statement made last August the president of the Amalgamated Association of Street and Electric Railway Employees spoke enthusiastically of the blessings of municipal ownership and operation from the viewpoint of the electric railway employee. He was referring to conditions in Canada "where the Amalgamated has jurisdiction over the street railway employees." In a later report to the Salt Lake annual convention some very pessimistic comment was made by the same official as to experiences with municipally owned and operated railway properties in Canada, which indicated to him that "municipal slavery of the worker" might be as objectionable as "corporate slavery."

It is a fair inference that there will now be a return of the yearning for "municipal slavery" following the making of an agreement last month between the city of Edmonton, Alta., Canada, and the employees of the Radial Railway, owned and operated by the city. The Edmonton Mayor and Council are described as being of and for "labor." This, of course, makes a difference. The preceding administration supported the superintendent of the railway in his refusal to make an agreement which turned over many essentials of management and control to the Amalgamated Association. The "labor" administration has no such scruples and has approved an agreement which follows the familiar lines of iron-clad union agreements here, but introduces some improvements, that is, from the labor standpoint.

In the first place, one is struck by the fact that the Edmonton contract, though dated Feb. 17, 1914, is made effective as of Aug. 31, 1913, so far as the wage scale is concerned. This scale runs from 27½ cents per hour for the first six months of employment up to 37½ cents beginning with the third year and thereafter. The working day is based on nine and one-half hours, with time and a half for all over ten hours' work. There is something naïve, aside from the English, about Section 7 of the agreement, which provides "that preference shall be given to citizens of Edmonton for positions in the department, who must be able to read and write English, provided he passes his examination satisfactorily before a committee composed of two members of the association, approved by the superintendent and officials of the department, the training period being left to the discretion of the department." Section 17 states that "the department prefers that all employees affected by the agreement should be members of this association." The following section provides that trades of position may be made "with approval of association." The omission of specific provision as to rate of pay for the mechanical men who may be kept on duty at all times opens the way for claims of time and a half, or double time in many instances.

As a whole, the agreement is about what one would expect if the management of a railway handed a pen to the president of a trades union and told him to write his own agreement and to help himself while doing so. With a "labor administration" in a city enjoying the blessings of municipal ownership this contract shows

what would be very likely to happen—namely, concession of whatever demands the employees of the city might choose to advance. Considering that they had no opposition on the part of the city government, and that the railway manager was overruled in the drawing of the Edmonton agreement, those who secured it may well repeat the words of Lord Clive and say that when they think of their opportunities they are astonished at their moderation. Of course, the Edmonton public will have to provide for the city's generosity to its workers. If it and other cities municipal-ownershiply inclined are willing to do this, so be it. But the Edmonton experiment and San Francisco's Geary Street Railway pay of \$3 for eight hours' platform work is fair warning of what may be expected.

CAR EQUIPMENT AS SEEN FROM THE PIT

Under the title of "Real Maintenance," we discussed in our issue of Dec. 27, 1913, the need on many railways for a more intelligent car maintenance staff and for more liberal expenditures in car upkeep. Perhaps no better argument for a higher grade of shop service could be afforded than by a review of the situation from a sometimes neglected vantage ground, namely, the pit.

In the early days the underside of most cars carried the simple rigging of a spindle brake, a set of grids, a fuse box and a few exposed cables between the motors and K controllers. How different are the conditions to-day! A tangle of pipes, rods, chains and levers extends from end to end to serve the four-motor equipment and its contactor control, the air brakes, the slack adjuster, the air-dropped fender, the door and step devices, the ventilation and heating control, the lesser electrical circuits—and even the long-distance operation of the fare register. Is it wise to put all of this costly gear into the hands of ignorant laborers and untrained foremen or to be miserly in funds for inspections and renewals?

It is true that in the modern surface car one specialty has been piled upon another to a most amazing degree, but increasing complexity has always been the price of progress. Gutenberg's press was very simple indeed, but no one complains of the design of its thousand-membered successor. Complex as the car of to-day may be, everything on it has at least one good reason for its being. The use of contactor control frees the platform of clumsy equipment and eliminates flash-overs, the air brake brings quicker schedules, the slack adjuster gives better shoe wear and lengthens inspection from daily to weekly periods, the air-served fender saves life through its faster action, the joint movement of door and step make platform mishaps nil, while such auxiliaries as automatic ventilators and thermostatic control promote the public health in ways hitherto deemed impossible on a moving and crowded vehicle. No railway would willingly dispense with these improvements, costly as they may be at first, but directors must understand that these devices cannot take care of themselves nor be maintained at the same price as cars with less equipment but with smaller earning capacity.

Electrification of the Canadian Northern Montreal Tunnel and Terminal

The Writer Points Out that the 2400-Volt Direct-Current System Was Chosen as Most Economical for a Combination of Trunk-Line Locomotive and Suburban Motor Car Service

BY W. C. LANCASTER, ELECTRICAL AND MECHANICAL ENGINEER, MACKENZIE, MANN & COMPANY, LTD., MONTREAL

The Canadian Northern Railway when completed during the present year will be the second transcontinental system to be operated in Canada and will have a total track of more than 10,000 miles. Most of this mileage is in the provinces of Alberta and Saskatchewan, from

choice section of this land, that near the west portal of the tunnel, has been subdivided into city lots and is known as Mount Royal or the "Model City." (See Fig. 2.)

FREIGHT AND PASSENGER TERMINALS

At Cartierville, a small town on the Rivière des Prairies, a large yard will be established for the sorting of freight, and there also the incoming and outgoing trains will change from steam to electric locomotives, and vice versa, this being the present end of the electrified zone.

Fig. 3 is a "bird's-eye" view of that portion of the electric zone from the Model City to the St. Lawrence River. The passenger terminal will be built at the east portal of the tunnel, right in the heart of Montreal. From this point it is planned to run tracks down to the water front, where a freight station will be located and where connection will be made to the Harbor Commissioners' tracks, which extend throughout the whole shipping district, thus giving access to the docks.

REASONS FOR ELECTRIFICATION

Electrification of the tunnel was necessary for comfort and safety. It was also necessary for the operation of the trains in the passenger terminal, where the tracks will be beneath the terminal buildings and about 45 ft. below the street surface. As this amount of electrification had to be installed, it was decided to extend the electric zone to a point about 5 miles beyond the tunnel, so that multiple-unit trains could be run, and because the Cartierville yard would provide a convenient place for changing locomotives. Thus when work on the tunnel and terminal was started the problem was

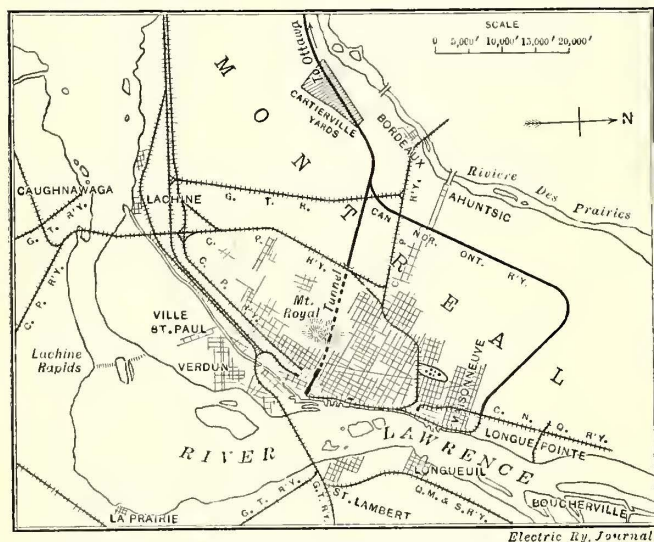


Fig. 1—Montreal Tunnel—Map of the Canadian Northern Railway at Montreal, Showing the New Line with Tunnel Under Mount Royal to a Central Passenger Station

whose vast grain fields is drawn the traffic which has made the harbor of Montreal the second in importance in the American continent. On this new route from Montreal to Vancouver the grain traffic in a single day often amounts to more than 1,000,000 bushels of wheat. With Montreal the destination for most of this enormous and ever-increasing traffic, it became necessary to provide terminal facilities adequate to prevent any possibility of congestion.

SUBURBAN AS WELL AS TRUNK-LINE SERVICE

A general idea of Montreal and vicinity may be had by reference to the map, Fig. 1. The principal commercial and financial section of the city lies between Mount Royal and the St. Lawrence River. To reach this district it was necessary to drive under the mountain a tunnel a little more than 3 miles long. This work was begun in the summer of 1912 and has progressed rapidly, the headings meeting on Dec. 10, 1913. The tunnel, which is of double-track construction (see Figs. 4 and 5) will not only serve as an entrance into Montreal for trunk-line trains, but will also bring the country to the west, lying between the mountain and the Rivière des Prairies, within a few minutes of the heart of the city. This district, which now consists of farm land, will be developed as a suburb of Montreal and a quick and frequent service will be maintained for commuters by means of multiple-unit trains. Already the

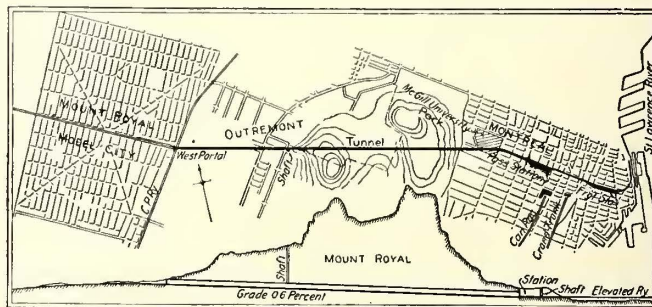


Fig. 2—Montreal Tunnel—Route of Tunnel

not whether steam or electricity should be used, but rather what system of electrification would best suit the conditions.

As a basis for the study of this question, train schedules and train weights were assumed that, it was thought, would probably be used. No exact operating data were available at the time this study had to be made, as the railroad entering Montreal from the west was not completed and the traffic department's plans were not definitely settled. Recourse was therefore had



Fig. 3—Montreal Tunnel—Bird's-Eye View Showing How the Tunnel Will Develop the Territory on the Far Side of Montreal

to the statistics of the two other large railroads that have been bringing traffic into the city for many years. The train sheets and load curves were worked up largely on this basis, due allowance being made for future growth.

The train weights and some of the other data assumed are given in the accompanying table. Portions of the calculated daily load curves are shown in Fig. 6.

TRAIN WEIGHTS AND SPEEDS ASSUMED FOR MONTREAL TERMINAL ELECTRIFICATION

Class	Trailing Tons	Speed Level	0.6 per Cent Up Grade	Schedule
Transcontinental	1130	37.0	26.5	21.2
Express and local	556	37.5	27.1	21.6
One motor coach	60	50.0	41.5	22.2
Three motor coaches	180	50.0	41.5	22.2
Three motor coaches and two trail coaches	260	47.8	34.8	21.8
Freight	1000	32.5	23.5	...

Four systems of electrification were considered:
 Three-phase, 3300-volt to 6600-volt trolley.
 Single-phase, 11,000-volt trolley.

other alternating-current systems, the economy of transformation by means of stationary transformers instead of rotating machinery.

In this case, however, the first of these advantages did not apply, as the maximum grade throughout the whole of the electric zone is only 0.6 per cent. As regards the last advantage, it was expected that electric energy would be purchased rather than generated by the railroad company, and as all the available power in Montreal was at sixty cycles, whereas fifteen cycles or twenty-five cycles is required for this system, rotating machinery in the shape of frequency changers would have been necessary. This, of course, would have eliminated the greater economy of transformation that this system claims over direct current.

The chief disadvantages of this system appeared to be:

Necessity for two trolley wires and two collectors insulated from each other.

Complicated and inefficient speed control.

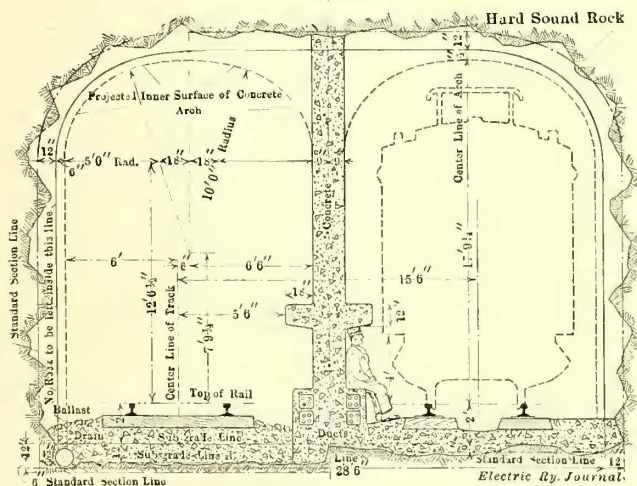


Fig. 4—Montreal Tunnel—Typical Tunnel Section in Hard Rock

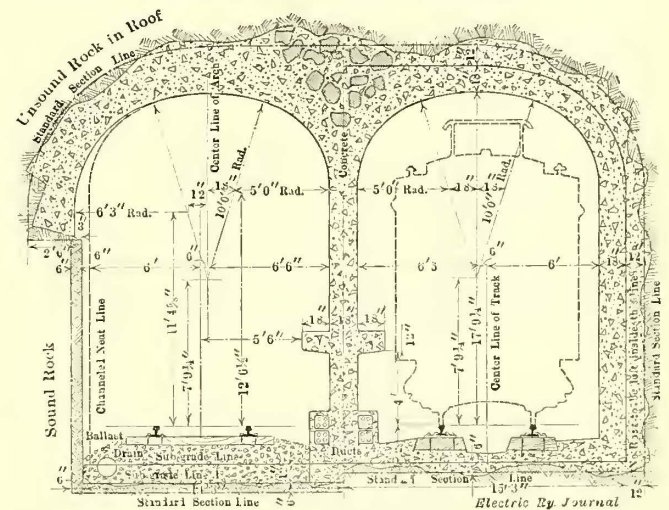


Fig. 5—Montreal Tunnel—Typical Tunnel Section—Bad Rock in Roof

Low-voltage direct current, 600-volt, third-rail.
 High-voltage direct current, 1200-volt to 2400-volt trolley.

CONSIDERATION OF THREE-PHASE

The chief arguments in favor of the three-phase system are the regeneration of energy on steep grades and the resulting economy both in energy consumption and wear of brakeshoes and tires, and also, in common with

High peaks on the substation due to the constant-speed characteristic independent of the torque.

Constant-speed characteristic unsuitable for multiple-unit trains.

Low power-factor.

To balance these disadvantages there remained only the absence of commutators as an argument in favor of the three-phase system. This is not so strong an argu-

ment now as it would have been a few years ago. The modern d.c. railway motor with commutating poles is so reliable, and its commutation so nearly perfect, that the objection to the use of a commutator is largely a thing of the past.

CONSIDERATION OF SINGLE-PHASE

The principal reason that seems to make single-phase electrification attractive is the high efficiency of transformation and transmission. As has already been pointed out, however, the use of any a.c. system for the Montreal terminal would mean frequency-changer sets which would at once put this system, so far as the substation apparatus is concerned, on a par with direct current.

At first sight an 11,000-volt trolley promised considerable economy, especially when the possibility of future extensions some distance beyond the present electric zone were considered; but after careful calculations were made it was found that no such voltage was necessary, 2400-volt direct current being ample, even for 25-mile substation spacing, without excessive feeder copper.

absolute reliability, proved by years of use on electric roads all over the world, and the comparatively low cost of the electric motor car and locomotive equipments. However, it was found that the cost of the large amount of feeder copper and the additional substation would about balance the saving in the cost of rolling stock. As this low voltage was obviously unsuitable on account of the excessive cost for extensions of any considerable length beyond the 9-mile zone, it was thought best to use a higher trolley voltage.

CONSIDERATION OF HIGH-VOLTAGE DIRECT CURRENT

The chief objection to the 2400-volt d.c. system is that it is experimental, but this is not so serious as it might appear. The first railways to use the higher direct-current voltage obtained a trolley potential of 1200 volts by the use of two 600-volt generators wired together in series, the 600-volt railway motors also being wired in permanent series.

There was practically no difference in the design of these 600-volt generators and motors, so connected, and that of the old standard 600-volt generators and motors, except that they had to be insulated for 1200

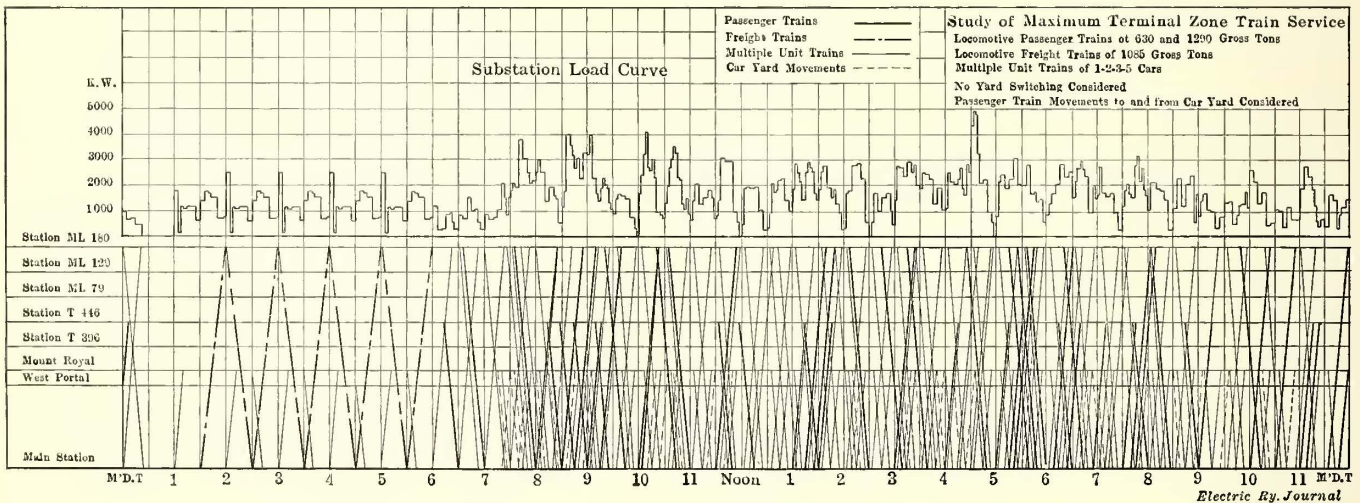


Fig. 6—Montreal Terminal—Estimated Substantial Load Curve

A very serious handicap to single-phase electrification was the large number of multiple-unit motor cars required for the suburban service. It was found that the cost of these would be very high compared with d.c. equipments, owing chiefly to the motors being heavier and more complicated for the same output.

As regards operation, it was thought that the cost of maintenance of the single-phase system would be somewhat greater than either low-voltage or high-voltage direct current, especially when the interference, due to induction, with neighboring telephone and telegraph lines was considered.

CONSIDERATION OF LOW-VOLTAGE DIRECT CURRENT

It might seem, without going fully into the question, that a 600-volt contact system would be ample for this electrification of only 9 miles length. When the heavy trains are considered, however, it was found that two substations instead of one would be necessary, and also that a third-rail would have to be used on account of the heavy current. Trouble from snow and ice in the deep cut west of the tunnel was feared if a third-rail should be installed, and it was thought that the maintenance of this type of conductor in the two yards and in the passenger and freight terminals would be higher than that of an overhead trolley.

Undoubtedly there were two very important points in favor of this low-voltage direct current, namely, its

volts and were furnished with commutating poles. The matter of insulation was not difficult, as much higher voltages have been used for many years on a.c. machinery. The commutating poles, which are of comparatively recent development, have done more to make high-voltage direct current successful than anything else, as they completely overcome commutating difficulties which would otherwise be serious at the higher voltages.

For the first 1200-volt systems, then, the motors and generators were wound for 600 volts and insulated for 1200 volts. This was a comparatively simple step. The next step was to wind these machines for 1200 volts so that one could be used instead of two in series. This was an important matter. It has been done and done successfully. At the time this study was made seven roads in the United States were using either motors or generators wound as well as insulated for 1200 volts and 1500 volts. Abroad there were at least six roads using machines wound for 1000 volts or higher. On these roads this high-voltage d.c. machinery had been thoroughly tried out and had been in operation quite long enough to prove its entire success.

It seemed, therefore, a comparatively simple matter to go one step further and wire two of these motors or generators wound for 1200 volts in series and insulate them for 2400 volts, this being comparable with the first simple step of connecting two 600-volt machines

in series to obtain 1200 volts. That this could be done satisfactorily has been abundantly proved by the Butte, Anaconda & Pacific Railway, in Montana, which has had its 2400-volt system in successful operation since last July. With convincing proof that the use of 2400 volts direct current would not be experimental and would prove to be reliable, it soon became evident that this higher voltage was better suited to the heavy electrification contemplated for the Montreal terminal than 1200 volts and 1500 volts.

After the somewhat greater cost of the 2400-volt locomotives and car equipments was balanced against the extra copper and extra substation required for these lower voltages, it was found that 2400 volts would not be any more costly for the 9-mile zone only, and in case of any large extensions it worked out far cheaper than 1200 volts and 1500 volts.

POSSIBILITY OF HIGHER D.C. VOLTAGE

There is another advantage in the use of 2400 volts which some may criticise as being too visionary but which in the opinion of the writer is a very real point.

The tendency in electric railway development seems to be strongly toward d.c. potentials even higher than 2400 volts. In England a 3500-volt electrification is already in operation. The writer has seen factory tests with 5000 volts direct current that indicate the practicability of this voltage. Much experimental work is being done along this line. While 2400 volts is quite high enough in certain instances, it must be admitted that where grades are steep and loads are heavy an even higher voltage would be desirable.

The advantage of 5000 volts for long trunk-line electrification would be enormous. It is chiefly a very high trolley voltage which makes single-phase current appear so attractive. Undoubtedly the successful development of 5000 volts direct current would mean that many railroads would find it exceedingly profitable to electrify for long distances where just the reverse would be the case if a lower voltage had to be used. This is especially true in Canada, where cheap water-power can frequently be obtained along the right-of-way and where the expense of operating steam locomotives during the bitterly cold winters of the country is so great.

Thus if a 5000-volt system is developed, which seems likely, and a 1200-volt system had been chosen for Montreal, the railroad could never have adopted this higher voltage as standard for its long-distance electrifications, except with the decided disadvantage of having to operate its 5000-volt equipment at half speed over the 1200-volt trolley. By using 2400 volts now, if 5000 volts should ever become desirable, the motors for the higher voltage being wound for 2400 volts and operated two in series on 5000 volts, could readily be operated in multiple on 2400 volts at full speed, just as 1200-volt equipments are now run at full speed on 600 volts.

EQUIPMENT ORDERED

After a careful study of the four systems that have been briefly discussed, the conclusion was reached that, all things considered, the 2400-volt d. c. system would be the most economical for the Montreal tunnel and terminal. The initial order for equipment, amounting to more than \$540,000, was then placed with the Canadian General Electric Company. This included six locomotives, eight multiple-unit car equipments and two 1500-kw motor-generator sets with switchboard and auxiliary apparatus. A brief account of this equipment has already been given in the *ELECTRIC RAILWAY JOURNAL* of Oct. 11, 1913. In subsequent articles it is intended to give complete descriptions of both the rolling stock and substation.

The single substation will be at the west portal of the

tunnel, where three-phase, sixty-cycle, 11,000-volt energy will be purchased and transformed by means of the two synchronous motor-generator sets into 2400 volts direct current. Each of these units has a continuous rating of 1500 kw and a five-minute overload capacity of 200 per cent. Space will be provided in the building for a third unit, which will be installed when required by increase in traffic, so that ultimately the total station rated output will be 3000 kw continuously and 9000 kw for five minutes. As one unit will always be held in reserve as a spare, this ultimate station capacity is based on the rating of two of the motor-generator sets rather than all three.

THE MERCURY VAPOR TURBINE

At the present time W. L. R. Emmet, of the General Electric Company, is conducting experiments on mercury boilers and turbines with a view to determining the practicability of the use of mercury vapor in the production of mechanical power. Mr. Emmet's preliminary calculations and tests indicate that with the most efficient oil firing of boilers the mercury turbine should result in a fuel economy very near that commercially obtainable in Diesel engines. The mechanical simplicity and freedom from the probability of deterioration should, in his opinion, give the mercury turbine a very decided advantage over the Diesel engine. The theoretical saving in the use of mercury as a vapor instead of steam results from the wide range of temperature variation possible. Mercury boils at 677 deg. Fahr. at atmospheric pressure and condenses in a 28-in. vacuum at 455 deg. It is therefore well adapted, at least by pressure and temperature conditions, for use in a temperature cycle above that now used with steam.

Mr. Emmet has built a small experimental equipment of a capacity of about 100 hp with which experiments are now being made. Two boilers are used, a pressure boiler for producing the vapor and a condensing boiler for exhausting the mercury from the turbine. The condensing boiler produces steam which is used in the ordinary way. In the experimental plant a special pressure boiler has been constructed with flat curved tubes, the flattening being resorted to to reduce the volume of mercury required and the curving to take care of expansion and contraction. The condensing boiler used was made from a standard high-pressure feed-water heater having a water space at top and bottom connected by tubes in the manner customarily used in such devices. This is not considered a suitable permanent design since the temperature differences impose excessive strains on the expanded tube sheet.

Mr. Emmet makes the statement that the use of mercury turbines would not result in a permanent increase in the price of mercury as the sources of supply appear to be ample. His estimate shows also that by the use of 15 per cent additional fuel the output of a steam plant can be increased 66 per cent by adding mercury turbines with a mercury vapor pressure of 10 lb. per square inch and a vacuum of 28.5 in.

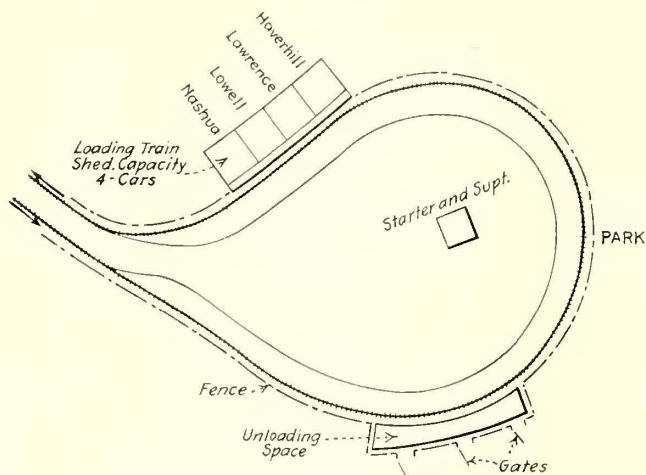
Recently published results of tests of locomotives of about 500-hp capacity for a plant in Wiborg, Finland, show fuel consumption of from 1.06 lb. to 1.11 lb. per hp-hour and steam consumption of about 9¼ lb. per hp-hour with a load of about 540 hp. Three of these units will be operated in conjunction with a small hydraulic plant to supply light and power to the city. This remarkably low fuel consumption is secured by the use of high-pressure, high-temperature steam in a compound engine mounted directly on the boiler. The locomobile type of power-generating unit is in extensive use abroad and has been introduced in America.

Operation of Canobie Lake Park

This Park Serves a Number of the Popular Cities in the Merrimac River Valley—The Experience of the Company with Various Attractions Is Described

Canobie Lake Park, at Salem, N. H., on the lines of the Massachusetts Northeastern Street Railway, is one of the best known pleasure resorts along the lower Merrimac River Valley. It can be reached in between thirty and forty-five minutes from Lowell, Lawrence and Haverhill, Mass., and from Nashua, N. H., and it is yearly increasing in popularity. The Massachusetts Northeast-

ern system is a consolidation of fourteen roads aggregating about 150 miles of track, with headquarters at Haverhill, Mass. The company operates cars in the northern half of the Merrimac Valley between Nashua and Hampton Beach, with connecting lines to important points in eastern Massachusetts and southern New Hampshire. It also operates Central Park, Somersworth, N. H., and handles an extensive through service to Hampton and Salisbury Beaches from Newburyport, Amesbury and the cities previously mentioned.



Canobie Lake Park—Plan of Terminal

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Canobie Lake Park is situated about 1½ miles off the company's main line, but it is connected with the latter by a track terminating in a loop at the park entrance. The park covers about 50 acres and is laid out on a level stretch bordering the lake for which the resort is named, the central portion of the grounds being tastefully divided by gravel walks and lawns, with shrubbery along the borders. Pine and chestnut trees form attractive groves for picnic parties, and in addition to the aquatic pleasures available, a large athletic field is a prominent feature. The attractions include a merry-go-round, circle swing, roller coaster, bowling alleys, deer park, theater, inclined slide, shooting gallery, penny arcade, ice-cream pavilion, dancing pavilion, lunch room, electric fountain, photograph gallery, boat-house, swimming pool and power launches.

The loop track at the park entrance is doubled to provide for car storage and flexibility of operation. Incoming cars discharge passengers at an unloading platform on the opposite side of the loop from the loading space, the latter being divided into four separate sections covered by a train shed and marked with the destinations of outgoing cars. The loading platform is 120 ft. long. In summer a thirty-minute headway is maintained on the principal lines, with a minimum headway of fifteen minutes under heavy traffic conditions. The standard car is a fourteen-bench open equipment. Im-

TRAFFIC ARRANGEMENTS

The park season opens May 30 and formally closes on Labor Day, but the grounds are open until mid-October for picnic parties. Through car service to the park is discontinued one week after Labor Day, and with the exception of a half-hourly service rendered to and from Lawrence, the schedule is placed on an hourly basis at this time. About 250,000 persons visit the park yearly, the accounts being kept separately from those of the railway company. Concessions are leased upon a fixed price plus a percentage basis, and a cashier on the grounds makes daily collections from each concessionaire and turns the receipts into the main office at Haverhill. All car movements are in general charge of the local division superintendent, whose offices are at Salem, but arrangements for the hiring of special cars are made at the manager's office in Haverhill. A dispatcher at Salem handles special cars running between the park, Haverhill and Lawrence, and a dispatcher at Pelham, N. H., handles the cars running between the park, Nashua and Lowell.

The fares are 10 cents per trip from Lawrence and Haverhill, 15 cents being charged from Nashua and Lowell. No single round-trip rates are in force except when large parties of 500 or more are concerned. In such cases a round-trip rate of 17½ cents per passenger is made from Lawrence and Haverhill and a round-trip rate of 27½ cents per passenger from Nashua and



Canobie Lake Park—Center of Park, Showing Electric Fountain

Lowell. The distances from the park of the principal cities on the system are: Haverhill, 10.4 miles; Lawrence, 8.5 miles; Lowell, 14 miles; Nashua, 16.2 miles, and Newburyport, 28 miles. The special car rate is \$5 per car round trip in a fare zone, seventy passengers being allowed in summer and fifty in the winter. All the company's fares are not based upon a 5-cent unit.

ATTRACTIONS

On account of the diversity of attractions, it is difficult to accord popular preference to individual features, but the dance hall is the best patronized. The theater seats about 2000 persons, many benches being provided. In former years 10-cent and 20-cent seats were sold. Last year the entertainment consisted of moving pictures only, 5-cent and 10-cent seats being sold. These

and monkeys are a usual attraction at the park. Soda and refreshment booths are located at various points, and a women's cottage, with matrons in attendance, is a much appreciated feature.

The groves accommodate parties of 2000, 400 and 600, the trees being principally firs. A Sunday band concert is given weekly at 4 p. m. and lasts two hours. On July 4 fireworks are displayed, the railway company



Canobie Lake Park—Lake Front, with Ice-Cream Pavilion Built Over Lake



Canobie Lake Park—Large Restaurant; Roof Outlined with Incandescent Lamps

were a failure, the popular preference being for the usual vaudeville entertainment of former seasons. The lack of success of the "movies" was probably due in part to the necessary use of canvas curtains at the sides of the theater to produce the requisite darkness, this arrangement rendering the auditorium uncomfortably warm on many days. The theater has a roof over the stage and the central seats. The roller coaster is patronized at 10 cents per person and is 565 ft. long, with two tracks, giving a total ride of about half a mile in two revolutions. The dancing hall floor is 44 ft. by 105 ft. and will accommodate about 250 couples.

The larger restaurant on the grounds seats about 700 and the smaller one, which is used as a lunch counter, souvenir store, etc., seats about a dozen. Thirty boats and twenty canoes are maintained in livery on the lake, and the latter has an area of about 6 sq. miles. The gasoline launches at the park hold thirty and twenty persons, the larger boat making regular 10-cent trips

and the concessionaires sharing the cost. An annual feature at the park is a music festival of choral societies of Nashua, Manchester, Lowell and Lawrence, in which 400 voices give two daily concerts on the Saturday and Sunday following Labor Day. At the athletic field no admission is ordinarily charged, and this contains a baseball diamond and 0.2 mile running track. The field is fenced in and two grand stands are provided so that events with admission fees can be properly handled. Ten arc lamps are installed on standards bordering the running track when night events are scheduled. The lamps are taken down when not in regular service. All the principal buildings in the park are outlined in incandescent lamps. Energy for lighting service is supplied by the railway company with an auxiliary connection to the lines of the Lawrence Gas Company. Advertising is begun in the local press one week in advance of the park opening, and throughout the season 4-in. advertisements, with weekly changes, are run in



Canobie Lake Park—Walks and Lawns



Canobie Lake Park—Pine Grove for Picnics

around the lake, occupying about half an hour each, while the smaller launch is rented to private parties. There are ten bowling alleys. The swimming pool has a capacity of 250,000 gal. and is lined with white enameled tile, being 4 ft. in depth at one end and 9 ft. deep at the other. A life rope is carried around the tank and it is equipped with springboards and life preservers. Twelve deer are maintained in the deer park,

the local dailies. A traffic solicitor is also employed for the park service during the season.

The park is looked after by a superintendent who resides on the grounds the year through, three regular uniformed police (with two extra police on Saturdays, Sundays and holidays), from ten to twelve gardeners and caretakers, two matrons and a cashier. E. F. Bowser is superintendent.

A few words about the beach resorts on the company's lines may be added. Through cars are operated in the summer from Haverhill to Hampton Beach on thirty-minute headway, a distance of about 25 miles via Salisbury Beach, the fare being 35 cents. Direct cars to Hampton are run hourly. The attractions at Hampton a large casino owned by the Exeter, Hampton & Amesbury Street Railway, a baseball diamond and summer hotel and cottages in large numbers, with regular band concerts and theatrical performances, draw large crowds. Hampton is a natural stopping point en route from Boston, Lowell, Lawrence and Haverhill by trolley to Portsmouth and the Maine coast, and the Massachusetts Northeastern company handles a large through business yearly to and from this resort. Central Park, Somersworth, N. H., is on the Dover, Somersworth & Rochester Street Railway, operated by the Massachusetts Northeastern company. It is 4 miles from Dover, N. H., and contains a theater and baseball grounds as noteworthy features. Franklin Woodman is general manager of the Massachusetts Northeastern company.

MOTION PICTURES FOR INSTRUCTIONS ON RULES

The Pacific Electric Railway, Los Angeles, Cal., is using motion pictures very successfully in connection with the instruction of its trainmen. Originally the plan, as developed by the instruction department of the company, contemplated the production of views indicating simply the wrong and the right ways of complying with operating rules. To this plan the company has adhered in the main, but in some instances it has been expanded to show the consequences in cases of accident caused by violations of the different rules. In other cases the pictures show simply the proper method of procedure under the rule. No attempt is made to present equipment views in motion pictures as this feature of instruction work is fully and satisfactorily covered by practical instruction while the employees are "breaking in" and by lectures which are illustrated by stereopticon views as well as charts.

Practically 4000 ft. of film has been produced. For the most part, regular employees of the company have been used as actors, as it was found easier to make actors out of railroad men than railroad men out of professional actors.

In carrying out the original idea one crew was used to depict the careless, incompetent and negligent observation of the rules, while another crew was exhibited in the pictures as alert, competent and vigilant in its work. To complete the lesson the incompetent crew is shown carelessly attired, with caps on one side, collars turned up, etc., while the second crew is neat in dress and erect in bearing.

The pictures, following in a general way the rules of the transportation department, show first the meeting of the two crews in front of a saloon. The members of the first crew invite those of the second into the saloon to have a drink, but the latter crew refuse and go about their business, while the other crew enters the saloon. In connection with this picture a slide is shown quoting the rule concerning the uniformed employee entering saloons.

Throughout the pictures sub-titles are shown explaining them, and a lecture by the instructor is also given, which adds much to the interest. In addition to the sub-titles, slides have been prepared to illustrate the various rules, and these rules are interpreted by the pictures in so graphic a way that no mistake can be made by any employee in his understanding of them.

Thus the rule concerning the flagging of railroad crossings at grade is illustrated by pictures which show the negligent conductor in conversation with the motorman while the car is approaching the crossing. When the car stops the conductor swings off the front platform, although the rule requires him to alight from the rear platform and walk forward across the railroad track. He then mechanically gives a proceed signal without looking in either direction. The motorman, whose mind is still intent on the subject of the conversation, acts on the signal without looking for an approaching train, and the car is almost on the crossing when the crew awakens to the fact that a train is almost upon the car, and an accident is narrowly averted.

A similar scene with the second crew gives the proper procedure under the same conditions.

A thrilling picture is made of the failure of a motorman to slow down on a slow-speed curve which is protected by a fixed signal. Just around this curve is a high railroad bridge, and the motorman discovers a pedestrian on the bridge but is unable, on account of his speed, to stop. The result is that the pedestrian is run down and killed. This scene was accomplished with the aid of a dummy. The second motorman rounds the curve at proper speed and thus is able to stop on seeing the pedestrian. The latter is allowed to escape from the bridge without accident, but not without a warning.

Another view shows a motorman in conversation with a conductor, who, of course, is not in his proper place, and both are so interested in the matter under discussion that the motorman runs past a landing where a passenger is waiting to board the car. Then, instead of backing up to the landing, the motorman allows the passenger to follow the car and the conductor lets him climb up on the rear end without assistance, although he has heavy baggage with him and is standing on the shoulder of a fill.

A similar scene shows the car backed up after running by a landing, while the conductor is still on the front end. But in this case the passenger, in following the car, has caught his foot in the slat cattle-guard and is run down by the returning car.

In another set of views the proper procedure at meeting points on single track is shown, as when trains of the same class meet and when an extra train on short time meets a regular train coming in under protection of a flag.

The proper and improper ways to protect the rear end are also shown. In this case insets have been made in the film to give close views of the placing of torpedoes on the rail, the lighting of fuses and similar operations.

The proper protection of a car with a two-man crew in using a four-track crossover is also illustrated in such a way that the man who sees the picture once will never be at a loss to handle a situation which to those accustomed to single-track operation is sometimes puzzling.

The use of manual staff machines is clearly shown in another set of views. All signals, both hand and lantern, are given, including many of the signals common to the yard, but not found in the rule books.

The list of scenes mentioned is illustrative and comprises only a few of the views presented at the lectures. To show all of the pictures with the accompanying lecture requires two hours or more. These views are now shown at all evening classes of the company. The classes occur three times per week, and one or two reels are thrown on the screen at the close of each class. They have been found to add greatly to the interest of the men in the regular instruction.

Butte, Anaconda & Pacific Railway Electrification

This Ore-Carrying Road Is the Largest 2400-Volt D. C. Electrification—Seventeen 80-Ton Locomotives Are in Use—Current Is Furnished from Great Falls, Mont.

The Butte, Anaconda & Pacific Railway electrification has attracted unusual attention on account of the use of 2400 volts, direct current, on a large scale. Out of a total of 114 miles of single track, 75 have been electrically equipped and full electrical operation commenced about five months ago. A preliminary account of this project was printed in the issue of the *ELECTRIC RAILWAY JOURNAL* for Feb. 10, 1912. Details of the overhead construction were given in the issue for Aug. 31, 1912, and a full account of the type of locomotive selected appeared in the issue of Jan. 7, 1913. A brief review of the essential features of the equipment will suffice as an introduction to some of the operating details.

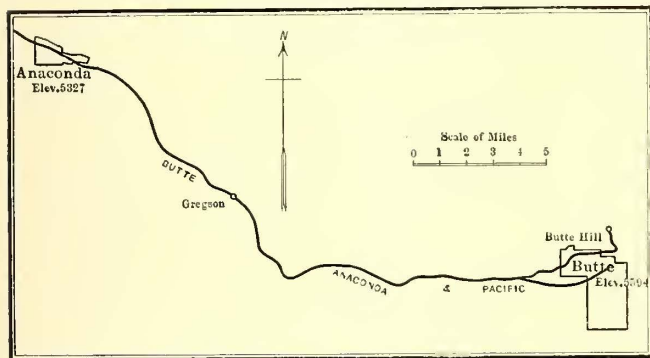
There are seventeen 80-ton locomotives in use, two for passenger and fifteen for freight service. The freight locomotives are geared for a free running speed of 35 m.p.h. The passenger locomotives are able to draw three loaded passenger coaches at 45 m.p.h., and the freight locomotives produce a tractive effort of

power supply is prevented by overlapping the contact wires at breaking points. They are separated by the distance necessary for insulation, which is easily bridged by the roller. Lightning arresters are installed on poles every third of a mile.

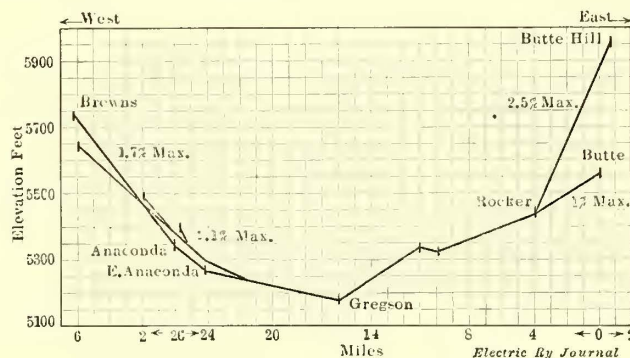
The contact wire is reinforced by two 500,000-circ. mil bare copper cables, tapped in every 1000 ft. These normally connect the substations, permitting an interchange of power.

CAR HEATING AND LIGHTING

Current for car lighting is drawn from the dynamotor at 600 volts, each passenger and baggage coach being wired for five groups of five series lamps each. The electric heating is furnished in each coach from a 25-kw heating unit from which warm air is distributed by means of a motor-driven blower having a capacity of 500 ft. to 1000 ft. per minute. Cool air is drawn into the heater from a point on the car roof and distributed



Butte Electrification—Map of Electrified Line



Butte Electrification—Profile of Electrified Line

25,000 lb. at 15 m.p.h. The maximum tractive effort for five minutes is 48,000 lb., based on a tractive coefficient of 30 per cent.

The locomotives are of the articulated double-truck type with all of the weight on the drivers. Four 1200-volt motors of the GE-229-A type are used. They are commutating-pole motors with supplementary forced ventilation, the blower for this purpose forming part of the dynamotor equipment used for lowering the voltage to 600 for the auxiliary apparatus. The blower on each unit has a capacity of 7200 cu. ft. per minute at 4-in. pressure. The motors are connected in two series groups which are operated like single motors in the usual series-parallel control. Nine steps are provided in the series connection and ten in the parallel. Overhead roller pantographs, pneumatically controlled, are used.

OVERHEAD CONSTRUCTION

The overhead contact wire is No. 0000 grooved wire, supported by an eleven-point catenary suspension, hung from steel messenger cable. Both side bracket and cross-span supports are used as required. In one case twelve yard-tracks are spanned, requiring an intermediate pole support for the span cable. A rolled-steel strap hanger looped loosely on the messenger wire is used to hang the contact wire with the necessary flexibility.

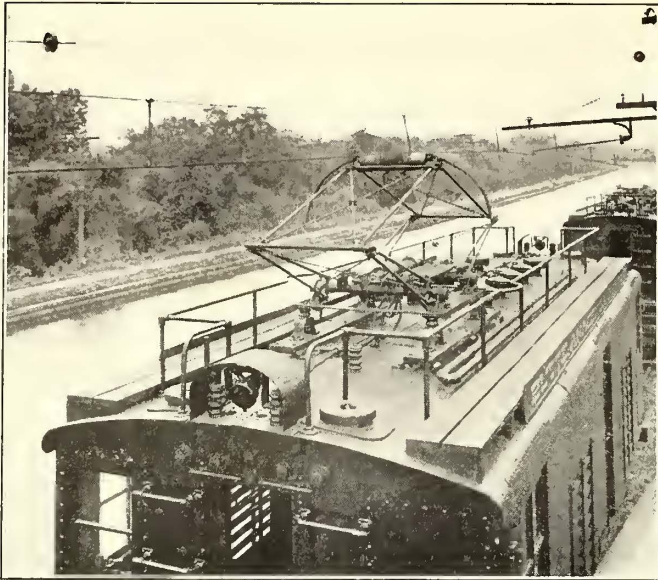
The contact wire is made up of the usual sections connected by circuit-breakers, but the interruption of

through ducts under the floor to radiators placed between alternate seats. The heating unit is in sections for the purpose of graduating the power consumption. The temperature is controlled by means of the usual thermostats.

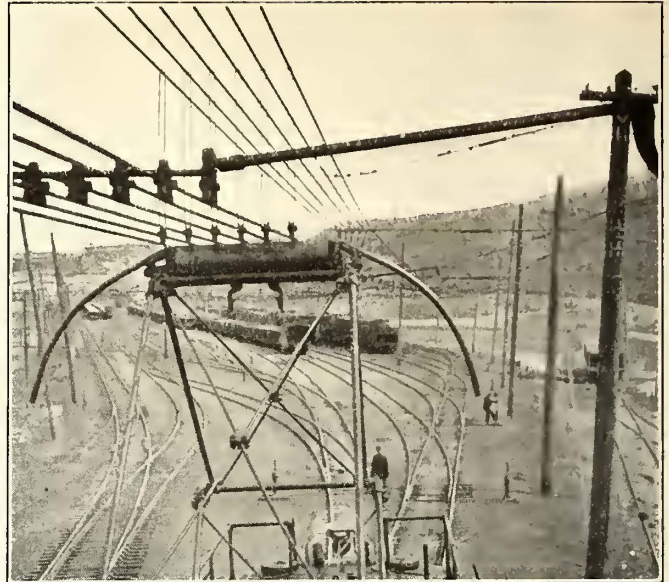
POWER SUPPLY

The energy needed for the operation of the electrified zone is obtained from the Great Falls Power Company's plant at Great Falls, about 125 miles distant in an air line. The capacity of the six generating units in the plant is 21,000 kw, and they produce electric power at 6600 volts, three-phase. The voltage is stepped up for the 130-mile transmission to Butte to 102,000, while power is from this point supplied to Anaconda, 26 miles farther on, at 60,000 volts. The Butte substation forms the center of the extensive power system operated by the Montana Power Company, which has several power plants to draw upon.

The only substations in use are at Butte and Anaconda. Here 2400-volt, sixty-cycle synchronous motor-generator sets, three in each substation, transform 2400-volt, three-phase power to the 2400-volt d.c. form. Each set contains one motor and two 500-kw, 1200-volt, commutating-pole generators, operating in series. These generators are compound-wound and have compensating pole-face windings. The series fields are connected on the grounded sides of the armatures, and the main fields are separately excited from 125-volt exciters.



Butte Electrification—View of Apparatus on Roof of Locomotive Cab



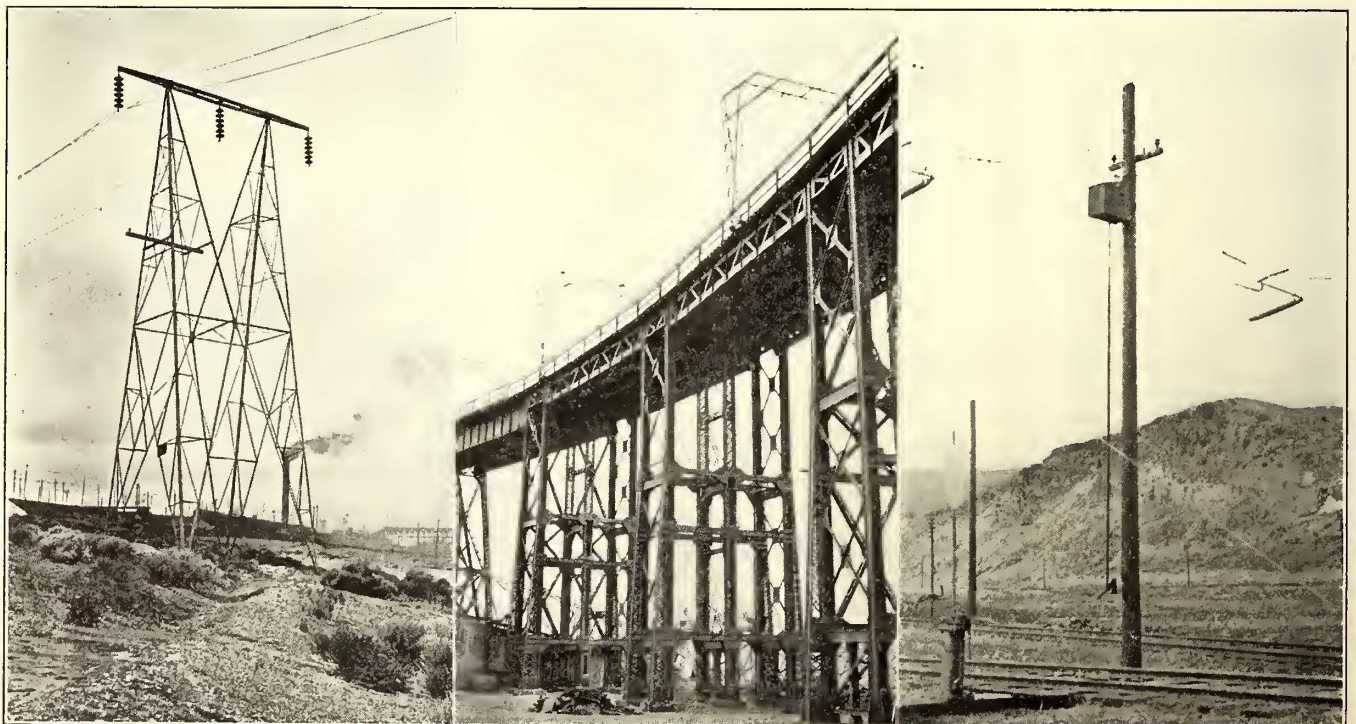
Butte Electrification—Section Where Pantograph Engages Six Trolley Wires

2400-VOLT SWITCHING

On account of the use of such a high voltage, special switchboard apparatus had to be designed. The circuit-breakers are provided with arc chutes with magnetic blow-outs of great intensity, the pole faces being so designed as to distribute the magnetic flux uniformly over the whole arc chute, thus insuring that the direct-current arc will be ruptured when the circuit-breaker opens. Low-voltage protection is secured by means of a low-voltage release coil, which, forming a part of the breaker and acting in conjunction with a speed-limiting device installed on the corresponding machine, prevents overspeeding by tripping out the breaker as soon as the speed for which it is set is passed. The low-voltage release and a reverse-current relay are connected in the 2400-volt circuit through high resistance and are in-

sulated from the circuit-breakers so that the speed-limit device on the generator may be kept at ground potential. The low-voltage release must be set before the circuit-breaker will remain closed. This is done by lifting the plunger with a wooden rod connected through a bell-crank mechanism to an operating handle on the front of the switchboard. The breaker may be shifted manually by pulling the operating handle out to the limit of its travel. Lever switches and circuit-breakers are mounted on insulators for the purpose of effectively insulating them against the high voltage of the system.

The main buses are located above and to the rear of the circuit-breaker panels and are protected by asbestos lumber covering which inclines upward from the top of the circuit-breaker panel to the wall behind the switch-



Butte Electrification—Steel Transmission Tower Carrying 100,000-Volt Lines—Trestle at Washoe Smelter, Showing Steel Bridge Construction—Section Switch and Operating Lever

board to form a barrier. This prevents circuit-breaker arcs from reaching the buses and also protects the buses from objects which might fall from above.

The ammeters are incased in insulating covers, while the voltmeter, mounted on a swinging bracket, is connected to the circuit on the grounded side with the separate resistance on the positive side, thus making the potential from meter to ground a minimum. Every precaution possible is taken to insure the safety of operators by covering live parts of the board.

OPERATING DETAILS

Eight passenger trains are operated per day between Butte and Anaconda, four each way. Single locomotive units are used for this purpose. During the first seven months of service, the freight service having been begun some months earlier than the passenger service, the freight locomotives made approximately 201,000 miles and hauled 2,365,000 tons of ore.

The freight traffic consists largely of copper ore and amounts to more than 5,000,000 tons per year. This material is handled in steel ore cars weighing about 18 tons and having a capacity of 50 tons each. Trains of

up Smelter Hill to the ore bins. All of the shifting and "spotting" of cars at the smelters and in the sorting yards is done by single locomotive units.

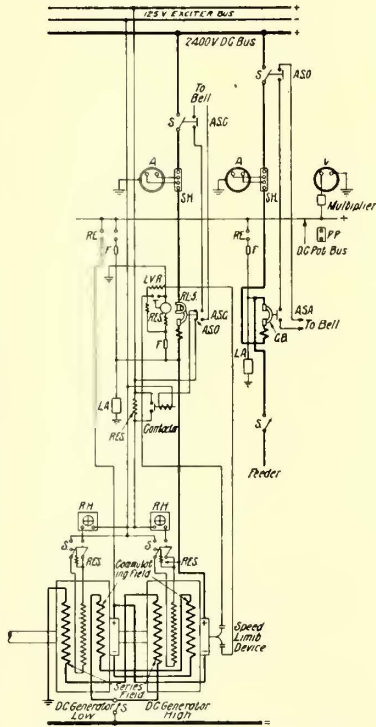
CONDENSED INFORMATION ON FREIGHT MOVEMENT

	West Bound			East Bound		
	Butte Hill Line	Main Line	Smelter Hill	Smelter Hill	Main Line	Butte Hill Line
Trailing load in tons.....	2000	4000	1400	1000	1260	650
Number of cars.....	30	60	20	55	70	35
Number of 80-ton locomotives per train.....	2	2	2	2	2	2
Approximate grade against load in per cent.....	2.5	0.3	1.1	1.1	1	2.5
Approximate speed on level tangent track, m.p.h.....		21			25	
Approximate speed on maximum grade.....	12	16	16	20	16	16
Average trolley voltage.....	2200	2200	2200	2200	2200	2200
Length of run in miles....	4.6	20.1	7	7	20.1	4.6

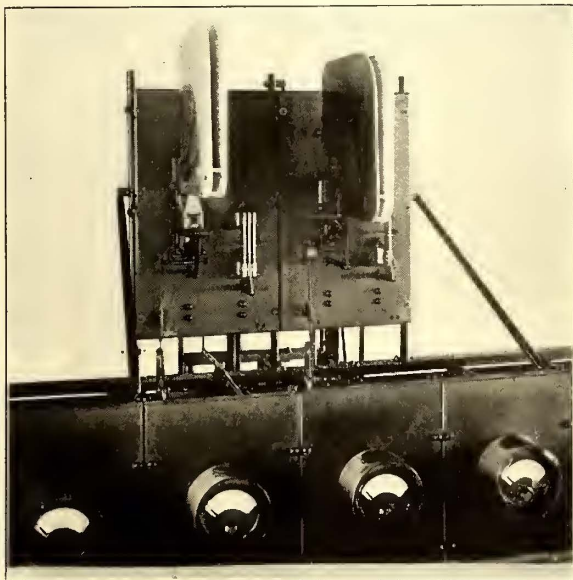
The steam locomotive crews, consisting of engineman and fireman, easily acquired proficiency in handling the electric locomotives. In fact, two or three days' instructions from a competent electrical man were ordinarily sufficient. The change from steam to electric haulage was made without any change in the personnel of the train crews and without any delays or alterations in the schedule. The engineers, without exception, have expressed themselves as being greatly pleased with the easy operation of the locomotives.

LIGHT VESTIBULED CARS FOR CHARLOTTE, N. C.

The Southern Car Company, High Point (N. C.), has recently furnished to the Charlotte (N. C.) Electric Railway four cars, and to the Greenville (S. C.) Spartanburg & Anderson Railway six cars, of the single-truck, arch-roof, full-vestibuled type shown in the accompanying illustration. These cars have no bulkheads, and the swing-type vestibule doors are arranged to operate in connection with the steps. The car bodies proper are 21 ft. 2 in. long over the corner posts, 32 ft. 6 in. over the vestibuled sheeting, 34 ft. 6 in. over the



Butte Electrification—Substation Wiring Diagram



Butte Electrification—2400-Volt Circuit-Breakers

thirty loaded cars weighing 2000 tons are made up at the Butte Hill yards and hauled by two-unit locomotives to the Rocker yards, where 4000-ton trains are made up for the main line. At the West Anaconda yards the trains are again broken up, and 1400-ton trains are sent



Charlotte Electric Railway—Single-Truck Vestibule Car

bumpers, 8 ft. 3 in. wide over the sills and 8 ft. 5½ in. high over the drip rails. The longitudinal sills are of long-leaf yellow pine with channel reinforcement. The cross timbers and the end sills are of oak reinforced with ¾-in. x 4½-in. plate. The side sills and end sills are tied together with corner angle-irons. The posts and roof framing are of white ash while the top rails and the intermediate rails in the roof are of long-leaf yellow pine. The sides of the car are sheathed up to the window rail with 3/16-in. steel. The arch roof is made up of white ash rafters and a concealed steel rafter.

The vestibuled platforms are each 5 ft. 8 in. long. They are carried on oak platform knees, which are reinforced with steel. The interior finish of the cars is in natural mahogany, and the ceilings are of agasote. Six pairs of transverse seats are installed on each side in addition to short longitudinal corner seats. The cars are equipped with Consolidated electric heaters and Crouse-Hinds incandescent headlights.

Stepless Double-Deck Car for Columbus, Ohio

The Writer Explains the Traffic Conditions in Columbus, Compares the Cost of Different Transportation Units and Describes the Car Selected as Most Suitable for the Service

BY ARTHUR ST. GEORGE JOYCE, E. W. CLARK & COMPANY, PHILADELPHIA

Westward the trail of the modern "double-decker" takes its way. Pittsburgh and New York started the innovation, Washington followed suit, and now Columbus, Ohio, has one of the cars in operation along its principal business street. There are certain features about the Columbus car which commend it to the attention of those interested in the problem of providing the maximum capacity at a minimum operation outlay.

TRAFFIC CONDITIONS AT COLUMBUS

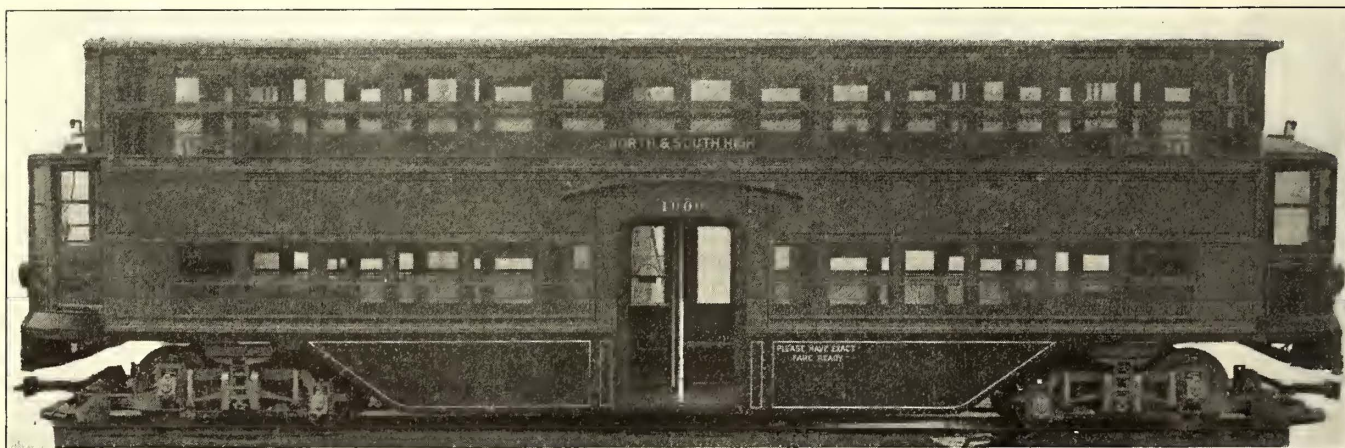
The street railway situation in Columbus differs from that of any other city in the country in having only one street along which there is traffic congestion. Into the electric railway cars that traverse this street there crowd during the rush hours almost all the persons in Columbus who want to ride to or from their homes and places of business.

lowest unit fare charged by any company in the country. It is obliged to furnish eight tickets for a quarter with free transfers. It has become imperative, therefore, for the company to provide a car having the largest carrying capacity coupled with the greatest degree of efficiency. The low-level stepless double-deck car was decided upon as the type which most nearly comes up to the requirements.

COMPARISON OF OPERATING UNITS

The reasons for choosing double-deck operation are contained in the following comparative table, which contrasts the operating expenses, initial cost and carrying capacity of the double-deck car with other types.

The contrast with the single-ended combinations does not mean much as far as Columbus is concerned, since there are very few loops there. It is only when loops



Columbus Double-Deck Car—Side View of Car

During the morning and evening rush hours traffic congestion on High Street throws all the traction lines of the Columbus Railway, Power & Light Company off schedule, since ten out of the sixteen routes operated by the company converge on that thoroughfare through its busiest section—Broad Street to Long Street—a distance of only two blocks. In an effort to relieve this congestion, several years ago, the company got permission from the municipal authorities to re-route some of the lines so that they traversed the next parallel streets east and west of congested High Street. The riding public, however, had become so accustomed to "taking the High Street cars" that it refused to violate traditions and declined to patronize any other line. So the relief plan was abandoned. The situation which confronts the company has become more serious each year. Two-car train operation was recently tried, but this did not prove satisfactory because of delays due to long stops. Again, the operating expenses of the two-car plan were considered too large, since, with seating capacity for only eighty passengers, the train required a crew of from three to four men to operate it.

The Columbus Railway, Power & Light Company, managed by E. W. Clark & Company, Philadelphia, operates under a franchise which demands next to the

are numerous that this scheme of operation can be used economically, because without loops annoying delays result from switching movements at terminals.

COMPARISON SHOWING COST AND EFFICIENCY OF DIFFERENT TYPES OF OPERATING UNITS

	Double-Deck	Single Motor Car	Two Motor Cars with Multiple Unit Control	Single-Ended Two-Car Trains, Both Motor Cars	One Motor Car, One Trailer, Stepless
Cost of equipment (estimated)	\$6,500	\$4,903	\$9,933	\$8,773	\$7,203
Seated passengers	83	40	80	80	100
Seated and standing passengers	171	100	200	200	210
Total weight without passenger load, lb.....	46,000	35,773	71,546	68,209	61,773
Depreciation per train mile in cents.....	1.100	0.830	1.681	1.485	1.219
Cost of energy in cents per kw-hour	1.602	1.144	2.288	2.038	1.976
Maintenance in cents per mile	2.058	1.470	2.940	2.940	2.940
Platform wages in cents per mile	5.227	5.227	7.841	7.841	7.841
Total cost in cents per train mile	11.121	9.526	16.483	15.835	15.232
Cents per passenger capacity per train mile..	0.0650	0.0952	0.0824	0.0792	0.0725

It will be noted also that the wages paid the conductor and motorman on the new double-deck car are

the same as those of the single-motor cars and represent a much smaller outlay than the sums paid to operators of the other types. The cost per passenger capacity per train mile is lower than that of the other contrasted types.

Selection of the double-deck car was also influenced by these economic features:

Additional safety to passengers by elimination of dangers incident to entrance and exit.

Greater convenience in entering and leaving car.

Improvement in working conditions of motormen and conductors.

Better sanitation through scientific ventilation.

Elimination of dangers due to premature starting of cars, since they cannot start until the doors have been shut.

Greater facilities for passengers who want to smoke.

Traffic congestion reduced by increase of almost 100

which separate the motormen's cabs from the seating space of the lower deck. The stairways are at the extreme ends. Each stairway extends up with three steps to a platform and branches to the right and left with four more steps to reach the walkway of the upper deck. The stairways are provided with hand rails.

The walkway of the upper deck extends clear around the car except at the stair wells and is 5 ft. 1½ in. above the floor at the semicircular end seats of the lower deck. The floor at this point is 19 in. above the rail and is reached by a ramp from the floor level at the entrance doors. The floor at the entrance is 11 in. above the rail. The upper walkway extends over the longitudinal seats of the lower deck, and it is not necessary, therefore, to have it high enough to permit a man to stand erect, it being only 6 ft. 8½ in. above the track rails. The seats on the upper deck are placed at the proper elevation to provide ample headroom along the center aisle of the



Columbus Double-Deck Car—Views of Front of Car, Showing Motorman's Cab and Fender Arrangements, and of Lower Deck Interior

per cent in the carrying capacity per foot of street occupied.

Decreased maintenance and operating expenses in the handling of passengers.

GENERAL FEATURES

The new car, built by The J. G. Brill Company, is 45 ft. 6 in. long over all, having an extreme width over the belt rails and eaves of 8 ft. 3 in. The over-all height from top of rail is 13 ft. 2½ in. The trucks are on 29-ft. centers. The framing throughout is of rolled-steel or pressed-steel sections.

The lower-deck floor extends from the center of the car to the edge of the semicircular seats at each end, rising slightly from the center to clear the truck axles. The space underneath the end and cross seats is not floored and the wheels and truck frames extend up under these seats. This arrangement permits the truck to swing sufficiently to pass around a curve of a minimum radius of 37 ft.

The upper deck extends only between the bulkheads

lower deck, but are so high that it is necessary to provide a footboard along the full lengths of the seats, which, in giving space for passengers' feet, keeps them from blocking the walkway.

The upper deck is closed in winter and will be opened during the summer months by taking out the removable sash and sections of sheathing. The ends of the upper deck are protected against the weather by extension of the first-floor bulkheads, and are fitted with outward-swinging windows. The upper-deck roof is of agasote covered with No. 6 cotton duck. The lower-deck headlining is of agasote. Advertising card racks are provided for both decks.

The floors of both decks are of long-leaf yellow pine covered with ¼-in. agasote. Carborundum safety treads are used at the center doorways and at the doorways of the motorman's cabs, and narrow sections of this tread are used to face the stairway steps and the front edge of the upper-deck foot seats.

The car is equipped with Brill maximum traction trucks of the low-bolster type with outer bolster bear-

ings outside of truck side frames. The axles are of Carnegie heat-treated steel and the wheels of Carnegie rolled-steel single-wear type. The driving wheels are 33 in. and the pony wheels of 18 in. diameter. The truck wheelbase is 5 ft. The brakes are the inside-hung type. Each truck is designed to receive one outside-hung motor.

MOTOR AND CONTROL EQUIPMENT—AIR BRAKES

Two GE-201-A motors are used with the manufacturer's grade L gears and grade K pinions. The gear ratio is 71:15. The motors are rated at 55 hp at 500 volts or 65 hp at 600 volts. The equipment is designed for a schedule speed of 8.5 m.p.h. with seven stops per mile, but the gear ratio will give a maximum speed of approximately 25 m.p.h. on level tangent track. All calculations were made on a total weight of the car, with eighty-eight seated and eighty-three standing passengers, of 69,085 lb.

The control equipment is suitable for double-end operation with K-36 controllers. The contactors are fitted with interlocks in connection with the control system in order to interlock the latter with the operation of the car doors. The motor rheostats are of special design in view of the low level of the car.



Columbus Double-Deck Car—Interior of Upper Deck

GE straight air brake equipment is used. The C-P-27-A compressor has a piston displacement of 15 cu. ft. per minute when operated against a tank pressure of 90 lb. (gage) per sq. in. The equipment is provided with two brake cylinders, also five reservoirs of special dimensions, because of their location under stairways and longitudinal seats of the lower deck.

SEATING ARRANGEMENT AND WEIGHTS PER PASSENGER

The seats of both decks are longitudinal except for the semicircular seats and the two cross seats at each end of the lower deck. The seats on the upper deck are set back to back and the feet of the passengers seated on them are almost directly over the heads of the passengers who are seated on the longitudinal seats of the lower deck. The latter seats extend from the center entrance space to the end wells of the car. At the end of these seats are two permanent cross seats. The semicircular end seats extend from the cross seats around the end wells. All seats are rattan.

On a basis of 17 in. per passenger, the upper deck will seat forty-two passengers and the lower forty-one, making a total of eighty-three. It is expected that the car will take care of 171 seated and standing passengers. The total weight of the car completely

equipped is approximately 46,000 lb., giving a weight per seated passenger of 554.2 lb. and a weight per passenger standing and seated of 269 lb.

ENTRANCE AND EXIT FACILITIES

The only opportunity for entrance and exit is by the center side doors. These doors are made in halves. The total door width is 50 in. and is divided into two passages by a rail so that two streams of passengers may leave or enter the car at once. The doors are electro-pneumatically operated and are controlled by the conductor.

The entire center of the car for a width of 50 in. is devoted to receiving and discharging passengers. The conductor is seated on a folding seat along the unused center door and before him is a swinging change desk. Space for ten passengers is provided on the loading platform. Entering passengers line up before this desk, and after depositing their fares in the fare box pass on toward the seats and stairways at both ends of the car. The door and step devices were supplied by the Prepayment Car Sales Company, New York, which also controls the Hedley-Doyle stepless car patents incorporated in this car.

VENTILATION AND HEATING

A forced-draft ventilator system is provided for the ventilation of both decks. The foul air is drawn through ventilators which are placed along the center line of the ceilings of both decks and is carried along longitudinal ducts to the motor-operated fan at the end of the car, where it is discharged. The duct for the lower deck is carried between the seat backs of the upper deck, and at the center of the car a riser connects this duct with the one running along the roof of the upper deck. Heat for the car is supplied by electric heaters, fourteen being installed in the lower deck and twelve in the upper deck.

ELECTRIFICATION WORK OF THE LANCASHIRE & YORKSHIRE RAILWAY

As noted in the "Personal Mention" columns of this issue, Messrs. Gobey, Halliwell and Povey, of the Lancashire & Yorkshire Railway, are visiting the United States for the purpose of studying high-tension electric railways. This company has been operating for the past six months an experimental line between Bury and Holcombe Brook, a distance of nearly 4 miles, with a 3500-volt d.c. catenary and car equipments carrying four motors coupled in series. This experimental line is one which was formerly operated with self-propelled steam-motor cars. It is considered an excellent piece of track for tests inasmuch as it has grades of 2½ per cent, a viaduct 360 ft. long and numerous sidings out of Bury.

In the meantime the company has already decided to electrify a branch line between Manchester, Victoria and Bury with a 1200-volt third-rail. This company has been operating for years a 600-volt third-rail between Liverpool and Southport. The new electrification will comprise 9½ miles of route and 20 miles of single track. There are six stations between Manchester and Bury, but three more stations are planned for use as the suburban traffic increases because of the electrification. This particular line has suffered from the competition of tramways, but the company is confident from its experience with the Liverpool & Southport electrification that the service will be greatly improved after the proposed changes have been carried out and that increased traffic will follow. It is expected that the new line will be in operation early in 1915.

Annual Meeting Illinois Electric Railways Association

Travel Bureau Will Be Established in Chicago—Abstracts of Papers on Hydraulic Development at Marseilles, Ill., and Features of the Illinois Public Utility Law

The annual meeting of the Illinois Electric Railways Association was held at the Leland Hotel, Springfield, Ill., on March 6, 1914. The morning session opened with about fifty members in attendance and President Sampsell presiding. Secretary Griffin read the minutes of the previous meeting, following which H. E. Chubbuck, vice-president executive of the Illinois Traction System, briefly reported the work done by the executive committee during the past year. The membership committee reported applications from four railway companies which were accepted for membership.

The report of the secretary and treasurer for the past year showed that the association was in excellent financial condition. This report also contained a summary of the bills affecting electric railways presented in congressional committees and called special attention to those on steel cars, the safe operation of trains and the regulation of the issuance of securities of interstate carriers. At the close of the reading of this report, Mr. Chubbuck spoke of the hearing conducted by the committee on interstate and foreign commerce, reported in the issue of the *ELECTRIC RAILWAY JOURNAL* for March 7, at which different railway managers protested against certain of these bills.

Resolutions were drafted expressing the sympathy of the association and were sent to the families of C. E. Flenner, formerly secretary and treasurer of the association, and B. E. Merwin, both having died since the last meeting.

At the close of the business session a nominating committee was appointed, and after a brief recess its report was received and unanimously passed, electing Britton I. Budd, president of the Chicago Elevated Railways, president; F. E. Fisher, general superintendent of the Chicago, Ottawa & Peoria Railway, first vice-president, and J. R. Blackhall, general manager of the Chicago & Joliet Electric Railway, second vice-president; executive committee, Marshall E. Sampsell, E. C. Faber, H. E. Chubbuck, W. C. Sparks, L. C. Haynes and F. J. Baker.

Following the annual election of officers, retiring President Sampsell addressed the association, urging complete co-operation with the Illinois Public Utilities Commission in an effort to gain its confidence. He stated that the association should not fail to realize that the real essence of the whole situation was the personal equation. The commission has great responsibilities and is in need of all the aid the association members can give it, as well as fair play on the part of all the companies coming under its jurisdiction. In line with this work the railway association should work more closely with the electric light association of the State; in fact, the executive committees of the two associations should work as one so that there would be no overlapping. The incoming president, Mr. Budd, was then introduced, and he addressed the association in a few earnest and well-chosen remarks. He emphasized the remarks of Mr. Sampsell concerning co-operation between the executive committees of the electric light and railway associations of the State. A vote of thanks of the association was extended to the officers and executive committee of the association for the past year.

Before continuing the regular program, President

Budd urged each of the members to study carefully the question of public relations and referred to the exceptionally strong papers on this subject presented at the last midyear meeting of the American Electric Railway Association. Along this line Mr. Budd said that the effect of re-routing the elevated lines in Chicago had necessarily changed the riding habits of many of its patrons and had meant more convenience to some and had inconvenienced others. Where a complaint was received the company had made it a policy to explain its position. It was found quite difficult to meet all the complainants singly, but representatives of the company were sent to attend the various club and committee meetings at which time the attitude of the company was set forth. As usual, the complaints were of all kinds, some reasonable and some unreasonable, but the result of these personal visits to explain matters was 95 per cent effective. Women representatives of the company were sent to answer the complaints of women, either individually or in clubs, and when doing so always requested suggestions for remedying the difficulties. This policy resulted in not only clearing the trouble but in winning many new friends for the company.

Continuing his address, President Budd suggested that the association should establish an electric railway bureau in Chicago to supply information about the transportation which could be supplied by all the roads in the State. He offered to distribute literature of this character at all the elevated railway stations in Chicago, but this formed only a part of his idea of what could be done to cultivate the riding habit throughout the State. He suggested along this line that the publicity committee be instructed to proceed with the purchase of a map showing all the electric lines in the State of Illinois, indicating prominently the special points of interest on each road. Upon motion the publicity committee was instructed to proceed along this line. The executive committee also was instructed to take up the question of establishing an electric railway bureau for the dissemination of information regarding electric travel in Illinois or on connecting lines, which if approved could be established by the proposed publicity committee.

C. W. Humphrey, consulting engineer, Chicago, then read his paper on "The Development of Water Power at Marseilles, Ill." William J. Norton, of Norton & Bird, engineers of Chicago, followed with a paper describing some of the features of the Illinois public utilities law, and J. L. Layng, of the General Electric Company, Schenectady, N. Y., closed the regular program with an illustrated talk on railway motors. The papers of Messrs. Humphrey and Norton are published in abstract on the following pages.

Just before the meeting adjourned, President Budd appointed the following standing committees for the ensuing year: membership committee, Frank E. Johnson, Garret T. Seeley and A. J. Purinton; traffic committee, R. Breckinridge, G. W. Quackenbush, A. M. Farrell, W. M. Brown and E. W. Gregory; signal committee, J. Leisenring, E. F. Gould, W. F. Carr and B. J. Fallon; program committee, W. V. Griffin, C. A. Willoughby and H. A. Fisher; publicity committee, E. E. Soules, Fred Bayless, J. M. Strasser and C. E. Patten.

HYDROELECTRIC DEVELOPMENT AT MARSEILLES, ILL.

The paper by C. W. Humphrey related to improvements in the hydroelectric power station of the McKinley system on the Illinois River at Marseilles, Ill., described in the issue of the *ELECTRIC RAILWAY JOURNAL* for Feb. 24, 1912, page 300. One of the principal features of interest of the plant is the low head, 11 ft., at which it operates. Mr. Humphrey stated that while this was not the first low-head hydroelectric plant, it nevertheless was one of the largest low-head plants and one of the earliest for such a low head. He felt that it was a forerunner of a great many low-head projects and called attention to the fact that water-powers in the Mississippi Valley have been neglected until recent years, attention having been confined first to the extremely high-head plants of the Western mountainous country and later to the medium-head plants of the East.

The plant contains six new 74-in. Samson turbines, two new 40-in. Samson turbines and six 62-in. Samson turbines which were formerly in the plant of the Consolidated Water & Light Company. The 74-in. turbines operated at 75 r.p.m. rated at 450 hp each, at 11-ft. head. These vertical units drive direct-connected Westinghouse generators, two being sixty-cycle and four twenty-five-cycle. The 62-in. turbines are arranged in two groups of three each, one driving a 450-kw, sixty-cycle generator, the other a 500-kw, twenty-five-cycle generator. These geared units will later be replaced by more modern types. The small turbines are directly connected to 90-kw exciters, while a 100-kw motor-driven exciter is used for relay purposes. The twenty-five-cycle and sixty-cycle systems are tied together by means of a 750-kw, 300 r.p.m. frequency-changer.

The power plant supplies two general transmission systems, one a twenty-five-cycle system furnishing all power requirements for the Chicago, Ottawa & Peoria Railway, the other the sixty-cycle system, supplying the Northern Illinois Light & Traction Company, which furnishes light and power in Marseilles and Ottawa, the LaSalle Lighting Company at LaSalle and also power and light in the towns of Spring Valley, Utica, Seneca and Morris. The hydraulic plant operates in parallel with three steam plants, one at LaSalle, one at Ottawa and one at Marseilles. It is thus possible to maintain a high load factor on the hydraulic plant while water is plenty and so to utilize the full capacity of the stream.

A feature of the sixty-cycle transmission line is the fact of a large portion of it being constructed with concrete poles. This line is built on a right-of-way along the bank of the Illinois-Michigan Canal. The poles were all made up at Marseilles, seasoned and loaded on a barge on which was erected a small derrick for placing the poles.

As the head under which this plant operates is so low, special care was taken to conserve it by reducing losses at every point. Trash racks with wide bars, pointed on both sides, were specially designed and these were set against a concrete apron 1 ft. below water level for the purpose of preventing the transmission of heat from the cold air down into the water along the steel bars and causing ice to form on them. The forebay, tailrace and river excavations were all laid out to minimize friction losses, and the speed of the wheels was so selected as to give maximum efficiency at the head used. Special generators had to be designed for the low speed of 75 r.p.m., but this was considered justifiable in view of the higher hydraulic efficiency obtained.

STATE REGULATION OF UTILITIES

BY WILLIAM J. NORTON, CONSULTING ENGINEER, CHICAGO

The Illinois Public Utility Commission Law, in spite of the stress and turmoil under which it was adopted and the general indifference of the Legislature as to the actual wording of the law, is a well-balanced and efficient piece of legislation.

The general regulatory powers of the commission over utility rates, capitalization, accounts, service and valuation are not materially different from those conferred by the laws of other states. The actual duties of the commission, however, are given in as much detail as possible in the law and are made very strict and drastic from the utility standpoint. In the regulation of the franchises granted by local authorities the law is clearly defective, in that it gives no jurisdiction whatsoever over municipal utilities. There is no doubt, however, that the public will soon realize, as it has in Wisconsin, that municipal utilities need more regulation than privately owned utilities, and the commission must ultimately obtain such jurisdiction.

The method of procedure before the commission requires full hearings in all cases, but a distinct attempt has been made to limit appeal to the courts as far as possible. The penalty provisions are perhaps a little more drastic than is usual, but as most commissions have attempted regulation in the spirit of co-operation, these provisions have practically but little effect.

A peculiar situation exists in the State of Illinois relative to regulation, for there is no real public sentiment behind public service regulation. The regulatory act as it stands to-day represents personal and political ambition, and its passage is mainly the result of a majority of the Legislature being unwilling to go on record against a bill supposed to be popular. Such opposition as was manifested against the bill was entirely the opposition of the city of Chicago, which was in favor of local regulation for its utilities. The public clamor in Chicago, however, was of no avail. The bill became a law, and to-day Illinois has a public utility commission law which, if properly administered (and Governor Dunne's appointments to the board give promise that this will be a fact), will be the most important law upon the statute book of the State.

The relative merits of state and local regulation of public utilities, however, are still an important question in Illinois. The citizens of Chicago will on April 7, 1914, vote upon the following referendum: "Shall the State Legislature amend the act creating a state Public Utilities Commission approved June 30, 1913, so as to provide for home rule and the control by the city of Chicago of public utilities in the city?" In view of this fact, an analysis of the fundamental points involved in the regulation of utilities will be quite timely.

The progressive public utility of to-day refuses to confine itself to a single local community. Hydroelectric and steam central station properties now stretch out over an area with a radius of at least 100 miles. Electric railways, while they may for legal purposes stop at the city limits, in reality continue far out into the suburbs and often to the borders of the state. The telephone is probably as important from its long-distance and toll connections as it is for local purposes. Even the source of supply of the common municipal waterworks is outside of the city limits. Natural gas is in general an interstate matter, and even artificial gas companies often serve more than one community.

Fundamentally, therefore, modern utilities have lost all of their local significance. The argument is sometimes offered that such railroads as the Grand Trunk

and the Michigan Central are international utilities and that if the power of regulation is taken from municipalities it should not go to the state but to the federal or international authorities. Such an argument has no weight, for regulation is a complex practical problem, and the responsibility must be divided in the most logical manner. Steam railroads and telephones are mostly interstate in scope and in the end will fall under federal jurisdiction alone. But street and interurban railways and gas, electric and water companies, for practical reasons, must eventually be left entirely to state commissions.

Regulation naturally divides itself into control over the following: competition, capitalization and intercorporate relations, accounts, rates, service and extensions, franchises. Each of these subdivisions may be taken up with reference to whether the primary interest involved is a local or a state interest, as follows:

COMPETITION

While a city should have the right to determine whether a utility may use its streets and under what conditions, the determination of the question whether convenience and necessity require a duplicate use is a matter over which the state itself should have a veto power. The cities have always shown, and this is true in Chicago, that they are entirely too near to the problem, too much involved in the issue, to be able to reach a fair determination as to whether competition should be allowed.

CAPITALIZATION

Intercorporate relations and the issue of stocks and bonds are matters which relate to the corporate entity of the utilities.

Corporate life depends upon a grant from the state, and it naturally follows that any change in the corporate existence or in the corporate relations should be also controlled by the state.

ACCOUNTS

The regulation of utility accounts strives to accomplish two purposes: (1) uniformity; (2) statistical information. Uniformity would never be acquired under a great number of municipal regulations, and if there is not uniformity, accounts have very little statistical value. Hence here again it appears that the regulation of accounts should be a state function.

RATES

There are two methods of rate regulation, occasional regulation and continuous regulation. Most cities have attempted occasional regulation. The commissions, as a rule, have attempted continuous permanent regulation. State regulation of rates assumes the form of an arbitration between a corporation and the public which it serves. Municipal regulation is the attempt of one party of a controversy to settle it. If any one should propose that all disputes between capital and labor should be settled by a committee appointed entirely from labor, the idea would seem ridiculous, but this is analogous to what municipal regulation would mean. Even if the political element did not enter into the regulation of rates by a municipality, it would still mean an arbitration decided by one party in the controversy. There can be absolutely no doubt that the regulation of utility rates should be in the hands of an arbitration board or jury having as little personal connection with the issue as is possible. The municipality, however, is the last authority which should have such an important judicial function.

SERVICE AND EXTENSIONS

When a city gives up its streets to a private corpora-

tion for the benefit of the public, the matter of local service is fundamentally most important. There is a great tendency for municipalities to exaggerate the importance of rates, but really they are more interested in the matter of service and in the proper extension of the utilities. The local authorities should have something to say in the matter of service and extensions, but a state commission should have a veto power and a general authority over such requirements in case they should prove unfair and unreasonable.

MUNICIPAL OPERATION

There is no regulation of municipal utilities under the Illinois law. It has been found in Wisconsin that municipal utilities have required at least twice as much regulation as privately owned utilities. The fact is that unless there is a strong state commission having the confidence of its citizens the public will never receive fair treatment from utilities operated by the municipality itself. Municipal utilities have always been more drastic and overbearing in exacting deposits and service charges and in discontinuing service than have privately owned utilities, and unless there is some regulation of the former the public in the end must suffer.

Thus in only one of the important functions of regulation is there found any interest that is purely municipal in connection with service and extensions. All other functions belong to the state and should be exercised and controlled by the state.

ELECTRIC RAILWAY ECONOMICS RESEARCH AT BOSTON "TECH."

As already mentioned in this paper, a comprehensive investigation of the economics of the 5-cent fare unit on electric railways is now under way at the Massachusetts Institute of Technology, Boston, the work being in the hands of the research division of the electrical engineering department. The funds for this study are being supplied through the co-operation of the firm of Stone & Webster, Boston, Mass., the General Electric Company and the Public Service Railway Company of New Jersey. The department has been guaranteed the sum of \$3,600 per year for five years, and it is probable that other concerns will be contributors to the fund in the near future. The original sponsors of the investigation were Stone & Webster, but in view of the importance of the subject interest is being manifested in other public utility circles.

The fundamental object of the studies now being conducted is to determine a method of fixing the economic possibilities of the 5-cent fare unit on city electric railways, particular attention being given to the relations between the length of ride and the fares in force, and also to the effect of transfers, length of routes, etc., upon the return upon the capital investment. The work has been in progress for about three months under the supervision of Dr. Harold Pender, director of the research division, and H. F. Thomson, secretary of the division, and has thus far been chiefly confined to the exhaustive study of existing data on the fare question and the analysis of operating results on forty representative electric railways serving purely urban communities. Tabular summaries have been made of capitalization, traffic, earnings, expenses, car-hour, car-mile, per-passenger and other unit data; an extensive bibliography of fare problems and their discussion has been prepared, and a number of plots have been made to show the changes with respect to the past twenty years in unit operating results. In these latter tabulations the revenue passenger has been selected as the fundamental unit.

The plots thus far made indicate that the ratio between expenses and receipts is about the same on large and small roads. It also appears that the average net earnings per total passenger are somewhat smaller in the larger cities on account of the greater transfer traffic. A study of the operating records of two representative street railways in Massachusetts, not including that at Boston, indicates that in the past twenty years the fixed charges per passenger have increased more than the operating cost, and that the diminishing rate of return upon the investment is due in large measure to the greater outlays for construction and equipment per passenger as compared with former years. No general conclusions are as yet available regarding the relations between fares and hauls, and the research division is devoting much attention to the best lines of approaching this complex problem. The immediate conduct of the work is in the hands of David J. McGrath, a graduate of the civil engineering department of the institute in 1912. Mr. McGrath's field experience includes work in the engineering department of the Boston & Albany Railroad, hydroelectric work with the Power Construction Company of Shelburne Falls, Mass., subway work with the Hugh Nawn Contracting Company, Boston, Mass., and electric vehicle statistical research and mechanical engineering laboratory instruction at the institute.

TENTATIVE I. C. C. UNIFORM SYSTEM OF ACCOUNTS

The Division of Carriers' Accounts of the Interstate Commerce Commission has just issued a tentative uniform system of accounts for electric railways for consideration and criticism by such carriers before the system is finally prescribed by the commission. Printed copies of this system were mailed to all electric interstate carriers Feb. 28, and the accompanying letter, which is printed below, says that replies and criticisms should reach the chief examiner of accounts on March 21. It is understood that these criticisms will be considered by the representatives of the commission jointly with the classification committee of the American Electric Railway Accountants' Association at a meeting to be held probably on March 25. Mr. Sweney, chief examiner of accounts, has authorized this paper to say that any criticisms received before that date will receive consideration.

INTRODUCTORY LETTER

INTERSTATE COMMERCE COMMISSION, DIVISION OF CARRIERS' ACCOUNTS

WASHINGTON, Feb. 16, 1914.

To Accounting Officers of Electric Railways:

This circular contains, in tentative form, the first revised issues of the electric railway classifications of expenditures for road and equipment, operating revenues and operating expenses, and, also in tentative form, the first issues of the classifications of income, profit and loss, and general balance-sheet accounts. It has been the purpose in revising the three first-named classifications to modify the present effective accounting rules to conform with the rules contained in other classifications of later issue, to include as a part of the text of the accounts affected the interpretations published in accounting cases, and to make such further changes in the details of the existing rules as will clarify or add to the usefulness of the system of accounts as a whole. These classifications practically complete the system of accounts to be used by electric railways subject to the jurisdiction of the Interstate Commerce Commission. Attention is particularly directed to the general instructions preceding several of the classifications.

To each classification has been given a separate series of account numbers as follows:

Operating expense accounts, beginning at 1.
 Operating revenue accounts, beginning at 101.
 Income accounts, beginning at 201.
 Profit and loss accounts, beginning at 301.
 Balance-sheet accounts, beginning at 401.
 Road and equipment accounts, beginning at 501.

The following changes should be noted in the tentative revised classifications:

In *Operating Expenses* a new general account, "Power," has been provided, in order to bring together, under one general account, the expenses incident to the maintenance and operation of power plant buildings and power plant equipment (including transmission lines). The expenses includible under this head have been eliminated from other general accounts and necessary primary accounts have been added. (See Section 3 of general instructions for operating expense accounts.)

Three new primary accounts have been provided for equalization of expenses under the general accounts "Way and Structures," "Equipment" and "Power," respectively. As explained in their texts, the adoption of these accounts is optional with the carrier. Another new primary account for equipment retired has been added under the general account "Equipment." This account, as more fully explained in its text, is intended to include the cost, less depreciation accrued and accounted for, of equipment retired, whether replaced or not.

The text of the proposed account No. 32, "Locomotives," now includes maintenance of electric equipment of locomotives, and the account "Electric Equipment of Locomotives" has been eliminated. An account called "Parks, Resorts and Attractions" has been provided for in traffic expenses. Under "General and Miscellaneous" accounts have been provided to include amortization of franchises and valuation expenses.

In *Operating Revenues* attention is called to Account No. 103, "Parlor, Sleeping, Dining and Special Car Revenue," the title and text of which have been amended to include revenues derived from sleeping and dining cars.

In *Road and Equipment Expenditures* several accounts have been added to the classification and a number of the retained accounts slightly changed for the purpose of making their titles more representative of the items of expenditure includible therein. There has also been provided a new general account called "Power," under which have been included all primary accounts representing expenditures for power plant buildings and equipment. It should be noted, however, that Account No. 546, "Interest During Construction," provides that, in addition to interest, a proportion of discount on funded debt issued for construction or addition and betterment purposes is includible as a part of the cost of construction.

It is proper publicly to acknowledge the hearty cooperation of the committee on a standard classification of accounts of the American Electric Accountants' Association in working out the details contained in these classifications. With but few exceptions the rules as now promulgated conform to the recommendations of that committee, and the assistance of its members in the consideration of the questions involved herein has been invaluable.

Accounting officers are invited to offer such criticisms and suggestions regarding this circular as in their opinion may be helpful to the commission in the preparation of the system of accounts for authoritative issue. In order to be given consideration replies to this accounting circular should reach this office not later than March 21, 1914.

(Signed) FRED W. SWENEY,
 Chief Examiner of Accounts.

COMMUNICATIONS

CO-OPERATIVE TRAINING FOR ELECTRIC RAILWAY EMPLOYEES

UNIVERSITY OF CINCINNATI

CINCINNATI, OHIO, March 7, 1914.

To the Editors:

The editorials in your issues of Feb. 7 and Feb. 21 referring to the training of men for responsible positions in railway operation and maintenance are of peculiar interest in some respects. The unsatisfactory situation indicated by Mr. Basford, and referred to in your editorial of Feb. 7, has been known for some time. About ten years ago I remember reading communications to the *American Engineer and Railroad Journal* by technical graduates who had gone into the special apprentice courses offered by railroads. In nearly every case the results, so far as these graduates were concerned, were unsatisfactory. Railroad officials also have indicated more or less dissatisfaction with the results obtained from these courses. Evidently the dissatisfaction is thorough enough on both sides to indicate that the problem is not solved in an entirely satisfactory way by the educational methods in general use at the present time.

Since large numbers of men are engaged in the business of transportation and since technical training is becoming more and more necessary to the men who are to be responsible for the satisfactory maintenance and operation of railroads, both steam and electric, this problem must be solved one way or another.

It seems as though the co-operative principle in education, as enunciated by Herman Schneider about twelve years ago, and as applied at the University of Cincinnati during the past seven or eight years, can solve this problem. The principle is really a very old one, but it has remained for educators of recent years to apply it. It is inherently simple enough, namely, that education should not take students out of intimate contact with the practical affairs of life. There should be actual productive work done along with the work of the classroom. In the practical application of this principle the students alternate, by two weeks' periods, between the shops and the university. For each position there are two men. While one man is at the university the other is at work.

Practical operation for more than seven years has shown that this principle is sound and practical. At present the university is co-operating with the Pennsylvania and Big Four railroads and with the Cincinnati Traction Company as well as with many other manufacturing and operating companies.

The co-operation is on a purely business basis. The students are paid the same rate as is paid to any one else doing the same grade of work. With many companies definite arrangements are made regarding wage scale, which assure a progressive development on the part of the student.

One great advantage of the co-operative system is that students discover their fitness for engineering work earlier in life than would be possible under the regular methods of education. For instance, one young man who entered the co-operative course last year had a good shop record, but his work at the university was not up to the standard. The result is that he has decided to devote his entire time to becoming a good blacksmith and is doing efficient work in which he finds satisfaction and profit. The scope of this brief comment will not permit an extended discussion of examples. The point is that when students are brought into direct contact with actual engineering practice

there is less likelihood of their investing time and money inefficiently in education.

When the proposition is made to a manufacturer, a merchant or a railroad official to employ co-operative students, some explanation is necessary to clear away the doubts which always arise. In practice, the troubles which are anticipated from two students working alternate two-week periods on the same job rarely ever materialize. In fact, it has been found that the two viewpoints are a distinct advantage in some lines of work. To many concerns the advantage is apparent of having, with a given number of jobs, twice as many ambitious young men from whom to choose possible foremen and other officials as would be possible under the old methods.

Organized labor has seen the advantages of the co-operative principle and has gone on record as favoring it. As a matter of fact, one argument which appeals to the ambitious artisan living in Cincinnati is that his son has the opportunity to get a technical training which would be out of the question with the regular four-year college course. The only criteria by which students are selected for advancement are their abilities in the shop and in the university.

When the course of training is completed there can be no illusions regarding the ability and effort necessary for success in engineering. There can be no feeling on the part of the graduate that he has invested time and money in a field with which he was unfamiliar. And the officials who may have occasion to use the services of such a graduate can determine his value in a relatively short time.

A. M. WILSON, Professor of Electrical Engineering.

THE CIRCULAR INCH VS. THE CIRCULAR MIL

PHILADELPHIA, PA., March 5, 1914.

To the Editors:

When so much thought, effort and money are spent in "scientific management," which might also be termed the lessening of waste efforts, it is rather curious that engineers continue to waste their own personal mental and physical energy by blindly following old practice in their own personal work when more efficient methods are within their grasp. The writer has frequently called attention in print to numerous ways in which the daily work of the engineer may be reduced and made more efficient in simplifying his numerous daily calculations by using more convenient units. The saving in each calculation may be small, but the aggregate number of daily calculations is very large.

In this connection the writer desires to call attention to the useless daily waste in effort and space by continuing to use circular mils in referring to large cables, in which their number is in the millions, as in 1,500,000 circ. mil or 500,000 circ. mil, etc., when it would be so much simpler to use the circular inch instead, hence shortening these figures to 1.5 or 0.5 circular inch.

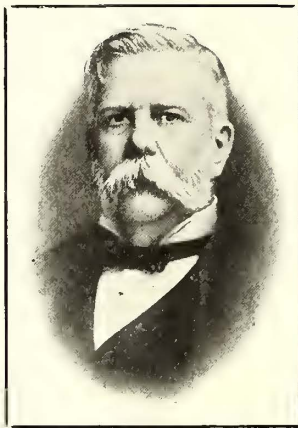
In calculations on electrical matters when the numbers run into thousands and millions, or thousandths and millionths, it is customary to substitute for ciphers the prefixes kilo- and mega-, or milli- and micro-. A circular inch would then be a mega-circular-mil, but as the name circular inch already exists for this unit, no new name is necessary.

Although electrical engineers in the past have been noted for their progressiveness in adopting simpler methods and looking after greater efficiencies, the present case is one in which other engineers have been more progressive, as I understand the circular inch and circular foot have been in use for many years for small and large pipes, rods or other structural materials whose section is always circular. CARL HERING

GEORGE WESTINGHOUSE: A BIOGRAPHY

George Westinghouse died in New York City on March 12 from heart failure. During a year or more he had been suffering from troubles brought on presumably by indigestion, which affected his heart. For some months he has been obliged to desist from his business activities. His affairs have been left in the hands of trustees, his brother H. H. Westinghouse, president of the American Brake Company; Charles A. Terry, vice-president of the Westinghouse Electric & Manufacturing Company, and W. D. Uptegraff, director of the Westinghouse Air Brake Company. Mr. Westinghouse had always possessed a strong physique and was a prodigious worker. He had the ability to concentrate his attention and to turn it from one important subject to another without distraction.

During the past few years Mr. Westinghouse has received recognition of his achievements such as comes to but few men. In 1913 he received the Grashof medal, in 1912 the Edison medal from the Institute of Electrical Engineers, still earlier the John Fritz medal, the Cross of the French Legion of Honor and other foreign decorations. In 1906 the Koenigsliche Technische Hochschule bestowed on him the honorary degree of Doctor of Engineering. In 1890 Union College, at which he studied when a boy, gave him the honorary degree of Doctor of Philosophy. Several technical societies showed their appreciation of Mr. Westinghouse by making him an honorary member.



George Westinghouse

At the time of his death Mr. Westinghouse was at the head of a large number of important manufacturing concerns in the United States and abroad. Of these, the principal ones were the Westinghouse Machine Company, the Westinghouse Air Brake Company and the Union Switch & Signal Company. These companies have an aggregate capital of more than \$100,000,000. The organizations for which he was primarily responsible are capitalized at twice this sum and give employment to some 50,000 men.

Mr. Westinghouse was born at Central Bridge, Schoharie County, New York, on Oct. 6, 1846. His father's ancestors came from Germany and settled in Massachusetts and Vermont before the Revolution. His mother was of Dutch-English origin. His father was an inventor, and in 1856 he took his family to Schenectady, N. Y., where he established the Schenectady Agricultural Works in a building still standing, opposite the present General Electric Works. George was one of five sons. He attended the Schenectady public schools, spending his leisure time in his father's machine shop, and before he was fifteen had invented a rotary engine.

On the outbreak of the war he was anxious to enlist, but as he was far under age, found it impracticable to do so. However, by June, 1863, when he was less than seventeen, he was able to overcome the barriers to admission to the Twelfth New York National Guard and was admitted on account of his strapping size, without undue inquiry as to his age. He soon afterward joined the Sixteenth New York Cavalry and served until honorably discharged in November, 1864. He was

always interested in the engineering side of whatever work he took up and a month after discharge joined the navy as third assistant engineer. At the close of the war he entered Union College and remained in school until the end of the sophomore year. He was very proficient in mathematics and had secured all of the training in this and scientific lines that the college then afforded. On the advice of the president of the college, who saw that young Westinghouse was not getting what he required in preparation for the engineering career for which nature had evidently intended him, he went into practical work.

Then began the remarkable series of inventions which in a few years made Mr. Westinghouse famous and wealthy, although he started with practically no resources excepting his own ability. In 1865, following his usual habit of observing the ordinary events of everyday life, he noticed the clumsy method used for replacing railroad cars on the track. He was able quickly to invent a replacing frog which he patented and developed. While making a trip in connection with the manufacture of this device, his attention was attracted to a delay caused by a collision between two freight trains due to the inability of the brakemen to stop them in reasonable time. The idea of originating some device by means of which the engineer could apply the brakes along the entire length of the train immediately appealed to him as worthy of development. He had some time before been interested in the operation of railroad signals and switches by means of compressed air and this means seemed to be the most practicable for braking purposes. He at once patented devices for accomplishing this purpose, securing his patents on April 13, 1869. Three months later he formed the Westinghouse Air Brake Company and was soon successful in introducing the brakes on the Pennsylvania and other important roads. In 1871 he went abroad and introduced the new brakes in England. A dozen years were required to develop inventions to overcome the difficulties of air-brake practice as they arose. By 1882 this had been practically accomplished, but it still remained to invent the automatic features of the brakes, which were patented in 1886. The history of the application of this device records an unbroken line of accomplishment.

Mr. Westinghouse early became interested in the electric lighting industry, and he formed a company in 1886, known as the Westinghouse Electric Company, to manufacture lamps and electric lighting apparatus. This concern developed rapidly and two large pioneer companies, the United States Electric Light Company and the Consolidated Electric Light Company, were absorbed between 1889 and 1890. The company was reorganized in 1891 under the present name, the Westinghouse Electric & Manufacturing Company. This company was a pioneer in the development of electric lighting business and was also prominent in the application of the electric motor to traction.

At about the time the Westinghouse Electric Company was formed, Mr. Westinghouse became interested in the a.c. system which had been invented in England by Gouland and Gibbs, who had devised transformers for changing a.c. voltage. The transformer was immediately developed on a commercial basis against great commercial obstacles. Mr. Westinghouse also backed Tesla in his experiments on induction motors and commercialized this important invention. In the early nineties the company took the contract for the building of ten generators for Niagara Falls which were of epoch-making importance. Mr. Westinghouse's interest in a.c. apparatus is reflected at the present time in the activity of the company in developing a.c. traction

for heavy railroading. While he did not take as much personal interest in the light electric traction as in other branches of his business, he encouraged his engineers to do so. Late in his life he gave much study to this subject and by public utterance showed his mastery of this department of engineering.

As Mr. Westinghouse's first invention was an engine, his interest in the later development of the gas engine and steam turbine is easily understood. The Westinghouse Machine Company for a time devoted its energy largely to the building of high-speed, single-acting engines, and this business was succeeded by the gas engine. Mr. Westinghouse saw the possibilities of the Parsons type of steam turbine and secured the American rights together with technical assistance from England. Later he became interested in a reducing gear for adapting the turbine to drive low-speed machinery. In the *New York Times* of March 13 Mr. Westinghouse's close friend, Arthur Warren, summarized his career in the following words:

"Physically he was a big man. Character was crowded into him, a great, fine, sturdy character that makes a great man. His mind was big. So was his good-heartedness. He did not suffer fools gladly. If patience ever snapped, he controlled his temper. Angry he might become, but he kept the brakes on anger. He did not show it. And not once in his life did he ever show the white feather. There was not a mean streak in his nature. He despised pettiness. But within that big physique, with its powerful will and unbreakable spirit, there was a sensitiveness which he strove to conceal. Never was his honor tarnished. As he grew older, his considerateness grew broader. He mellowed well. And men became more and more loyal to him, if that were possible in the case of a man who had a rare capacity for inspiring loyalty and achievement in other men. It has often been said that he dominated. It was true, but he did not domineer. Sum up the man in this: George Westinghouse, what he was, no less than what he did, must be remembered as one of the best assets of a nation."

QUICK RECUPERATION FROM STORM IN NEW JERSEY

The Public Service Railway Company, which operates some 300 miles of interurban and suburban track, in addition to 550 miles of city track, in the State of New Jersey, suffered severely by the recent storm. Its interurban cars were stalled from one to three days, and snow drifts in many places 12 ft. in depth had to be encountered. One 12-ft. drift was one mile in length. No such storm has been encountered in New Jersey since 1903, when there was one very similar in character. The Public Service Railway lost very little pole line, not more than fifty poles, but the lines were put out of commission by those of other companies which fell across them. In one place 5 miles of pole line of the Postal Telegraph & Cable Company were down, putting the Public Service Company's signals out of commission. Six miles of new trolley wire will replace the loss in this direction.

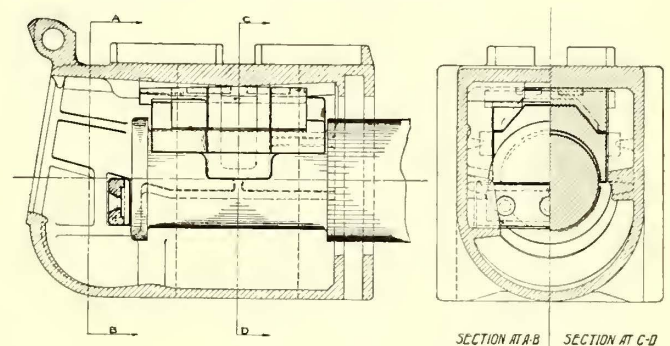
Within a week of the storm dispatching lines were in operation. The Public Service track parallels in places the track of the Lehigh Valley, West Shore and Pennsylvania Railroads, all of which had practically all of their pole lines down. It will still require two weeks or more to get all of the Public Service telephone lines into operation.

The company was gratified by the manner in which the car and plow crews stood by their tasks. Residents all along the line showed very friendly feeling, furnishing food for the men. In one case a resident cooked

a chicken dinner for a plow crew at 2 o'clock in the morning. The loyalty of the crews was one evidence of their appreciation of the expenditure of money and thought on the part of the company in welfare and social work.

END THRUST ON JOURNAL BRASSES

In the issue of Feb. 28 E. W. Holst, superintendent of equipment Bay State Street Railway, described a device for overcoming end thrust of journals as well as the side thrust due to heavy applications of the brake on one side of the wheel. Since this communication was published a drawing of the assembled journal box and brass has been obtained, and this is reproduced in the accompanying illustration. From this it will be seen that the end-thrust bar, which is $\frac{7}{8}$ in. x $1\frac{1}{8}$ in. in cross-section, is supported at the ends in recesses formed by lugs cast in the sides of the journal box. The bar may be lifted out when worn and replaced with a newly babbitted bar whenever necessary.



Bay State Journal Box with Semi-Circular Brass and End-Thrust Bar

The extended wings on the journal brass, which make complete the full semicircular cross-section, are limited in length to a short section at the center of the brass. The remainder of the cross-section of the brass is approximately the same as the standard M.C.B. design. This arrangement reduces the weight of the additional metal in the journal brass and at the same time aids somewhat in the removal of a brass from the box.

The new design as shown is reported to have overcome the difficulty with excessive end-play on journals with small collars and, in addition, to have eliminated the tendency on the part of the journal to draw to one side under heavy applications of the brake.

With this design as well as with the hooded wedge and hooded brass the end thrust from the journal has to be absorbed at one side of the truck, and the result in some cases has been reported to involve spreading the truck sides out of line. With the standard arrangement the end thrust is carried by both boxes alike, as on one side the thrust comes on the collar of the journal and on the other side on the shoulder of the axle. In consequence there is no tendency to spread the truck sides. However, with trucks having end frames this objection naturally does not hold.

The March issue of the *Canadian Railway and Marine World* contains the following total statistics for the fifty-seven different electric railways in Canada: First main track mileage, 1356.63 miles; gross earnings from operation, \$28,216,110; operating expenses, \$17,765,372; taxes, funded debt, etc., \$5,334,905; net income, \$6,434,742; total car mileage, 90,819,638 miles; fare passengers carried, 597,863,801.

Equipment and Its Maintenance

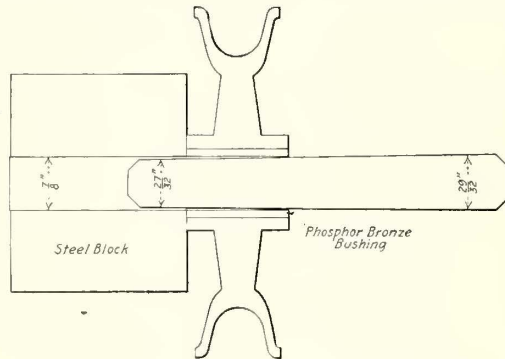
Short Descriptions of Labor, Mechanical and Electrical Practices in Every Department of Electric Railroading

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

MAXIMUM WEAR FROM TROLLEY WHEELS

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

For the past year the Rockford & Interurban Railway, Rockford, Ill., has been able to average approximately 10,000 miles on its trolley wheels by getting the maximum possible wear out of them. We use a 6-in., 4-lb. wheel with a $\frac{7}{8}$ -in. hollow shaft, for which we pay \$1.05. The new wheels are installed in interurban service, and as they wear down are transferred to city cars until worn out. We had much trouble at first because the hub would become badly worn before the rim. Now when this occurs we bore out the hub $1\frac{1}{8}$ in. scant and press in a $\frac{7}{8}$ -in. inside diameter, $1\frac{1}{8}$ -in.



Expanding Bushing for Trolley Wheel

outside diameter phosphor-bronze bushing, which is swaged at both ends with a tapered pin ($\frac{1}{16}$ -in. taper to fit). This makes the bushing tight in the wheel and allows it to run freely on the $\frac{7}{8}$ -in. axle. At a cost of 7 cents for labor and material we frequently obtain from 3000 to 4000 miles additional life from a wheel, and in all cases we attain the limit of wear.

RED STRIPES PAINTED ON WALLS TO LOCATE FIRE-FIGHTING EQUIPMENT

BY W. H. BOYCE, SUPERINTENDENT BEAVER VALLEY TRACTION COMPANY, NEW BRIGHTON, PA.

We have read with much interest the article by E. L. Mathews entitled "Red Lamps Used to Protect Fire Extinguishers from Freezing," as published in your issue of March 7, 1914. After four and one-half years' use of a box of practically the same type as that described by Mr. Mathews, we have found that it is all that he claims for it. In addition to this method of marking boxes, the location of which is obscured to a person standing in the center of a carhouse, because several cars are often between the person and the fire extinguisher, we have found the following practice to be helpful. We paint one bright red stripe 10 in. in width on the wall from the top of the fire extinguisher box up to the eaves of the building. A second bright red stripe 5 in. in width painted on the wall from each

sand bucket to the eaves has also proved to be of help.

It is well that Mr. Mathews has stated in his article that "an ordinary 16-cp electric light bulb" is used in the fire extinguisher box for we have found that while in severe weather a 23-watt or 35-watt lamp does not furnish enough heat to keep the extinguisher from freezing, a 16-cp 60-watt carbon lamp does do so.

RECLAIMING OLD SWITCH TONGUES AND GENERAL SPECIAL WORK

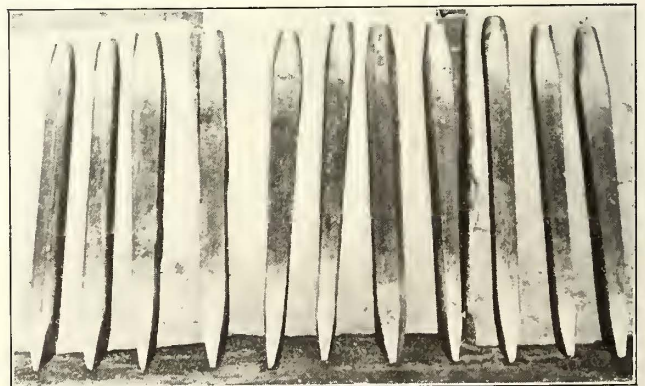
BY "CONTRIBUTOR"

The Connecticut Company makes a practice of saving all tongues from old switch pieces removed from the streets. When scrapped special work is sold these



Section of Yard Showing Special Pieces Reserved for Use

tongues are removed and those fit for re-use are hung on a special rack provided for this purpose. The remainder are made over into "bull-points" by a blacksmith for use in breaking up old concrete. The heel-tightening device is also removed and placed in a closet



"Bull-Points" or Chisels Made from Old Switch Tongues for Use in Breaking Up Old Concrete

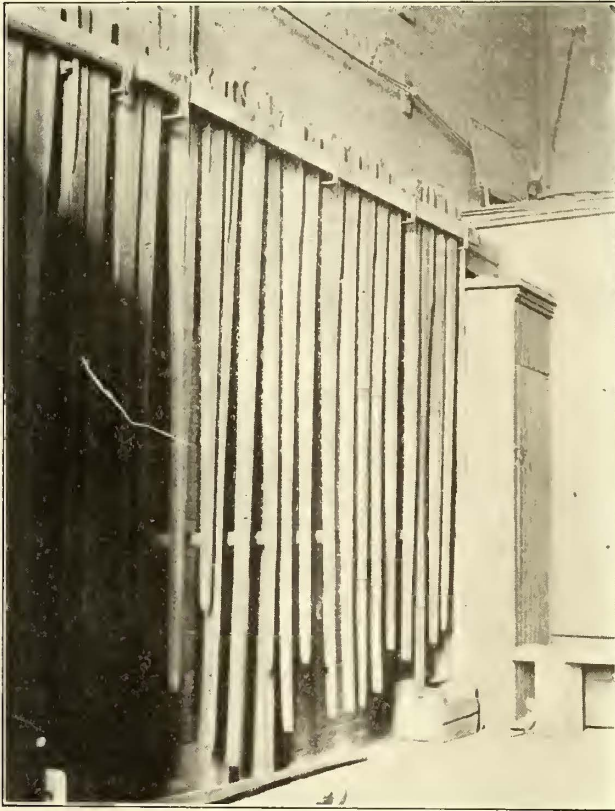
where all repair parts for switches are kept. The material thus reclaimed furnishes the company with tongues and switch parts which are sufficient for all ordinary repairs.

Old special work fit for use is placed in the yard in

a section reserved for this purpose. This includes frogs, switches, mates, compromise rails, curved rails and occasionally a complete layout. Each piece is numbered and measured and its condition noted. This information is then recorded in a card index system. By this method a great many old pieces in fair condition are available for repairs. The record shows clearly just

PEG BOARD FOR ORDERING CARS TO THE SHOPS FOR INSPECTION

BY O. P. CHUBBUCK, SUPERINTENDENT OF SHOPS, ILLINOIS TRACTION SYSTEM



Rack for Holding Old Switch Tongues Fit for Use

what pieces are in the yard, and when a piece fails under service the company can make sure that there is nothing suitable in stock before purchasing new material. We use old partly worn pieces by preference as we find that the wear on the layout is more even. When the time comes for a renewal of the complete layout, no great loss is suffered by reason of having to discard comparatively new pieces.

ANOTHER PAPER ON RAIL CORRUGATION

A paper discussing the causes of rail corrugation and the possible remedies was read at a meeting of the British Institution of Civil Engineers on Feb. 24. The author was S. P. W. D. Sellon. Briefly, he was of the opinion that the steel now used for rails is not hard enough or tough enough for its work. Some evidence is also given from the experience of himself and others that rails of higher carbon offer more resistance to corrugation. The possibilities of rails receiving initial corrugation in the process of rolling and cooling was briefly discussed, but the author believed that if such initial corrugation ever existed it was uncommon.

In conclusion he said that the British standard specification for rails requires an ultimate tensile strength of 40 tons per square inch and that the compressive strength was probably about the same as the tensile strength. The author recommended that this ultimate tensile strength should be increased to from 50 to 60 tons per square inch. This should make the rail hard enough to resist wear imposed upon it by street railway operation, but it should not have very great ductility.

The accompanying sketch shows the form of a peg board which we use at our office in connection with our system of ordering cars to the shops for inspection. This board measures 56½ in. x 15½ in., and is laid out in ¼-in. squares with white paint on a black background. A ⅛-in. hole is bored in the center of each square for pegs. The board is numbered from 1 to 31 inclusive across the top on the left side for days and from 1 to 12 on the top on the right side for months. A 1-in space runs vertically the entire length of board, between the days and months, for car numbers. The pegs are made of finishing nails and are painted orange and yellow, so that the board can be read at a distance. An orange and a yellow cord run vertically the entire length of the board to assist in placing the pegs in the proper holes. The orange peg and cord is used to order cars to the shops and the yellow peg and cord to show the last date that the car was in the shops. Cars are ordered to the shops for general inspection every sixty days.

A daily report of the cars which are being repaired is sent to the office by the shop foreman, and yellow pegs are placed opposite the car number the following morning to show the last dates the cars were in the shops. The peg on the right is then moved ahead sixty days from date, the orange peg and cord being kept six days in advance of the yellow cord and peg for ordering cars in. For example: A yellow cord is on the board under date of Feb. 12 and an orange cord under date of Feb. 18. Car No. 259 is in the shops and repaired on Feb. 12. When the report comes in on Feb. 13, a yellow peg is placed in the hole opposite the car number under the number 12 at the top of the board, and the yellow peg to the right of the car number under the number 2 in the "month" section is moved under the number 4, making sixty days. The yellow cord is then moved under the number 13 on the "daily" side, and the orange cord is moved under the date of the 19th on the "daily" side. Thus if we follow an orange cord from top to bottom, and find a yellow peg opposite car No. 235, and a yellow peg to the right of the number under 2, this shows that the car was in the shops last on Dec. 19. The yellow peg is then removed, an orange peg is put in the same hole, and request is made on the transportation department to send the car to the shops. In case a car comes to the shops on account of certain

Cars Ordered to Shops																														
Day															Month															
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Car No.

Electric Ry. Journal

Part of Peg Board Used on Illinois Traction System to Keep Track of Shopped Cars

defects, the pegs are moved ahead sixty days, just as if the car was ordered in for inspection.

We began to use this board in November and find that it gives satisfactory results, as it enables us to see, in most cases, that the cars are inspected before they become defective. In case a car is ordered in and does not appear within six days, the attention of the transportation department is called to this fact.

DETAILS OF BEVELED-TIE PRACTICE ON ELEVATED STRUCTURES

BY M. BERNARD, ASSISTANT ENGINEER IN WAY AND STRUCTURE DEPARTMENT, BROOKLYN RAPID TRANSIT SYSTEM

The use of tapered ties to secure superelevation for curves when these form part of overhead structures may be advisable at times. The following particulars relate to one method applied in such cases.

to get proper superelevation. The standard length of ties which support the footwalks is 12 ft. There are two classes of such ties, one where the footwalk is on the side of the low rail and one where the footwalk is on the side of the high rail. These ties are also subdivided into six different types, one for each variation of 1/2 in. in superelevation. Fig. 1 illustrates both types of ties in detail.

All standard ties are sawed yellow pine dressed four sides to 6 in. x 8 in. This cross-section is adhered to

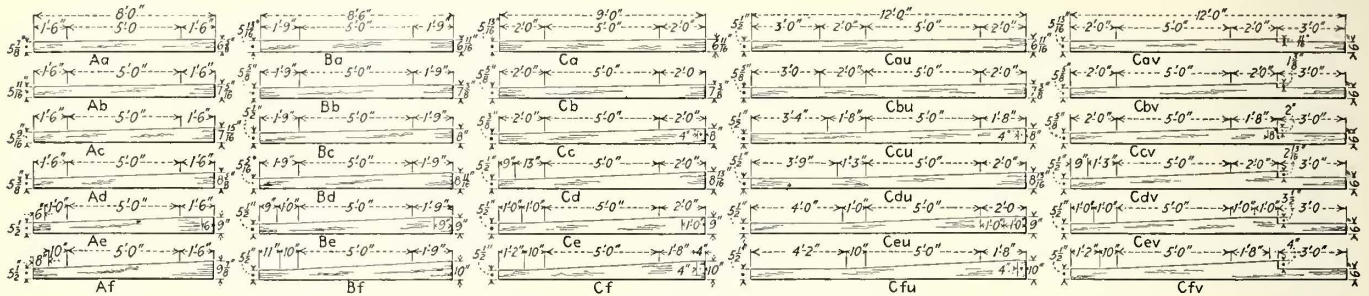


Fig. 1—Complete List of Standard Beveled Ties, Brooklyn Rapid Transit System

It is necessary, in view of the impracticability of using the theoretical superelevation for curves, to assume some arbitrary maximum superelevation, in this case 3 in., and to make the superelevation at the point of tangency two-thirds of that assumed for the main portion of the curve. In order to lead up gradually to the point of the assumed superelevation, the outer rail is raised 1/16 in. for each tie. To illustrate: If we have assumed 3 in. for the proper superelevation of a curve, the superelevation at the point of tangency would be

under the low rail for all ties, the slope being extended beyond the high rail to a depth in inches next above the normal thickness of tie plus the superelevation. The ends of all ties must be marked by the manufacturer with letters for designating the beveled ties on general working drawings like that shown in Fig. 2. The beveled ties are of such length as to extend 9 in. beyond the center line of the supporting girder and not less than 1 ft. 9 in. from the gage line of the nearest rail in order to allow the use of guard timber and standard fastenings.

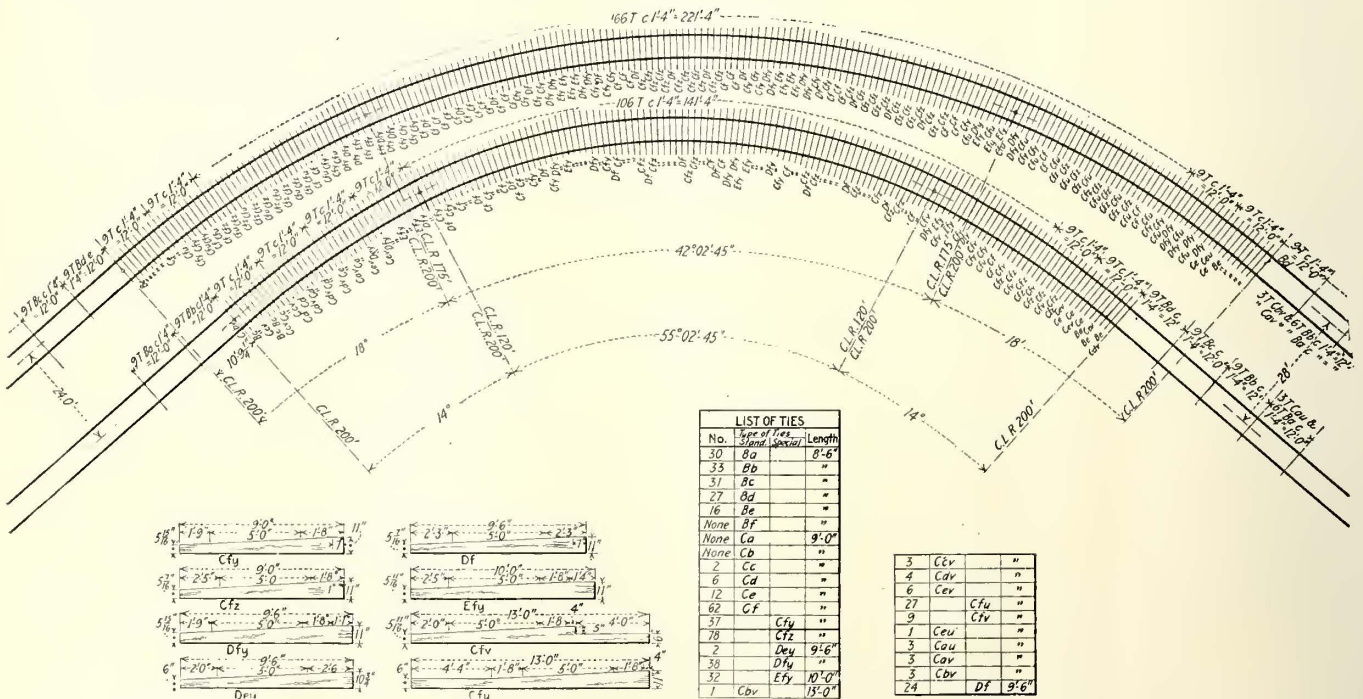


Fig. 2—Layout of Beveled Ties for an Elevated Railway Curve, Brooklyn Rapid Transit System

2 in.; with a tie spacing of 18 in. the lead would be: 48 ties = 72 ft.

Since the longitudinal girders are chords of the curves supported by them, it follows that the length of the ties will vary. Three lengths of ties, 8 ft., 8 ft. 6 in. and 9 ft., have been adopted as standard. These three lengths are subdivided into six different types, one for each variation of 1/2 in. superelevation. The ties are

In addition, every sixth tie must extend not less than 2 ft. 3 in. beyond the gage line of the rail next to the third-rail. The length of the ties is denoted by capital letters beginning with "A," which identifies a length of 8 ft., each additional 6-in. length being marked with the succeeding letter. Thus "E" would denote a tie 10 ft. long.

In the same way every difference of 1/2 in. super-

elevation is denoted by small letters, the initial $\frac{1}{2}$ in. being marked "a," while every succeeding difference of $\frac{1}{2}$ in. superelevation is denoted by the next succeeding small letter. Thus small "e" would denote $2\frac{1}{2}$ in. superelevation. The combined markings "Ee" would therefore denote a tie 10 ft. long and with $2\frac{1}{2}$ in. superelevation. The foregoing statements refer to symmetrical ties, namely, ties whose center is the center of track. In case unsymmetrical ties are required, another mark, "y" or "z," is added to denote whether the long end of the tie is under the low or high rail. It will be seen from the typical working drawing (Fig. 2) that the track foreman has only to look at the designating mark on the end of a tie to discover the proper location. No checking of dimensions is required. This method of handling the installation of beveled ties has been followed in Brooklyn for a number of curves with very good results.

A "SAFETY FIRST" INSTRUCTION CAR

BY A. H. SARVIS, DETROIT UNITED RAILWAY

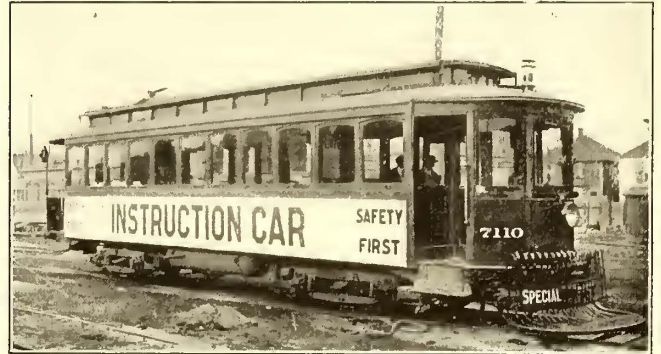
To keep alive the "safety first" campaign and to impart to employees practical knowledge of safety methods, the Detroit (Mich.) United Railway has equipped a "safety first" instruction car, which is to be taken over all of its interurban and city lines. One trip has been made with the car over the Rapid Railway as an experiment and the interest which was displayed along that line has guaranteed the continuance of the car in this educational service.

It is planned to make trips at least once each month over all of the Detroit United Lines and to give demonstrations in the city carhouses. The course of instruction will be changed from time to time so that a varied knowledge of all departments of operation may be given to the employees.

The car is equipped with miniature trolley poles and wires, and a practical electrician explains the uses of

and the necessity of having safe tools in all carhouses and in the track department are taken up in the form of a demonstration or in short talks.

One of the features is the instruction in first aid to the injured in addition to the "safety first" suggestions. A company physician gives a half-hour lecture at each stopping place on the treatment of all classes of injuries, with a demonstration of the various practical methods of handling the results of accidents. In this connection the general safety board has issued a first aid

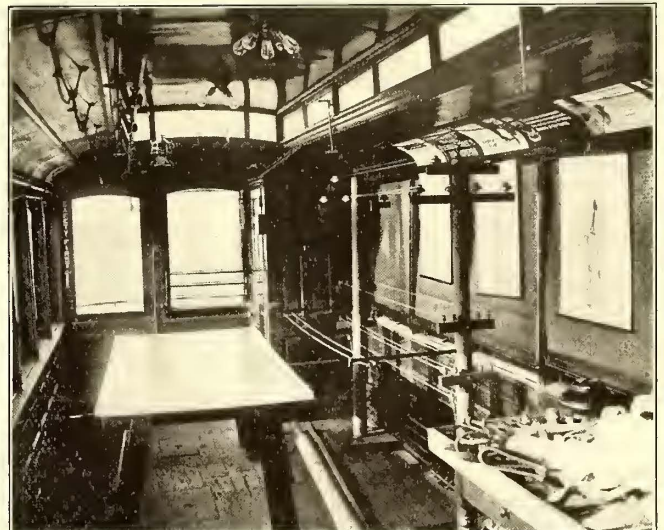
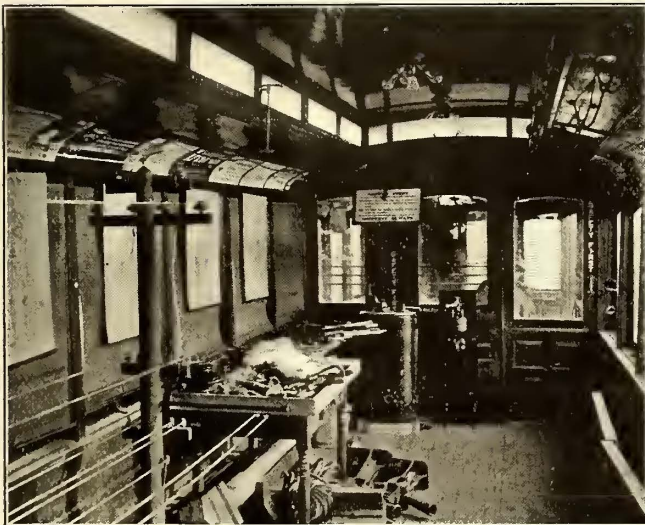


Detroit United Railway—Standard Car Fitted Out for Instruction in Safe Operation

primer containing general instructions. Copies of this primer are distributed to all employees.

The car which is used is an ordinary interurban car with the seats and bulkhead removed. A circus-seat arrangement is provided to enable the employees to be seated while demonstrations are being made in the car. Where the number of employees is too large to be accommodated within the car demonstrations and lectures are given in the carhouses, the equipment of the instruction car being easily removed.

In equipping the car and starting it over the lines, the general safety board appreciated that it was purely



Detroit United Railway—Two Views of the Interior of the "Safety First" Instruction Car, Showing the Variety of Equipment Used for Teaching—These Views Were Taken Before the Installation of "Circus" Seats for the Students

the various wires and the dangers connected therewith. A representative of the mechanical department explains the operation of air brakes, controller and other mechanical devices on the cars. Safe and unsafe methods of operation are demonstrated. In this connection instruction is given in the proper method of flagging and placing fuses and torpedoes protecting trains. Such matters as the use of jacks, the proper handling of tools

an experiment. The interest which has been manifested by the employees, however, insures that the car will be maintained and operated for some time.

The report of the Brighton Railway, Brighton, England, for 1913 states that good progress is being made with the single-phase section put in hand, from Balham to Walington, via West Croydon.

SIX ELECTRIC LOCOMOTIVES FOR THE PIEDMONT & NORTHERN LINES

The Piedmont & Northern Lines, Charlotte, N. C., are placing in commission six new 1500-volt d.c. box-type locomotives on the Greenville, Spartanburg & Anderson division of their system. These locomotives weigh 63½ tons, with all the weight on drivers, and are designed for heavy freight service. At the normal rating of the four GE-212-F motor equipment, operated on 1500 volts, two in series, each locomotive will develop a tractive effort of 17,500 lb. and a speed of 21 m.p.h. The locomotives will handle trains of 800 tons to 1000 tons gross weight.

MECHANICAL FEATURES

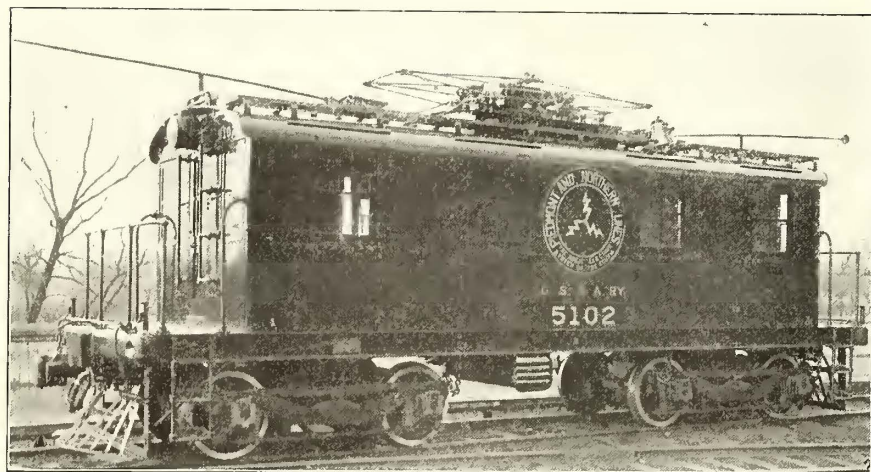
The locomotives were designed and built by the General Electric Company and are designated class 404-E-120-4-GE-212F machines. The all-steel box cab extends nearly the whole length of the underframe, railed outside platforms of suitable width being left at each end for the switchman to handle the trolley poles. While the operating mechanism is grouped in the central

this is covered with the usual wood flooring. The necessary ballast required to bring the locomotive up to its rated weight consists of steel bars running the whole length of the platform, notched over the bolster plates and bolted to the longitudinal sills.

The side frames of the two four-wheel trucks are built of heavy rolled bars for top and bottom members with cast-steel pedestals. The bolster, or center transom, is bolted rigidly to the side frames, and the entire weight of the truck framing is supported on semi-elliptic springs hung by links to the double side equalizer bars, which in turn rest on the journal boxes. The journal boxes are a standard design with MCB bronze bearings and wedges. The wheels are solid rolled steel, 36-in. diameter, with MCB treads and flanges. The axles are forged open-hearth steel, 6-in. diameter between the wheels and with 5½-in. x 10-in. journals. The air brakes are the combined straight and automatic type. The brakeshoes are inside-hung, and the brake rigging is proportioned for a brakeshoe pressure of 85 per cent of the weight on the drivers with 50 lb. pressure in the brake cylinders. Hand brakes are also provided. The outside of the locomotive has grab-handle and other standard safety fittings.

ELECTRICAL EQUIPMENT

The locomotive is driven by four 600-1200-volt box-frame commutating-pole motors insulated for operation on 1500 volts. Each motor is geared to an axle. All the axles are therefore driving axles. A forged pinion is mounted on each armature shaft and meshes into a corresponding solid steel gear mounted on the axle. The gear ratio is 65 : 18. The continuous capacity of each motor is 200 amp under forced ventilation and 269 amp at the one-hour rating. For the four motors this is equivalent to a continuous tractive effort of 11,200 lb. at the rail head. The control equipment is the well-known Sprague-General Electric Type M multiple-unit control, arranged to operate the four motors with seven steps in series and five steps in series-parallel.



Piedmont 1500-Volt Locomotive—General View of Box-Type Locomotive for Trains of 1000 Tons Gross Weight

section of the cab, it is not placed in a compartment separate from the engineer's operating cabs. Convenient passageways run along each side and connect with the operating positions in each end.

The underframe consists of four 10-in. steel channels extending the entire length of the platform. These channels are tied together by heavy end-frame box girder castings and bolster plates, each channel being riveted to the webs of the end-frame castings and to the top and bottom bolster plates. The bolsters are built up of 18-in. x 1-in. plates, the top bolsters being carried clear across the platform and riveted to all four longitudinal sills. The two center channels are inclosed throughout with steel plates riveted to the under sills and carry the center-pin castings, which are bolted to them. The space between the center sills serves as a reservoir for distributing air from the blowers to the motors. Openings in the floor of this reservoir admit air from it through suitable intake pipes into the back end of each motor.

The drawhead castings are bolted to the center sills, which in turn are riveted to the end frames. The draft gearing consists of MCB No. 3 couplers with 5-in. by 7-in. shank and standard yoke, twin springs and follower plates. The whole platform is floored and braced by heavy steel plates running the width of the locomotive and riveted to the longitudinal sills. In the cab

One of the new and distinctive features for a locomotive of this type is the convenient manner in which the apparatus is arranged in the central section of the cab. The main motor rheostat boxes are mounted in banks in an inclosed sheet-steel compartment in the cab center. This compartment extends from the floor to the roof and is accessible through doors opening into the passageways on each side. The floor in the compartment is open and it is surmounted by an open monitor deck. Thus there is a continuous draft of air rushing up through the compartment while the locomotive is running, which affords exceptionally good ventilation. The rheostats are formed of the usual cast-iron grids assembled in frames and insulated with mica.

The contactors and reversers are grouped at each end of the rheostat compartment and suspended from the roof of the cab in laterally inclosed steel frames, accessible through lift doors at the sides. Beneath these are installed on the floor the dynamotor, the blower and one of the air reservoirs in one end, and the two air compressors and the other air reservoir in the other end.

The blower set for ventilating the motors has a capacity of 2000 cu. ft. per minute and is driven by a series-wound motor of the railway type. Air is taken

from the exterior through a suction box with side louvers underneath the platform at the center. Current at 600 volts for the operation of the blower, and also the air compressors, the contactors and the lights, is furnished from a 2/5 tap taken from the dynamotor. The contactors are of the same general design as that employed in the standard 600-volt type M control. The principal modifications are embodied in the greater insulation distances and more effective methods of insulating where the contacts and magnetic blow-outs make and break on the 1500-volt circuit.

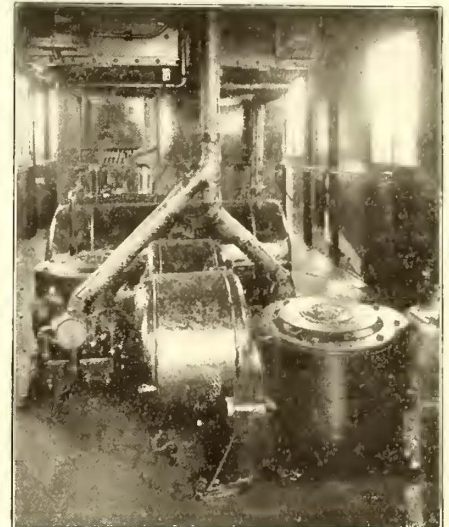
The air compressors are two-stage motor-driven compressors, type CP-30, and have a total piston displacement of 70 cu. ft. per minute when pumping against a tank pressure of 90 lb. per square inch. Air is taken in from the interior of the cab through strainer screens and is delivered into the two air reservoirs, each 28 in. x 60 in., connected in series, thereby affording an opportunity for radiation of heat and condensation of moisture before entering the air-brake cylinders.

At the operating positions in each end of the cab are

the motor cut-out switches already mentioned, and also two manually operated main auxiliary switches for cutting around the 1500-600 volt automatic relay.

The protection of the locomotive against short-circuit includes one main fuse for the trolley circuit, two fuses for protecting locally the circuits of the pairs of motors and smaller fuses for the auxiliary circuits. The main fuses are of the copper ribbon type and are fitted with hinged covers to facilitate fuse renewals. All fuse boxes have magnetic blow-outs, energized by current passing through the fuse to insure proper rupture of the arc. The main fuse box is placed as near as possible to the overhead trolley to protect the wiring circuits near the source of supply. An aluminum-cell lightning arrester is also installed in the cab.

The locomotive is equipped with standard luminous arc headlights fitted with semaphore lenses. The brackets and plugs are arranged so that one headlight may be installed on each end or two on either end as desired. Trolley retrievers are used for the pole collectors, and the edge of the cab roof has projecting guard rails to



Piedmont 1500-Volt Locomotive—Motorman's Cab Showing Operating Equipment and the Location of Apparatus at No. 1 and No. 2 End, Respectively

the engineer's seat, controller, air-brake valves, bell and whistle ropes, ammeter, air gages, sander valves and other parts of the control apparatus that should be within immediate reach of the engineer. A tool box is also provided.

Current is collected by an overhead US-13 pantograph trolley, which is pneumatically controlled and can be put into service from either engineer's station by a manually operated valve. The trolley is arranged for a minimum operating height of 14 ft. 6 in. and a maximum height of 22 ft. On local lines where the overhead construction is not adapted for the pantograph trolley the locomotives use pole-type trolleys and trolley wheels. Some of these local lines are operated on 600 volts and even 500 volts. A change-over switch is installed to cut out the dynamotor while the locomotive is operating on low-voltage circuits, so that in such cases the current for the auxiliary control and supply circuits is obtained direct from the trolley circuit. This change-over switch is protected by an automatic relay, which makes it impossible to connect 1500-volt trolley current to the auxiliary circuits of the locomotive.

The main switch has a powerful blow-out to handle heavy currents without damage. There is also furnished a complete equipment of auxiliary switches, one each for controlling the lighting, compressor and blower circuits, two each for the headlight and control circuits.

prevent the trolley rope from cutting on the edge or catching in the lamps. The ammeter at each engineer's station indicates the current in the circuit of one pair of motors, and with the air gages is illuminated by a gage light connected in the headlight circuit, so that the headlight switch turns on simultaneously the headlight and gage lights in corresponding ends of the locomotive.

The sanders at each end are pneumatically operated. The incandescent lamps in the cab include two portable lamps with extension cords installed at the center in the side passageways. The bell is fitted with an automatic bell ringer, and the whistle is air-operated. All wiring is drawn through conduits and carefully protected from mechanical injury. Two air signals are supplied, one in each end of the cab, to enable the switchmen to signal the engineer.

Data and dimensions apply to the locomotive follow:

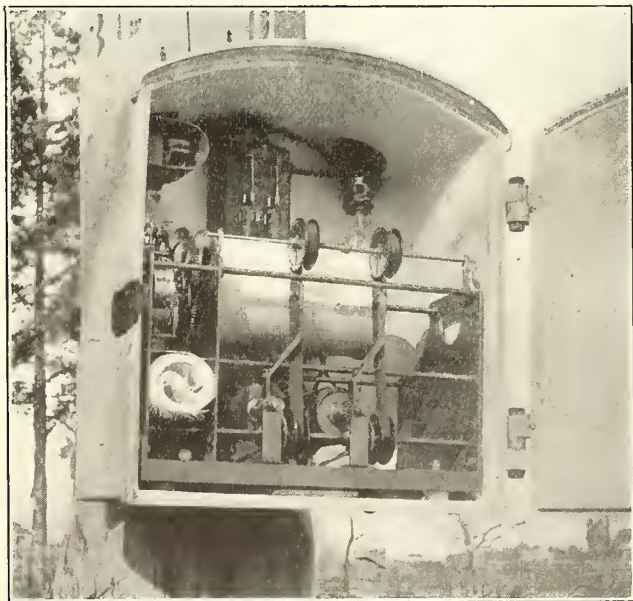
Length inside of knuckles.....	37 ft. 4 in.
Length over cab.....	27 ft. 0 in.
Height to trolley base.....	13 ft. 0 in.
Width over all.....	9 ft. 7 in.
Total wheelbase.....	26 ft. 8 in.
Rigid wheelbase.....	7 ft. 2 in.
Track gage.....	4 ft. 8 1/2 in.
Tractive effort at 25 per cent coefficient.....	30,000 lb.
Tractive effort at one-hour rating.....	17,500 lb.
Tractive effort at continuous rating.....	11,200 lb.
Weight per driving axle.....	31,750 lb.
Weight electrical equipment.....	37,500 lb.
Weight mechanical equipment.....	89,500 lb.
Total weight on drivers.....	127,000 lb.

AUTOMATIC HEADWAY RECORDER

A device much needed in the electric railway field, known as the automatic headway recorder, designed to improve the car schedule and to lighten the work of the inspectors, is being placed on the market by the Nachod Signal Company, Inc., New York.

The recorder is inclosed in a cast-iron box attached to the pole at the point where the record is to be taken, at which point a Nachod trolley contactor is placed in the trolley wire and connected to the recorder. Every car which passes that point prints a mark on a paper record showing the exact time of its passage. The original of the record reproduced is about 7 in. x 13 in. in size, ruled horizontally in hours and vertically in minutes. The record is double; that on the left side of the sheet is, say, for north (or east) bound cars, and that on the right for south (or west) bound. Each half represents twenty-four hours, the left of each half representing the a. m. hours and the right the p. m. hours. Thus the time of any mark can be read by its position both in the vertical hour space and in the horizontal minute space, as, for instance, the mark of the car at 7:06 p. m. northbound. The scale is a very open one, a minute being represented by almost 1/4 in. and in all there are 53 1/2 ft. of record space on one sheet. If the cars, for instance, are due to pass the recorder point ten minutes apart at the 3's, then on a perfect schedule all the cars at three minutes after the hour would make marks lying on the horizontal line 3, and those at thirteen minutes after the hour on the horizontal line 13. Any departure or scattering of the marks away from this line shows the irregularity of the schedule in the most graphic manner. The recorder does not indicate the particular car which made the record, but this information is obtained from the run number or the predetermined succession of cars.

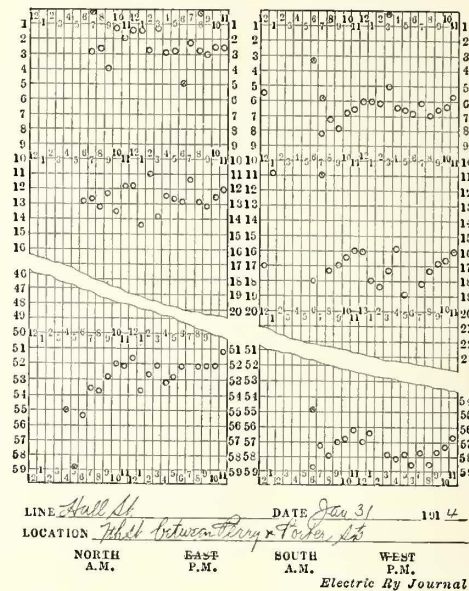
The most valuable operating feature of the headway



Headway Recorder Installed with Cover Swung Open

recorder is the improvement in the schedule due to the definite location of the causes of irregularity. On the Virginia Railway & Power Company, Richmond, Va., these recorders have resulted in a remarkable betterment of the schedule. In one instance, which was taken at random, only seven cars were more than two minutes off schedule out of the entire number passing the point in twenty-four hours.

The recorder will show such operations as the following: A motorman may reverse his car without proceeding all the way to the end of a single-track line, in which case a recorder at the end of the line would not show the mark for that car; the car crews may lie over too long at a point and run at a dangerously high speed to get on schedule again; a motorman may run ahead of his schedule; the car crew may "drag" the car



Part of Record Made on Headway Recorder

at the peak load in order to obtain a larger number of fares, some of which would otherwise have been collected on the next car, but the first crew might turn in only the usual amount.

The record is given in a compact form convenient for filing, and it obviates a large amount of clerical work. The recorder is free from any favoritism and relieves the inspector of the fatiguing work of making an equally accurate record by checking. The attention required is winding the recorder clock daily, putting on a new paper record and removing the old record. A number of these recorders would be required on most lines and their location can be easily changed, as desired.

The mechanism, as shown in the accompanying cut, consists of a clock with a wide-faced pinion driving a drum in the manner of a traveling nut, one end of the drum having a gear meshing in the pinion. The drum travels on a fixed thread and therefore has two movements. It makes one revolution in an hour and moves forward at the same time about 1/8 in. into the next hour line on the record. A printing bar is operated by a magnet to print the mark through a typewriter ribbon which has a feed on the backward stroke of the bar. This obviates the use of liquid ink, the wear of a perforating device and makes a clearer mark than an embossing. Two magnets are used, one for each direction of car movement. A perforation in the blank record slips over a locating pin on the drum while the edges of the record are further aligned by the shrouded ends of the drum. The end of the record paper is gummed and perforated. To remove the record, a knife is run under it, cutting through the perforations and leaving the overlapped part gummed to the back. On this are filled out the line, date, location and north (east), south (west).

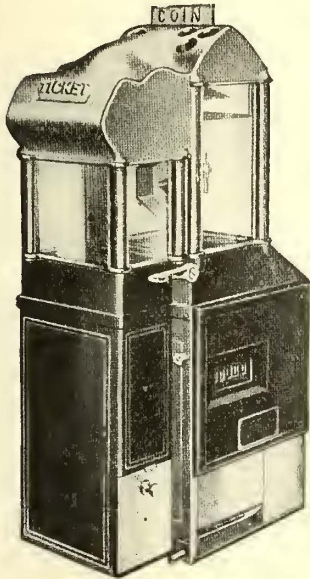
The contactor through which the printing magnets receive temporary current as the car passes them is easily installed, has no moving parts, and requires no maintenance.

TICKET RECEP-TACLE ADDED TO FARE BOX

A recent development in recording fare boxes is the addition of a receptacle for holding tickets as perfected by the Johnson Fare Box Company, Chicago and New York. This receptacle is incased beside the recording fare box and requires but 2½ in. more floor space on one side. It incloses a canceling device installed so

near the top of the receptacle that tickets are actually seized as they are inserted in the slot provided for that purpose. This canceling device is composed of a pair of hollow rolls each containing about 1 oz. of indelible ink which is sufficient to cancel at least 100,000 tickets. The ink is drawn to the surface of the rolls by capillary attraction through a series of felt rings. These rings come in contact with the tickets as they are drawn between the rolls, which are revolved continuously by a small motor. A continuous run of a month showed no wear or change in the rolls. The ink is made by the same formula as that used by the United States government in canceling postage and revenue stamps.

The small motor which drives the roll mechanism receives its energy from one of the car circuits. It may be operated in series with the lamps or other suitable resistance and consumes about 0.2 amp at 70 volts. A test of one of the small motors running continuously 457 days without relubrication or other attention proved

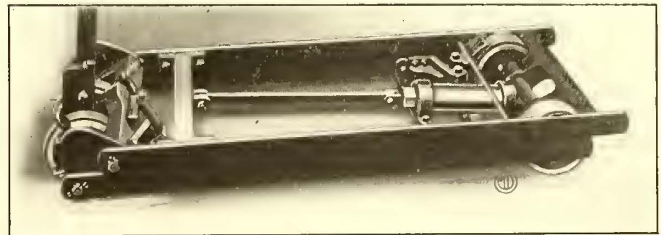


Fare Box for Tickets and Cash

nickel. The usual form of crooked chute, funnel and inverted bell used in the standard box was adopted in the new one. The new hopper prevents the deposit of tickets therein, for a ticket placed on the gabled top will slide to the floor. Then, too, the gabled top lends itself more readily to being manufactured as a single bronze casting for both the coin and ticket compartments. Each compartment is provided with the usual inspection chamber and trap doors operated by separate levers.

HAND-DRAWN TRUCKS OF ELEVATING TYPE

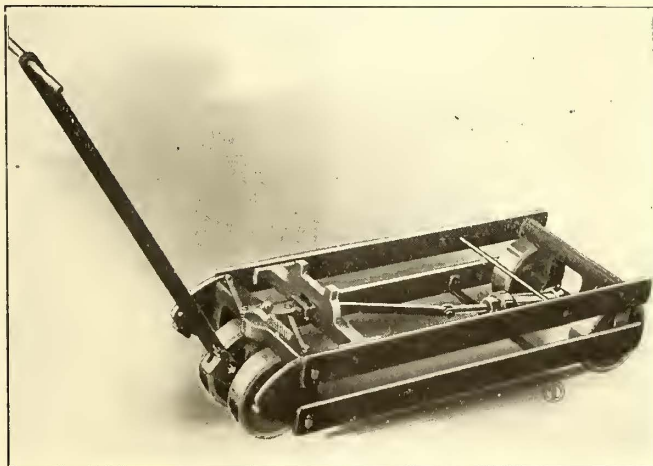
An effective labor-saving device for shops and store-rooms is the "National-Chapman" elevating truck, the construction and use of which are shown in three accompanying halftones. This truck, as made by the National Scale Company, Chicopee Falls, Mass., elimi-



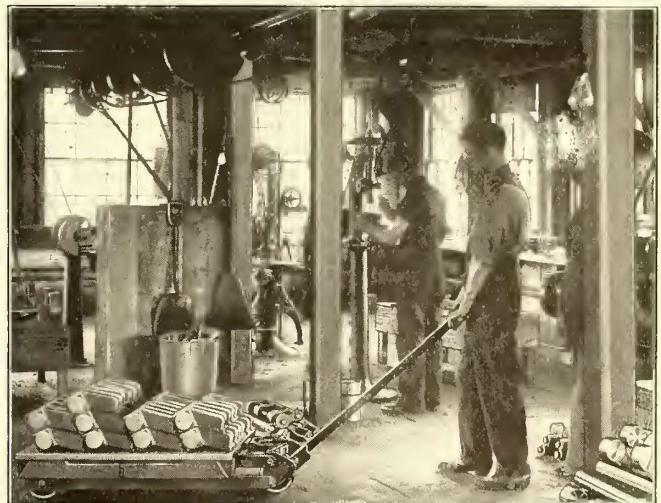
The Truck Lowered

nates all unnecessary handling in loading and unloading material between different levels. When the material is stored originally it is placed on small wooden platforms of the user's manufacture. When it is to be moved the shopman simply runs the truck under the platform and so transports the load without any piece by piece transfer. To raise the load the operator simply presses a pedal and moves the handle. The mechanism locks automatically, and then the loaded truck is pulled away for deposit where wanted. The lowering movement is effected without shock with a hydraulic check.

Aside from special designs, these four-wheel trucks



The Truck Raised



The Truck Used in a Machine Shop

its durability conclusively. As shown in the accompanying illustration, the entire device is extremely compact and so simple in construction that its care can be left to any mechanic with perfect safety.

In addition to adding the ticket receptacle and canceling compartment, the coin-receiving hopper has been redesigned. It now consists of a gabled hopper with holes just large enough to permit the passage of a

are made in nine sizes with lifts varying from 1⅝ in. to 2¼ in. The capacity ranges from 2500 lb. to 4000 lb., and is limited only by the hauling power of two men. The operator rolls the front wheels beneath the load, thereby obtaining great leverage with little effort. The steering gear is effective at any position of the handle, and it is impossible for the handle to fly backward.

News of Electric Railways

New York Traction Officials and Street Cleaning Department Confer on Snow Problem

A conference regarding snow removal was held on March 6, 1914, in the office of Street Cleaning Commissioner John T. Fetherston, in the Municipal Building, New York City. After the meeting Commissioner Fetherston said that for the first time there was light ahead for the snow problem, and that there was reason to believe that the co-operation of all the snow-fighting forces of New York with modern equipment would be brought about before the following winter.

There were present at the meeting Mr. Fetherston, Superintendent Gunther of the snow removal bureau, Frank Hedley, vice-president and general manager of the Interborough Rapid Transit Company and the New York Railways; E. A. Maher, vice-president and general manager of the Third Avenue Railway, and officials representing the Brooklyn Rapid Transit Company, the Union Railway, the New York Central Railroad and the Second Avenue Railroad.

It was suggested to the railways that they should take control of cleaning every street in the city through which they operate cars. This would take from the street cleaning department officials practically every important business street in the city except Fifth Avenue and a few important crosstown streets, notably those in the downtown financial district.

Commissioner Fetherston gave out the following statement:

"We were agreed that with proper co-ordination of the snow-fighting forces the snow problem could be greatly simplified provided we are able to get the modern equipment needed. For instance, the railways reported that already they were experimenting with a new type of sweeper which would not only clear the tracks, but would clean the roadways also for a distance of 12 ft. on each side of the tracks.

"We also discussed the possibilities of flat cars, operated on the street car lines as a means of snow disposal, and we took into consideration two minor problems—namely, the problem of loading the flat cars without causing too great delay to passenger traffic, and the question of terminals for the dumping of the snow from the cars. The representatives of the railways also pointed out that the situation can be improved by a greater co-operation on the part of the Police Department in keeping the railway tracks clear and where possible compelling trucks and other vehicles to keep to the sides of the roads and off the tracks."

One of the chief objections raised to the plan was that with present methods of handling snow it would tie up traffic, since shovelers would take from twenty to twenty-five minutes to load a car. Commissioner Fetherston said mechanical loaders had been used successfully in loading snow in other cities, and that they did the work in a fraction of the time taken by men.

A letter from F. W. Whitridge, president of the Third Avenue Railway, was read by Mr. Maher. Mr. Whitridge said that in future storms he would be glad to let the railway do anything it can for the city, such as transporting snow at cost. He suggested that the city should have a number of storage battery sweepers, and said that fifteen such sweepers would keep Fifth Avenue clear up to 110th Street, it being possible thereby to bank the snow in the center of the street.

Mr. Whitridge's other suggestions were that removal should begin at the river; that carts and laborers should be proportioned so that the men would not have to waste time waiting for carts, as he had seen them doing; that more use should be made of the sewers; that the police should prevent trucks from getting in the way of the trolley cars; that overloading of vehicles should be made an offence, and that the dock department should provide more dumps and the removers be shown where the rivers are.

Detroit Valuation Estimate Submitted

The Detroit (Mich.) United Railway estimates the value of its physical property within the one-fare zone at \$31,028,982, exclusive of franchise values, material on hand and several large construction and reconstruction operations now under way. The appraisal was presented on March 12, 1914, to the Municipal Street Railway Commission, which will ask the company to fix a selling price for the property. Based on the inventory, with the franchise values and the supplemental estimates, the company's final appraisal will approximate \$37,000,000. The appraisal is figured as the reproduction value of the property. The commission will make no comment pending the study of the inventory by its engineers.

The Common Council of Detroit has voted to place in the city budget for the year the sum of \$100,000 for the use of the Street Railway Commission appointed by the Mayor following the adoption of a municipal ownership amendment to the city charter a year ago. The commission is empowered to negotiate with the Detroit United Railway for the purchase of the lines of the company within the city.

Chairman of District Sub-committee Advocates Municipal Ownership

Representative Robert Crosser, chairman of the street railways sub-committee of the House District committee, advocated municipal ownership of the District of Columbia electric railway systems before the Study Club in Economics at the Public Library in Washington, D. C., on March 4, 1914. The sub-committee of which Mr. Crosser is chairman has been holding hearings on the question of the advisability of taking over the lines in Washington and is expected to report soon. Mr. Crosser's address was taken to mean that if his recommendations are followed the sub-committee will report in favor of municipal ownership. He was quoted in part as follows:

"Any one who has studied the question, even superficially, will see that the matter of transportation is inseparably connected with the problem of congestion, slums and tenements. I think there can be no doubt that the operation of street railways is an entirely proper function of a municipal government. I insist that the private ownership and operation of street railways is not the best thing for the public. In the first place, in order to be satisfactory to the people there must be only one system. That, of course, leaves out of question the possibility of competition, and makes it necessary for the people to accept the service offered by that system or do without, which is a practical impossibility.

"It is objected by some that this is socialism. The fact is that there is no essential difference between the service being supplied and that which we are now proposing. Cities now operate waterworks, electric light and power plants and furnish police and fire protection, but very few yet furnish street railway service. Proper! It is indeed the only method which is absolutely proper, and it is the only method which absolutely insures justice to the public in the use of the streets. As soon as we undertake private ownership and operation we are compelled to grant the private concerns the special privilege to the use of such streets. Throughout the entire country this right has been capitalized by private interests at more than the physical property used by the companies. The people are then required to pay sufficient fare to make possible the payment of dividends on this franchise value or what is sometimes called 'water.' My examination into the Washington street railways has satisfied me that they are shining examples of the very thing of which I speak.

"If the reports which I have examined and studied are correct, and if the testimony of the companies' own officials is even approximately correct, then I am satisfied that the whole system of street railways in Washington could be reproduced for a little over \$20,000,000, whereas the total capital liabilities amount to \$50,000,000; that is to say, the

two principal companies. I feel sure that a municipal street railway system in Washington, managed as efficiently as the waterworks department and other District instrumentalities, could be operated at a 2½-cent fare, with universal transfers."

Subway Section Contracts in New York

With the exception of two small connections and the two-track spur to Brooklyn, the Seventh Avenue subway in Manhattan, for operation by the Interborough Rapid Transit Company, is now entirely under contract from Vesey Street, on the south, to Times Square, on the north, the Public Service Commission for the First District having let the contract for the last section, namely, Section No. 4, during the week ended March 7. This section extends under the Seventh Avenue extension and Seventh Avenue from Commerce Street to Sixteenth Street, and embraces a local station at Christopher Street and an express station at Fourteenth Street. The contract went to the lowest bidder, the United States Realty & Improvement Company, for \$1,837,726. The total amount of the contracts awarded for this road up to date is \$11,776,562. North of Park Place the line will be a four-track underground railroad, with two tracks south of that street. The contract for Section No. 5, extending from Sixteenth to Thirtieth Street, originally awarded to the Canavan Brothers Company, has been assigned to the United States Realty & Improvement Company, the successful bidder on Section No. 4, the adjoining section on the south.

The Public Service Commission has begun advertising for bids to be opened on March 27, for the construction of Section No. 1-A of Route No. 12, the Eastern Parkway subway in Brooklyn. This line, which will be operated by the Interborough Rapid Transit Company, is to be an extension of the existing subway from its present terminus out Eastern Parkway as far as Buffalo Avenue, as a four-track underground railroad. Beyond Buffalo Avenue there will be a three-track elevated railroad through East Ninety-eighth Street and Livonia Avenue, as far as New Lots Road. There will also be a two-track branch from Eastern Parkway under Nostrand Avenue as far as Flatbush Avenue. Section No. 1-A covers that part of the line in Flatbush Avenue between St. Marks Avenue and Plaza Street. For the greater part of this distance the road will be a six-track structure. Four of the tracks are to be devoted to the Interborough Rapid Transit Company line, and two will be used by the New York Municipal Railway Corporation for the connection between the Fourth Avenue subway and the Brighton Beach line.

Plans and form of contract for the construction of Section No. 1 of Routes Nos. 4 and 38, the Seventh Avenue subway in Manhattan, have been approved by the Public Service Commission and sent to the Interborough Rapid Transit Company, which is to operate the line, for its suggestions.

The Public Service Commission has authorized the New York Municipal Railway Corporation to let the contract for the steel to be used in the third-tracking and reconstruction of the Fulton Street elevated railroad in Brooklyn to Milliken Brothers, Inc., the lowest bidders. The contract calls for approximately 12,000 tons, at \$38.90 per ton, or a total of \$466,800. At the same time the commission approved the plans and specifications for the steel work. The lot covered by this contract is intended for the railroad between Nostrand Avenue and Sackman Street, a distance of 12,368 ft. The commission also has awarded the contract for the supply of ties and timber to be used in equipping the Fourth Avenue subway in Brooklyn to J. H. Burton & Company, Inc., the lowest bidders, for \$96,540, delivery to be made in from 100 to 240 days. The commission has also authorized the chairman and the secretary to advertise for bids for the supply of tie-plates, felt-pads and ballast for the Fourth Avenue subway, in Brooklyn, bids to be opened March 26. In the general proposal for track materials for this subway, received about a week ago, no bids were submitted for the three items mentioned, and it was necessary for the commission to readvertise as to those items.

On March 12 the commission opened bids for the construction of the short stretch of the Seventh Avenue line from Forty-second Street to Forty-fourth Street. The bids ranged from \$305,261 to \$737,835.

Providence Subway Plan Submitted

The plan for a subway system for the city of Providence, R. I., upon which a joint special committee of the City Council, assisted by William W. Lewis, a Massachusetts engineer, has been at work for months past, was submitted to the Board of Aldermen on March 7, 1914, and by it referred back to the committee for a series of public hearings. The plan submitted proposes a system of subways with branches running from the Seekonk River, Trinity Square, Olneyville Square and the North Burial Ground to Exchange Place, with central underground transfer stations at that point. The estimated cost is placed at \$13,600,000, but this figure includes the cost of purchasing the new East Side tunnel, which is rapidly nearing completion. The committee suggests an extension of the East Side tunnel to the Seekonk River, to be completed by 1916. It is proposed to finish the Trinity Square tube by 1918, the tube to the North Burial Ground by 1920 and the Olneyville subway by 1923.

The committee proposes to finance the project by the issuance of city bonds outside the debt limit, the interest on the bonds to be paid from rentals to be received from such companies as may obtain the right to operate in the subways. This rental is to be sufficiently high also to establish a sinking fund to retire the bonds. It is proposed that the system shall be placed under the control of a board of nine members to be known as the Providence Transit Commission, with the Mayor and the commissioner of public works as ex-officio members. Accompanying the report of the committee is a draft act which it is proposed to submit to the Legislature under which the authority to finance and construct the lines may be obtained.

Agreement Reached on Terms for Extension in Akron

Charles Currie, general manager of the Northern Ohio Traction Light Company, Akron, Ohio, addressed a letter to the board of control of that city, dated March 3, 1914, in which he expressed the company's willingness to make such extensions as the board suggested in its communication of Feb. 25, 1914, with one or two exceptions. The company objects to the construction of tracks on Exchange Street between the railroad tracks and East Market Street until certain conditions are complied with. Then it is willing to build a double track, as desired. In return the company asks the Council to grant a franchise for the operation of these extensions on the same terms and conditions as on the other lines to which it holds grants.

Mayor Frank W. Rockwell has expressed his approval of the company's proposal, concluding his communication to Council as follows:

"Mr. Currie, the general manager, has authorized me to say that the tracks will be completed within three years if Council will pass ordinances allowing the company to operate on the streets under the same terms and conditions as the company's present franchise, the new grants to expire at the same time that the present franchise expires. While under this agreement the city will not get all the extensions that were asked for in the negotiations of last year it does get the larger part of them and those of which we are in the most urgent need, and I therefore recommend that ordinances granting the necessary franchise be passed with as little delay as possible."

Report Upon Workmen's Compensation Acts

August Belmont, chairman of the workmen's compensation department of the National Civic Federation, announces the publication of the report upon the operation of state workmen's compensation laws made by the commission created in July, 1913, by the National Civic Federation and composed of employers, legal experts and labor representatives appointed by the American Federation of Labor. The workings of the various compensation laws in states having had any important experience are reviewed and analyzed in a way to bring out distinctly the strong and weak provisions. The findings are based upon personal conferences and hearings in different sections of the country, and upon replies to thousands of letters of inquiry and questionnaires, the answers representing a

payroll of \$358,640,383. The labor viewpoint as to the benefits derived from workmen's compensation laws was sought and opinions were secured from employers, public officials and insurance men. The report presents the facts impartially, with no attempt to offer theories or to make recommendations. This volume, which is practically a working handbook of 200,000 words, may be had, free of charge, upon application to the workmen's compensation department of the National Civic Federation, New York City. The United States Senate has ordered the volume to be reprinted as a government document.

Chicago Surface Lines Refuse to Accept the Committee's Initial Subway Rental Demand

At the meeting of the local transportation committee of the City Council of Chicago and the officers of the surface railways on March 4 it developed that there was little likelihood that an agreement could be reached for the use of the initial subway by the surface railways. In their report to the subcommittee Messrs. Arnold and Weston recommended three plans for renting the proposed initial subway system, namely, that the city invest its traction fund in subways or other extensions to the surface line properties in such manner as to increase the service and charge no rental, that it limit the net receipts to the surface companies to 7 per cent on the capitalization and fix the rental charge to the companies at the amount saved by their using the subways instead of the street, or that it rent the lines on a basis which would return 5 per cent interest to the city on the \$26,000,000 investment in the initial subway scheme.

At the meeting of the committee on March 4 Messrs. Weston and Arnold submitted a letter recommending that the city demand a flat 5 per cent rental for the subways, or a rental equivalent to the saving from subway operation plus all earnings above a fixed percentage allowed the company, which was set tentatively at 7 per cent. The committee adopted the recommendation carrying with it a straight 5 per cent rental. It became apparent at a meeting on March 9 that the ordinance could not be passed by the City Council prior to the spring election on April 7, when the subway question was to be submitted in referendum vote. At the regular meeting of the Chicago City Council held on March 9 a resolution was submitted by the local transportation committee to the effect that the board of election commissioners be requested, if it was within its power, not to include the question of constructing an initial system of municipally owned subways upon the ballot submitted to the voters at the April election.

Decision in Chicago Car License Case.—According to a decision of the Supreme Court of Illinois the Chicago & Oak Park Elevated Railroad, now included in the Chicago Elevated Railways, must pay the city of Chicago license fees accruing since May 1, 1896, on cars for which the company is alleged to have made no accounting.

Vote on Municipal Ownership in Superior.—The electors of Superior, Wis., are to be asked to vote at the election on April 7, 1914, on the question "Shall the city buy and operate its street car lines?" If the vote is favorable the plan of the City Commissioners is to avail themselves of the recent legislative amendment and conduct negotiations with the end in view of taking over and operating the lines of the Duluth-Superior Traction Company in Superior.

Engineering Experiment Station at the University of Wisconsin.—An engineering experiment station has been created by the Board of Regents of the University of Wisconsin to have general charge of the testing and research work of the college. The staff of the station will consist of the dean as director and members of the instructional staff. They will be assisted by fellows, scholars and assistants, who may be engaged in experimental and research work. The results of experiments conducted at the station will be published in the form of bulletins. Dean F. E. Turneaure, of the College of Engineering of the University of Wisconsin, has long been engaged in research work of various kinds.

Serious Gas Explosion in New York.—Three gas explosions wrecked Twenty-third Street, at Broadway and Fifth

Avenue, New York, on Sunday morning, March 8, causing the injury of nine persons. They endangered the Fifth Avenue Building, caused two large breaks in the water mains at that place, partly wrecked the trunk sewer that runs under Twenty-third Street, broke scores of windows and plate-glass fronts of stores and offices in the neighborhood, flooded the new Broadway subway to a depth of about 10 ft., threw out of commission for the entire day the street car lines that run past the point where the explosions occurred and partly wrecked a car of the New York Railways which was in the danger zone.

Reconstructing an Indiana Property.—Through the medium of a bondholders' protective committee represented by F. Y. Keator, J. C. Cavender and C. D. Kellog, the Gary, Hobart & Eastern Traction Company has been refinanced and the work of electrifying the line has commenced under the supervision of E. O. Sessions, consulting engineer of Chicago. The line was built between Gary and Hobart, Ind., a distance of 10 miles, for operation as a gas-electric motor road. It has been out of service since October, 1912. The work now being carried out includes all the necessary overhead lines, substations, carhouses and the purchase of three passenger motor cars and one express car. B. J. Schramm, formerly superintendent of overhead of the Kankakee & Urbana Traction Company, Urbana, Ill., is superintendent in charge of the reconstruction work for the company.

Low Fare Vote Enjoined.—The Omaha & Council Bluffs Street Railway, Omaha, Neb., attacks the constitutionality of the initiative and referendum law in a petition which it filed recently in the District Court at Omaha for an injunction to prevent the holding of the seven-fares-for-a-quarter election. The suit is against Harley G. Moorhead, as election commissioner, and Gurdon W. Wattles and William A. Smith are plaintiffs, as taxpayers. Mr. Wattles is president and Mr. Smith is vice-president of the company. It is claimed that the initiative and referendum law is in conflict with a constitutional amendment adopted in 1906 creating the State Railway Commission and delegating to that commission power to regulate rates charged by common carriers, and that a case is now before the State Railway Commission in which the commission is asked to require the company to establish a rate of six fares for a quarter.

Objection to Kansas City Depot Franchise.—Clyde Taylor, associate counsel for the receivers of the Metropolitan Street Railway, Kansas City, Mo., appeared before the street, alley and grade committee of the lower house of the City Council recently and presented ordinances necessary to carry out the Kealy-Ash plan for routing street cars to the new Union Depot. The chief difference between the receivers and the Council committee is over the clause providing that any competing line shall be allowed the use of track up to three blocks. Mr. Taylor served formal notice that if this clause was included in the depot ordinance, it would not be accepted by the receivers. He maintained that if every ordinance passed by the Council for extensions stipulated that three blocks might be used by other car lines it would not be long until competing companies would be able to use a substantial part of the Metropolitan Street Railway's lines.

Safety Medals for Electric Railways.—Three medals, of gold, silver and bronze, to be known as the Anthony N. Brady memorial medals, will be awarded for the first time this year by the American Museum of Safety for the best work done during the year by an electric railway in America in accident prevention and industrial hygiene. The medals have been donated by Nicholas F. Brady, son of Anthony N. Brady, who succeeded his father as president of the New York Edison Company. They will be awarded at the next annual meeting of the Museum of Safety, and thereafter each year. The gold medal is to be awarded to the company which makes the best record. The silver medal will be awarded to the department of the railroad winning the gold medal which, in the judgment of the railroad's directors, has done the most in obtaining the results for the award of the gold medal. The bronze medal will be presented to the employee who individually, in the judgment of the directors, has done the most to promote safety of life and conditions for good health.

Findings of Montpelier Arbitrators.—The arbitrators who have been considering the differences between the officers of the Barre & Montpelier Traction Company, Montpelier, Vt., and the employees have reported their findings. The new schedule of wages which has been proposed is as follows: From Feb. 1, 1914 to Feb. 1, 1915—First six months, 19 cents an hour; second six months, 21¼ cents an hour; third six months, 24 cents an hour; fourth six months and thereafter, 25 cents an hour. Feb. 1, 1915, to Feb. 1, 1916—First six months, 20 cents an hour; second six months, 23 cents; third six months, 25 cents; fourth six months and thereafter, 26 cents an hour. Feb. 1, 1916, to Feb. 1, 1917—First six months, 21 cents; second six months, 24 cents; third six months, 26 cents; fourth six months and thereafter, 27 cents an hour. The new agreement expires on Feb. 1, 1917. The men are granted a nine-hour working day and will receive full day's pay for Sunday work, even though the day be shorter than nine hours. The spare men will receive additional opportunity to earn a day's pay. The work car will hereafter be run by trainmen instead of by carhouse employees.

Wage Readjustment in Des Moines.—Emil G. Schmidt, president of the Des Moines (Ia.) City Railway, has signed the new wage scale agreed upon by the company and employees. The men have agreed to accept an increase of 1 cent an hour. The original request was for a 7-cent increase. The contract will run from March 1, 1914, to March 1, 1915. Motormen and conductors will receive 5 cents an hour additional instead of 3 cents for overtime. Carhouse men and line drivers will receive time and a half for overtime. Snow plow men will get 5 cents an hour increase and meals. The minimum wage for extra men is to be \$50 a month. The demand for fifteen minutes' extra time at the end of each day's run to check in was not allowed. Under the new scale motormen and conductors will receive 24 cents an hour the first year, 25 cents the second, and 29 cents the third. Carhouse men will receive 26 cents the first year and 27 cents thereafter. Line drivers will receive a straight 26 cents. Shop men and general repairers will receive 31 cents and helpers 26 cents. Pipemen will receive 36 cents and their helpers 26 cents. Airbrake men will be paid 34 cents and their helpers 26 cents.

Banquet of Westinghouse Interests in Pittsburgh.—On March 7, 1914, the Westinghouse interests of the Pittsburgh district held their fourth annual banquet at the Fort Pitt Hotel, Pittsburgh, under the auspices of the Westinghouse Club. The interests represented were the Westinghouse Air Brake Company, the Westinghouse Electric & Manufacturing Company, the Westinghouse Machine Company, The Union Switch & Signal Company, the R. D. Nuttall Company and the Pittsburgh Meter Company. The toastmaster was W. A. Bole, assistant general manager of the Westinghouse Machine Company and director of the Trafford City foundry. A. L. Humphrey, vice-president and general manager of the Westinghouse Air Brake Company, spoke on the product and the possibilities of the Air Brake Company. Col. H. G. Prout, vice-president of the Union Switch & Signal Company, called attention to the value of automatic signal system as an aid to travel. C. A. Terry, vice-president of the Westinghouse Electric & Manufacturing Company, spoke of the recent achievements of that company. Guy E. Tripp, chairman of the board of directors of the electric company, discussed the administration bills now before Congress looking to the regulation of trade.

Seattle Company Opposed to Extensions Under Modified City Charter.—A bill directing the Puget Sound Traction, Light & Power Company, Seattle, Wash., to construct an extension of its lines from their present terminus at West Sixty-fifth Street to West Eighty-fifth Street has been introduced in the Council by Oliver T. Erickson and has been referred to the city utilities and the franchise committees. Because of a charter provision that common user privileges shall be incorporated in all franchise grants and that the city shall receive the right to take over the property at any time, the company has refused to extend its existing lines, particularly as it fears that the provisions covering an extension might be construed by the court to mean that the same provisions applied to any line so extended. Mayor George F. Cotterill, who drafted the amendment, has since admitted that it was the inten-

tion to make the provision retroactive. The company announced recently that it will make no extensions except where application is made by the company in the usual way and where the grant is similar to the franchise under which the original line was constructed. This is the fourth attempt that has been made by the city to force the company to extend its lines under the terms of the charter.

Mr. McLimont as Pacificator.—A. W. McLimont, the new general manager of the San Francisco-Oakland Terminal Railways, Oakland, Cal., who has been notably successful in his relations with the public and his staff, received much praise in an editorial "In the Right Spirit" which was published recently in the *Oakland Enquirer*. The *Enquirer* said in part: "Yesterday's conference between a committee of the Merchants' Exchange and A. W. McLimont, general manager of the terminal properties, was notable for the feeling of amity and good-will evinced upon the occasion. It was remarked by members of the committee, at the close of the conference, that they had met with the utmost courtesy and assurances that the matters brought to Mr. McLimont's notice would receive immediate attention. The main achievement of this interchange of views was the establishment of cordiality and mutual respect. Once mutual confidence and a spirit of co-operation are established all problems will be found easy of solution. Most problems approached in this spirit can not only be most quickly solved but most thoroughly worked out. Friendly relationships are a solvent for almost all woes. Mr. McLimont is practically a stranger to the local conditions, having been in charge of the traction system for only a very brief time, but it is his purpose, we are assured, to address himself with alacrity to these and other problems."

Campaign in the Interest of Home Purchases.—The employees of the Portland Railway, Light & Power Company, Portland, Ore., have organized a club for the purpose of encouraging the purchase of home-made goods. It has taken for its name, "P-R-L-&P Made-in-Oregon Club." Its main object is to increase the opportunity for labor in Portland. The company has 3000 employees and it is estimated that they expend \$1,500,000 yearly for the purchase of supplies for the home. It is the largest number employed by any single concern in Portland, and one of the largest on the Pacific Coast. The club members believe that by the proper application of instructive talks and presenting of information as to who are the manufacturers of Portland and the character of goods made by them a considerable portion of \$1,500,000 can be devoted to the purchase of home-made goods. In furtherance of its purpose the club is sending out a letter to manufacturers in Portland and Oregon asking for the name of the factory and the trade name of the goods made, so that a member of the club may call for them. The answers are to be analyzed and the information given to the members, so they can make the proper inquiry. Records are to be kept by individual members as to their experience in buying home-made goods, so that full information may be had with regard to the real difficulties in buying the goods made in Portland. The club has for its president Frederick Cooper, superintendent of transportation. Mr. Cooper, A. C. McMicken, sales manager; F. D. Hunt, traffic manager, and B. F. Boynton, claim agent, form the executive committee.

LEGISLATION AFFECTING ELECTRIC RAILWAYS

KENTUCKY

The chances for the passage of proposed workmen's compensation legislation in Kentucky at the present session are practically nil. The manufacturers of the State were opposed to State insurance, while representatives of organized labor insisted on a State insurance feature, and succeeded in killing a bill in the House which was a revised form of the measure introduced by the manufacturing interests. Efforts to eliminate common law defenses, without limiting the liability of the employer, were defeated, so that the situation, as far as employer and workman are concerned, remains in statu quo.

NEW YORK

Senator McClelland has introduced a bill amending the stock corporations law relative to reorganizations. Every

corporation organized under the sections is required to issue stocks and bonds provided for in reorganization plan, or in any agreement with a public authority respecting the organization, if it has not already done so prior to Jan. 1, 1914. It also gives beneficiaries under reorganization, or a committee acting in behalf of all similarly situated beneficiaries, right to apply to the Supreme Court for an order enforcing reorganization plans and agreements, or construing their terms and determining reasonableness of requirements imposed on any party. The bill provides that at least six months must be allowed all beneficiaries to accept and participate in such a plan or agreement after final adoption by the necessary parties and approval by public authorities. Stocks and bonds or funds provided for in reorganization are declared trust funds for the beneficiaries, subject to supervision and control of equity courts.

The following bills have been introduced in the Assembly: An act to amend the railroad law in relation to extending the time for the commencement of construction or the completion of certain railroads in the hands of the receivers; an act to amend the railroad law in relation to removing certain disabilities of railroad corporations now in the hands of receivers; an act making an appropriation for the elimination of grade crossings and authorizing the state comptroller to issue bonds of the State to pay such appropriations; an act to amend the railroad law in relation to the application of grade crossing provisions; an act to amend the railroad law in relation to the discontinuance of regular passenger trains; an act to amend the general city law in relation to electrical inspectors; an act to amend the railroad law in relation to the number of motormen to be employed on certain subway trains; an act to amend the railroad law in relation to the minimum number of employees to be employed in the operation of street surface railways.

The following bills have been introduced in the Senate: An act to amend the railroad law in relation to heating passenger cars propelled by gasoline or oil engines; an act to amend the railroad law in relation to the names of railroad stations; an act to amend the railroad law in relation to the application of grade crossing provisions; an act making an appropriation for the elimination of grade crossings and authorizing State bonds for this purpose.

RHODE ISLAND

An act which would compel street railways to furnish seats to both motormen and conductors operating their cars has been introduced in the House and has been sent to the judiciary committee for consideration. The Rhode Island Company has already equipped most of its suburban cars with stools for motormen.

Senator Munroe, of Providence, has introduced a bill in the Senate by request, which provides that motormen and conductors shall be instructed by competent persons before taking up their duties and that they shall be residents of the State for sixty days.

PROGRAMS OF ASSOCIATION MEETINGS

New York Railroad Club

The regular monthly meeting of the New York Railroad Club, which will be held on March 20, 1914, will be the annual "Electrical Night." The speakers of the evening will include Emil Huber-Stockar, head of the department for the introduction of electrification on the Swiss Government Railways. The subject will be "Heavy Electric Traction."

Massachusetts Street Railway Association

The regular monthly meeting of the Massachusetts Street Railway Association has been postponed until March 18, 1914, at Young's Hotel, Boston, Mass. John N. Cole, Andover, Mass., former Speaker of the Massachusetts House of Representatives, will address the members on "The State as the Big Father."

Central Electric Railway Accountants' Association

A special meeting of the Central Electric Railway Accountants' Association was called to be held at the Hollenden

Hotel, Cleveland, Ohio, on March 13, 1914, at 8 a. m., to consider the tentative classification of accounts for electric railways issued by the Interstate Commerce Commission and known as Accounting Series Circular No. 41. All criticisms according to the official notice contained in the circular must reach the office of the commission not later than March 21, 1914. Each member was urged to study the classification carefully and to come prepared to take an active part in the discussion.

Pennsylvania Street Railway Association

The semi-annual meeting of the Pennsylvania Street Railway Association will be held in Harrisburg on May 12 and 13, 1914. This will be the first meeting since its amalgamation with the Keystone Railway Club. Under the new constitution and by-laws it is provided that manufacturers and supply men may become associate members of the association upon the payment of \$10 annual dues, which entitles them to two representatives at any regular meeting of the association. A charge of \$5 is made for each additional representative above two. Associate members do not have the voting privilege, but are entitled to representation on the executive committee. The program for the meeting will be announced later.

Railway Signal Association

A joint meeting has been arranged between the Railway Signal Association and the Chicago section of the Illuminating Engineering Society to be held at 8 p. m. on April 10, 1914, in the auditorium of the Western Society of Engineers, Monadnock Block, Chicago, Ill. The following papers will be presented:

Paper, "Fundamentals of Illumination," by William A. Durgin.

Paper, "Illumination of Signals," by Thomas S. Stevens, signal engineer of the Santa Fé Railroad, Topeka, Kan.

Paper, "Signal Lenses," by William Churchill, of the Corning Glass Works, Corning, N. Y.

Paper, "Physiology of the Eye and Its Relation to Signal Affairs," by Nelson M. Black, Milwaukee.

An informal dinner will be held at the Grand Pacific Hotel, Chicago, Ill., preceding the meeting.

New York Electric Railway Association

The nineteenth quarterly meeting of the New York Electric Railway Association will be held at the Fort William Henry Hotel, Lake George, N. Y., on the evening of Friday, March 20, 1914, and on Saturday, March 21, 1914. The session on Friday evening will be opened with an informal dinner at 8 o'clock at the hotel, after which several speakers will deliver addresses. There will be a business session on March 21 at 10 a. m., at the Fort William Henry Hotel, at which addresses on the general subject "Safety" will be delivered. The names of speakers follow:

J. S. Doyle, superintendent of car equipment of the Interborough Rapid Transit Company, New York, N. Y.

Harry A. Bullock, secretary of the New York Municipal Railway Corporation, Brooklyn, N. Y.

Edward A. Maher, Jr., assistant general manager of the Third Avenue Railway, New York, N. Y.

Allison J. Van Brunt, director of safety education of the Public Service Railway, Newark, N. J.

An open discussion will follow.

Requests for hotel accommodations should be made to Albert Thieriot, manager of the Fort William Henry Hotel, Lake George, N. Y.

Plans for this meeting were arranged at a meeting of the executive committee of the association held on March 10 at the Engineers' Club, New York, N. Y. Those present were Frank Hedley, president; James F. Hamilton, vice-president; Charles C. Dietz, secretary, and James P. Barnes, John J. Dempsey and Wilbur C. Fisk, executive committee members. W. H. Collins, J. S. Doyle, Charles R. Ellicott and Charles V. Smith were also in attendance.

Mr. Hedley appointed the following committee on hotel arrangements: James F. Hamilton, chairman, Albany; W. H. Collins, Gloversville, and A. E. Reynolds, Glens Falls.

Financial and Corporate

ANNUAL REPORT

Stock and Money Markets

Lake Shore Electric Railway System

March 11, 1914.

In the trading on the New York Stock Exchange to-day the important railroad and industrial issues failed to maintain the strength shown at the close of trading yesterday, and nearly all the issues yielded one point or more under pressure. New Haven was strong in the early trading, reacted and in turn was strong at the close. The market closed steady. Rates in the money market to-day were: Call, 2 per cent; sixty days, 2 3/4 @ 3 per cent; four months, 3 1/2 @ 3 3/4 per cent; six months, 3 1/2 @ 3 3/4 per cent.

In the trading in Philadelphia to-day odd lots of Union Traction sold at 45, while 18 3/4 was bid for Philadelphia Rapid Transit.

In Chicago the market for stocks to-day was narrow and the trading dull. The feature of the bond market was the sale of \$10,000 of Chicago Railways 5's.

The Boston market was not very active to-day and generally heavy in tone.

The active issue in a narrow and dull market in Baltimore to-day was United Railways & Electric, sales of which total 586 shares. The bond transactions totaled \$44,200, par value.

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

	Mar. 4	Mar. 11
American Brake Shoe & Foundry (com.)	95	93
American Brake Shoe & Foundry (pref.)	143 1/2	141 1/2
American Cities Company (com.)	36	36
American Cities Company (pref.)	61 1/4	61 1/2
American Light & Traction Company (com.)	352	365
American Light & Traction Company (pref.)	107	107
American Railways Company	39	38
Aurora, Elgin & Chicago Railroad (com.)	36 3/4	38
Aurora, Elgin & Chicago Railroad (pref.)	78 1/4	79 1/2
Boston Elevated Railway	82	87
Boston Suburban Electric Companies (com.)	7	6
Boston Suburban Electric Companies (pref.)	60	60
Boston & Worcester Electric Companies (com.)	*6 1/4	*6 1/4
Boston & Worcester Electric Companies (pref.)	39	39
Brooklyn Rapid Transit Company	93 3/4	92 3/8
Capital Traction Company, Washington	109 1/2	109 1/2
Chicago City Railway	170	170
Chicago Elevated Railways (com.)	20	20
Chicago Elevated Railways (pref.)	65	65
Chicago Railways, ptcptg., ctf. 1	92	92
Chicago Railways, ptcptg., ctf. 2	32 1/2	31
Chicago Railways, ptcptg., ctf. 3	6 1/2	6 1/2
Chicago Railways, ptcptg., ctf. 4	2 7/8	3
Cincinnati Street Railway	110	105
Cleveland Railway	104 1/2	104
Cleveland, Southwestern & Columbus Ry. (com.)	*5	4
Cleveland, Southwestern & Columbus Ry. (pref.)	*26	23
Columbus Railway & Light Company	13	20 1/2
Columbus Railway (com.)	53	62
Columbus Railway (pref.)	80	81
Denver & Northwestern Railway	71	71
Detroit United Railway	a85	85
General Electric Company	147	148
Georgia Railway & Electric Company (com.)	120	120
Georgia Railway & Electric Company (pref.)	87	87
Interborough-Metropolitan Company (com.)	14 3/4	14 5/8
Interborough-Metropolitan Company (pref.)	60	59 3/4
International Traction Company (com.)	*30	30
International Traction Company (pref.)	*85	a85
Kansas City Railway & Light Company (com.)	*19 1/2	10
Kansas City Railway & Light Company (pref.)	35	25
Lake Shore Electric Railway (com.)	*5	5 1/2
Lake Shore Electric Railway (1st pref.)	*82	85
Lake Shore Electric Railway (2d pref.)	*20	22
Manhattan Railway	130 1/4	131
Massachusetts Electric Companies (com.)	11 1/4	11
Massachusetts Electric Companies (pref.)	61	62
Milwaukee Electric Ry. & Light Co. (pref.)	*95	95
Norfolk Railway & Light Company	*24 1/2	25 1/4
North American Company	70	78
Northern Ohio Traction & Light Co. (com.)	63	63
Northern Ohio Traction & Light Co. (pref.)	98 1/2	98 1/2
Philadelphia Company, Pittsburgh (com.)	44	42 1/4
Philadelphia Company, Pittsburgh (pref.)	43	42 1/4
Philadelphia Rapid Transit Company	18 3/4	18 1/4
Portland Railway, Light & Power Company	*53	54
Public Service Corporation	112	112
Third Avenue Railway, New York	44 1/2	44 1/4
Toledo Traction, Light & Power Co. (com.)	20	20
Toledo Traction, Light & Power Co. (pref.)	80	75
Twin City Rapid Transit Co., Minneapolis (com.)	106 1/2	105 3/4
Union Traction Company of Indiana (com.)	*11 1/2	11 1/2
Union Traction Company of Indiana (1st pref.)	*80	80
Union Traction Company of Indiana (2d pref.)	*14	14
United Rys. & Electric Company (Baltimore)	26 1/2	27
United Rys. Inv. Company (com.)	20 1/2	20
United Rys. Inv. Company (pref.)	45 1/2	43 3/4
Virginia Railway & Power Company (com.)	53	53
Virginia Railway & Power Company (pref.)	95	96
Washington Ry. & Electric Company (com.)	87	87 3/8
Washington Ry. & Electric Company (pref.)	87	87
West End Street Railway, Boston (com.)	71	72
West End Street Railway, Boston (pref.)	93	94
Westinghouse Elec. & Mfg. Company	71	73
Westinghouse Elec. & Mfg. Co. (1st pref.)	116 1/4	116 1/2

* Last sale. a Asked.

The following is a comparative statement of the results of operation of the Lake Shore Electric Railway System (comprising the Lake Shore Electric Railway, the Lorain Street Railroad and the Sandusky, Fremont & Southern Railway), the principal office of which is in Cleveland, Ohio, for the years 1913 and 1912:

	1913	1912
Gross income	\$1,416,983	\$1,326,883
Operating and taxes	837,497	754,821
Net income	\$579,486	\$572,062
Interest	421,447	419,450
Surplus	\$158,039	\$152,612
Dividend, first preferred	60,000	60,000
Net surplus	\$98,039	\$92,612

E. W. Moore, president of the above companies, says in part in the statement which is addressed to the stockholders:

"The overhead system through Clyde was rebuilt on account of the track being shifted from the side to the center of the street. The making of this change required span construction and the building of a new double pole line.

"A new siding was built near the Vermilion River at Vermilion, this work being required on account of the erection of a new bridge. The contract with the King Bridge Company made in 1912 for the erection of steel bridges was completed during the past year. On the Toledo division new steel bridges over Sugar, Big Muddy and Toussaint Creeks were installed. On the Cleveland division Chappell, Vermilion River and Oak Point bridges were completed early in the summer. On West Main Street, Bellevue, for 1200 ft. new 100-lb. T-rail was laid on white oak ties and crushed stone and paving completed. On East Main Street, Norwalk, 2500 ft. of 100-lb. T-rail was laid on white oak ties and crushed stone and pavement completed. At Clyde the track was moved from the side to the center of the street from East Street to Birdseye Street, a distance of 3800 ft. From East Main Street to the northerly city limits of Norwalk on the Old State Road, a distance of 1700 ft., the track was moved from the center of the road to the easterly side of the road. On the bridge over Black River at Lorain the company laid 2000 ft. of new rail on treated white oak ties, the use of ties being required on account of the elevation of the floor.

"On the morning of June 16 the substation and machinery installed in it at Berlin Heights were very badly damaged by fire. This loss, however, was covered by insurance. In order that the service might not be affected a temporary floating substation was placed in service. The damaged building was rebuilt, contracts were made for new electrical equipment to take the place of that damaged and the delivery of same was made late in December.

"In order to furnish current from the high-tension lines for the Bellevue lighting plant, two 250-kw frequency changers, with three 185 kw transformers, complete new switchboard and other necessary equipment, were purchased. One 25-kw transformer was installed in the substation at Hessville for the purpose of furnishing power for lighting to the village of Lindsay. One 25-kw transformer was installed in the substation at Dover Bay for the purpose of furnishing lighting service to the village of Bay.

"Five double-truck passenger cars for use in Sandusky were purchased. These cars are of the cross-seat type, equipped with Brill trucks, Westinghouse motors and air brakes. One Thew automatic electric shovel was purchased for use in new construction and trestle filling work. A new 100-hp Ideal boiler was installed in the shops at Sandusky for the purpose of heating the carhouse and shops.

"On Feb. 7, 1913, rights of the company over the County bridge across Black River at Lorain were extended for twenty-five years. On March 24, 1913, the franchise over the Huron River bridge at Huron, on Columbus Avenue from the Soldiers' Home to Sandusky city limits, and on

Hancock Street from the Soldiers' Home to Sandusky city limits, were renewed for twenty-five years. On Dec. 9 the company's franchises in Fremont were extended for twenty-five years.

"In accordance with the sinking fund provision of the first consolidated mortgage of 1923, there was acquired during the past year and delivered to the Citizens' Savings & Trust Company, Cleveland, Ohio, trustee, \$10,000 of bonds for cancellation, making \$60,000 bonds canceled in all, and leaving the total amount of bonds outstanding \$1,690,000.

"The March flood caused heavy losses to the company through loss of business and damage to property. This was particularly true on the Toledo division, the power plant and shop at Fremont being out of service for nearly two weeks. On account of the severe snow and ice storm beginning Nov. 9, the Cleveland division was practically out of service for a period of three days thereafter. These cessations of service not only caused a severe loss in business but also largely increased the operating charges of the company."

The comparative statement of gross earnings and operating expenses of the Lake Shore Electric Railway for the years 1913 and 1912 as contained in the report is as follows:

	1913	1912
Gross earnings	\$1,119,312	\$1,052,518
Operating expenses and taxes.....	670,605	605,063
Net earnings	\$448,707	\$447,455
Other income	25,000	25,000
Surplus	\$473,707	\$472,455
Interest paid	324,697	322,701
Net surplus	\$149,010	\$149,754

During the year 1913 the operating ratio of The Lake Shore Electric Railway was 59.91 per cent as compared to 57.49 per cent in 1912. The number of car miles decreased from 3,333,070 to 3,303,012. The income per car mile rose from 31.58 cents to 33.89 cents, which, although the operating expenses and taxes increased 2.15 cents per car mile, was sufficient to give an increase of 0.16 cents in net earnings per car mile, or 13.59 cents. Passengers carried in 1913 were 5,647,440 as compared to 5,366,013 in 1912.

The comparative earnings and expenses of the Lorain Street Railroad for 1913 and 1912 were as follows:

	1913	1912
Gross income	\$196,947	\$179,249
Operating expenses and taxes.....	118,216	105,624
Net earnings	\$78,731	\$73,625
Interest paid	64,500	64,500
Net surplus	\$14,231	\$9,125

Comparative statistics of the Lorain Street Railroad for the years 1913 and 1912 as contained in the report include the following:

Operating ratio in 1913, 60.03 per cent; in 1912, 58.92 per cent. Car miles, in 1913, 651,201; in 1912, 648,170. Income per car mile in 1913, 30.24 cents; in 1912, 27.65 cents. Operating expenses and taxes per car mile in 1913, 18.15 cents; in 1912, 16.29 cents. Net earnings per car mile in 1913, 12.09 cents; in 1912, 11.36 cents. Passengers carried in 1913, 3,399,490; in 1912, 3,034,318. Earnings per passenger in 1913, 5.80 cents; in 1912, 5.91 cents.

The earnings and expenses of the Sandusky, Fremont & Southern Railway for 1913 as compared with the previous year follow:

	1913	1912
Gross income	\$75,723	\$70,116
Operating expenses and taxes.....	48,675	44,133
Net earnings	\$27,048	\$25,983
Interest paid	32,250	32,250
Deficit	\$5,202	\$6,267

During 1913 the operating ratio of the Sandusky, Fremont & Southern Railway increased from 62.94 per cent to 64.28 per cent. Car miles increased from 239,299 to 240,455; income per car mile from 29.30 cents to 31.49 cents; operating expenses and taxes from 18.44 cents to 20.24 cents, and net earnings per car mile from 10.86 cents to 11.25 cents. Passengers carried increased from 311,620 to 349,710, but earnings per passenger dropped from 21.80 cents to 20.53 cents.

Pennsylvania Electrification Plans

The sixty-seventh annual report of the Pennsylvania Railroad for the year ended Dec. 31, 1913, contains the following statement in regard to electrification by the company:

"To relieve congestion by increasing the yard and track capacity at Broad Street Station, Philadelphia, the electrification of the main line to Paoli for suburban passenger trains is under way and will be followed by the electrification of the New York division to North Philadelphia and thence to Chestnut Hill. About 1 mile of overhead construction on the main line has been completed between Radnor and St. Davids, which will enable the company to decide by actual tests the type of overhead construction best adapted to its train service.

"In keeping with the policy of the company to promote efficiency and economy in operations, the management has been considering the advisability of electrifying that portion of the main line between Altoona on 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. From preliminary estimates, it would appear that a saving would be effected which would compensate the company for making the expenditure, but the subject must still receive much further examination and is also largely dependent upon an improvement in the revenues of the company to warrant raising the new capital required for this project."

During the year the Fourth Street passenger station at Harrison, N. J., was completed and placed in operation on the Newark rapid transit line.

According to the report the operating revenue of the Long Island Railroad for the year ended Dec. 31, 1913, was \$12,879,967 and the operating expenses, including taxes, were \$10,187,747, leaving a total income of \$2,692,220. Other income amounted to \$559,867 and interest and other charges to \$4,239,072, giving a deficit of \$977,984.

Purchase-Money Mortgage Disapproved by the New Jersey Public Utility Commission

The plan of the Public Service Railway, Newark, N. J., to pay for thirty-five cars by the issuance of a purchase-money mortgage for \$200,000 has been disapproved by the Board of Public Utility Commissioners of New Jersey. The board based its findings on the fact that the proposed issue would not constitute in reality a purchase-money mortgage and, therefore, the holders of the bonds should not be permitted to acquire a right to which they are not properly entitled.

The thirty-five cars proposed to be subjected to the mortgage are now the property of the company and were not purchased by it. The motor equipment was bought by the company from outside sources. The cars, however, were constructed by the company in its own shops by men engaged in general repair work and through use of the same plant and equipment which the company maintains for the repair of its cars. The commission stated that its investigation showed that the company had through the construction of the cars in its own shops effected a material saving and that the cars in question considerably exceeded in value the sum of \$200,000. This sum the company would be entitled to capitalize.

Commenting upon this situation, the Board of Public Utility Commissioners said in part:

"The cost of material, work and labor involved in such construction has been met by the company out of available funds. It is now indebted to no one on account thereof. The purpose of the proposed mortgage and issue of bonds thereunder is to capitalize the expenditures so made and in such capitalization to create a debt which does not now exist. Clearly a mortgage cannot under such circumstances be said to be a purchase-money mortgage, or have the effect of such a mortgage. Some other method of capitalizing the expenditures which were made in the construction of these cars must therefore be devised by the company."

J. P. Morgan & Company and the New Haven

On March 9, 1914, J. P. Morgan & Company, in response to a request from Howard Elliott, chairman of the board of the New York, New Haven & Hartford Railroad, issued a detailed record of all the transactions between that road and the Morgan banking house during the last twenty years. The record shows that the firm participated in the handling of \$333,082,803 in securities of the New York, New Haven & Hartford Railroad and its subsidiaries. On these transactions the Morgan house realized a net profit of \$350,265, after taking count of losses incurred on the resale of some of the securities purchased from the railroad.

The correspondence with Chairman Elliott is made public in full by J. P. Morgan & Company. It sets forth that neither the firm of J. P. Morgan & Company nor any of its members ever had any interest in the New York, Westchester & Boston Railway, the steam railways, electric railways, or steamship companies acquired by the railroad or any of its subsidiaries, with the exception of a small interest which the late J. P. Morgan had in a wharf and terminal company.

The report contains a copy of "Account No. 2," which details in a general way the lending of \$11,155,000 of New Haven money to the Millbrook Company for the purchase of the New York, Westchester & Boston Railway. The ledger account, however, being unsupported by journal explanations, gives no definite information concerning the debits and credits, and it does not show what finally became of the \$11,155,000 of New Haven money after it had been paid over to Oakleigh Thorne and Marsden J. Perry, the promoters of the Millbrook Company.

The examiners of the Interstate Commerce Commission are gathering information for the public investigation of the New York, New Haven & Hartford Railroad, recently ordered by the United States Senate. The scope of the inquiry will not only embrace the circumstances by which the New York, Westchester & Boston Railway was taken over by the New Haven, but also the details of the acquisition of electric railways in Massachusetts, Connecticut and Rhode Island, and various steamship corporations.

In a statement which he made at Boston on March 10, Howard Elliott, chairman of the board of directors of the New York, New Haven & Hartford Railroad, said that an expert accountant was at work upon the company's books preparing a statement which will show "where every dollar of the \$175,000,000 of new capital raised from 1903 to 1913 has gone." He intimated that the results of the investigation would be given to the public and to the newspapers.

Compliance with I. C. C. Accounting Rules

The decision recently rendered by the Interstate Commerce Commission in the case of the Chicago, Milwaukee & St. Paul Railway and its subsidiary, the Chicago, Milwaukee & Puget Sound Railway, although dealing primarily with steam lines, is of general interest to interstate electric railways as indicating the attitude of the commission toward compliance with its prescribed accounting rules and regulations. In reviewing the history of its classifications the commission states that practically all carriers subject to the act have manifested a cheerful acquiescence in the rules of the commission and a spirit of co-operation, but that in some instances there have been serious departures from the prescribed regulations.

In 1905 the Chicago, Milwaukee & St. Paul Railway began construction of a line to the Pacific Coast. Under the accounting rules of the commission it was permitted to include in its accounts a proper revenue for transportation, rents for equipment and other facilities used in the construction of this road, as well as interest on the funds advanced. Instead of doing this periodically, however, the railway included in its income accounts for 1910 all the interest, rents and revenues assignable to the period prior to July 1, 1909, a total of \$4,600,000, thus overstating its income for 1910. The next year there was an apparent falling off of \$2,000,000 in income, which the company in its annual report stated was due to the inability to obtain increased rates and the great increase in the cost of labor. Investigation of the commission, however, based on the company's own figures, showed that expenditures for labor were \$50,000 less than during the pre-

vious year. Another point of criticism of the Chicago, Milwaukee & St. Paul Railway was that, having established a percentage of depreciation of equipment of 1½ per cent a year, it began on Jan. 1, 1913, to set up a charge of only 1 per cent. This reduction meant an inflation of net income of \$500,000 a year. This depreciation rate, omitting the annual salvage, gave the equipment of the company an estimated life of approximately 100 years, a position which the commission stated was wholly indefensible and unjustifiable.

The commission also condemned the delinquencies in the accounting of the Chicago, Milwaukee & Puget Sound Railway, stating that large amounts included in the cost of the construction of the road should have been entered as expenses of operation, and that net income was overstated by including in the cost of construction interest items accruing after the road was open for public service. Moreover, revenues were overstated by including charges for transportation of construction material at rates higher than those exacted under published tariffs. No charges whatever were set up for depreciation of equipment. If these different items had been carried to the books, the commission stated that the income of the company for its first year, reported at \$2,250,440, would have been practically eliminated.

After reviewing these facts the commission made a statement in part as follows in regard to its future attitude concerning accounting delinquencies:

"We have regarded the interval since the promulgation of the earlier and more important classifications as a formative period, during which we have not invoked the penalties of the law against carriers and their officials for errors and failures to observe our rules and regulations. This period, however, must now be considered as having come to an end, and we shall hereafter expect a more exact observance of the prescribed system. Accounting officers understand the true functions of accounts, but in many instances they have not been left free to follow their natural inclinations. Their hands or the hands of ones immediately under their authority, however, make the wrongful record, and it is they whom the commission will first hold responsible when it becomes necessary to invoke the penalties of the law. We shall not hesitate, however, to call to account with even greater severity higher officers who share in the responsibility for any violation of the accounting rules."

Competitive Public Sale of Bonds Successful

Bids aggregating \$18,872,000 were received from fifty bidders for the \$4,000,000 of first refunding 4 per cent bonds of the Third Avenue Railway, New York, N. Y., offered direct to the public on March 10, 1914. The successful bidders were Clark, Dodge & Company and J. & W. Seligman, bidding jointly; Bernard Baruch, George Ehret, Seasongood & Haas and Lazard Frères. They took the entire issue at an average price netting the company 83.0437. The individual bond awards showed that \$1,506,000 went to Lazard Frères at 82.815; \$1,000,000 to Bernard Baruch at 83.53; \$1,000,000 at 83 to J. & W. Seligman & Company and Clark, Dodge & Company, the joint bidders; \$450,000 to Seasongood & Haas at 82.83, and to George Ehret \$44,000 at 83. Other bids were \$400,000 in lots of \$50,000 each at prices ranging from 82¼ to 82⅝, \$600,000 at 80.333, \$100,000 in lots of \$10,000 ranging from 82½ to 81⅝, \$100,000 at 82¾, \$100,000 at 79 and \$100,000 at 81. There were many miscellaneous bids, ranging in amount from \$3,000 to \$50,000, at prices from 82.27 to 77.26.

F. W. Whitridge, president of the company, said: "I am pleased down to the ground. I sold my bonds at a better price than I expected and at a better price than I could otherwise have received."

Report of Board of Railroad Commissioners of Iowa

The thirty-fifth annual report of the Board of Railroad Commissioners of the State of Iowa just published contains the decisions of the board during the year 1912 on important interstate rate cases and cases involving other points, together with general financial and operating returns for various public utilities under the jurisdiction of the commission. Comparative statistics are presented for steam railroads, electric interurban railways, terminal and

bridge companies, showing the annual figures for mileage earnings, expenses, employees' accidents, etc., from 1878 to 1912, inclusive. The financial statements are given for the year ended June 30, 1912. For the year 1912, gross earnings from operation for electric interurban railways in Iowa amounted to \$1,823,191; operating expenses, \$1,272,340; net earnings from operation, \$550,851; net earnings per mile, \$1,607; outstanding stock, \$16,225,905; outstanding bonds, \$13,272,544.

Alton, Jacksonville & Peoria Railway, Alton, Ill.—It is reported that by an agreement of claimants for liens on the Alton, Jacksonville & Peoria Railroad reached at a conference at St. Louis on Feb. 24, 1914, all suits will be dismissed and an order for the sale of the road under foreclosure may be entered in the Madison County Circuit Court. There are mortgage claims of \$600,000, receiver's certificates of \$100,000 and other liens of \$60,000. It is reported that the creditors have agreed to take securities in the reorganized company, and that the line will be purchased by the Clark interests of Philadelphia, a tentative proposition from these interests having been made and considered acceptable by the creditors. J. J. Cummings, Chicago, Ill., holder of the \$100,000 of receiver's certificates, has resigned as a member of the bondholders' committee in order to take up the matter of the reorganization of the road.

American Cities Company, New York, N. Y.—At the annual meeting of the stockholders of the American Cities Company on March 9, 1914, the retiring directors were re-elected with the exception of Harry Bronner and Maurice Stern, who were succeeded by Marshall J. Dodge and G. G. Westfeldt.

Berwick & Nescopeck Street Railway, Beaver Falls, Pa.—On Feb. 27, 1914, Judge S. J. Straus, Wilkes-Barre, Pa., dismissed the injunction brought by A. C. Sickles to restrain the foreclosure of the mortgage of the Berwick & Nescopeck Street Railway by the Wyoming Valley Trust Company. The plaintiff asserted that if the lines were properly managed it would not be necessary to foreclose the mortgage, but the court decided that the plaintiff had failed to establish his case. The financial management of the road, however, was criticised, it being stated that a little over a mile of road was represented by \$100,000 in stock and \$43,500 in bonds.

Buffalo & Lackawanna Traction Company, Buffalo, N. Y.—The Public Service Commission for the Second District of New York recently took action ratifying the pledging by the Buffalo & Lackawanna Traction Company of \$100,000 of its first mortgage 5 per cent twenty-year gold bonds with the Columbia National Bank, Buffalo, N. Y., as collateral security for a loan of \$75,000.

Capital Traction Company, Washington, D. C.—The Public Utilities Commission of the District of Columbia has authorized the Capital Traction Company to sell \$350,000 of 5 per cent bonds for the purpose of providing funds for improvements and extensions to property. The bonds are the unsold balance of the \$6,000,000 issue of June 1, 1907, which was authorized by Congress.

Chicago & Milwaukee Electric Railway, Highwood, Ill.—Judge Geiger in the United States District Court at Milwaukee on Feb. 27, 1914, ordered the resale of the Wisconsin division of the Chicago & Milwaukee Electric Railway and denied the petition of John Griffiths, who holds about \$200,000 of stock, to intervene to become a party to the suit to prevent the reorganization committee from being permitted to bid at the next sale. Judge Landis of the federal court in Chicago has announced that he will set a date for the sale of the Illinois division coinciding with that which may be set by Judge Geiger for the sale of the Wisconsin division. At the former sale, which was set aside by the court after a plea of suppression of bids had been made by some of the creditors, the Illinois division sold for \$1,600,000 and the Wisconsin division for \$1,650,000. The property was bid in at that time by the reorganization committee representing the bondholders.

Cumberland (Md.) Electric Railway.—A bill has been introduced in the Legislature authorizing the consolidation of the Edison Electric Illuminating Company, Cumberland, and the Cumberland Electric Railway. At present the companies have a combined capital of \$150,000. The bill

authorizes the consolidated company to issue \$1,000,000 of common stock in exchange for the present shares.

Des Moines (Ia.) City Railway.—The Illinois Trust & Savings Bank, Chicago, Ill., as mortgage trustee, on Feb. 28, 1914, brought suit in the United States District Court to restrain the city authorities of Des Moines from ousting the Des Moines City Railway from the streets, on the ground that it is operating under a perpetual grant from the city.

Dry Dock, East Broadway & Battery Railroad, New York, N. Y.—An application from the Dry Dock, East Broadway & Battery Railroad for the approval of a mortgage and the issue of \$2,800,000 in bonds failed of approval recently, at a meeting of the Public Service Commission for the First District, by a tie vote.

Elmira Water, Light & Railroad Company, Elmira, N. Y.—The Public Service Commission of the Second District of New York heard on March 9, 1914, the application of the Harrisburg Light & Power Company for permission to purchase from the Elmira Water, Light & Railroad Company 3146 shares of its preferred capital stock of the aggregate par value of \$314,600 and 3476 shares of the common stock of the Elmira company of the aggregate par value of \$347,600, and to pay therefor the sum of \$500,000. William M. Clark, of the firm of Beekman, Menken & Griscom, New York, explained that the main purpose in view was a matter of investment, but a secondary consideration was the gradual liquidation of the obligations of a certain holding company. After considerable discussion it was decided that further information and data pertaining to the companies involved should be produced at Albany on March 16, 1914, and acted upon as a supplemental petition to that heretofore filed.

Galveston-Houston Electric Company, Galveston, Tex.—Stone & Webster, Boston, Mass., state that the entire issue of \$1,000,000 of Galveston-Houston Electric Company common stock offered to stockholders at par has been subscribed for. Rights to subscribe to this stock expired with a bid price equivalent to 106.9 for the stock, carrying a semi-annual dividend of 3½ per cent payable on March 16, 1914.

Lake Shore Electric Railway, Cleveland, Ohio.—The Public Utilities Commission of Ohio on March 6, 1914, authorized the Lake Shore Electric Railway to issue general mortgage 5 per cent gold bonds of the aggregate principal sum of \$70,000, the bonds to be sold for the highest price obtainable but not for less than 85 per cent of the par value. The proceeds from the sale are to be used to reimburse the income account for expenditures made therefrom during the year ended Dec. 31, 1913, for the construction of additions, extensions, improvements and betterments to the railroad system.

Little Rock, Pine Bluff & Eastern Traction Company, Little Rock, Ark.—The Little Rock, Pine Bluff & Eastern Traction Company has an option on the Argenta Railway with the end in view of making that line part of its proposed interurban system.

Metropolitan Street Railway, Kansas City, Mo.—A protective committee, composed of J. B. Dennis, J. J. Storrow, P. M. Warburg and W. K. Wigham, has been formed in the interests of the holders of the 5 per cent mortgage gold bonds of the Central Electric Railway, which is owned by the Metropolitan Street Railway. These bonds mature on May 1, 1914, and are upon property also covered by certain issues of the Kansas City Railway & Light Company and the Metropolitan Street Railway. Holders of the bonds are requested to deposit them, on or before April 15, 1914, with the New York Trust Company, New York, N. Y., or with the Old Colony Trust Company, Boston, Mass.

Newport News & Hampton Railway, Gas & Electric Company, Newport News, Va.—A mortgage has been filed with the Maryland Trust Company, Baltimore, Md., as trustee, by the Newport News & Hampton Railway, Gas & Electric Company to secure an issue of \$7,500,000 of bonds. As noted in the *ELECTRIC RAILWAY JOURNAL* of Feb. 14, 1914, this is a consolidated company including the Newport News & Old Point Railway & Electric Company, the Citizens' Railway, Light & Power Company, the Hampton

Roads Traction Company, the Hampton, Phoebus & Fort Monroe Gas Corporation and the Newport News Gas Company.

New York, Westchester & Boston Railway, New York, N. Y.—The New York, Westchester & Boston Railway has applied to the New York Stock Exchange to list \$1,290,000 additional first mortgage 4½ per cent guaranteed bonds, Series "I," due 1946.

Oakland, Antioch & Eastern Railway, Oakland, Cal.—W. Arnstein, president of the Oakland, Antioch & Eastern Railway, has issued a circular, in part as follows, in reference to a recent assessment on the stockholders of \$4 per share: "In a circular letter of Aug. 12, 1913, it was stated that if in addition to the assessment of \$5 per share then levied \$1,000,000 of bonds could be sold, the railway would be put in a strong financial condition. Unfortunately the bond market remained very depressed and only \$540,000 of bonds were underwritten by the shareholders. It was therefore necessary to raise part of the money needed by a \$4 assessment, the balance to be raised by a short-term note issue of \$700,000 secured by deposit on \$1,167,000 of bonds of the Oakland, Antioch & Eastern Railway." On Feb. 6, 1914, the Railroad Commission of California issued a supplemental order approving the detailed engineering data and specifications for the additions and betterments and equipment to be acquired from the sale of \$500,000 of first mortgage 5 per cent thirty-year bonds. The original order, referred to in the *ELECTRIC RAILWAY JOURNAL* of Feb. 14, 1914, provided that the bonds, while approved, should not be sold until the engineering data and specifications had been examined.

Pennsylvania Railroad, Philadelphia, Pa.—The Pennsylvania Railroad stockholders, at their annual meeting on March 10, 1914, authorized the board of directors to create a mortgage under which bonds may be issued in such amounts and at such times as may be required properly to finance the company. The mortgage is to cover "the whole or such portions of its railroad, property and franchises as the directors may authorize," and the aggregate amount of the bonds "at any time outstanding shall not exceed the par value of the then outstanding capital stock of the company."

Pittsburgh & Butler Street Railway, Pittsburgh, Pa.—Governor Tener of Pennsylvania has approved the action of the Public Service Commission of Pennsylvania on March 9, 1914, granting the petition for a merger of the Pittsburgh & Butler Street Railway and the Butler Passenger Railway.

Porto Rico Railways, Ltd., Ponce, P. R.—The Porto Rico Railways, Ltd., has just issued £65,000 of additional re-funding general mortgage 5 per cent bonds, making a total of £265,000 outstanding.

St. Joseph Railway, Light, Heat & Power Company, St. Joseph, Mo.—E. W. Clark & Company, Philadelphia, Pa., former managers of the St. Joseph Railway, Light, Heat & Power Company, have issued a statement to the effect that the Cities Service Company has made a payment of \$15 a share on the common stock of the former company to March 1, 1914, together with interest on the unpaid amount of the purchase price. This payment is ready for distribution pro rata to holders of deposit certificates. A deduction of \$1 a share is made to reimburse the bankers for services in connection with the sale of the property to Henry L. Doherty & Company. The distribution, therefore, including interest to March 1, 1914, will amount to \$15.75 a share.

San Francisco-Oakland Terminal Railways, Oakland, Cal.—On Feb. 26, 1914, the California Railroad Commission was petitioned by John S. Drum and W. I. Brobeck to authorize the San Francisco-Oakland Terminal Railways to issue and pledge \$1,000,000 of five-year 5 per cent bonds as additional security for \$2,500,000 of notes issued by the Oakland Railways in 1912 and now due as extended, Sept. 14, 1913, and also for a new issue of \$500,000 of 7 per cent notes due Sept. 12, 1914. It is reported that these notes have been subscribed for by a syndicate of local bankers at par, and that the proceeds are to be used to replace money taken from income for capital expenditures and for other capital investment immediately necessary. Commissioner John M. Eshelman

said that approval of this additional issue must not be construed as an approval of outstanding issues and that a complete refinancing plan should be presented to the commission as soon as possible. The decision was taken under advisement, with the understanding that more complete details of how the money was to be expended would be furnished. Protests were filed on behalf of stockholders of the San Francisco-Oakland Terminal Railways and owners of bond certificates of the United Properties Company.

Southern Traction Company of Illinois, East St. Louis, Ill.—Following the failure of efforts to float a large bond issue with the Ethelburga Syndicate of London, England, receivers were appointed on March 6, 1914, in Danville, Ill., for the Southern Traction Company of Illinois. The receivers are former Senator William Lorimer of Chicago, John A. Hamilton of Marissa, Ill., and W. E. Crane of St. Louis. The application for the receivership was made by former Governor J. Y. Sanders of Louisiana, representing the construction company that furnished the funds to build the line from East St. Louis to Belleville and the portion completed beyond Belleville. The road has been building for the last seven years, hauling passengers by electricity and planning to use steam for the purpose of moving freight.

Third Avenue Railway, New York, N. Y.—The holders of the fifty-year adjustment mortgage income bonds of the Third Avenue Railway have been notified that the United States Mortgage & Trust Company, trustee, will pay the semi-annual instalment of interest of 2½ per cent, due on April 1, 1914, on that date at the office of the trust company upon presentation and surrender of coupon No. 3.

Union Traction Company of Indiana, Anderson, Ind.—At the annual meeting of the stockholders of the Union Traction Company, held on March 3, 1914, all the directors were re-elected with the exception of J. Levering Jones, Philadelphia, who was succeeded by Courtland Van Camp, Indianapolis.

United Railroads, San Francisco, Cal.—Arrangements have been made for the United Railroads of San Francisco to extend until Dec. 31, 1914, the unpaid \$600,000 of the \$650,000 of Ferries & Cliff House 6 per cent bonds which matured on March 1, 1914, and were called for delivery at the Anglo-London & Paris National Bank and the office of N. W. Halsey & Company, as noted in our issue of March 7, 1914. No public offering will be made of the extended bonds as the present holders will be permitted to join with the bankers in carrying the bonds for the extended period. The property covered by these bonds formerly carried \$1,700,000 of first mortgages. It is expected that the extended bonds will be paid off at maturity out of earnings for 1914. The Park & Cliff House Railway 6 per cent bonds, amounting to \$350,000, were canceled by the company on Jan. 14, 1913.

Washington, Baltimore & Annapolis Electric Railroad, Baltimore, Md.—Application has been made to list the securities of the Washington, Baltimore & Annapolis Electric Railroad on the Washington Stock Exchange.

Washington Railway & Electric Company, Washington, D. C.—A quarterly dividend of 1¾ per cent was paid on March 1, 1914, on the \$6,500,000 of common stock of the Washington Railway & Electric Company to holders of record of Feb. 13. This compares with 1½ per cent paid in June, September and December, 1913, with 1 per cent extra in December.

West Virginia Traction & Electric Company, Wheeling, W. Va.—Ten bonds issued under a mortgage made by the Wheeling & Elm Grove Railroad and dated March 1, 1898, were paid by the West Virginia Traction & Electric Company on March 2, 1914, at the office of the Germania Half Dollar Savings Bank, Wheeling, W. Va.

Wisconsin Traction, Light, Heat & Power Company, Appleton, Wis.—The Wisconsin Supreme Court recently sustained the State Railroad Commission by upholding the indeterminate permit law in the suit of the Wisconsin Traction, Light, Heat & Power Company against the city of Menasha. The city, which had been furnishing its own street lighting service for some time, began to do a regular commercial lighting business in competition with the plaintiff and without the necessary authority of a certificate of convenience and necessity. The Supreme Court, re-

versing the lower court, held that a municipality as well as a private corporation would be obliged to secure a certificate from the State Railroad Commission showing that public convenience required the proposed service.

Dividends Declared

Brazilian Traction, Light & Power Company, Toronto, Ont., quarterly, 1½ per cent, preferred.

Brooklyn (N. Y.) Rapid Transit Company, quarterly, 1½ per cent.

Chicago (Ill.) City Railway, quarterly, 2½ per cent.

Chippewa Valley Railway, Light & Power Company, Eau Claire, Wis., quarterly, 1¼ per cent, preferred.

Connecticut Valley Street Railway, Greenfield, Mass., 3 per cent, preferred.

Manila Electric Railroad & Lighting Corporation, Manila, P. I., quarterly, 1¼ per cent.

St. Joseph Railway, Light, Heat & Power Company, St. Joseph, Mo., quarterly, 1¼ per cent, preferred.

Second & Third Streets Passenger Railway, Philadelphia, Pa., quarterly, 3 per cent.

United Traction & Electric Company, Providence, R. I., quarterly, 1¼ per cent.

Washington Railway & Electric Company, Washington, D. C., quarterly, 1¼ per cent, preferred; quarterly, 1¼ per cent, common.

West Penn Traction & Water Power Company, Pittsburgh, Pa., quarterly, 1½ per cent, preferred.

ELECTRIC RAILWAY MONTHLY EARNINGS

AURORA, ELGIN & CHICAGO RAILWAY, WHEATON, ILL.

Period	Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1m., Jan., '14	\$145,484	*\$100,888	\$44,596	\$34,828	†\$9,768
1 " " '13	140,578	*90,967	49,611	32,065	17,547
7 " " '14	1,244,564	*776,888	467,675	238,196	229,479
7 " " '13	1,191,064	*885,613	505,451	224,531	280,920

BERKSHIRE STREET RAILWAY, PITTSFIELD, MASS.

1m., Jan., '14	\$75,568	*\$83,790	\$8,059	\$15,473	†\$23,533
1 " " '13	72,592	*68,042	4,550	12,531	†7,981
7 " " '14	617,934	*534,744	83,191	106,354	†23,163
7 " " '13	589,959	*524,047	65,912	87,585	†21,673

CONNECTICUT COMPANY, NEW HAVEN, CONN.

1m., Jan., '14	\$613,199	*\$460,336	\$152,863	\$88,374	\$64,489
1 " " '13	592,924	*452,771	140,153	86,495	\$53,638
7 " " '14	5,027,512	*3,573,768	1,453,744	625,527	828,217
7 " " '13	4,687,123	*2,179,084	1,508,040	605,892	902,148

DETROIT (MICH.) UNITED RAILWAY

1m., Jan., '14	\$972,275	\$682,844	\$289,431	\$176,765	\$112,666
1 " " '13	1,005,366	677,776	327,570	178,500	149,070

NEW YORK & STAMFORD RAILWAY, PORT CHESTER, N. Y.

1m., Jan., '14	\$22,612	*\$24,129	\$1,516	\$7,801	†\$9,317
1 " " '13	23,448	*23,704	256	7,327	†7,584
7 " " '14	233,031	*179,723	53,309	53,893	†584
7 " " '13	229,457	*203,710	25,747	49,391	†23,644

NEW YORK, WESTCHESTER & BOSTON RAILWAY, NEW YORK, N. Y.

1m., Jan., '14	\$32,375	*\$49,867	\$17,492	\$9,226	\$26,718
1 " " '13	29,478	*45,488	16,010	13,992	30,002
7 " " '14	256,216	*345,873	89,656	64,866	154,522
7 " " '13	175,868	*328,686	152,818	87,942	240,760

REPUBLIC RAILWAY & LIGHT COMPANY, NEW YORK, N. Y.

1m., Jan., '14	\$257,978	*\$152,278	\$105,699	\$43,089	\$62,610
1 " " '13	244,341	*148,566	95,775	45,816	49,958
12 " " '14	3,001,307	*1,847,676	1,153,631	533,538	630,093
12 " " '13	2,710,158	*1,633,306	1,076,852	529,986	546,866

RHODE ISLAND COMPANY, PROVIDENCE, R. I.

1m., Jan., '14	\$431,160	*\$350,635	\$80,525	\$109,389	†\$28,864
1 " " '13	433,441	*292,915	140,545	102,056	38,489
7 " " '14	3,326,466	*2,372,088	954,358	747,857	206,501
7 " " '13	3,266,188	*2,077,832	1,188,357	714,390	473,967

TWIN CITY RAPID TRANSIT COMPANY, MINNEAPOLIS, MINN.

1m., Jan., '14	\$746,309	\$412,638	\$336,671	\$232,436	\$101,235
1 " " '13	690,510	375,758	314,753	238,117	76,636

VIRGINIA RAILWAY & POWER COMPANY, RICHMOND, VA.

1m., Dec., '13	\$457,372	*\$216,658	\$240,715	\$135,435	\$105,280
1 " " '12	424,422	*196,322	228,099	123,166	104,933
12 " " '13	2,666,244	*1,313,156	1,353,089	802,818	505,271
12 " " '12	2,488,442	*1,207,977	1,280,465	741,793	538,672

WESTCHESTER STREET RAILROAD, WHITE PLAINS, N. Y.

1m., Jan., '14	\$17,528	*\$21,226	\$3,698	\$1,164	†\$4,862
1 " " '13	17,487	*20,778	3,291	925	†4,216
7 " " '14	154,684	*149,692	4,992	7,580	†2,588
7 " " '13	145,883	*149,327	3,444	5,768	†9,212

*Includes taxes. †Deficit.

Traffic and Transportation

New Transfer System for Brooklyn

The Public Service Commission for the First District of New York on March 6, 1914, ordered the Brooklyn Rapid Transit Company to put in force a new transfer system which will add 287 places to those at which it was already possible to transfer free from one car to another. There will now be 1008 transfer points, and it is asserted by the traffic experts of the commission that it will be possible to go from any point in the borough to any other point for a single fare, without walking more than two long or four short blocks.

The railway was not satisfied with the plan worked out by the commission and submitted an alternative, which provided transfers between the cars of the Coney Island & Brooklyn Railroad and those of the Brooklyn Rapid Transit lines, retained the feeder privileges and existing feeder lines, but did not provide some additional feeder lines, connecting feeders and feeder privileges desired by the commission. It was unanimously decided by the commission, however, to insist on its own scheme.

The system of transfers as finally adopted includes a transfer privilege between all lines of the company, including the recently absorbed Coney Island & Brooklyn Railroad, at every point of intersection. Besides the one transfer, a second transfer is provided by means of the establishment of feeder lines and connecting feeders, notably Fulton Street and Church Avenue. Altogether there are twenty-two feeder lines and fifteen connecting feeders thus created. The only exceptions to the transfer privilege are a few intersections where a round trip would thus be made possible.

A feeder line may be defined as a line upon which a passenger upon starting gets a ticket which entitles him to a transfer. In the case of a passenger getting on a car by a transfer, he would always be entitled to a ticket for any intersecting feeder line.

A connecting feeder may be distinguished from the above only in that it is a line upon which a passenger who presents a ticket is entitled to a continuing trip ticket. A connecting feeder line would be the second of three lines one traveled on, while an ordinary feeder would either be the first or the third.

It is expected that the formal order of the commission will require the adoption of the new system by May 1, 1914. The company has not announced whether or not it will accept the order.

Letters to Team and Automobile Owners

Brief mention was made in the ELECTRIC RAILWAY JOURNAL of March 7, 1914, page 561, of the letters addressed by the Northern Ohio Traction Company, Akron, Ohio, through E. H. Clindinst, supervisor of safety, to owners of teams and of automobiles asking that they cooperate with the company to secure the greatest possible degree of safety to themselves and others while on the streets. The letter to team owners follows:

"Every effort to promote safety in the city streets is of direct importance to you as it also is to us. Every careless act, by whomsoever committed, is a menace to life and to property.

"We believe you are interested, both from humanitarian motives and the preservation of your own teams and vehicles from damage, in eliminating so far as possible every chance of accident. That is exactly our position. We are striving constantly among our own employees to the end that they shall obey every rule, have every regard for the rights of others and that they do not 'take chances.' They are expected to keep mind and muscles alert to prevent accidents.

"Your co-operation is of utmost importance if the best results are to be obtained. Will you give it? Will you urge your teamsters or drivers to avoid taking chances and to use all reasonable care at all times? Every man of them is playing an important part in the movement of the enormous business and traffic that uses the streets. Every man of them should respect the duties and responsibilities of the other fellow. The street car man who un-

necessarily delays or obstructs other vehicles is wronging himself and many others. Just so, too, does the driver whose wagon unnecessarily delays the street cars do a wrong to the riders in that car. Your own customers may be among them.

"It is a case of 'pull together' if we are to avoid these things. If we do this, very much can be accomplished. Your interests and our own are so nearly identical we confidently count on your aid and the entire public will be the gainer.

"SAFETY FIRST. It is far better to be safe than sorry."

The letter addressed by the company to automobile owners follows:

"Your interests' as a citizen and as an automobile owner are so identical with our own as regards avoidance of accidents that we offer a suggestion.

"Our car men are earnestly and frequently cautioned and instructed to think of safety first, to keep their cars under control, to have every regard for the rights of others. There is no doubt this work is productive of good results.

To be sure accidents will sometimes occur, and the purpose of this letter is to appeal to your own good judgment and to your personal interest to the end of having your co-operation in reducing accidents to the lowest possible minimum.

"Will you not think carefully of this, instruct your drivers to use all possible care and caution every member of your family, yourself included, as only by watchfulness and the barring of every unnecessary risk can the chance of accident be avoided?

"With the coming of fall and winter weather and dangerous street conditions, the necessity of thoroughly efficient brakes is more than ever apparent. The danger from skidding is also greater in these seasons. Very many 'don'ts' with all of which you are familiar, if you but call them to mind, might be mentioned. 'Don't take chances' is the chief of them.

"The co-operation we solicit is vitally necessary if results are to be as you would yourself wish to have them. All concerned, and this includes the entire public, will appreciate your aid."

"Don'ts" Addressed to Subordinate Officers of Fort Dodge, Des Moines & Southern Railroad

C. E. Carson, superintendent of the Fort Dodge, Des Moines & Southern Railroad, Boone, Ia., has compiled the following list of "Don'ts" to be used, not by the men under him, but by his fellow officers:

"Don't nag. Many a good man has been nagged into inefficiency.

"Don't humiliate a man by advertising his shortcomings from the housetops, but quietly point them out to him. He will lose an arm for you.

"Don't treat your men as if they belonged to the kindergarten class. Chances are they are better posted than you are.

"Don't be afraid to compliment an employee for some commendable service. He is made of precisely the same kind of stuff that you are.

"Don't forget that if the subordinate had as much gray matter as you have he might be holding your job. Try to be bigger than any man on your payroll.

"Don't forget that where some of your men may be making mistakes that cost dollars, you may be costing the company thousands of dollars by pursuing a mistaken policy.

"Don't forget that a man who will stand for a 'cussing' because of some mistake or oversight is not the kind of a man who is able to help your administration. He should be fired.

"Don't forget that while you are checking everybody else up it might be a good thing for the company you represent to make a careful inventory of yourself. You may be twenty-five years behind the times.

"Finally, let each action be sweetened by a little of the milk of human kindness. It will cause you to have pleasant recollections after you have been laid on the shelf and enable you to look your old associates in the company in the eyes."

Sunday Operation in London, Ont.—An agitation that has been conducted in London, Ont., resulted on Feb. 22, 1914, in the installation of a Sunday service within the city limits on the London Street Railway.

Fare and Service Complaint in Buffalo.—Complaint against the rates and service of the International Railway, Buffalo, N. Y., has been filed with the Public Service Commission of the Second District of New York by the Progressive Club, which desires the commission to inquire into the advisability of ordering the company to reduce its fares during rush hours.

Folding Doors on Chattanooga Cars.—The Chattanooga Railway & Light Company, Chattanooga, Tenn., has decided to equip its cars with folding doors at entrances. As soon as the 100 or more cars of the company can be renovated so as to conform to this change, every car on all lines will be operated in such a way that no one can board or leave a car while it is in motion.

Draft of Michigan Uniform Rules Completed.—The first draft of the proposed uniform rules and regulations for the operation of electric railways in Michigan has been practically completed by the special committee of operating officials and will be presented to officials of the various companies and the members of the Michigan Railroad Commission at a meeting to be held in Detroit on March 18, 1914.

Commutation Tickets to Be Discontinued.—The Railroad Commission of California has granted the application of the Glendale & Eagle Rock Railway, Glendale, Cal., to discontinue the sale of twenty-ride commutation tickets at 50 cents and to substitute in lieu thereof a regular fare of 5 cents. The special commutation ticket will be applicable, however, to children under the age of eighteen years.

New System of Signs in Buffalo.—E. J. Dickson, vice-president of the International Railway, Buffalo, N. Y., has announced a new system of signs for the cars of the company in Buffalo. Hereafter the destination of the near-side cars will be shown in large letters on the front transom of the center window at the front. The route number will be maintained on the right-hand window at the front, as heretofore.

Toronto Purchase Agreement to Be Submitted on March 30.—Mayor Hocken, of Toronto, Ont., announced on March 6, 1914, that the agreement between the city and the Toronto Railway for the purchase of the railway by the city would be ready for submission to the City Council on March 30, 1914. He explained that the delay in completing the agreement on the part of the company was due to its lawyers being engaged in Ottawa.

Car Gates a Precaution in Louisville.—The rules of the Louisville (Ky.) Railway, which refuses to permit prospective passengers to board cars after the gates have been closed and the car is in motion, have been upheld by Judge W. M. Smith, of the Jefferson Circuit Court at Louisville, who sustained a demurrer of the company to the petition of William Caufield, who sued for damages for injuries alleged to have been received while he attempted to get on a car after the gates had been closed.

Joint Traffic Agreements of California Roads.—R. M. Rodenbaugh, traffic manager for the Oakland & Antioch Railway, Oakland, Cal., has announced that a traffic agreement has been signed by the Southern Pacific, Santa Fé, Western Pacific and the Oakland & Antioch lines, providing for joint through freight service to all parts of the United States and to all points touched by the electric lines running out of Sacramento. An agreement has also been reached which will make it possible for persons living along the line of the Oakland & Antioch Railway to buy through tickets to any point.

Express Service in Albany.—The United Traction Company, Albany, N. Y., has established an express service on its Pine Hill line during the rush hours. James F. Hamilton, general manager of the company, in announcing the details of the service, said: "A plan similar to the one in Albany has worked very well in Schenectady. The Schenectady Railway some time ago put on two express cars from the works of the General Electric Company to the suburbs, and the service was so acceptable that eighteen cars are now running on the same schedule. Should the experi-

ment with the Pine Hills line prove successful it will be extended to West Albany and other lines which are operated by the company."

Safety First Campaign in Buffalo.—Mayor Louis P. Fuhrmann of Buffalo, N. Y., sent to the Board of Aldermen recently the names of a committee appointed to co-operate with him in a "safety-first" movement. Among those on the committee is Thomas Penney, chief counsel of the International Railway, who, it is stated by the Mayor, will be the real directing force of the movement. The police record shows that forty-seven persons were killed and 1831 injured on public highways of Buffalo during the last year, and that the number of automobile accidents was 1042. The Mayor thinks that nearly all of the accidents which occurred were to some extent due to carelessness.

Boston Elevated Telegraphers Ratify Agreement.—The wage and working hours agreement reached recently between telegraphers on the rapid transit lines of the Boston (Mass.) Elevated Railway and the company has been unanimously ratified by the members of the union. An increase of 3 cents an hour in wages, dating from May 1, 1913, to March 14, 1914, has been granted, with an additional increase of 1 cent an hour after the latter date. The new wage scale will terminate on Sept. 14, 1915. About \$72 in retroactive pay will be received by each of the thirty-four telegraphers in the company's service. The company is considering a plan to grant one day off in thirty to each man without loss of pay.

Team Work in Kansas City.—The transportation department of the Metropolitan Street Railway, Kansas City, Mo., recently arranged to hold monthly luncheons for the twenty-one heads of departments of the Metropolitan Street Railway, the Kansas City Railway & Light Company and its subsidiary companies. The luncheons are to be held at the Mid-Day Club in the Commerce Building on the first Saturday of each month. The meetings are chiefly to afford an opportunity for the discussion of topics affecting the company and for the exchange of opinions by department heads. While every department head is efficient in his own work, it was believed that his value to the company would be greatly enhanced if he could secure an insight into the workings of other departments, and the arrangements which have been made for the monthly luncheons followed.

Smokers to Be Ejected from Bodies of Chicago Cars.—Leonard A. Busby, president of the Chicago (Ill.) surface lines, has instructed conductors of the company to eject smokers from the body of the car when violations of the rules against smoking are brought to their attention. Mr. Busby said: "So long as smoking is permitted in one part of the car it is almost a physical impossibility to prevent some persons from taking advantage of the privilege and smoking elsewhere in the car. Only with constant vigilance and the co-operation of the public it is possible to prevent the spread of the smoking nuisance. It does not require a very strenuous exercise of imagination to learn that a 'half dead' smoke is the equivalent of at least two live ones, from an olfactory standpoint." The Council committee on health has prepared an ordinance to prohibit all smoking on cars, and has presented the measure to the City Council. Under the rules of the Council this ordinance will be held over until March 16, 1914, when final action will be taken.

Safety Cards in Language Study.—The principal of an evening school in Brooklyn has devised a method of safety co-operation that is attracting attention. This school has a large foreign enrolment and one of the most important lines of instruction is English. The principal therefore requested the bureau of public safety of the Brooklyn Rapid Transit System to supply his school with copies of its "danger" cards and warning signs. In this way foreigners seeking instruction in English have their attention forcibly called, for example, to the ordinance against spitting in public places and the orders of the Public Service Commission in regard to smoking in cars and on station platforms. The dashboard signs containing the injunction "Avoid accident—Wait until the car stops," are also included, and for those who may be poetic-

ally inclined, there is the poem by another school principal, telling how to get on and off a car in safety. The principals of one or two other evening schools have taken up the idea.

Ordinance Against Smoking in Atchison, Kan.—The City Council of Atchison, Kan., recently passed an ordinance against smoking on street cars. The Atchison Railway, Light & Power Company ordered smoking on cars stopped, but found itself unable to enforce the prohibition without an ordinance. The city authorities co-operated by passing the necessary measure. The case recalls that of the Metropolitan Street Railway, Kansas City, Mo., which eliminated smoking on the street cars a year ago or so ago. The public of Kansas City paid little attention to the order against smoking, and the company instructed its car crews to halt the cars as soon as a passenger began smoking. As soon as the smoker ceased the car resumed its journey. Later, cars were sidetracked when the public ignored the order regarding smoking. In Kansas City, however, the City Council took a hostile attitude and announced that the Metropolitan had no authority to prevent smoking. The officers of the company, however, held to their course, and the public finally acceded to the orders which had been issued regarding smoking.

Service Complaint Satisfied.—The Public Service Commission of the Second District of New York has closed upon its records the complaint of residents of the village of Walden against the Orange County Traction Company alleging insufficient car service between Walden and Newburgh, overcrowded condition of cars at certain times and other matters pertaining to the general service of the company. After an investigation by Charles R. Barnes, inspector of the commission, it was found that because of the peculiar conditions affecting the operation of the line some of the conditions complained of could not be changed to meet the views of complainants and at the same time fully meet the requirements of travel during certain periods over portions of the line between Newburgh and Walden. Since the investigation the roadbed has been improved, waiting rooms have been established at Walden and Newburgh, double-truck cars have been put in operation between the points mentioned, a block signal system has been installed, through cars have been put in operation on Sundays and holidays during the summer season, and various other improvements have been established. All these changes have been received by the complainants with satisfaction.

Differences Regarding Entrance to Kansas City Settled.—The disagreement between the Metropolitan Street Railway, Kansas City, and the Kansas City & Western Railway, running to Leavenworth, Kan., has been settled by the leasing of the Kensington branch by the Metropolitan Street Railway. The interurban will continue to operate its cars over the line, but will not pick up city passengers. Heretofore residents of Kensington desiring to enter Kansas City, Mo., have paid 5 cents to the Kansas City & Western Railway and an equal amount to the Metropolitan Street Railway, which completed the trip. The Public Utilities Commission held that the trip from Kensington, which is in Kansas City, Kan., to the Missouri side should be made for one fare of 5 cents. The two companies disagreed as to the division of the 5-cent fare, and the Metropolitan Street Railway ordered the interurban to cease using its tracks after a certain date. The Metropolitan Street Railway tracks were necessary for the interurban to complete its trip into Kansas City. The trouble was settled when the interurban leased the Kensington branch to the Metropolitan Street Railway, which will get the entire fare and in return pay the Kansas City & Western Railway a fixed sum annually. The Metropolitan Street Railway probably will operate twelve-minute service over the Kensington branch, which will connect with the Central Fairmount line at Eighteenth Street and Central Avenue, Kansas City, Kan., and which will be operated under the universal transfer. The agreement went into effect on March 9. Following the settlement, the City Council of Kansas City, Kan., passed an ordinance requiring the Kansas City & Western Railway to stop its cars at the following points: Seventh and Central Avenue, Tenth and Central, Eighteenth and Central, Chelsea Junction, and Reidy Road.

Personal Mention

Mr. Jacob M. Vogdes has resigned as president of the St. Petersburg & Gulf Railway, St. Petersburg, Fla.

Mr. D. Warren has been appointed master mechanic of the Cortland County Traction Company, Cortland, N. Y.

Mr. Charles C. Tennis, vice-president of the Pittsburgh & Butler Street Railway, Butler, Pa., is acting as general manager of the company.

Mr. R. E. Sprenkle, secretary and treasurer of the Pittsburgh & Butler Street Railway, Butler, Pa., is acting as purchasing agent of the company.

Mr. F. W. De Mart has been appointed chief engineer of the power station of the Altoona & Logan Valley Electric Railway, Altoona, Pa., to succeed the late James Honor.

Mr. Charles A. Edwards, of Huntington, Ind., assumed his duties as a member of the Indiana Public Service Commission March 1, taking the place of Mr. Frank E. Payne, of Jeffersonville.

Mr. L. B. Cramer, formerly connected with the Hill lines of the North, has been appointed electrical engineer in charge of the electrical department of the San Francisco-Oakland Terminal Railways, Oakland, Cal.

Mr. F. Roher has been appointed master mechanic of the Slate Belt Electric Street Railway, Pen Argyl, Pa., to succeed Mr. William Hipple. Mr. Roher was formerly connected with the Lehigh Valley Transit Company, Allentown, Pa.

Mr. M. J. Harrington, formerly secretary of the Dock Department of New York, has been appointed assistant secretary of the Public Service Commission of the First District of New York, succeeding Mr. W. L. Ransom, now a City Court justice.

Mr. R. Vance Pearson, who has been connected with the electric line and service department of the Utah Light & Railway Company for the past ten years in Salt Lake City and Ogden, Utah, has been appointed to represent the company in the commercial field at Ogden.

Mr. M. A. Stainer has resigned as general superintendent and chief engineer of the Nashville-Gallatin Interurban Railway, Nashville, Tenn., to become chief engineer of the Central City, Greenville & Drakesboro Railway, Central City, Ky., which is about to begin active construction on its proposed road.

Mr. Harry E. Funk, formerly assistant engineer assigned to building construction in the department of maintenance of way and structures of the Brooklyn (N. Y.) Rapid Transit System, has been appointed superintendent of buildings in the same department. He will continue to report to Mr. C. L. Crabbs, engineer of way and structure.

Mr. Britton I. Budd, president of the constituent companies of the Chicago (Ill.) Elevated Railways, was elected president of the Illinois Electric Railways Association at the annual convention of the association in Springfield, Ill., on March 6. A portrait and a biography of Mr. Budd were published in the *ELECTRIC RAILWAY JOURNAL* of Aug. 12, 1911.

Mr. Seymour Van Santvoord, whose appointment as a member of the Public Service Commission of the Second District of New York was noted in the *ELECTRIC RAILWAY JOURNAL* of Feb. 28, 1914, has been designated as chairman of the commission to succeed Mr. Martin S. Decker, who resigned that office on March 11, 1914, but continues as a member of the commission.

Mr. B. J. Schramm has been appointed superintendent of construction in charge of electrifying the Gary, Hobart & Eastern Traction Company's line between Gary and Hobart, Ind. He was formerly employed as superintendent of overhead of the Kankakee & Urbana Traction, Urbana, Ill. A biography of Mr. Schramm was published in the *ELECTRIC RAILWAY JOURNAL* at the time of his appointment to the latter position.

Mr. G. C. Fields has been appointed general superintendent of interurban lines of the Portland Railway, Light & Power Company, Portland, Ore. Mr. Fields is a native of Oregon City. He entered railway work in 1892 with the East Side Railway, Portland. In 1896 he was made freight

agent at Oregon City. In 1898 he was selected freight manager at Portland and held this position until 1908, when he went into business for himself.

Mr. C. S. Sims, vice-president of the United Traction Company, Albany, N. Y., and vice-president and general manager of the Delaware & Hudson Railroad, has been elected a director of the Hudson Navigation Company. Mr. Sims is also vice-president of the Cohoes (N. Y.) Railway, vice-president of the Hudson Valley Railway, Glens Falls, N. Y.; vice-president of the Plattsburg (N. Y.) Traction Company, president of the Schenectady (N. Y.) Railway, and vice-president of the Troy & New England Railway.

Mr. Emil Huber-Stockar, head of the department for the introduction of electricity on the Swiss Government Railways, is visiting this country for the purpose of studying the operation of heavy electric railways, especially terminal electrifications at New York. Mr. Huber was formerly manager of the works of the Oerlikon Company, Oerlikon-Zurich, Switzerland. He will deliver an address on heavy electric traction before the New York Railroad Club on March 20. This meeting will be the annual "electrical night" of the club.

Mr. Francis Edward Gobey, carriage and wagon superintendent of the Lancashire & Yorkshire Railway, Manchester, Eng., is visiting the United States in company with Mr. David Halliwell and Mr. S. C. Povey of the same company. The party arrived on the *Lusitania* on March 6 and is planning to remain in the United States about a month. The principal object of the trip is to study the high-tension electrified lines in the United States, especially high-tension third-rail work, with a view to gaining information for further electrifications of the Lancashire & Yorkshire Railway, as described elsewhere in this issue.

Mr. W. B. McKinley, president of the Illinois Traction System, Peoria, Ill., is expected in New York on March 17, 1914, on his return from a trip around the world. Mr. McKinley left Seattle, Wash., on July 10, 1913. He is accompanied by his two nieces, the Misses Mary and Julia Mattis, also of Champaign. The party has visited Japan, China, India, the Nile country and southern and central Europe. During the trip Mr. McKinley sent to friends in all parts of the United States several thousand postal cards and also newspapers containing interviews with him. These interviews are in newspapers published in many countries and printed in many languages.

Mr. W. S. Murray has been appointed by the New York, New Haven & Hartford Railroad to be consulting engineer in general charge of all electrical engineering and construction, reporting to President Hustis, with offices at New Haven, Conn., effective on March 16, 1914. Following the substantial completion of the construction of the system for complete electrical operation west of New Haven Mr. Murray will enter into closer relations with the railroad company. His jurisdiction will hereafter be extended to include the electrical features of operation in addition to electrical construction. He will continue with the firm of McHenry & Murray in general consulting practice as before.

Mr. George P. Wilson, of Philadelphia, has been appointed chief of the bureau of tariffs by the Public Service Commission of Pennsylvania, the appointment to date from March 16. Mr. Wilson has been in the freight department of the Pennsylvania Railroad for the past two years and for five years previous to that time was chief of the freight tariff bureau of the Pennsylvania Railroad. He started his railroad service as a boy in the employ of the Philadelphia & Reading Railway, for which company he worked eleven years. The commission will soon issue an order requiring all utility companies subject to its jurisdiction to file all rates and tariffs.

Mr. R. F. Kelker, Jr., formerly in charge of the track and roadway department of the Board of Supervising Engineers, Chicago Traction, has been placed in charge of office drafting in the Central District of the Division of Valuation, Interstate Commerce Commission, Chicago. Mr. Kelker's previous experience in engineering work was obtained with the Brooklyn (N. Y.) Rapid Transit System, the International Railway, Buffalo, the Baltimore & Ohio Railroad and on the Chicago street railways, where he was in charge of track rehabilitation work for six

years. At the time of his resignation from the Board of Supervising Engineers, Chicago Traction, he was principal assistant engineer to Mr. George Weston, engineer of the board.

Mr. H. Doughty, superintendent of the Regina (Sask.) Municipal Railway, has notified the members of the City Commission of Regina of his intention to accept an offer made him by an English railway syndicate operating in Japan and in Hongkong. It is understood that Mr. Doughty will leave the service of the city of Regina about April 22. He will not take up his new duties until June, and will spend the intervening time in studying the railway systems in the coast cities. Mr. Doughty was appointed to the Regina Municipal Railway in the fall of 1912. He had previously been superintendent of the Lethbridge (Alberta) Municipal Railway, in charge of construction. Before that he was engaged in street railway construction work in Western Ontario for three years. Mr. Doughty was also engaged in similar work in England and on the Continent for about eight years.

Mr. E. D. Gault, whose election as treasurer of the Reading Transit & Light Company, Reading, Pa., was noted in the *ELECTRIC RAILWAY JOURNAL* of March 7, 1914, has also been elected treasurer of the Metropolitan Electric Company, the Oley Valley Railway and the Neversink Mountain Railway, Reading, Pa. Since he left school Mr. Gault has been engaged continuously in accounting work, first with a wholesale dry goods concern, and later with gas, electric and street railway properties. For sixteen years he was continuously in the employ of the Mahoning & Shenango Railway & Light Company, Youngstown, Ohio, or some of its underlying companies, and for a period of five years occupied the position of auditor of that company. Mr. Gault has always taken an active interest in the work of the Central Electric Railway Accountants' Association and the American Electric Railway Accountants' Association and has served on the executive and other committees of both of these associations.

Mr. J. Q. Brown, whose resignation as assistant manager of the San Francisco-Oakland Terminal Railways, Oakland, Cal., was noted in the *ELECTRIC RAILWAY JOURNAL* of Feb. 21, 1914, became connected with the electric railways at Oakland, Cal., on May 1, 1900, five years after he was graduated from the Ohio State University. These five years were spent in the employ of the Emerson McMillin interests, chiefly in Columbus, Ohio, with the railway and electric light companies. His first appointment at Oakland was as assistant general manager and engineer of the Oakland Rapid Transit Company, the property of which has since become a part of the larger Key Route System. During his fourteen years of service with the San Francisco-Oakland Terminal Railways Mr. Brown had charge of the design and erection of distribution systems, signals, rolling stock, shops, and power stations, including the Yerba Buena power station, one of the most complete and economically operated stations of its kind in the West. He also had charge of the maintenance of everything mechanical and electrical on the Key Route System, including the buildings and ferry steamers. Mr. Brown is a stockholder in the company, and was formerly a director. He is now a director of the Petaluma & Santa Rosa Railway. Mr. Brown invented and patented the movable railing now used in the prepayment cars in Oakland and San Francisco, and also invented and patented the roller pantograph trolley, in use of the Key Route System, Southern Pacific and other roads.

Mr. F. W. Brown, whose appointment as traffic manager of the San Francisco-Oakland Terminal Railways, Oakland, Cal., was noted in the *ELECTRIC RAILWAY JOURNAL* of

Feb. 28, 1914, began his railway career as a telegraph operator for the Lake Shore & Michigan Railroad in 1883, continuing with that company in the capacity of operator, agent and ticket agent until 1896, when he was appointed to the position of purchasing agent for the Ohio State Reformatory. At the conclusion of his service with the reformatory in 1900 Mr. Brown became an agent for the Michigan Central Railroad at Lansing, Mich. In 1907 he resigned from the Michigan Central Railroad to become general passenger and freight agent of the Michigan United Railway, Lansing, Mich., and in July, 1913, in addition to his duties with that company, he was appointed traffic manager of the Michigan & Chicago Railroad, a steam line operated in connection with the Michigan United Railway. In February, 1914, he severed his connection with the Michigan United Railway and the Michigan & Chicago Railroad to become traffic manager of the San Francisco-Oakland Terminal Railways.

OBITUARY

Edward Franklin Adams, a foreman for the Metropolitan Street Railway, Kansas City, Mo., died in Kansas City recently. He was thirty-eight years old.

John Y. Boyd, one of the first members of the State Railroad Commission of Pennsylvania, died at his home in Harrisburg, Pa., on March 9, 1914, aged fifty-two.

Edwin R. Mitchell, superintendent and chief electrician of the Fort Madison (Ia.) Street Railway, is dead. Mr. Mitchell had been connected with the company for nineteen years. He was a native of England.

James Honor, chief engineer at the power plant of the Altoona & Logan Valley Electric Railway, Altoona, Pa., is dead. Mr. Honor had been a resident of Altoona for the last ten years. He was born in Schuylkill County on April 10, 1866, and was educated in the schools of that county, and soon afterward entered upon an apprenticeship in a machine shop. He entered the employ of the Logan Valley Railway in 1904.

Prof. E. J. Houston, joint inventor with Prof. Elihu Thomson of the Thomson-Houston arc-lighting system and widely known as an author and educator, died at his home in Philadelphia on March 1 of heart failure. Although well known as one of the pioneers in the electric lighting field, Prof. Houston was pre-eminent as a teacher. He wrote numerous text books, among the fifty-four works bearing his name being "Electric Street Railways." He was professor emeritus of the Philadelphia Central High School, past president of the American Institute of Electrical Engineers and a member of numerous scientific societies. A brother and two sisters survive him.

Benjamin W. Porter, formerly general manager of the Derby (Conn.) Street Railway, died suddenly in Boston on March 6, 1914. Mr. Porter was a native of Freeport, Ill. He entered street railway service as a clerk at Derby in 1888, and rose to the managership of the company in twelve years. When the property was acquired by the United Gas Improvement Company, Philadelphia, Pa., Mr. Porter was offered the position of assistant general manager of all the street railways under the control of the syndicate in Connecticut. At the time of his death Mr. Porter was prominent in mill and banking circles and was president of the Western New England Chamber of Commerce.

S. Reed Anthony, of the banking firm of Tucker, Anthony & Company, Boston, Mass., died at his home in Boston on March 10, after an illness of a few weeks. Mr. Anthony was born in Boston in 1863. His early business life was passed as a member of the staff of Kidder, Peabody & Company, Boston, with whom he was associated for eleven years. In 1892 he organized, with Mr. W. A. Tucker, the firm of Tucker, Anthony & Company, which became identified with the financing of various interurban railways in the Middle West. More recently the firm has been identified with water-power development near Duluth, Minn., and at Stanislaus Falls, in California. Mr. Anthony was a director in many corporations and at the time of his death he was president of the Manchester (N. H.) Street Railway, treasurer and a director of the Manchester Traction, Light & Power Company and treasurer and a director of the Mascoma Light & Power Company.



J. Q. Brown

Construction News

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

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

RECENT INCORPORATIONS

*Atlanta & North Georgia Railroad, Atlanta, Ga.—Incorporated in Georgia to build an electric or steam railway from Atlanta to Creighton, a distance of 50 miles. Capital stock, \$1,200,000. A. B. Kellogg, Atlanta, is interested.

*Olathe, Winfield & Arkansas City Railway, Topeka, Kan.—Incorporated in Kansas to build a 175-mile electric or steam railway between Olathe and Arkansas City. Capital stock, \$1,000,000. Incorporators: J. W. Gettel, W. A. Powell and F. A. Nickel, Enid, Okla.; P. E. Wiles, Lamont, Okla.; J. E. Jones, Atlanta, Kan.; P. H. Guy, P. H. Albright, W. H. Perry and C. M. Wallace, Winfield, Kan.

*Sudbury, Kippawa & Bell River Railway, Ottawa, Ont.—Application for a charter has been made by this company in Ontario to build an electric or steam railway from Sudbury to the foot of Lake Temiskaming and from Kippawa Junction, in Quebec, to connection with the National Transcontinental Railway at the point where it crosses Bell River.

FRANCHISES

Phoenix, Ariz.—The Phoenix Street Railway has asked the Council for an extension of its lines down East Washington Street. Construction will begin immediately.

Pasadena, Cal.—The Pacific Electric Railway will ask the Council for a franchise for its proposed new short line between Pasadena and Los Angeles, via South Pasadena.

Rialto, Cal.—William G. Henshaw, as proprietor of the Crescent City Railway Company, has made application to the Railroad Commission for a certificate of convenience and necessity authorizing the company to construct electric lines in Rialto, San Bernardino County. The company operates between Riverside and Bloomington and the line has recently been extended to Rialto, authorities of which have granted an application for a franchise.

Miami, Fla.—An electric railway franchise in the city of Miami is offered for sale and proposals for construction will be received for thirty days by Mayor John W. Watson. It is stated that enough subscriptions have been made to build 2½ miles of tracks.

Louisville, Ky.—The Council has been asked to grant a twenty-year franchise in Louisville for an electric line on Twenty-seventh Street from Chestnut to Madison Street and west on Madison Street to Shawnee Park. It is understood the franchise will be used by the Louisville Railway for an extension of its Chestnut Street line.

St. Joseph, Mo.—The St. Joseph Railway, Light, Heat & Power Company has asked the Council for a franchise to extend its Frederick Avenue line in St. Joseph to Thirty-sixth Street.

Batavia, N. Y.—Stephen W. Brown, Batavia, has received a fifty-year franchise from the Board of Aldermen in Batavia. This is part of a plan to have Mr. Brown take over the present street railway in Batavia from the Buffalo & Williamsville Railway and relay it with new track, build sidings and equip it with modern pay-as-you-enter cars.

*Canton, Ohio.—Philadelphia capitalists and citizens of Canton have asked the Council for a franchise in Canton. Storage battery cars will be operated. No names are yet given of those interested in the project.

Sharon, Ohio.—Mahoning & Shenango Railway & Light Company has asked the Council for a franchise for the construction of extensions in Sharon.

Ardmore, Okla.—The Ardmore & Western Interurban Railway has asked the Council for a franchise in Ardmore. This line will connect Ardmore, Springer, Woodford, Milo, Oil City, Cornish, Orr and Brock. F. B. McElroy, Ardmore, president. [E. R. J., March 7, '14.]

Portland, Ore.—The Portland Railway, Light & Power

Company has received a franchise from the Council for the East Side crosstown line from East Twenty-fourth Street and Broadway south to East Twenty-ninth Street and Hawthorne Avenue in Portland.

Nashville, Tenn.—The Nashville Railway & Light Company has asked the Council for a franchise to extend its tracks in Nashville.

Dallas, Tex.—The Dallas Southwestern Traction Company has received from the Council a second extension of time on its franchise in which to build its line from the western end of Commerce Street in Dallas to the county line. This 80-mile line will connect Dallas, Glen Rose, Grand Prairie, Mansfield, Alvarado and Cleburne. E. P. Turner, Dallas, president. [E. R. J., Nov. 29, '13.]

Salt Lake City, Utah.—The Utah Light & Railway will ask the Council for a franchise for a 5-mile extension of its Centerville line in Salt Lake City.

Cashmere, Wash.—Hyman Harris, Wenatchee, has received a franchise from the Council in Cashmere. This is part of a plan to build a line to connect Leavenworth, Wenatchee and Clockhum. Work will be begun within the next few months. [E. R. J., Feb. 28, '14.]

Centralia, Wash.—The City Council has passed an ordinance to submit to voters at an election on April 1 the question of granting a franchise to the Washington Electric Company to operate over certain streets in Centralia.

TRACK AND ROADWAY

Alberta Metropolitan Railway, Calgary, Alta.—This railway when completed will be operated by the company and not, as has been reported, by the Calgary Municipal Railway. It is said that gasoline electric cars will be used. W. J. C. Madden, Calgary, general manager.

Lacombe & Blindman Valley Electric Railway, Lacombe, Alta.—This company has awarded a new contract to the Middle West Construction Company to build a line in substitution for the contracts entered into Nov. 17 and 24, 1913, and has applied for an agreement to be made between the company and the Alberta government under the light railways assistance act. Eight miles of grading have been completed and contracts for ties and rails have been awarded. The section of line under construction extends from Lacombe to Gull Lake, 10 miles, but the contract provides for a further 20 miles from Gull Lake to Rimbey. J. B. McBride, Lacombe, secretary. [E. R. J., Jan. 17, '14.]

Phoenix (Ariz.) Street Railway.—Plans are being made by this company to extend several of its lines in Phoenix.

Oakland, Antioch & Eastern Railway, Oakland, Cal.—Work will soon be begun on the extension from Pittsburgh to Antioch.

Geary Street Municipal Railway, San Francisco, Cal.—Bids for the construction of the Van Ness Avenue and Chestnut Street lines of this company are to be received by the Board of Public Works on March 18. The contract will provide for building the roadway and installing the trolley poles and the conduits for the electric feed wires. The Van Ness Avenue tracks will extend to North Point Street and the Chestnut Street line will run from Van Ness Avenue, along Chestnut, Greenwich, and Steiner Streets to Union Street, where it will connect with the company's Union Street line. The construction is to be begun within fifteen days after the contract is signed.

Capital Traction Company, Washington, D. C.—The Public Utilities Commission has authorized this company to sell \$360,500 of bonds for extensions and improvements of its lines in Washington. D. S. Carl, general manager.

Atlanta & Carolina Railway, Atlanta, Ga.—Application for the appointment of a receiver for the Atlanta & Carolina Railway Company has been made by the Chicago Title & Trust Company, trustee representing the holders of \$1,000,000 of the company's bonds. Judge George L. Bell, before whom the action was brought, reserved his decision. The railway already had begun laying tracks between Atlanta and Augusta, Ga. It was planned to extend the line into South Carolina.

Chicago & Joliet Electric Railway, Joliet, Ill.—Plans are being made by this company to extend its lines through Forest Park.

Tri-City & Northeastern Interurban Street Railway, Port Byron, Ill.—This company has been dissolved.

Manhattan City & Interurban Railway, Manhattan, Kan.—Work will be begun at once by this company on the line between Manhattan and Fort Riley. The company has purchased 12,000 tons of 75-lb. steel rails, and will close a contract within the next few days for 20,000 ties and enough poles to complete the line to Fort Riley. It is planned to have this extension in operation by July 1.

Arkansas Valley Interurban Railway, Wichita, Kan.—This company has secured most of the right-of-way for its 22-mile line between Halstead and Hutchinson.

Shreveport (La.) Traction Company.—A one-mile extension from the present terminus of this line to the City Park in Shreveport is being contemplated by this company.

***Transcona, Man.**—A by-law has been approved by the legislative railway committee granting power to Transcona to construct and operate an electric railway in that place.

Linden, Mich.—Oliver H. Lau, Detroit, has asked the Railroad Commission for permission to issue \$50,000 of stock in a company soon to be incorporated for the purpose of building an electric railway from Holly to Linden. Ultimately this line will connect with an electric line to be constructed from Owosso to Detroit. [E. R. J., May, 10, '13.]

Mesaba Electric Railway, Virginia, Minn.—Plans are being made to begin work soon on the extension to Nashwauk.

Kansas City, Clay County & St. Joseph Railway, Kansas City, Mo.—The Union Switch & Signal Company has secured a contract for the installation of a block system on the two divisions of the Kansas City, Clay County & St. Joseph Railway. The company has purchased 12,000 yd. of ballast for its St. Joseph division and 5000 yd. for the Excelsior Springs division.

Springfield (Mo.) Traction Company.—A ½-mile extension of its Center Street line will soon be built by this company in Springfield.

Red Lodge (Mont.) Electric Railway.—Preliminary arrangements are being made by this company to begin work in the spring on the line to connect Red Lodge, Washoe and Bearcreek. C. C. Bowlen, president. [E. R. J., Jan. 21, '14.]

St. John (N. B.) Railway.—This company has officially announced that it has under consideration the following extensions: From Fairville to Manawaganish Road, 1 mile, and from Kane's Corner to Crouchville, 2 miles.

Binghamton (N. Y.) Railway.—This company plans to expend approximately \$100,000 this year in new equipment and improvements of its lines in Binghamton.

***Durham, N. C.**—Plans are being made to organize a company to build an electric railway between Durham and Chapel Hill, a distance of 12 miles. It is reported that the Southern Power Company is interested in the project.

***Drake, N. D.**—The Commercial Club of Drake is considering plans to build an electric line from Drake to Guthrie and Brush Lake.

Tiffin, Fostoria & Eastern Electric Railway, Tiffin, Ohio.—During the next few weeks this company will award contracts for 1000 white oak ties, 6 in. x 8 in. x 8 ft., and several cars of poles 6 in. at the top x 30 ft. long.

Toledo & Western Railroad, Toledo, Ohio.—An extension from Adrian to Jackson via Rome Center, Manitou Beach, Wild Water Beach, Devil's Lake station, Addison, and thence on to Jackson, is being contemplated by this company.

Belmont, Ont.—The citizens of Belmont and surrounding townships have declared themselves in favor of the proposed hydro-radial railway from London to Port Burwell via Belmont and Aylmer.

Fort William (Ont.) Street Railway.—The plan in connection with this railway system for the year 1914 includes an auxiliary line right across the city. Sufficient money has been voted for the work.

Ontario West Shore Railway, Goderich, Ont.—The four corporations of the townships of Ashfield and Huron and

the towns of Kincardine and Goderich will each ask the Legislature to have the charter of this company, which expires on April 13, renewed for another four years.

London & Lake Erie Railway & Transportation Company, London, Ont.—Representatives of St. Thomas, Aylmer, Yarmouth and Malahide met in St. Thomas on Feb. 24 to consider a proposal to guarantee the bonds of this company for an extension of the line from St. Thomas to Aylmer and from Union to Sparta. It was agreed to guarantee the bonds to the extent of \$20,000 per mile, but there is a difference as to apportioning the amount to be borne by the municipalities.

Peterboro (Ont.) Radial Company.—W. H. Munro, manager of this company, has announced to the Peterboro Council that the company is prepared to expend about \$40,000 on improvements to its lines in Peterboro.

***Thamesville, Ont.**—An electric railway line to connect Thamesville and Sombra is reported to be in prospect. T. M. Little, one of those interested, is said to have stated that work will be begun in the spring.

Southern Oregon Traction Company, Medford, Ore.—With the completion of the first 2-mile unit of this railway it is stated that plans are being made to build 3 miles of new track south from Medford toward Ashland this spring. S. M. Bullis, Medford, president. [E. R. J., Dec. 20, '13.]

Portland, Ore.—George F. Heusner, Portland, has filed complete plans with the Board of Public Works for the proposed electric railway in Portland, for which a franchise was granted last fall. This is part of a plan to build a line from the Kenton district to the West Side business district in Portland. [E. R. J., Jan. 10, '14.]

Montreal & Southern Counties Railway, Montreal, Que.—During the next few weeks this company will award contracts to build about 15 miles of new track between St. Cesaire and Granby.

Saskatoon (Sask.) Municipal Railway.—The City Council at a recent meeting decided to extend its electric railway through the Nineteenth Street subway in Saskatoon.

Chattanooga Railway & Light Company, Chattanooga, Tenn.—This company has proposed to the city authorities that it be allowed to cover the paving between its tracks on Market Street in Chattanooga with concrete, leveling the surface, instead of being required to repave with wood blocks, as has been proposed.

Knoxville Railway & Light Company, Knoxville, Tenn.—Plans are being made by this company to replace with reinforced concrete bridges the only two wooden trestles on its Fountain City line and to double-track its line from Knoxville to Fountain City.

Cumberland Valley & Interurban Electric Railway, Nashville, Tenn.—Preliminary arrangements are being made by this company to begin work soon on its line from Nashville to Sparta, via Greenvale, Auburn, Liberty, and Alexandria. The following officers were elected: W. G. Baird, Lebanon, president; Lee Baker, Mount Juliet, vice-president; W. W. Myers, Mount Juliet, treasurer, and Horace Osment, Nashville, secretary and general counsel. [E. R. J., Dec. 20, '13.]

Shelbyville, Petersburg & Decatur Railroad, Shelbyville, Tenn.—Within the next few weeks this company plans to begin work on its 20-mile line to connect Shelbyville and Pulaski, Tenn., and Petersburg, Decatur and Florence, Ala. The power plant will be at Ocoee and its repair shops will be at Shelbyville, Tenn. The company will supply power for lighting purposes. Capital stock authorized, \$600,000; bonds authorized, \$600,000. Officers: S. P. Kirkpatrick, Shelbyville, president; H. H. Nelson, Shelbyville, vice-president; T. G. Cunningham, Shelbyville, secretary; R. W. Clark, treasurer, and G. B. Howard, Franklin, Tenn., chief engineer. [E. R. J., Feb. 28, '14.]

Dallas Southwestern Traction Company, Dallas, Tex.—This company, which plans to construct an interurban line between Waco and Austin via Temple, announces that only 16 miles of the right-of-way of 110 miles remains to be secured. The route from Temple will virtually parallel the Missouri, Kansas & Texas Railway north of Temple, unless the company decides to build through Hillside and Robinsonville into McLennan County, in which event the line will

diverge from the Missouri, Kansas & Texas Railway and not enter the town of Lorena and others north of Bruceville. H. J. T. Witt, 606 Praetorian Building, Dallas, chief engineer. [E. R. J., Nov. 29, '13.]

El Paso (Tex.) Electric Railway.—Plans are being considered by this company for improvements and extensions of its lines. An extension to Las Cruces and Roswell is contemplated.

Fort Worth & Denton Interurban Railway, Fort Worth, Tex.—Work has been begun on this 35-mile line to connect Fort Worth, Denton, Keller and Roanoke. William Capps, Fort Worth, is interested. [E. R. J., Feb. 14, '14.]

San Angelo Street Car Company, San Angelo, Tex.—Improvements to cost at least \$35,000 are being planned by this company. Several extensions will be built.

San Antonio (Tex.) Traction Company.—This company is asked to consider plans to extend its lines through the Prospect Hill and Lake View section in San Antonio.

Utah Light & Railway Company, Salt Lake City, Utah.—Announcement has been made by this company that it will extend its interurban line into Davis County from Center-ville on to Farmington, 5 miles, during the year, and that ultimately the line will be continued through to Ogden.

Yakima Valley Transportation Company, North Yakima, Wash.—Plans are being made by this company to build a 7-mile extension to Tieton and an extension of its reservation branch to White Swan, Wash.

Oregon-Washington Railroad & Navigation Company, Seattle, Wash.—Announcement has been made by officials of this company that between \$5,000,000 and \$6,000,000 has been authorized by the directors of the Union Pacific system to be expended for improvements on the company's lines in Washington and Oregon.

Puget Sound Traction, Light & Power Company, Seattle, Wash.—This company is asked to consider plans to relay its track to the east city limits of Puyallup and extend it $\frac{3}{4}$ mile.

Chippewa Valley Railway, Light & Power Company, Eau Claire, Wis.—Preparations are under way to begin the construction of an electric line between Eau Claire and Altona.

La Crosse & Onalaska Street Railway, La Crosse, Wis.—During the next two months this company expects to award contracts to build 1 mile of new track with 70-lb. rails, six completed 70-lb. Dimond switches, and two 70-lb. curves.

Superior, Wis.—Plans are being made by the City Commissioners of Superior to take over that part of the Duluth Street Railway operated in Superior and establish a municipally owned electric railway there.

SHOPS AND BUILDINGS

Northern Electric Railway, Chico, Cal.—This company plans to move its headquarters from San Francisco to Sacramento at once.

POWER HOUSES AND SUBSTATIONS

Birmingham Railway, Light & Power Company, Birmingham, Ala.—Plans are being made by this company to build a new substation in connection with Lock 12 of the hydro-electric development of the Alabama Power Company. Machinery has been ordered. The cost is estimated to be about \$125,000.

Somerset Traction Company, Skowhegan, Maine.—In May this company plans to build a new substation in Skowhegan. It will install a 300-kw rotary converter. Orders have been placed for all electrical apparatus.

Chatham, Wallaceburg & Lake Erie Railway, Chatham, Ont.—This company's power house at Chatham was partly destroyed on Feb. 24 by an explosion in the boiler room. The whole rear part of the building was blown down.

Montreal & Southern Counties Railway, Montreal, Que.—During the next few weeks this company will award contracts to build a new power house in Granby.

San Angelo Street Car Company, San Angelo, Tex.—Preliminary plans are being made by this company to build a new power plant in San Angelo. New machinery will be installed.

Manufactures and Supplies

ROLLING STOCK

Escanaba (Mich.) Traction Company is in the market for two or three cars.

Omaha & Council Bluffs Street Railway, Omaha, Neb., is expecting to buy or build twenty-five cars.

Atlantic Shore Electric Railway, Sanford, Me., expects to purchase probably two cars during the year.

Jackson (Tenn.) Railway & Light Company, is reported to be considering the purchase of four new cars.

Toledo, Bowling Green & Southern Traction Company, Findlay, Ohio, expects to purchase additional freight cars.

Toledo, Fostoria & Findlay Railway, Fostoria, Ohio, is figuring on getting two new 57-ft. steel cars of latest pattern.

Ohio River Electric Railway & Power Company, Pomeroy, Ohio, expects to purchase during the year one single-truck closed car.

Electric Short Line Railway, Minneapolis, Minn., is reported to be considering the purchase of several gasoline-electric cars.

New Jersey and Pennsylvania Traction Company, Trenton, N. J., has ordered two package freight cars from The J. G. Brill Company.

Gary, Hobart & Eastern Traction Company, Chicago, Ill., expects to be in the market shortly for three interurban motor passenger cars and one motor express car.

Republic Railway & Light Company, Youngstown, Ohio, is considering the purchase of six trailers, in addition to the ten motor cars noted in the *ELECTRIC RAILWAY JOURNAL* of March 7, 1914.

Nipissing Central Railway, North Cobalt, Ont., which is operated by the Temiskaming & Northern Ontario Railway Commission, expects to place an order shortly for two interurban motor cars.

Richmond Light & Railroad Company, New York, N. Y., has ordered twenty National Brake & Electric air-brake equipments, to be installed on twenty of its fifteen-bench cars already in service.

Centerville Light & Traction Company, Centerville, Ia., noted in the *ELECTRIC RAILWAY JOURNAL* of Feb. 21, 1914, as expecting to purchase two passenger cars, has ordered two cars from the American Car Company.

St. John (N. B.) Railway has ordered twelve 20-ft. pay-as-you-enter cars from the Tillsonburg Electric Car Company, Ltd., Tillsonburg, Ont. Brill 21-E trucks, arched roofs and cherry interior finish, are specified.

Alberta Metropolitan Railway, Calgary, Alta., which is under construction, is reported to be considering the question of using gasoline-electric cars upon completion of its line. The manager is W. J. C. Madden, Calgary, Alta.

British Columbia Electric Railway, Vancouver, B. C., will rebuild for general service in its own shops at New Westminster, B. C., the cars which the company is displacing with new cars from the Preston Car & Coach Company, as noted in the *ELECTRIC RAILWAY JOURNAL* of Jan. 17, 1914.

Pittsburgh (Pa.) Railways, noted in the *ELECTRIC RAILWAY JOURNAL* of Feb. 21, 1914, as having issued specifications for 225 cars, has ordered 100 low-floor, baby-motor, center-entrance, end-door cars, fifty of which will be built by the Standard Steel Car Company and fifty by the Pressed Steel Car Company.

Imperial Government Railways of Japan, Yokohama, Japan, is building forty motor cars and fourteen trailers, which are to be placed in operation next fall on the 600-1200-volt Keihin electrification now under construction between Tokyo and Yokohama. GE-244 four-motor equipments have been ordered through Mitsui & Company, Ltd., New York, N. Y., exporters.

Geary Street Municipal Railway, San Francisco, Cal., has been authorized by the public utilities committee to purchase twenty-five new cars, in addition to the 100 cars which have recently been ordered from the Jewett Car Company. The extra cars will cost a total of about \$152,775.

This amount is available out of the surplus in the bond funds of the railway company.

St. Louis Southwestern Railway, St. Louis, Mo., noted in the *ELECTRIC RAILWAY JOURNAL* of Feb. 7, 1914, as having ordered eight 70-ft. gas-electric motor cars from the General Electric Company, has specified the following details for this equipment:

Seating capacity.....62	Couplers	M.C.B.
Weight, approx.....49 tons	Curtain fixtures.Cur. Sup. Co.	
Bolster centers, length,	Curtain material,	
53 ft. 7 in.	Cur. Sup. Co.	
Length of body.....70 ft.	Gears and pinions,	
Width over sills.....10 ft.	Gen. Elec. Co.	
Width over all..10 ft. 6 3/8 in.	Hand brakes.....Lindstrom	
Body	Heaters.....hot water	
Interior trim.statuary bronze	Headlights	GE Type J-3
Underframe	Journal boxes.....	M.C.B.
Air brakes.....West.	Motors.....	2 GE-205
Axles	Seats, style,	
Bumpers	Scarrit-Comstock Co.	
Cables	Seating material.....	rattan
Conduits and junction	Springs..	Ry. Stl. Spring Co.
boxes	Trucks,	
Control,	Plate frame swing bolster	
Two-motor, series-parallel,	Ventilators	Burt
generator field control	Wheels.....	33 in. M.C.B.

TRADE NOTES

Bemis Car Truck Company, Springfield, Mass., has appointed D. L. Beaulieu, formerly with the Westinghouse Electric & Manufacturing Company, as New England sales agent. T. S. Adams, who has previously covered this territory, has been assigned to the New Jersey, Pennsylvania and New York territory.

Street Railway Signal Company, Philadelphia, Pa., has been organized and incorporated under the laws of the State of Delaware, with a capitalization of \$100,000, \$50,000 paid in, with the object of manufacturing and selling automatic signals for electric railways. Officers are: Robert W. Withington, president; Fred W. Kulicke, vice-president; H. R. Stadelman, secretary, and James H. McGurk, treasurer.

Acme Supply Company, Chicago, Ill., announces the appointment of Stanley W. Midgley as general sales manager, with offices at 1103 Steger Building. Mr. Midgley has been in the railway supply business for the last twelve years, beginning with the National Car Coupler Company as general sales representative, and for the past six years he has been with the Curtain Supply Company as Western representative and Western sales manager, until his appointment to the present position.

Eccles & Smith Company, Los Angeles, Cal., has secured the following orders to equip the forty center-entrance pay-as-you-enter car bodies recently ordered by the San Diego (Cal.) Electric Railway from the St. Louis Car Company: Hale & Kilburn rattan and slat seats, Chicago City Railway type of pressed steel aisle and oval pedestal base, Pantasote curtains, Curtain Supply Company curtain fixtures, Sterling-Meaker double registers and Wearproof Mat Company mats. Specifications also include American Mason safety treads and Peacock hand brakes.

General Railway Signal Company, Rochester, N. Y., has received an order from the Wheeling & Lake Erie Railroad for selector equipment, to operate in connection with three telephone circuits. The selector equipment will be installed as follows: Brewster to Toledo, including branches to Huron, Dalton and Orrville, dispatching circuit, comprising 33 selector stations; Brewster to Norwalk, including branch to Huron, message circuit, comprising 23 selector stations; Brewster to Terminal Junction, including branch to Steubenville, message circuit, comprising 20 selector stations. The order specifies standard equipment, including selectors, bells, key cabinets and the necessary reactance and capacity units, which will be delivered at an early date.

Edison Storage Battery Company, Orange, N. J., has appointed W. F. Bauer as assistant manager of the railway department of the Edison Storage Battery Company at Orange, N. J. In the early days of electric car lighting Mr. Bauer was connected with the Pullman Company, of Chicago and Jersey City, and with the

Wagner Palace Car Company. He was chief electrician of the Missouri-Pacific Railway at St. Louis from 1903 to 1905. Later on he became sales manager for the Electric Storage Battery Company at Chicago, and in 1907 he was appointed to a similar position with the National Battery Company. Later on he became manager of the United States Light & Heating Company's railway department at Chicago. He will make his headquarters at 2025 Michigan Avenue, and will have immediate supervision over the sales of the railway department for the West and Southwest for the Edison company.

ADVERTISING LITERATURE

Chicago Pneumatic Tool Company, Chicago, Ill., has issued Bulletin No. 150, describing and illustrating its coal drills.

Electric Weighing Company, New York, N. Y., has issued a catalog describing Messiter conveyor sales for belt and pan conveyors.

Canton Culvert Company, Canton, Ohio, has issued Bulletin No. 350 illustrating the installation of its corrugated culverts under steam and electric railway roadbeds.

National Tube Company, Pittsburgh, Pa., has issued a catalog describing in detail its regrinding valves. The valve stem is cast from a special brass composition. The diaphragm is heavy and permits many regrindings.

Nungesser Carbon & Battery Company, Cleveland, Ohio, has issued Catalog No. 5, entitled "Brush Grades," which is supplemental to its previous price list and gives data and information in regard to its various grades of carbon, graphite and composition metal brushes.

Electric Service Supplies Company, Philadelphia, Pa., has issued a folder illustrating its "safety first" signs, of effective use near exposed electric wires, switches or third rail, also a folder describing an improved type of car-lighting switch necessitated by the increased capacity required for modern cars.

National Tube Company, Pittsburgh, Pa., has issued Bulletin 14 A on the subject of its tubular steel poles. Attention is called to the current tendency of progressive cities to substitute steel poles for the old wooden street poles. Numerous photographs show the installations of various types of tubular steel poles for railroad, street railway, electric light and power service.

Gold Car Heating & Lighting Company, New York, N. Y., has issued a catalog describing its electric thermostatic control of steam heating in cars. This apparatus gives an automatic control which will practically hold the temperature in the car constant. The lowering of the car temperature by changes in outside weather, as, for example, when a car runs from a low altitude up into the mountains, or by the opening of doors, etc., will cause the thermostat to open the valve, and the warming of the car above this point will operate to close the valve.

William H. Dentzel, Philadelphia, Pa., has issued a catalog describing and illustrating its various types of carrouseis and organs for electric railway parks. All gears used in connection with the motor-drive and galloping animal mechanism of the carrouseis are cut gears, thereby reducing the noise of the machine in operation to a minimum. All upright rods are incased in heavy brass tubing, which adds to the brightness of the machine. The mirrors used in the decorations are all of heavy plate, thus greatly benefiting the lighting effect. The organs supplied are of the latest German manufacture.

Atlantic Gas & Electric Company, New York, N. Y., has issued a catalog containing a general description of its properties. Attractive illustrations are shown of the territory in New Jersey and eastern Pennsylvania which is served with electric light, power and gas through its subsidiary affiliated companies. The subsidiary companies are: Eastern Pennsylvania Power Company, Easton Gas Works, Interurban Gas Company, Pennsylvania Utilities Company, Binghamton Light, Heat & Power Company, Sayre Electric Company, The Jersey Corporation. Through its subsidiaries the company furnishes all the electric current used for commercial lighting and power in thirty-five cities and towns, and numbers among its power customers six electric railways operating 123 miles of railway.