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COST OF SUPPLIES INCREASING

The municipalities which are finding that electric railway companies are not increasing their service with the growth of traffic should hesitate before holding the companies at fault. The jitney of last year inflicted a double injury on the companies. It not only cut down their gross receipts during the spring, summer and early fall, but in so doing it discouraged the purchase of new equipment when prices were low. Now that the jitney seems to be passing as a factor in city transportation, the railway companies find that the demand in the munitions field has not only caused an increase in the cost of most railway supplies, but it has made them difficult to obtain at any price. We have published several articles on this situation as regards the cost of new cars. In the Financial and Corporate department of this issue we are publishing some other data obtained from several purchasing agents which show an equally marked increase for general railway supplies. For this condition the manufacturers are not to blame. Their predicament is about the same as that of the railway companies because of the higher cost of their raw materials. We are not prophets and cannot say how long this condition will continue. The subject deserves the most careful study, however, as well as full publicity, so that the public will understand the new burdens in the way of cost which have been put on utility operation.

ELECTRIC ENGINES IN SWITCHING SERVICE

The coincidence of publication in this issue of two brief articles on electric locomotives in switching service on widely separated railroads gives occasion for comment on the fact that yard work seems to offer in many cases a much more attractive field for electricity than main-line operation. This is mainly due to the peculiar character of the motive power that is required. Primarily, a switch engine is a machine requiring neither great speed nor energy output, but in their place it must have in the highest degree an ability to give rapid acceleration to loads of varying character. To meet this requirement the steam switch engine is invariably under-boilered and under-cylindrical, the former because but little steam is needed and the latter because there must be no tendency to start slipping, a time-losing and therefore costly occurrence. Tractive effort is of vital importance. This is the feature that gives the electric switching locomotive its greatest advantage. The steam machine is usually designed to exert a maximum effort of not more than 20 per cent of the weight on drivers; the electric machine 25 per cent, giving the latter a pulling power nearly one and one-

quarter times as great as the former under maximum loads. With the lighter loads which really constitute the bulk of switching work this increased tractive effort per ton of locomotive weight appears as increased acceleration. With one or two cars, for example, more effort is expended in accelerating the locomotive than in getting its load up to speed, and this, in part, accounts for the experience on the New Haven—the one railroad that has electrified really large yards. Here the thorough success that has been registered by electric switching is credited to the greater “smartness” of the electric locomotive, which has been estimated to give it an increase in daily capacity of some 60 per cent.

COMPANY SECTION NO. 9

The American Electric Railway Association company section just organized by the Cumberland County Power & Light Company begins its work under unusually favorable circumstances. The property is of moderate size, and a very democratic spirit prevails among the employees. The management insisted that if a section was organized it must be an employees' organization. At first a certain skepticism was manifested by some of the men as to the benefits which would come to them from its activities. This was dispelled after the purposes and plans had been explained and the work of other sections had been described. It is evident from the start that the transportation department is to play an important part in the section work, as indeed it should do in that of all sections by virtue of the proportionately large number of employees in this department. But in the older sections, formed in the days of the \$5 membership fee, the proportion of platform men in the original membership was necessarily smaller than in the new section. In Portland a conductor was the temporary chairman chosen by representatives of the several divisions of the transportation department. The first president, although now track superintendent, was formerly a conductor; the vice-president is a conductor, while one director is a motorman and another is a conductor. This situation in regard to section leadership is characteristic of a change which must come over the older sections as their membership grows under the stimulus of the lower dues. The rank and file of the sections will be platform men. These are “the company” to the mass of patrons of the railway, and the thoughtful ones among them wish fitly to represent the company to the public. The company section affords an excellent training ground for this purpose. Future section programs and activities must be planned largely for the platform men, and the organization plan of Section No. 9 is conducive to this end.

ONE-MAN CAR IN LARGE CITIES

Elsewhere in this issue is published a series of statements covering experiences with one-man cars in a number of cities whose population is in excess of 25,000. The most interesting feature is the definite unanimity of opinion that one-man cars, instead of increasing accidents as has been sometimes charged in the past, actually tend to reduce them. In addition to this it is evident that in the dozen or more of communities whose experiences are cited, one-man operation has been thoroughly satisfactory, both to the public and to the railway company. The alleged difficulty at railroad crossings appears in practice to be really no difficulty at all, and the possibility of making each car take a reasonable share of the day's work is demonstrated by the fact that the daily earnings can reach the perfectly normal figure of \$35. Summed up, the published statements show that the one-man car is a thoroughly practical operating unit and that, on any line where it is really required, its adoption may be considered without fear of unexpected and disastrous complications. Of course one-man operation is not a cure-all. The question of platform expense is not an all-important one, as demonstrated (from a diametrically opposite situation) by experience with train operation, and there are limits in regard to frequency and extent of passenger interchange beyond which the one-man car ceases to be economical. When a car has to remain stationary while a platform-full of passengers have change made, an extra platform man is by no means a useless appendage. This is going to keep the one-man car out of downtown New York and the Chicago loop district no matter what results it may show in cities with lighter traffic, and that fact may well be borne in mind at all times in considering its possibilities.

AN UNUSUAL BRITISH ELECTRIFICATION

The latest electrification of the Lancashire & Yorkshire Railway, which is described in the leading article in this issue, is the result of an unusually extended experience with electric operation in general. For years the railway company has been operating a 600-volt, third-rail line between Liverpool and Southport, which was changed from steam to electric operation to increase suburban passenger receipts, these having fallen off owing to severe competition with parallel surface railways. In 1913, the company, recognizing the inherent limitations of this low voltage, equipped a 4-mile experimental line between the towns of Bury and Holcombe Brook with a 3500-volt direct-current, overhead-contact system and motor cars having four motors permanently coupled in series. This line, like the company's most recent electrification, was located in the suburban district of the manufacturing city of Manchester, and it was operated with self-propelled steam-motor cars prior to the introduction of electric operation. It was considered to be an excellent piece of track for tests because it had relatively frequent and fast service over grades of 2.5 per cent.

In general, the tests appeared to be satisfactory, but apparently the great increase in voltage was considered

to be too radical a step to be undertaken for permanent construction. Even during the early operations of the Bury-Holcombe Brook line, a commission of three officials of the railway company came to the United States for the purpose of studying operating conditions on high-tension electric railways in this country, and at about the same time preliminary work was undertaken in connection with the 1200-volt third-rail line between Manchester and Bury, which has just been completed.

The new electrification is strictly a suburban proposition, including some 10 route-miles and about 22 miles of single track. Electrification of the rolling stock is confined to passenger cars that are operated in multiple-unit trains. Prior to the electrification, the line suffered severely from tramway competition, but it is fully expected that greatly increased traffic will follow the improvement in the service as soon as normal conditions are restored in Great Britain, experience with the Liverpool-Southport installation having demonstrated the practicability of electric operation as a traffic stimulant. This was, in fact, the immediate reason for the change in motive power, no tunnel or congested terminal conditions having made it imperative. The installation, judged by American standards, is therefore unique, since the principle of filling up the valleys in the suburban load curve by frequent midday service has not been put in practice in any of our steam railroad electrifications, although it has been recognized by a few of our engineers.

From the standpoint of American technical practice, also, there are a number of features in the installation whose novelty makes them especially noticeable. Storage batteries with booster sets have been installed, these being plainly designed for flattening out the effects of swings in the load. Such equipments have become more than unusual in this country ever since the first cost of power generating and distributing apparatus reached relatively low figures, although it should be remarked in this connection that the extremely short length of the route and the necessarily small number of trains in operation at any one time, present conditions that are not directly paralleled anywhere in America. The contact voltage, too, 1200 volts, is at least uncommon for electrified steam railroad service in this country, the Piedmont & Northern and the Fort Dodge, Des Moines & Southern installations being the only prominent ones. With this voltage, and the heavy multiple-unit trains that the Lancashire & Yorkshire has to handle, the use of a third-rail contact system is easily understandable, although the recent tendency in American practice has been away from it, especially when the higher voltages are involved, because of the inductive surges, the relatively short arcing distance between the live rail and the grounded car trucks, and the difficulty of protecting persons against an accidental contact, which are its inherent characteristics. With regard to the latter consideration, however, it must be said that the officials of the Lancashire & Yorkshire Railway have succeeded in working out a novel scheme of third-rail protection for exposed track which should be exceptionally effective.

THE ZONE SYSTEM AGAIN

The question of the zone system versus the uniform fare system was brought up at the New York State meeting by W. J. Harvie, but unfortunately there was little discussion upon the chief suggestions made in the paper, namely, the basis upon which a zone system for city fares can be established, the methods of collecting the fares and the general desirability of the plan. There are undoubtedly a great many arguments in favor of the zone system on account of the decreasing purchasing power of the 5-cent piece. We are rather inclined to favor the usual form of zone system with overlaps in city service than a strict proportioning of fare to distance, as recommended by Mr. Harvie, and would word his three fundamental principles somewhat differently, say as follows:

1. The passenger is willing to pay a reasonable amount for being transported a desired distance.
2. The carrier desires to furnish transportation on a basis which will yield him a fair profit.
3. The basis of charge for the distance traveled should be as equitable to both the passenger and the carrier as the convenience of both and the practical conditions of fare collection will permit.

And we would add another, as follows:

4. The interests of the community at large demand a fairly large minimum fare zone and high minimum fare to prevent congestion in urban living conditions.

It was undoubtedly the convenience of the nickel fare in the early days of city transportation which led to its general adoption in this country, coupled with its compliance with the first two principles mentioned. An indirect advantage was the fourth principle, but that was probably not considered at the time.

With the growth of the urban systems, however, and with operating conditions and taxes as high as at present, the 5-cent fare no longer in many cases fulfills the requirements of Principle 2, and some change is necessary. If the zone system is adopted, the needs of Principles 3 and 4 would seem to dictate the retention of the 5-cent fare as the minimum charge, and that for it the company should give as long a ride as its financial conditions permit, and the minimum fare zone should be at the center of the city so as to serve the convenience of as many passengers as possible.

The four principles which we have cited apply just as strongly to the determination of the extent of the second zone and the fare to be charged therein as to the size and fare charge in the first zone. In other words, both should be fairly large so as to reduce the complications of fare collection to both passengers and company. We do not believe that in the second zone, any more than in the first zone, it is of any real importance to proportion the fare exactly to the distance traveled. Theoretically, there may be some injustice to the passenger in a charge of 5 cents for a ride of a few blocks, but the plan is no more unfair to the passenger than that of requiring the company to provide its long-distance riders with a ride longer than that for which 5 cents is a fair charge. We are not prepared to say that the charge in the second zone should

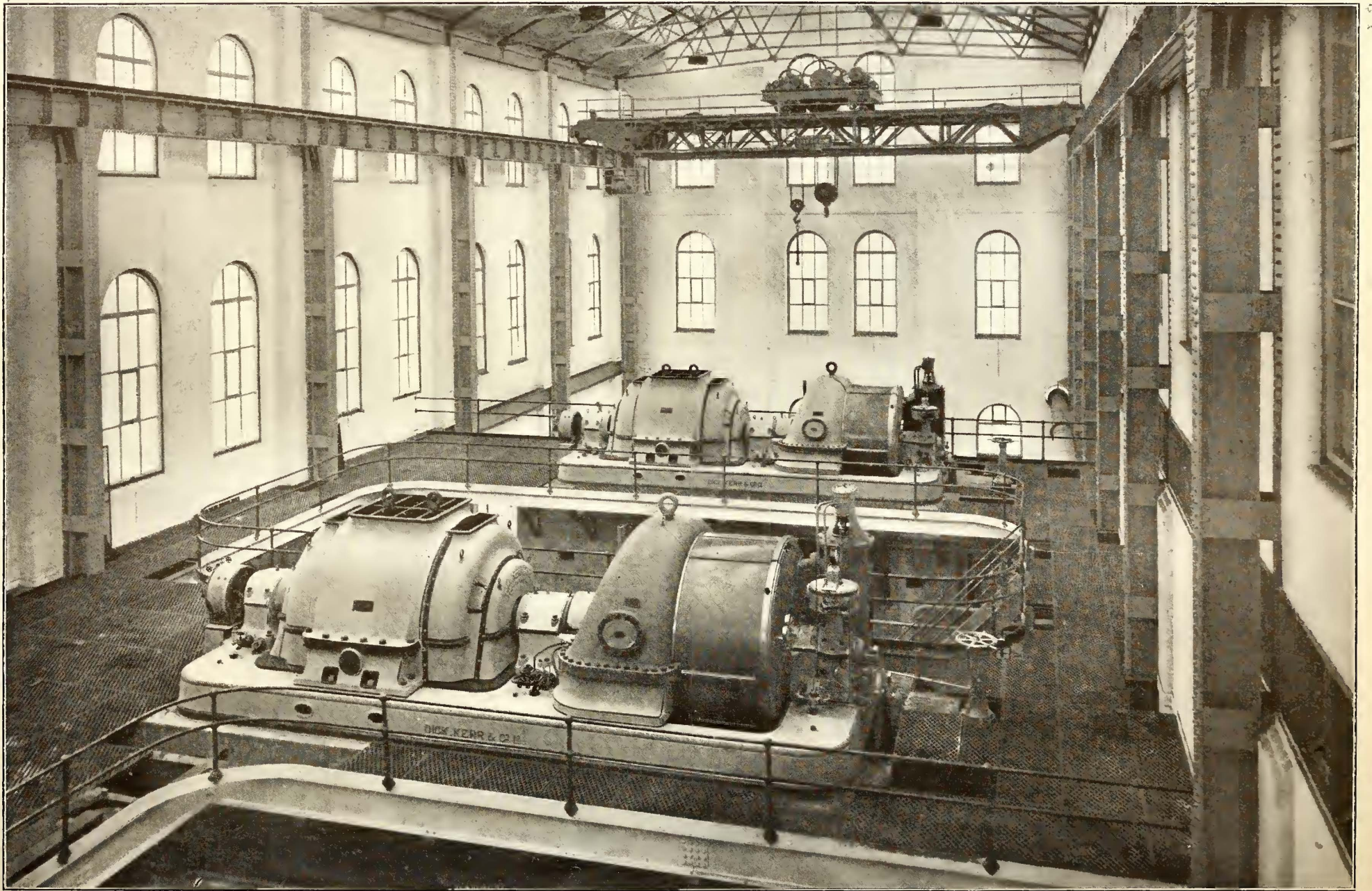
be another 5 cents, but it should certainly be not less than 2 cents.

The problems of fare collection in any zone system seem tremendous to one used only to the simplicity of the uniform fare. But the European zone system, with the attention which the conductor and inspector must give to individual passengers is not essential to the successful operation of the plan, as shown in Milwaukee and Cleveland. In fact, with modern types of cars in which there can be pay-enter entrances and pay-leave exits the difficulties in the use of the zone system, while not eliminated, are greatly reduced.

TENTH BIRTHDAY OF C. E. R. A.

Slightly more than a decade ago the Central Electric Railway Association was formed by the amalgamation of the Ohio Interurban Railway and the Indiana Electric Railway Associations. The achievements of this association during the ten years of its existence are emblematical of the real worth of an organization of this kind when full advantage is taken of the opportunities it offers. At the banquet held at the annual meeting of this association at Dayton, Ohio, President Henry pointed with pride to the fact that it now embraced more than 4000 miles of interurban road and had more than 142 supply men members. The mileage mentioned includes practically all of the important interurban lines in four states. Although this organization was intended primarily as a clearing house for the solution of operating problems, it has not only fulfilled that purpose admirably but has afforded a means of united action in other directions. In their relations with the regulatory bodies of Indiana, Ohio, Michigan and Kentucky, the various railway members, manifestly, must deal with the commissions having jurisdiction over them. The experiences and counsel of all the member companies, however, are at the disposal of anyone in solving regulatory problems.

In many ways the Central Electric Railway Association has blazed the way in adopting and trying out standards. In this particular the Traffic and Accountants' Associations, subsidiary organizations, have accomplished much. These two subordinate bodies have co-ordinated many operating differences to the great benefit of the parent body. The former has provided traffic interchange agreements, interchangeable mileage and harmonized schedules, and the latter has prepared standard methods of accounting which have also been adopted by the American Electric Railway Accountants' Association. Undoubtedly the large measure of success attained by this association is due to the fact that throughout the period of its existence it has had the hearty support and active co-operation of practically every member company. Moreover, the membership among the representatives of manufacturers, in many instances, has been an important factor in solving difficult operating and legislative problems. We congratulate the Central Electric Railway Association upon its enviable record, and if the experiences of the decade just passed may be taken as an index, this organization will be of great benefit in solving future problems.



LANCASHIRE & YORKSHIRE ELECTRIFICATION—INTERIOR VIEW OF TURBINE ROOM

New Suburban Electrification in England

Lancashire and Yorkshire Railway Installs 1200-Volt, Third-Rail, Direct-Current System for Passenger Service Between Manchester and Bury—All Steel Multiple-Unit Cars and a New Power Station with Storage Batteries Are Features of the Installation

THE latest electrification of the Lancashire & Yorkshire Railway, which covers approximately 22 track-miles on the line between the city of Manchester, England, and the suburban town of Bury, has special interest because it marks the first step of an important electrification scheme for the entire Manchester area. In this installation, the use of the third-rail, direct-current system, as used on the company's Liverpool and Southport line, has been adhered to but the voltage has been raised from 600 to 1200. The railway has been led to adopt this higher voltage because of the satisfactory results gained on its electrified line between Bury and Holcombe Brook, where direct current is used at 3500 volts, but with overhead construction.

In consequence of the war the full service of electric trains has not been put into force, but 27 per cent of the existing steam trains will be replaced by electric trains, and further electric trains will eventually be added which will augment the present service by 25 per cent. When the full electric service is established there will be ninety trains in each direction per day.

POWER STATION

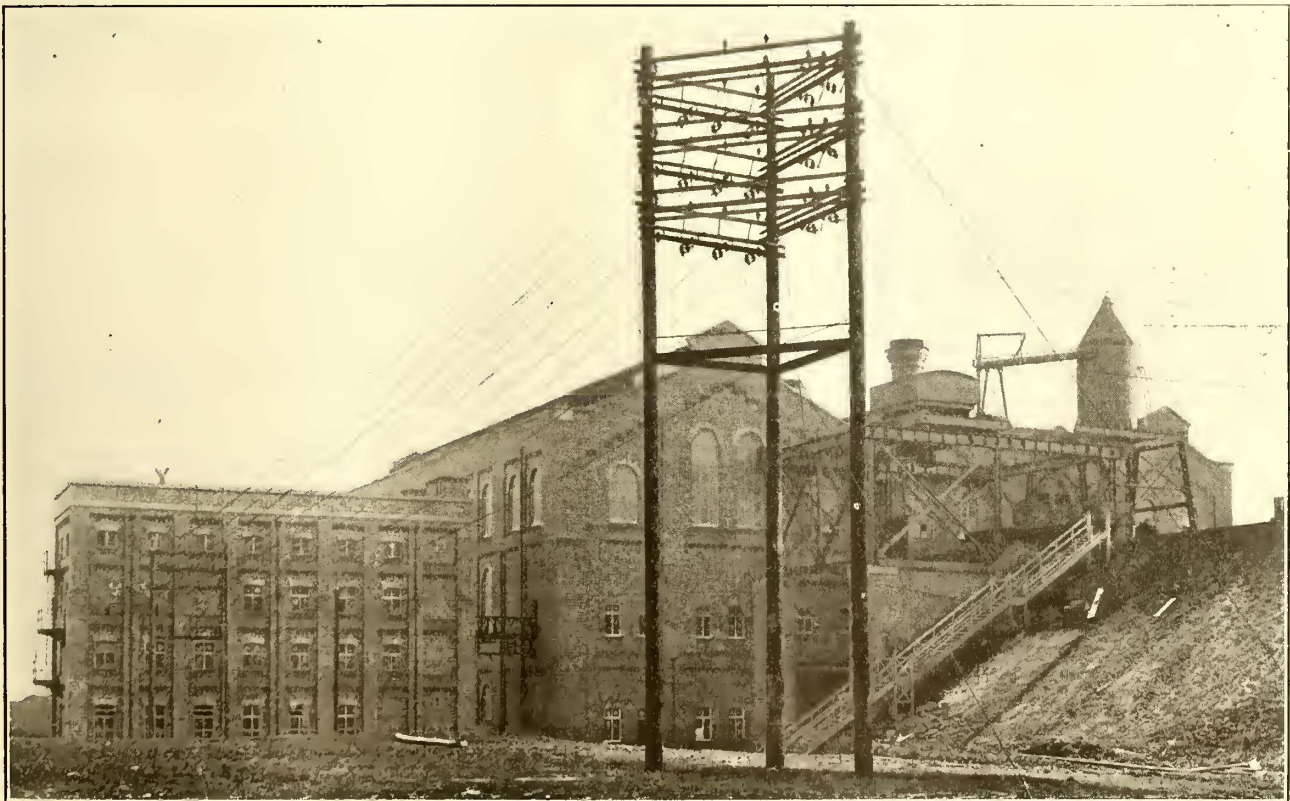
The power station for the installation has been built on the main line near Manchester adjacent to extensive coal fields and to a good supply of water from a canal owned by the railway company. The ground level at the power station is 37 ft. below the main line, which at this point is carried on an embankment, thus enabling coal cars to be run directly over the tops of the

coal bunkers and obviating the necessity of installing coal conveying appliances. Although the canal furnishes the normal supply of cooling water, a spray cooling pond is also provided to supplement the flow from the canal when necessary.

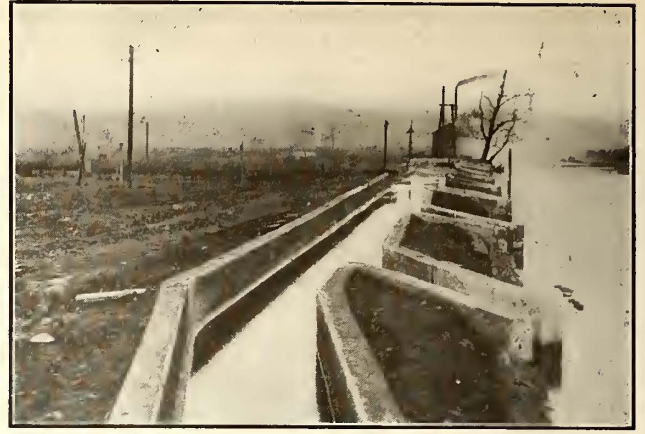
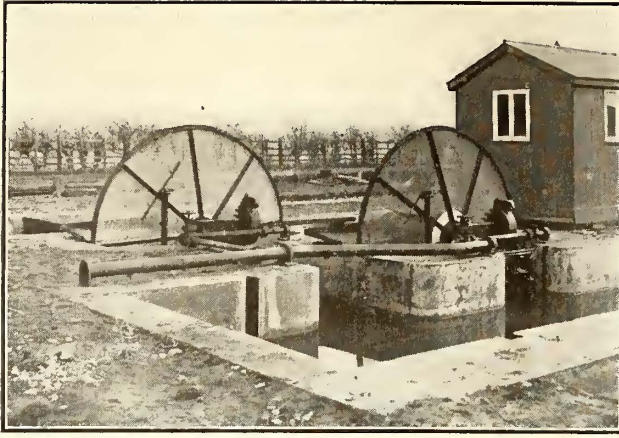
In the power house the boiler room is parallel with the turbine room, and at present contains three Babcock & Wilcox water-tube boilers, each having a normal evaporation of 32,000 lb. of water per hour, the steam being at 200-lb. pressure per square inch, superheated to 700 deg. Fahr. Eventually the boilers will be arranged in pairs, each pair making up a steam unit and being provided with its own induced-draft plant and chimney.

The boilers are fitted with B. & W. chain-grate, motor-driven stokers having variable-speed gear boxes allowing a speed variation to the grate of from 6¼ ft. to 25 ft. per hour. The grate area of each boiler is 144 sq. ft., the heating surface 7135 sq. ft., and the superheating surface 2635 sq. ft. Green economizers are placed above the boilers, each fitted with 256 tubes, 4 9/16 in. in diameter and 9 ft. long, and induced-draft motor-driven fans are installed to remove the products of combustion from each pair of boilers when working together.

The chimneys are made up of mild-steel plates varying from 5/16 in. to ½ in. in thickness. They are 6 ft. in internal diameter and brick lined, the tops being 87 ft. 6 in. above the firing floor. The ash from the back ends of the grates is taken periodically by means



LANCASHIRE & YORKSHIRE ELECTRIFICATION—GENERAL VIEW OF POWER STATION AND SWITCH HOUSE



LANCASHIRE & YORKSHIRE ELECTRIFICATION—CONDENSING WATER SCREENS AT INTAKE; DISTRIBUTING OUTLETS FOR DISCHARGE INTO CANAL

of a B. & W. suction ash-handling system to a large receiver from which it is loaded periodically into cars at the main-line level. Provision is made so that soot from the economizers can be dealt with in the same way. Electrically-driven ash breakers are provided between the ash hoppers under the grates and the suction ash pipe. The ash receiver has a capacity of 30 tons. Its air exhauster is motor-driven, and is of the Root blower type made by the B. F. Sturtevant Company, having a capacity of 3250 cu. ft. of air per minute at a pressure of about $2\frac{1}{2}$ lb. per square inch.

For checking the coal supply, a 30-ton weighing machine is provided on the approach track to the coal bunkers and no weighing apparatus has been installed on the bunkers themselves.

POWER-HOUSE EQUIPMENT

Two main generator sets, each having a normal capacity of 5000 kw., are installed. The turbines were manufactured by Dick, Kerr & Company, and they are of the impulse type, having a Curtis wheel at the high-pressure end, the remainder being bladed on the "Rateau" principle. The speed is 1500 r.p.m. Each turbine has two rows of "Wolfram" steel blades on the velocity wheel, and ten rows of brass blades on the low-pressure wheel, the axial and radial clearances being 5 mm. and 7 mm. respectively. The governor gear of each turbine is fitted with a small electric motor, enabling it to be controlled from the main switchboard.

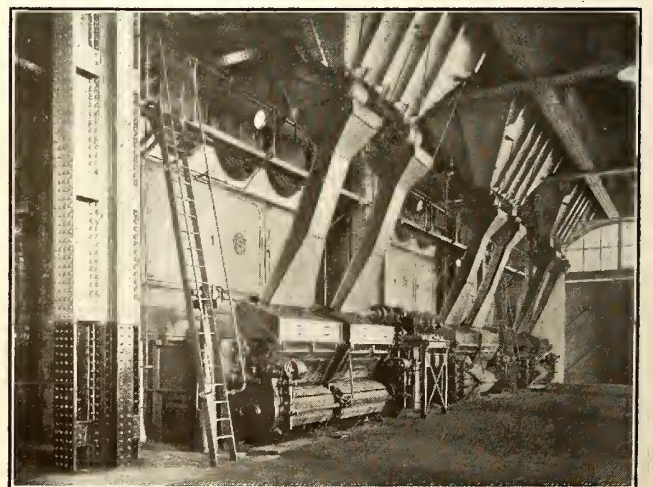
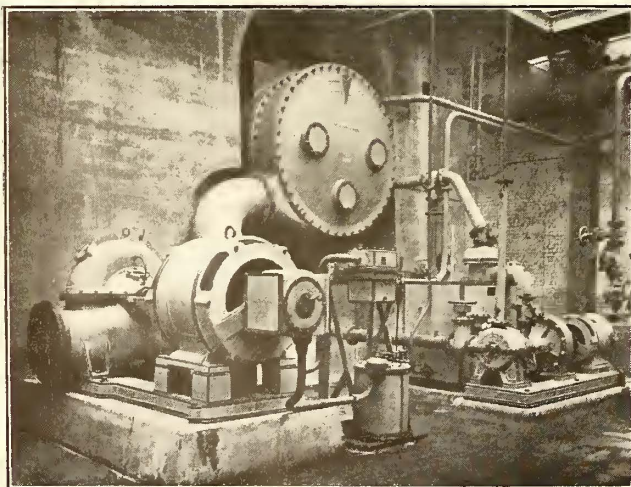
Each alternator consists of a Dick-Kerr two-pole three-phase machine, generating current at 6600 volts, 25 cycles, and is capable of carrying 25 per cent over-

load for two hours and 50 per cent overload for five minutes. The alternators are self-ventilated, and the air for ventilation passes through Heenan & Froude wet-air filters, each of which can deal with 30,000 cu. ft. of air per minute, the air passing through the filter at an approximate velocity of 1500 ft. per minute.

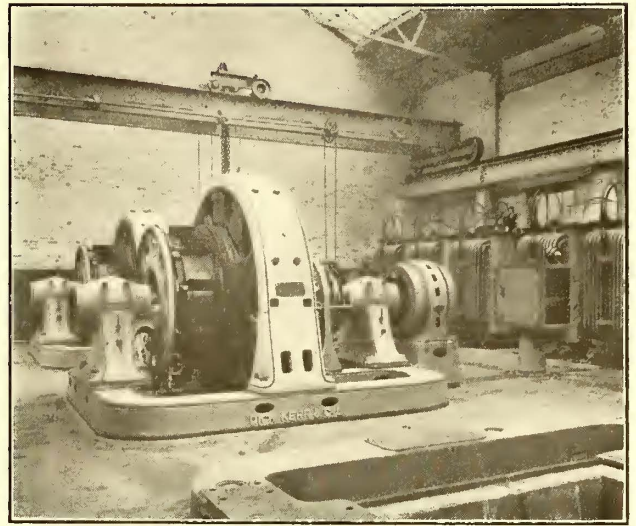
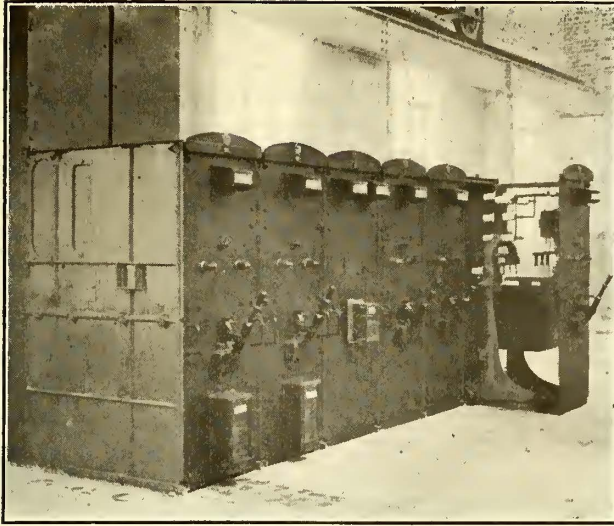
Each turbo-alternator is complete with its own surface-condensing plant, which consists of condenser, steam jet ejector, circulating water pump, kinetic air pump, and extraction and delivery pumps. The condensers can deal with 82,000 lb. of steam per hour, maintaining a vacuum of 28.1 in. at full load when supplied with cooling water at the rate of 6700 gal. per minute at a temperature of 75 deg. Fahr. The total cooling surface is 9500 sq. ft. obtained from 3464 $\frac{3}{4}$ -in. tubes.

The circulating water pumps are of the centrifugal self-regulating type, directly driven by slip ring induction motors of 110 hp. The steam-jet ejector is supplied by a $1\frac{1}{4}$ -in. steam pipe, and the estimated steam consumption is 0.75 per cent of the turbine steam consumption. When on full load, this will take 465 lb. of steam per hour. The kinetic air pump, which can handle 45,000 gal. of water per hour at 90-ft. head, and the extraction pump and the delivery pump are all mounted on one bedplate and driven by means of a 45-hp. slip-ring motor.

Power for the auxiliary apparatus is provided by a 500-kw. gear-driven turbo-alternator, built by the British Westinghouse Company. This set, which is complete with a Le Blanc surface-condensing plant, generates power at 440 volts, 25 cycles, the turbine being of



LANCASHIRE & YORKSHIRE ELECTRIFICATION—CONDENSER AND PUMPS BELOW MAIN TURBINE; STOKERS AND COAL HOPPERS



LANCASHIRE & YORKSHIRE ELECTRIFICATION—A.C. SWITCHBOARD OF CUBICLE TYPE IN SUBSTATION, ONE PANEL BEING WITHDRAWN FOR INSPECTION OF APPARATUS; ROTARY AND TRANSFORMERS

the high-pressure impulse type running at 3600 r.p.m. The gearing gives a speed reduction of 3600/750 r.p.m.

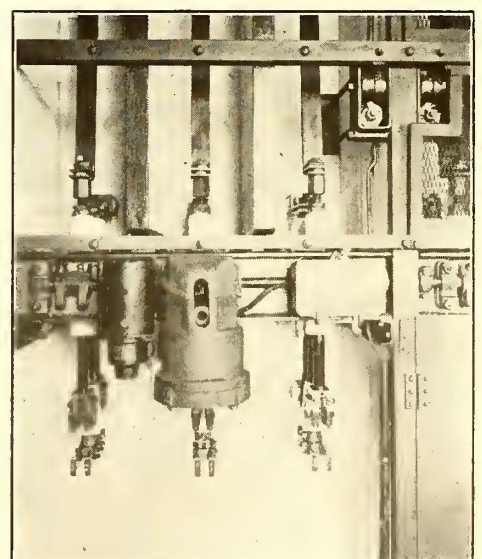
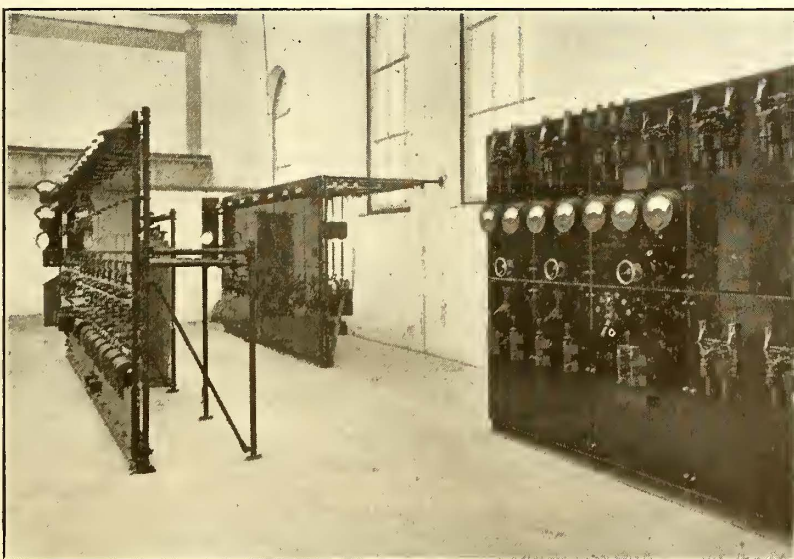
A 1460-gal. hot well is arranged centrally between the main generators. It is divided into two compartments, so that the valves may be examined, and the tanks cleaned and painted, without putting it out of commission. The water is heated by means of four 3-in. exhaust steam ejectors, the exhaust steam being taken from the turbine-driven feed pump. Two test tanks, mounted on weighing machines, are carried on the top of the hot well and arranged to work alternately and independently of each other. The condensates from all the sets are so conveyed to the hot well that the condensate from any one set can be passed through the test tanks, while the others are delivered directly to the hot well. Each test tank has a total capacity of 3800 lb. of water, discharging through a 6-in. quick-acting valve directly into the hot well below.

At present the station is equipped with two boiler feed pumps, one turbine-driven and the other a reciprocating pump, both capable of delivering 10,000 gal. of feed water per hour against a head of 217 lb. per square inch. The latter is the only reciprocating machine in the station. It is intended that the turbine pump should be used in service, and the reciprocator as a standby. Both pumps are situated near the hot

well, and at such a level that they are always flooded. The turbine pump is of the high-lift, multiple-chamber type, absorbing 40 hp. It is driven by a horizontal Curtis turbine and runs at 3000 r.p.m.

Condensing water is obtained from the canal, and it passes first through a bar screen, which stops the entrance of the larger pieces of floating matter, and then through rotary screens, which check the smaller weeds, etc., before reaching the cooling pond. The rotary screens are two in number, each 10 ft. in diameter, and rotate at 1 r.p.m. They are driven by Pelton wheels through worm gearing. The water for driving them is obtained from the spray pump discharge and is under a head of 18 ft. The screens are cleaned by means of rotating jets, which spray on the exposed portion of the screens on the side away from the incoming supply of cooling water.

Connections are taken from the discharge main to the spray pumps, which are similar to the main circulating pumps, so that the hot circulating water can be pumped back to the cooling pond through the spray nozzles. Thus, two methods of cooling are available, or a combination of both methods can be used at the same time. The cooling pond is 408 ft. long, 109 ft. wide and 2 ft. 6 in. deep. The spraying arrangement is capable of cooling 402,000 gal. of water per hour from



LANCASHIRE & YORKSHIRE ELECTRIFICATION—SWITCHBOARDS ON CONTROL PLATFORM; OIL SWITCHES WITH OIL RECEPTACLES REMOVED

95 deg. Fahr. to 75 deg. Fahr. under normal atmospheric conditions, being so arranged that slight extension to the pipe work will double the capacity. A total of 288 nozzles are provided for the present plant, each nozzle orifice having an area of 0.39 sq. in. and being capable of passing 1396 gal. of water per hour at a head of 18 ft.

At the end of the station are arranged the storeroom, offices, and switchboard platform. The stores are alongside the main entrance on the basement floor, and immediately above them on the turbine-room floor are arranged the offices for the operating staff. The control switchboards are placed on a gallery above the offices, overlooking the turbine room, and the control wiring is accommodated in the cable room between the ceiling of the offices and the switchboard gallery.

SWITCH GEAR

There are three separate switchboards, namely: the main control board for operating the main units and feeders; a 440-volt a.c. board operating the station auxiliaries, and a d.c. board controlling the control circuits, lighting, cranes, and standby battery for the control circuits.

The switch gear, manufactured by the British Thomson Houston Company, is of the solenoid-operated, remote-control type. The main switch gear is housed in a separate four-story building, access to which is obtained by a foot bridge from the turbine-room floor.

The main switch gear in the switch house is contained in cells built up of molded stone, each phase being separated throughout with barriers of the same material. Duplicate busbars with the busbar isolating switches are placed on the floor above the switchroom, the cell construction being of a similar character to the above. The fronts of the cells are covered by expanded metal sliding screens, these being interlocked with isolating switches so that it is impossible to open out any cell until the isolating switches controlling the apparatus in that cell have been opened. The cells containing the oil switches have metal doors which are not interlocked.

In normal running, the station auxiliaries will be worked through two 6600-440-volt transformers of 250 kw. each, enabling the 500-kw. auxiliary set to be shut down. During periods of very light load, such as lighting of stations during the night time, the auxiliary set can be run alone and the voltage raised through the same transformers to 6600 for transmission to the various stations or freight yards.

The direct current at 125 volts is obtained by means of two 50-kw. rotary converters operating through transformers from the 440-volt supply. These are used in conjunction with a seventy-cell battery and a small booster.

HIGH-TENSION TRANSMISSION LINE

Two main transmission lines each about 4 miles long are used to convey the power from the power station to the two substations. Both consist of three overhead cables, or of three-core cables, paper insulated, lead covered, and armored with steel galvanized wires. The overhead cable consists of 7/10 S.W.G. per phase, and the three-core of 19/14 S.W.G. per phase. The outer diameter of the three-core cable is 2.293 in., the armoring 0.1 in. and the thickness of the lead 0.14 in. The joints are of the plumbed lead-sleeve type, and the conductors are insulated with paper sleeves, the boxes being filled in with compound.

One of the transmission lines is practically all overhead, cable only being used when passing under public bridges. The other consists of 1¼ miles of overhead

and 3½ miles of cable. The overhead is carried throughout on "H" poles, the conductors being arranged three on each side of one pole, the other being left for future extensions. The standard span used is 210 ft. The three-core cable is carried on posts and, where convenient, on wall brackets. Both lines are in duplicate, and under ordinary working conditions will both be in use.

The "H" poles consist of two fir poles of an average diameter of 10 in. 6 ft. from the butt. The cross-arms supporting the insulators are of channel iron, 4 in. x 2 in. x ½ in., clipped on to the pole. The pole is also braced with wooden struts and bolts, but no anchor stays are used except at points where the line makes an angle. The whole of the armoring and the iron work on the poles are earthed to copper earthing plates at quarter-mile intervals. No lightning arresters are used, but at the points where the cables enter the power station and substations, choking coils are provided.

SUBSTATIONS

Each substation is equipped with three 1000-kw., ten-pole rotary converters, manufactured by Dick, Kerr & Company, operating six-phase, 25 cycles, 300 r.p.m. The overload capacity of each is 100 per cent momentarily, and they can be run continuously at 25 per cent overload. They are arranged with an induction motor on the end of the main shaft for starting and self-synchronizing. No arrangements for starting from the d.c. side are provided.

The transformers are of the oil-cooled type, and are inclosed in sheet-steel cases fitted with external tubes for radiating the heat and circulating the oil. The tubes are welded into position and this gives a perfectly oil-tight case.

BOOSTER SYSTEM

An Entz booster of the automatic reversible type with carbon regulator, made by Mather & Platt for the Chloride Electrical Storage Company, is installed in the rotary room. This consists of three continuous current machines—booster, motor and exciter—all coupled together and mounted on one bedplate. The outfit gives an output of 900 amp. at 185 volts continuously, or will give 2000 amp. at 190 volts for fifteen seconds. Its output for charging the battery is 300 amp. at 300 volts continuously, and the voltage can be raised to 400 for overcharging. These latter ratings are obtained by hand regulation.

The booster is shunt wound and is excited from the exciter for automatic working, or from a portion of the battery for hand regulation. The exciter also is shunt wound, and is separately excited from a portion of the battery. Its excitation is controlled by means of an automatic carbon regulator connected up on the principle of the Wheatstone bridge and operated by the main generator output. The exciter is capable of fully exciting the booster when the latter is doing its regulating work.

To prevent a lag in reversing, the exciter is designed to give three times the excitation voltage necessary to give the required boost, and the carbon regulator automatically throttles the excess current when the correct boost has been reached. The motor is capable of driving the booster at all loads, when running off a 1200-volt circuit, at the speed of 520 r.p.m. The speed can be raised to 650 r.p.m. by means of a shunt regulator in order to obtain the overcharge voltage. The set is provided with a device suitable for breaking the circuit of the motor when the speed of the set exceeds a definite amount.

The battery, which is housed in a separate building

outside the substation, consists of 580 Plantide cells, manufactured by the Chloride Electrical Storage Company. The capacity is 500 amp.-hr. on the one-hour rating, and the charging current can be raised up to 1500 amp. for fifteen seconds.

Each cell is contained in a pitch-pine box lined with sheet lead, and this box is of such a size that the capacity of the battery can be increased ultimately to 800 amp.-hr. by the addition of more plates. The positive plates are of the formed type and the negative plates are of the box or cage type, each plate consisting of an antimonial lead cage in halves, riveted together.

Each battery is divided into two portions, high-voltage and low-voltage, which are connected through an isolating switch, and when it is desired to carry out work on the 600-1200-volt portion of the battery, the isolating switches are opened, which reduces it to the same condition as the low-voltage half.

A combined charging and milking booster for the battery is installed in the rotary room, this consisting of two continuous current machines—one motor and one generator—coupled together. The set is capable of charging the cells, fifty in number, which are connected to the Entz booster, in two hours a day, charging twenty-five cells at a time, and giving 45 amp. at 40-70 volts. The motor is suitable for working on a 1200-volt circuit, and the booster is arranged for exciting from the cells to which the Entz regulator is connected. The set is also capable of milking the cells with an output of 200 amp. at from 2 volts to 14 volts.

The switch gear for each substation is in two parts, one of the "cubicle" type controlling the high-tension feeder and transformer leads, and the other of the flat-board type controlling the d.c. rotaries, battery, booster and live rail. The feeder and high-tension cubicles each contain a hand-operated oil switch, the connections to the busbars being made through switch clips at the back. The arrangement is such that the whole of the apparatus can be withdrawn from the cubicle for inspection purposes, interlocking devices being used to prevent the apparatus being withdrawn or replaced when the oil switch is closed.

THIRD-RAIL SYSTEM

Although the contact system adopted is of the well-known third-rail type with track return augmented by a fourth rail, a considerable departure has been made from the previous practice in that a side-running contact has been provided instead of over-running or under-running. This has been brought about by the fact that 1200 volts, which is the maximum voltage allowed on third-rails, necessitates more adequate protection against shock, and the form of rail adopted is admirably adapted for being protected. This, of course, also applies to the under-running type, but here the objection was the small clearance available.

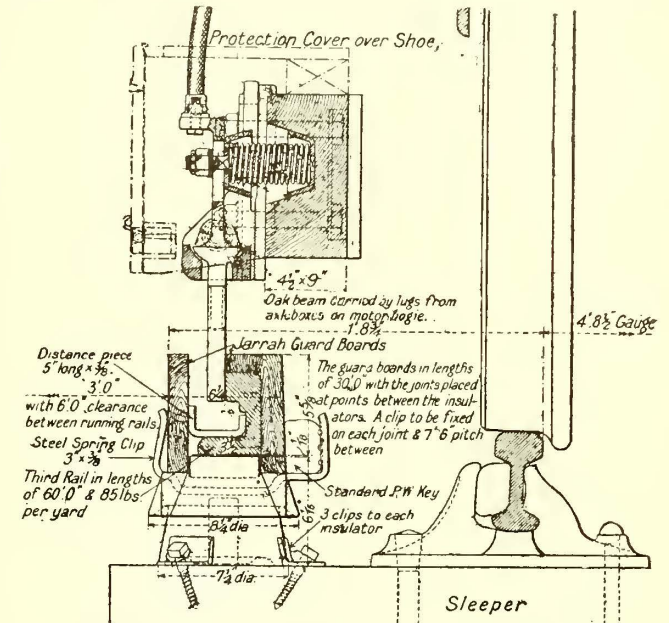
The third-rail and its protection, also its relative position to the track rails which was shown in the ELECTRIC RAILWAY JOURNAL for July 24, 1915, is the invention of J. A. F. Aspinall, general manager Lancashire & Yorkshire Railway. It is very compact, lies close to the running rail, and gives the maximum space for platelayers and other workmen in the 6 ft. where the rails are normally fixed.

The third-rail guards are made of jarrah wood, which was adopted for its non-combustible qualities, and are held in position by clips secured by ordinary rail-chair keys, no screws or nails being used. The arrangement is such that a projection on the upper portion of the insulator acts in conjunction with the guarding as a key which keeps the rail in position. The insulator itself is kept in position by three small brackets. The

rail, however, does not rest directly on the porcelain insulator, but a wooden packing is inserted between to act as a buffer.

The normal spacing of the insulators is approximately 12 ft. The live rail is anchored every 100 yd. by a specially-designed anchor insulator. The third-rail insulators are of white porcelain completely vitrified throughout and glazed all over, and are 6½ in. high. The actual creeping surface is 8 in. from metal to earth.

The cross-sectional area of the rail is 8.35 sq. in., and the weight 85 lb. per yard, its resistance ranging between six and a half and seven times that of copper



LANCASHIRE & YORKSHIRE ELECTRIFICATION—SECTION SHOWING THIRD-RAIL SHOE AND GUARD

of equal area and length. The normal length of the rail is 60 ft. and each joint is bonded with two flexible strip copper bonds, each bond having an effective cross-sectional area of 0.4 sq. in. The chemical composition of the rail is:

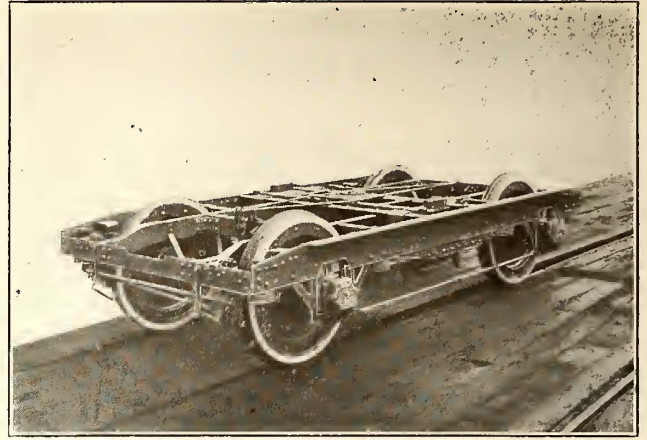
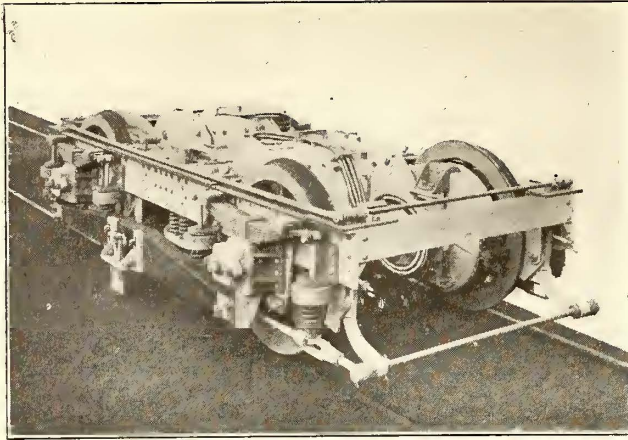
Carbon	0.08	per cent
Phosphorus	0.034	per cent
Manganese	0.22	per cent
Sulphur	0.026	per cent
Silicon	0.022	per cent
Iron	99.618	per cent

The fourth or return rail is of square section with rounded corners, and weighs 88.5 lb. per yard with a cross-sectional area of 8.84 sq. in., the chemical composition and electrical conductivity being the same as the live rail. This section has been adopted on account of the small surface exposed over a given volume of rail, and therefore involves small maintenance in painting, etc.

The fourth rail is cut in lengths of 60 ft. and is placed between the running rails. It rests on wooden pads 1 in. thick, which are secured to the sleeper by iron dogs, and is anchored at intervals of 100 yd. There are two bonds per joint and the effective cross-sectional area is 0.325 sq. in. per bond. The fourth rail is also cross-bonded every 100 yd. to the track rails with cable bonds of 37/15 S.W.G. copper. The track rails are also bonded by cable bonds.

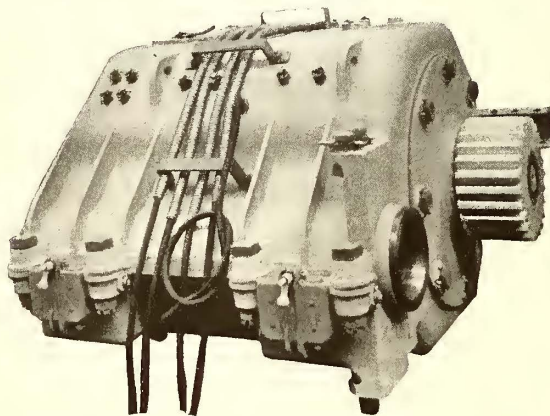
CAR EQUIPMENT

The rolling stock for electric operation includes both motor cars and trailers. The motor trucks, which were designed and built by the railway company, carry two



LANCASHIRE & YORKSHIRE ELECTRIFICATION—TRUCKS FOR MOTOR CAR AND TRAIL CAR

200-hp. motors mounted and geared to the axle through spur gearing, the ratio being 25:59. On either side of the truck is mounted a shoe beam carrying the controlling shoe. Each motor car is provided with two of these trucks, making a total of four motors, or 800-hp. per car, the gradients on the line being somewhat



LANCASHIRE & YORKSHIRE ELECTRIFICATION—1200-VOLT MOTOR OF 200 HP.

severe. The wheelbase is 9 ft., and the diameter of the wheels 3 ft. 7 in., the wheels being of standard locomotive pattern. Clasp brakes are used.

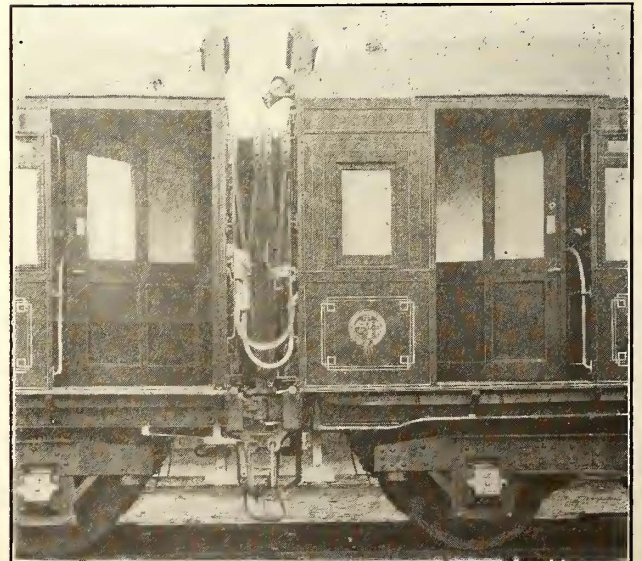
The motors, which are designed for 1200 volts, are series wound with commutating poles and are totally

inclosed. The field frame is of the box type, the main poles being arranged vertically and horizontally, this arrangement having been found to give the best space efficiency in the limited room available. Ventilation for the motors has been carefully considered, and as the armature laminations are carried on a hollow spider which also carries the commutator, there is a free passage of air through the spider and through the ventilating gaps in the armature which are continued through the main poles to the outside atmosphere.

The armature coils are all insulated with solid mica insulation, and the field coils are inclosed in brass cases to keep them from contact of oil. Ring lubrication is used for the armature shaft, the oil wells being of ample proportions, and oil lubrication with pads is adopted for the suspension bearings. The brush gear is carried on a solid steel yoke bolted to the frame. This is insulated with solid mica and forms a very rigid construction.

The control equipment on the cars is of the multiple-unit system and is arranged for automatic acceleration, although it can also be operated by hand by simply moving the reversing lever to a certain position. The whole of the equipment is operated by 100-volt current, which is transformed from the line voltage of 1200 by means of a rotary transformer mounted under the car.

All the 1200-volt equipment is housed in a special high-tension chamber, the door of which is interlocked so that the isolating switch connecting the control leads



LANCASHIRE & YORKSHIRE ELECTRIFICATION—VIEW SHOWING FOURTH-RAIL RETURN; VESTIBULE DOORS ON CARS



LANCASHIRE & YORKSHIRE ELECTRIFICATION—INTERIOR VIEWS OF FIRST-CLASS AND THIRD-CLASS CARS

from the shoes must be opened before the entrance can be effected. All the contactors, the reverser and the motor cut-out are mounted on the inner wall of the high-tension compartment opposite the window, and above these are mounted the isolating switch, main fuse and main circuit breaker, and in an auxiliary high-tension chamber is the starting gear for the rotary transformer with its isolating switch. The high-tension wiring is carried in flexible steel tubing.

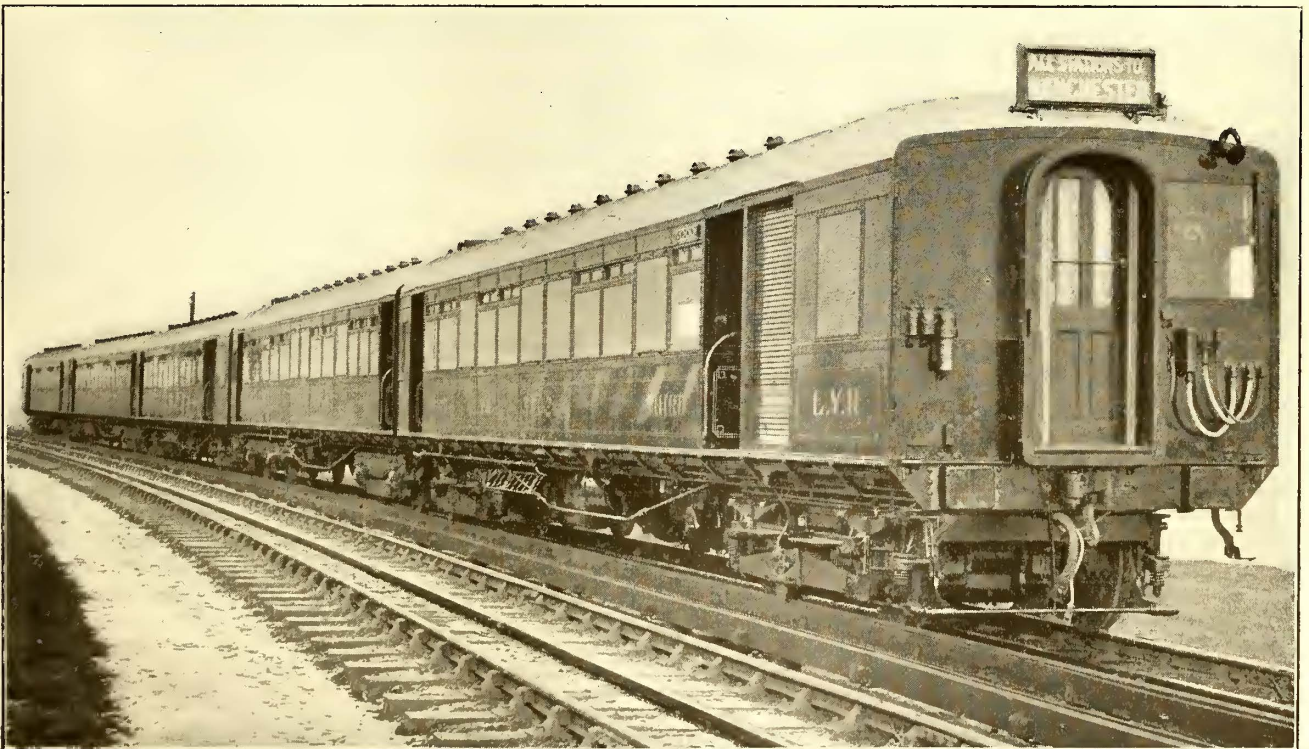
The reverser handle on the master controller has four positions, reading from right to left, "Reverse," "Off," "Ahead Automatic Control" and "Ahead Manual Control." The last position is used in case of emergency due to failure of the automatic control, but normally this is a stop which is sealed and which prevents the reverser handle from being placed in the manual position. There are four series points on the controller, three intermediate and three parallel, with an addi-

tional two positions by which the field of the motors is shunted when higher speed is required for express traffic.

The brake is the automatic vacuum type, so that, if necessary, ordinary steam trail cars can be coupled to electric trains, the brake still being effective. The vacuum is produced by means of a twin cylinder exhauster, driven through gearing by a Mather & Platt 5-hp. 100-volt motor. Current for heating is taken from the 1200-volt circuit, and for the lighting, pump motor and control, from the 100-volt circuit. The trolley cables, of which there are two, one on each side of the car, are continuous throughout the trains.

ALL-STEEL CARS

The electric trains for the new service consist of either two, three, four or five cars, according to the requirements of traffic, but the standard trains will



LANCASHIRE & YORKSHIRE ELECTRIFICATION—FIVE CAR TRAIN OPERATING FROM 1200-VOLT SIDE-CONTACT THIRD-RAIL

have five cars, the front, center and rear vehicles being third-class motor cars, and the intermediate vehicles first-class and third-class trail cars. A feature of the design is that the compartment for the accommodation of the driver is at each end of all cars, which enables the trains to be made up to any length required with the minimum of switching operations, time being of the utmost importance on an electric service.

The framework is of steel and the roof and the paneling of the sides are of aluminum sheets, the interior work being finished with moldings of drawn steel and aluminum sections. The parcel racks, air extractors and electrical fittings, together with all inside furniture of the cars, are made in polished aluminum, and the doors are made of steel.

Particulars of the motor and trail cars follow:

Length over body.....	63 ft. 7 in.
Length over couplers.....	65 ft. 3 in.
Height from rail to top of roof.....	12 ft. 4½ in.
Center to center of trucks.....	45 ft. 0 in.
Wheelbase of motor-car trucks.....	9 ft. 0 in.
Wheelbase of trail-car trucks.....	10 ft. 0 in.
Weight of motor car.....	54 tons
Weight of trail car.....	29 tons
Seating capacity, first-class.....	72
Seating capacity, third-class.....	79

The vehicles have been designed with a slight taper on the sides of the bodies and with elliptical roofs, the cars having large side lights and fan lights. The flooring has been built up of Keystone or Chanarch galvanized sheets, which are riveted to the steel underframe, and on these sheets is laid Flexolith or Decolith composition.

The cars are entered at the extreme ends of each vehicle, through vestibules, and gangways are provided throughout the trains so that passengers can pass from one car to another to secure a seat. Each car is divided into main passenger compartments with a center aisle, fixed and reversible seats being arranged alternately on either side; the first-class seats being upholstered in tapestry and the third-class seats in rattan. The first-class cars have the floors carpeted. The cars are equipped with electric heaters and electric fans, and by means of a two-way switch the latter can either supply fresh air from the outside or extract foul air from the inside of the car. Sanitary strap hangers, for rush periods, are provided in the third-class cars, these being secured to the roof by aluminum brackets.

The painting of the car interiors is finished in self-colors, the lower part in dark brown, from the waist panels to the cornice in a restful shade of green, and the roof in white. Large panorama photographs of places of interest complete the artistic effect of the inside decoration of the cars.

Classification of Electric Locomotives

In a paper on the "Electric Locomotive," read by F. W. Carter before the British Institution of Civil Engineers, it was brought out that the classification of locomotives according to wheel arrangement has been adopted from steam practice, but hardly affords the same insight as to type as in the case of the steam locomotives. Electric locomotives have not always been designed with due regard to the question of stability of the rolling motion of the wheels, and some run less smoothly than is desirable on this account. The tilting of the rails and the coning of the wheels causes the progression by pure rolling to assume a sinuous nature, and on the stability or instability of this motion depends the question whether the nosing effect tends to die down or to increase to the limits permitted by the wheel flanges. It can be readily shown, the paper asserted, that a locomotive carried on a rigid wheelbase is in some circumstances unstable, and accordingly may be expected to de-

velop a nosing tendency if run at high speed; the same is true when the locomotive is divided into units, each carried on a rigid wheelbase; guiding wheels elastically centered to align with the main wheels tend, however, to stabilize the motion.

Trackless Trolley vs. Motor Omnibus

Comparative Operating Costs on Keighley (England) Corporation Tramways Show Considerable Saving in Favor of Trackless Trolley

A RECENT issue of the *Tramway and Railway World* contains an article by Harry Webber, general manager Keighley (England) Corporation Tramways, which compares the results obtained by this company with electrically-driven trolley and gasoline motor omnibuses. The comparison is an unusually fair one since all the data on both systems were obtained on exactly the same route and deal with the same population and class traffic. The author believes this comparison to be of importance in England, owing to the belief that after the war has terminated most tramway managers will hesitate before embarking on any of the expensive systems of tramway track construction, such as the conduit system, and that only the cheaper forms of overhead construction will be considered.

The Keighley Corporation Tramways, after having operated gasoline motor omnibuses for five years, found it more economical to give them up in favor of trolley vehicles with the necessary overhead equipment. One factor which largely decided the question was that the gasoline-driven conveyance was costing 2d. (4 cents) per mile in gasoline, whereas the trolley omnibuses operate over the same route, consisting of about 9 miles partly undulating and partly very hilly country, at a cost in electricity of under 1d. per omnibus-mile. On a mileage of 100,000 per annum, it was found that the difference in power costs alone would cover the interest and depreciation on the overhead equipment.

Owing to the much heavier weight and uneven torque of the gasoline bus the relative cost in tires was 4 to 1 for the same roads in favor of the trolley omnibuses. The cost of general repairs for the gasoline buses was much heavier than for the trolley omnibuses. Another interesting comparison demonstrated was the revenue per mile from the two types. The motor omnibuses were double-deck, and carried from thirty-eight to forty passengers, but the maximum revenue obtained during their five years of operation never exceeded 1s. (24 cents) per omnibus-mile. At the present time the trolley omnibuses, although only of single-deck construction with a maximum carrying capacity of twenty-eight, have a revenue equal to nearly 1s. 2d. (28 cents) per mile.

From the passengers' point of view, the author states, the electrically operated vehicle is infinitely superior as the running is smoother; the operation is odorless; the vehicles can be more attractively lighted; and, owing to the absence of oily material, the trolley omnibuses generally are cleaner throughout.

The installation at the present time consists of 8¾ miles of overhead equipment and nine trolley vehicles. The overhead construction is of the over-running type, latticed steel poles with bracket arms carrying two trolley wires of grooved sections being used.

The installation has been in complete service only since March, 1915, and the operating figures up to a recent date give a proof that instead of making a loss of approximately £1,000 (\$4,866) a year, as was the case with the motor omnibuses, the profit will amount to about £1,000.

Track Maintenance in Streets*

The Author Discusses the Influence of the Street, as a Location, upon Street Railway Track Maintenance, His Purpose Being to Give in Detail the Reasons Why Such Maintenance Is Costly

By R. C. CRAM

Assistant Engineer Way and Structures Department, Brooklyn Rapid Transit Company

THE needs of modern surface transportation have developed the comparatively simple street railway track of the horse car days, which required little or no maintenance, into a structure requiring the best efforts of maintenance engineers. The importance of the work undertaken by such engineers becomes more evident when it is realized that there are now 1027 electric railway companies in the United States alone, operating more than 46,000 miles of track and almost 100,000 cars. The maintenance of this trackage at \$900 per mile per year requires an annual expenditure of \$41,000,000.

Street railways are in a period of reconstruction, which may be considered as extraordinary maintenance because comparatively little added capital is involved. New construction is almost at a standstill and comprises only occasional extensions to existing lines. This period of reconstruction began about eight years ago and the trackage which has undergone reconstruction has increased annually ever since.

Among the complications incidental to the maintenance of street railway track structures some of the principal factors are as follows: (1) Pavements, (2) street widths, (3) street and car traffic, (4) grades and drainage of streets, (5) street improvements, (6) sub-surface structures, (7) special forms of switches and frogs and (8) regulatory bodies or civic authorities.

With respect to these factors it will be noted that generally they seldom occur in steam railroad work. The location of tracks in streets renders the railway subject to many complaints from the general public, and the entire operation continuously invites accidents of various kinds. Railroads located upon private right-of-way seldom come in contact with many of these conditions. Such roads can at least select their own rails and other features of track construction but the street railway can very seldom do so without consulting several municipal or state authorities, and it quite often happens that the types of rails are legislated upon the street railways with little consideration of the railway's interest in such matters.

PAVEMENT IN THE TRACKS

Probably the most important feature affecting street railway maintenance is the pavement in the tracks, which accounts for between 40 and 50 per cent of the construction costs and at least 30 per cent of the maintenance expenditures. Maintenance expenditures for pavements have generally been legislated upon the railways either through franchise requirements or by foolish agreements made by early operators and promoters. There may have been some justice in requiring a railway company operating horse cars to maintain track pavements, and it is generally agreed that the extraordinary pavement wear by the horses was the basis upon which this requirement was hinged. The electric street railways have inherited the obligation and although they put no wear upon the pavements they are

still required to construct and maintain them. Such an obligation to-day greatly increases the burden because of the great improvement and cost in pavements over those existing when such obligations were imposed.

The width of the street in which tracks may be located, and its character as determined by its location have a marked influence upon the methods to be employed in carrying out maintenance work, as these factors determine the length of work which may be opened up and the distribution of materials to permit efficient handling. The latter is important because in narrow streets it is often found necessary to dispose of excavated material, with incidental handling under car traffic, at inopportune times, which in turn considerably increases the cost, in order to provide room for other classes of materials required in later operations.

In the work of reconstruction the street and car traffic has a considerable influence upon the manner in which the work shall be done, and a careful examination of the street is always necessary to determine the proper course to pursue in the regular program for the work. Such traffic conditions necessarily determine whether the work will be done under car traffic at all times, which is probably the most expensive, or by single tracking accomplished by means of temporary crossovers or by the installation of a third or temporary track. The selection of method of carrying out the work affects the labor costs materially because, under certain car and team traffic, conditions where tracks may not be put out of service for more than six or seven hours per day will often result in the loss of one-third of the effective labor due to time lost in avoiding cars and vehicles.

DRAINAGE AND TRACK MAINTENANCE

The drainage of streets has a peculiar influence upon the maintenance of track structures. Long, easy grades upon which surface water moves slowly or is retained for a considerable period, allow time for seepage of water into the pavements and sub-structures. The importance of correct street grades and contours which allow rapid drainage of surface water away from the track, and of surface drains placed in the tracks at low points cannot be emphasized too strongly. During reconstruction work much delay is experienced in wet weather because of the long retention of water in the subgrade of the trenches, which requires a period of waiting until the roadbed shall have dried sufficiently to warrant the continuation of the track installation.

The influence of the surrounding pavement in forming trenches of this character, where the pavement acts as a dam, is a feature which is not present in maintenance work upon private right-of-way. In the latter case, the roadbed is open and readily drained, so that comparatively little trouble is experienced from the retention of water in the roadbed, and consequently there is little delay to the progress of work as a result of inclement weather. These delays are reflected in the operating costs of the transportation department which are chargeable to the track work.

* Abstract of a paper presented at a meeting of the Connecticut Society of Civil Engineers, held at New Haven on Feb. 15 and 16, 1916.

Street improvements, especially those requiring repavement or grade changes, are productive of much additional maintenance expense because the railways are often obliged to install new pavements jointly with the city improvement. This requires either a most thorough overhauling and regrading of the tracks, or their complete renewal. The greater part of such expense becomes a maintenance charge and must be deducted from income. Thus the maintenance for reconstruction or overhaul in connection with such improvements is advanced several years, adding greatly to the average annual maintenance expense, generally without much influence in decreasing later expense. Such improvements, therefore, require close co-operation with the municipal authorities, and it is now a general practice for the respective engineers to consult early in each year for the purpose of preparing programs and budgets which will work together as far as possible.

Sub-surface structures, such as sewer, water, gas, telephone and electric mains, have quite a direct bearing upon the surface track maintenance costs. City sewer and water departments have a habit of rebuilding, relocating or repairing their mains, and many of them are either directly under the tracks or very close to them and they all have connections at frequent intervals which pass under the track. There is always a question as to how long a new track will remain undisturbed by work required upon some one of these sub-surface structures. The railway is often required to remove one or both tracks incidental to such work, and house connections are constantly being made which either require tunneling under or openings through the tracks. These features alone add greatly to the maintenance costs and additional maintenance may be expected later, even after the first restoration, due to subsidences following such work, which generally falls upon the railways.

STREET RAILWAY SPECIAL WORK

The special track work, such as switches, mates and frogs used in street work are quite different from the types used in roads located upon private right-of-way. In addition to being much more expensive in first cost they are subject to proportionately greater wear from car traffic and additional wear from vehicular traffic and, due to incidental disturbance of pavements, the installation and repairs are very costly. Owing to the street location the frogs and other pieces are usually provided with renewable parts at points undergoing excessive wear. Such parts are subject to peculiar troubles and require constant attention with special equipment for their proper upkeep. Noise, in operation, plays a large part in connection with the maintenance of such special work and much labor is expended in grinding joints, in arc welding and grinding hard centers and in replacing parts in order to satisfy complaints arising from this source.

Upon most systems in large cities there will be found a large number of such special-work layouts in proportion to the total track mileage and this proportion is much greater than that found in roads upon private right-of-way. Consequently the number of parts involved which will require the attention of maintenance forces is extraordinary, and most systems have one or more gangs almost constantly employed in repairing or replacing special track work. Further, in large cities, emergency crews are maintained for the prompt repair of switches, so as to minimize the effect of their failures upon the car service, and these gangs are often provided with automobiles so that they may reach the sources of trouble as quickly as possible.

The cost of such special track work is very high. This

is due to the high standard of construction required, generally involving the use of large amounts of manganese steel. The cost is also increased by the great variety of locations, street angles, controlling street widths and the types of cars in operation. Many of the frogs will suit only one location and so far it has been deemed practically impossible to standardize them so as to permit a reduction in cost through the elimination of a multiplicity of special patterns. However, the subject is now receiving much study and it is possible that ultimately their number may be decreased.

REGULATORY BODIES

Within a very few years there has been a marked increase in the number and powers of regulatory bodies or civic authorities. In New York City, for instance, there are at least eight of these and each has much to say in controlling maintenance work, with considerable overlapping of authority. We have the Bureau of Highways, the Department of Water Supply, Gas and Electricity, the Bureau of Sewers, the Board of Health, the Board of Estimate and Apportionment, the Department of Street Cleaning, the Police Department and the Public Service Commission. They tell us under the provisions of laws and ordinances to repave streets; to take out tracks for sewers; to stop noise at joints and special work; to remove snow; to keep traffic open; to rebuild tracks, and many other things. Consequently it has been found necessary to maintain a regular force of inspectors who investigate such orders and complaints so that we may determine their reasonableness and properly plan our work in compliance therewith.

INSPECTION OF MAINTENANCE WORK

The regular maintenance work of a large system, as distinct from reconstruction work, requires careful planning. As an aid to this, many systems now make annual inspections of their modern or standard tracks, paying particular attention to the three features which contribute most of the troubles. These are pavement, rail joints and rail corrugation. The inspections are rendered quite easy by the use of special report forms upon which the items may be entered and located by house numbers, cross-streets and pole numbers, in order to facilitate their later location by the various working forces. The areas of defective pavement, number of defective joints, and lineal feet of corrugated rail are then tabulated from the inspection reports in percentages of the grand totals of each item in the territory inspected. These percentages render the task of making a program of work quite simple, as it is only necessary to select the territories having the greatest amount of defects for the first and most important work of each kind. By this means we are also able to tell, in comparison with previous years, whether we are keeping up with the work and where special effort is needed.

Such inspections are also simplified by the use of plans made on letter-size sheets, which give the details of the type of construction upon each particular street. Each street or section of street receives a section number which is also indicated on the plan, and all costs for work done are charged against the various sections in sufficient detail to cover the main items which are productive of maintenance expense, so that we may know how much we are spending upon our modern tracks for these features. Information drawn from a comparison of these expense items enables us to learn what the various modifications from standard construction are costing and serve to point out what to avoid in future work. It is quite safe to say that had such information been available in Brooklyn, seven or eight years ago, some of our most expensive maintenance

items on certain tracks would be about one-half what they are at the present time. We have also been able to determine that approximately one-half of the total paving maintenance expense, upon our standard tracks, has been due to an unfortunate experimental repavement in the roadways which was undertaken by the city upon one street alone, while more than one-half of the joint maintenance costs was due to the type of joint on the same street and upon three others. It is hardly necessary to say that we have abandoned that type of joint and we would like to be able to avoid such costly city experiments in pavements.

RAIL JOINTS

Rail joints have been mentioned as an item which causes high expense for maintenance. The early types of joints, particularly of the bolted variety and many experimental forms of joint, have contributed an unreasonable share of the expense for track maintenance. However, the general adoption of 60-ft. rail lengths for modern tracks is rapidly tending to cut such expense in half. Furthermore there are now several kinds of welded joints, at least two types of riveted joints which provide head and base support, and at least one type of patented bolted joints which are showing marked decreases in costs for maintenance, and even the simple bolted joint has undergone such improvements in design as to render it much more serviceable.

PAVING DATA FROM BROOKLYN

Mention has been made of the importance of the pavement in street railway tracks and it may not be out of place to give some information, roughly compiled because of lack of close data, showing the amount of pavement involved in the maintenance of street railway tracks in Brooklyn. Out of the total trackage there are approximately 500 miles of single track in paved streets, requiring the maintenance of approximately 2,640,000 sq. yd. of pavement. This pavement would have a value, at an average cost of \$2.50 per square yard, of \$6,600,000. This yardage is equivalent to the average state highway 18 ft. in width and 250 miles long or of a street pavement 30 ft. in width and 150 miles long.

There are approximately 850 miles of paved streets in the Borough of Brooklyn, including streets upon which tracks are located, and from this it appears that the street railway maintains approximately 18 per cent of the total paved street mileage within the borough.

In addition to this, enough paving is installed or reconstructed in these tracks yearly to build a street pavement 30 ft. in width and from 7 miles to 9 miles long, and it has also been found that the street railway maintains an average of 50 per cent of the pavement in the streets in which it operates. This percentage will probably hold good for most street railways in the average city situated in the eastern part of the country. As the property owners in New York are assessed for the cost of all new pavement and the property on each side bears the cost to the middle of the street, upon all streets occupied by two tracks their assessments for pavement are cut in half and, further, the city is at all times relieved from the maintenance burden of half of the total paved area after its installation. In addition, in Brooklyn the present program of snow removal requires the clearing by the railway of 1,600,000 sq. yd. of surface.

All of these several branches of street railway track maintenance work require large investments in special tools and machinery designed for the purpose of reducing labor costs, and such investments will probably run from \$125 to \$150 per mile of single track.

While much has been published upon the subject of

economical maintenance of street railway tracks, but little has been said concerning the economics of maintenance. On this subject there is room for much more careful consideration of the fundamental laws and principles involved than has so far been given. For instance, it may appear to be economical to open a track pavement at a joint only so much as is required to give the necessary working space, yet this procedure may not be in accordance with the true economy involved because, with certain types of pavement, it has been found that the better method is to open an area much larger which in the end can be repaved more quickly, more satisfactorily and at less cost for paving labor. Similarly it may appear economical to keep rails in service because they have not fully reached the ultimate wear life as indicated by the head measurements, and yet it may be necessary to spend so much on repairs of various kinds, such as joint repairs and grinding corrugated rails with the incidental paving expense, that the true economics of the situation will show the actual rail renewal to be required. These illustrations emphasize the statement previously made to the effect that there is room for more careful consideration of the fundamental laws and principles governing street railway maintenance.

Jitneys Fall Off in Kansas City

Records of the Metropolitan Street Railway Show a Constant Decrease in Jitney Operation Since Last May

THE transportation department of the Metropolitan Street Railway of Kansas City has prepared an interesting chart of the progress of jitney operation in that city. It shows the high point to have been early in May, 1915, and the low point to have been the last day the records were kept, Jan. 29, 1916.

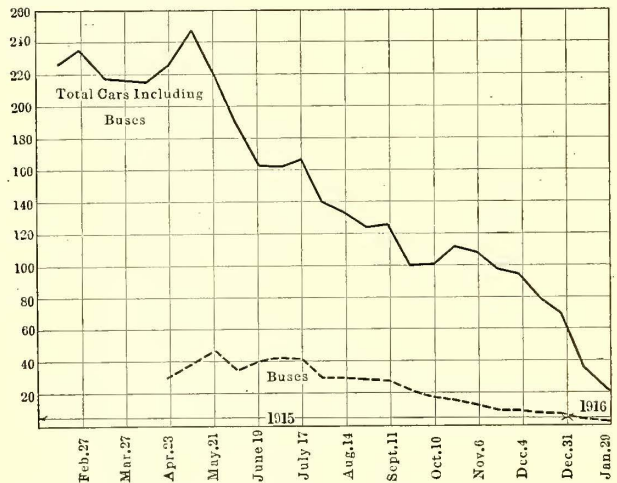


DIAGRAM SHOWING JITNEYS IN OPERATION IN KANSAS CITY

Jitneys began running in Kansas City in January, 1915. The railway company's record begins with Feb. 13, when 226 motor cars, including buses, were in use. A period of bad weather impeded growth of the numbers in March, but with spring the numbers rose rapidly, to 247 in May. This was about the time of the organization of the national association of jitney owners at Kansas City, and the public was fed with glowing stories of the success of the movement. Immediately thereafter the numbers began steadily to decline and with three slight exceptions continued to do so until the severe winter weather of last December, when the descent became sharp, and only twenty-one cars were in service on Jan. 29.

What the N. Y. E. R. A. Discussed

At Albany Meeting on Feb. 25 Delegates Took Up Topics of Shop Methods, Car Heating and Ventilation, and Fare Collection—Subject of Mutual vs. State Fund Insurance Called Forth Lively Comments

THE twenty-first quarterly meeting of the New York Electric Railway Association, which opened with a dinner at the Ten Eyck Hotel, Albany, N. Y., on the evening of Feb. 24, as described in the *ELECTRIC RAILWAY JOURNAL* of Feb. 26, page 404, was continued with a technical session on the morning of Feb. 25 at the same place. President John J. Dempsey, superintendent of transportation Brooklyn (N. Y.) Rapid Transit Company, was in the chair. The discussion during this meeting was focussed on four topics, as follows: shop methods, heating and ventilation of cars, fare collection, and mutual vs. State fund insurance under the New York compensation act.

DISCUSSION ON SHOP METHODS

The first paper was on "Modern Shop Methods," by P. V. See, superintendent of car equipment Hudson & Manhattan Railroad, New York. This was abstracted in the issue of Feb. 26, page 405. The discussion thereon was opened by C. F. Hewitt, general manager United Traction Company, Albany, N. Y., who asked what the Hudson & Manhattan Railroad did to enameled wrought-iron stanchions and grab-handles that were chipping and wearing out. Mr. See said that his company had met with no success in re-enameling them, and it used them until chipped and then bought more. These articles required a special enameling process, and the ordinary white enamel would darken and not look good. In reply to a query by J. P. Barnes, general manager Buffalo, Lockport & Rochester Railway, Rochester, N. Y., as to whether or not an artificial drying process is applicable to wooden cars to shorten the shop time, Mr. See said that his company did not use wooden cars, but utilized the same drying process for the wooden sashes as for the steel cars. Sometimes blisters resulted if the work was not done properly. The sashes must be thoroughly dried, and this was done by bringing them to a higher temperature than that required for drying the enamel.

W. G. Gove, superintendent of equipment Brooklyn (N. Y.) Rapid Transit Company, remarked that it was no longer possible or profitable to withhold rolling stock for the old-fashioned forms of painting, and that shorter methods were desirable from the point of view of economy. In his mind there was no question as to the value of baked-on enamel for steel cars; the only question was in regard to facilities for such work. Mr. Gove felt that car-cleaning was an essential part of operation, and that slack methods along this line did more to arouse public criticism than did poor car painting. He thought that some cheap but efficient cleaning method might be developed that would be better than any now used. Vacuum cleaners for interior work might be utilized, these in his opinion not being now used outside of San Francisco.

W. J. Harvie, engineer Allen & Peck, Inc., Syracuse, N. Y., raised the question as to whether or not there is any definite period before rust begins to appear around rivets and between plates on steel cars, and how long before this condition requires attention. Mr. See explained how under early conditions, when with no yards the cars were stored in tunnels just completed and not waterproof, and the painting and the shop facilities

were poor, some cars had rusted through and required complete new roofs. Under better conditions, however, cars six or seven years old that were treated properly show no deterioration, and no sand blast has been used to clean them. Cars of the Pennsylvania Railroad used in joint operation on the Newark line have been out five or six years and the steel is not changed. Mr. See believed that when equipment is treated properly it takes ten or twelve years before a sand blast is needed. In reply to another question from Mr. Harvie, Mr. See said that the company has a six-car space in the paint shop and runs out one car a day, so that it ordinarily takes six days to put a car through the shops. In one special case for the management, however, a car was completely painted in forty-eight hours.

MR. MCELROY ON HEATING AND VENTILATION

The second paper was on "Heating and Ventilation of Urban Cars," by Horace A. Abell, assistant engineer Schenectady (N. Y.) Railway, as abstracted in the issue of Feb. 26, page 405. John H. McElroy, assistant engineer Consolidated Car-Heating Company, Albany, N. Y., said that Mr. Abell's paper showed the absolute uniformity of the temperatures in the different portions of a car heated by electricity, thermostatically controlled. For the seven days reported, the temperature at the floor varied from 52 deg. to 53 deg., while at a point between the breathing level and the ceiling it varied from 52 deg. to 54 deg. With the thermostat set to work between 53 deg. and 55 deg. the distribution and constancy of the heat, as shown in the test, was characteristic and worthy of attention. The temperatures with the stove-heated car showed the seat to be from 10 deg. to 27 deg. warmer than the floor. The saving in current was computed at 26 per cent on the coldest seven days of the month during which the test was made (the most disadvantageous time of the year from the standpoint of the thermostatically controlled car), and the result was remarkable when it is remembered that the big savings due to thermostats are had in the late fall and early spring.

Mr. McElroy expressed his regret that the time allowed for discussion did not permit the introduction of tests covering a wide enough range of temperatures to give the electrically heated cars an opportunity to show what they could do. Careful tests covering an entire heating season showed that the percentage of saving due to the thermostatic control of electric heat when the outside temperature was 28 deg. was double that at 20 deg.; at 34 deg. it was three times that at 20 deg., and at 38 deg. it was four times that at 20 deg. These percentages were based on an 18 per cent saving at 20 deg., and it is interesting to note that the mean temperature for the entire month of January, 1916, at Albany, which is the nearest weather bureau station to Schenectady, was 29.2 deg.

Mr. McElroy considered that the comparison between the different methods of heating cars given by Mr. Abell was fair only during a few days of the year, and then only in case the data and assumptions were correct, which in many cases he found not so. For instance, Mr. Abell gave the power consumed by the stove motor as 180 watts, costing 22.5 cents per 100 car-

hours. He neglected, however, the fact that the resistance by means of which the trolley voltage was reduced to 220 dissipated nearly twice this power, raising the cost to 60 cents per 100 car-hours.

Moreover, Mr. Abell did not include any costs of the current, interest or depreciation, maintenance and repairs, or cost of hauling of six cab heaters consuming 3.3 kw., which even during the past week, with an outside temperature of 30 deg., were permanently connected by a jumper so as to help heat car No. 507, the test car heated by the stove. It should be noted that on cars No. 509 and No. 511 the cab heaters were so wired that only one platform could be heated at a time. Thus the stove-heated car used for heating purposes, in addition to the cumbersome stove, 44 per cent as much current as was required to heat the thermostatically controlled car. No reference was made by Mr. Abell to this fact.

Among other points Mr. McElroy also asserted that the weights of the equipment as given in the paper were seriously in error. The electric heater equipment exclusive of wiring weighed 296 lb. The difference between this and 475 lb. called for considerable wire, 179 lb. per equipment. If the cab heaters in the stove-heated car were assumed to counterbalance those in the other cars, the weight of the electric heaters and switch should be reduced to 209 lb. Moreover, Mr. Abell's costs were based on an average consumption per car-hour of 10.64 kw.-hr. for car No. 511, which was more than the heaters could possibly take with all three points of heat, although the system in force, for the non-observance of which there was no excuse on a car under test, called for a maximum consumption of 6.92 kw.-hr. on five of the seven days recorded. Another point was that the cost of the repair parts furnished for electric heater equipments to the road on which the tests were made averaged only 30.5 cents per car per year during the seventeen years' use of electric heaters. This was equivalent to less than 1 cent per 100 car-hours. The depreciation at 7 per cent was also excessive, as the heaters on the cars tested had already been in service for fourteen years and were then in first-class condition. Lastly, no account was taken of the fact that the use of the stove necessitated the removal of seats for two passengers.

In general, Mr. McElroy said that few of the computations could be checked from the data given, but the errors and omissions mentioned could not but cast serious doubts on the value of all. Referring to ventilation, he mentioned that the car heated by the ventilating heater actually showed 29.5 per cent more air exhausted through the ventilators with the blower inoperative than it did with the blower working, the blower being the only feature about a coal-burning, gas-producing stove that entitled it to be called a ventilating unit. It was obvious that the amount of air exhausted through the ventilators of cars No. 509 and No. 511 should be at least as great as that of car No. 507 with the motor stopped. It did not seem possible that ventilators which exhausted 85 per cent of the air with the motor stopped were able to handle only 59 per cent with the motor running. The estimated intake must be in error or considerable of the ventilation must be due to the car itself if 41 per cent of the air went out through openings around doors and windows with the blower working, when only 15 per cent was discharged from the same car without the blower, although there was but little difference in the total amount of air brought into the car and consequently slight difference in the pressure outward.

Finally, Mr. McElroy called attention to the fact that in the State of Massachusetts and the city of New York

no coal is allowed to be burned in cars. This, he said, was doubtless due in large measure to the danger from a health standpoint, although the serious danger from fire, as instanced recently in the Chicago accident when a steel car ran off the track hurling burning coals about the car and seriously burning eleven passengers, might be a contributing influence.

OTHER DISCUSSION ON HEATING AND VENTILATION

Mr. Harvie complimented Mr. Abell on the thoroughness of the tests made in Schenectady and emphasized particularly the truthfulness of Mr. Abell's remarks that the majority of complaints in regard to ventilation and heating are due to a "psychic condition of mind." Mr. Harvie said that cars in city service were more easily regulated as regards heat than those in interurban service, for in the between-season period the heat on the city cars could be turned off. He had often seen passengers on interurban cars pick out the side opposite the heating apparatus. Double windows made it difficult to control the heating. In his experience more heat was frequently found in the front of the car even if the doors were kept reasonably closed, the difference in temperature between the two ends being very noticeable. Mr. Harvie felt that the whole problem of heating and ventilation had not been put up to the manufacturers as thoroughly as possible.

METHODS OF FARE COLLECTION

Mr. Harvie then read his paper on "Methods of Fare Collection," which is abstracted elsewhere. In commenting thereon, Robert M. Colt, general passenger agent Fonda, Johnstown & Gloversville Railroad, Gloversville, N. Y., said that in the matter of collecting children's fares, which was often a point of difficulty to electric railways, his company had helped the conductors through putting up in the rear of the car a placard clearly stating the company's rules and rates of fare. Talks with conductors had disclosed the fact that this device had been of great benefit in obtaining without dispute the stipulated fares for young passengers. Mr. Colt also described a combination duplex hat check and fare record which had recently been sent to his company and was being considered. This check is split as the terminal or station is neared, the conductor taking up half, which must tally with the carbon presented to the auditor.

James F. Hamilton, general manager Schenectady Railway, said that several years ago his company, which has an all-cash fare, began to use a duplex showing the fare paid and the points between which the passenger traveled. Later, the conductors were compelled to collect the slips from the passengers when leaving the car. In regard to the point that the conductor might not issue a duplex to some passenger, Mr. Hamilton said that the conductors were very closely checked, and it was deemed thievery if it was found that no duplex was issued. If by chance the conductor missed a passenger the first time through, there would be no excuse for not discovering this on the later collection of the slips.

According to C. E. Holmes, general passenger agent Albany (N. Y.) Southern Railroad, his company is still looking for an ideal method of fare collection. To his mind the great trouble is to get the passengers sufficiently interested to see how much fare was paid and whether or not the amount was correct. During the winter the company tried an experiment with the duplex, on which the figures for the fare were printed in large type, but after the first show of interest the public soon became indifferent. Mr. Holmes believed that there was needed for interurban fares something that

is in use in the cities, a pay-as-you-enter or a pay-as-you-leave fare, but no completely satisfactory system had yet been found.

STATE FUND INSURANCE

The last subject, mutual *vs.* State fund insurance, was treated at length from the State fund point of view by F. Spencer Baldwin, manager State Insurance Fund of New York. Mr. Baldwin briefly described the relative merits of the four possible methods of insurance, as follows: self-insurance, stock company insurance, mutual insurance and State fund insurance. In his opinion the first form is really not insurance at all, for under this form a company simply carries its own risks and gambles as to the necessity for compensation payments. This form is practically certain to grow less popular, for sooner or later a scandal will arise through the inability of some company to meet its payments in the face of a catastrophe, and then the State will put an end to the practice. As regards stock company insurance, this is needlessly expensive and wasteful, like the old discarded practice of farming out taxes. Modern progress demands that all superfluous overhead charges for agents' commissions and all stockholders' profits be eliminated in the interest of both the employee and the employer. The stock company rate for electric railways (not interurban) per \$100 of payroll is \$3.24, while the State fund rate is \$2.50, a saving of 33 per cent in favor of the latter. Moreover, the State fund has paid to electric railways dividends averaging 15 per cent, making a total saving of 48 per cent, as compared to stock company insurance. If the State fund had maintained a large electric railway group from its beginning, it could have paid dividends amounting to 40 per cent.

Mr. Baldwin stated that mutual insurance as well as State fund insurance cut out the economic waste involved in the stock company form, for the premium in each case is not loaded for profits or for acquisition expenses. Mutual trade insurance enables the employees to obtain protection at the exact cost of the insurance risk in their particular business. If electric railways favor this form of insurance, they should organize their own mutual in order to secure the benefit of their own experiences, and not be burdened with the hazard of other industries with less care in accident prevention. But all the advantages of such a separate organization can be obtained through insurance in the State fund, however, for this already has its separate electric railway group which gets the benefit of the experience of all its members and of their efforts for accident prevention, and is insured at the actual net cost of carrying its own risk. A separate account is kept for the group, and at the end of the fiscal period any excess is credited to the members on the next premium due.

Moreover, said Mr. Baldwin, insurance in the State fund has certain advantages that are not obtainable in mutual insurance. In the first place, the insurance is offered at the lowest cost. Other things being equal, the loss ratio of the trade mutual and the State fund is the same, but the expense ratio in the State fund is lower. For the eighteen months ended Dec. 31, 1915, the expense ratio of the State fund was 14 per cent, and the fund is now operating at an expense ratio of 12 per cent. The expense ratio of the Brewers' Mutual Indemnity Insurance Company is almost as low as this, but no other ratio is anywhere near it. The expense ratio of the largest mutual company in the country is 25 per cent, while that of the third largest mutual is more than 25 per cent.

The second advantage of the State fund noted by

Mr. Baldwin was the fact that the employer is relieved from all liability for injuries or death to employees, this exemption not being granted to mutual insurers. The Appellate Division of the New York Supreme Court has held that the State fund policy gives absolute protection to the insurer in every case. Cases started to test this were all withdrawn when the facts were understood. As a third advantage under State fund insurance, there is a release from assessment liability, while in mutual trade insurance the insurers have such a liability up to 100 per cent. The present law states that in the event of the withdrawal of an employer his liability for assessment shall continue for a year, but Mr. Baldwin explained this to be only a nugatory reference to another provision which the legislators decided not to adopt. In the absence of explicit statutory authorization of assessments, the Workmen's Compensation Commission and the Industrial Commission have both ruled against any assessment of insurers in the State fund, and the Attorney-General has formally ruled that the policyholders are not subject to assessment.

The last advantage of the State fund cited by Mr. Baldwin was that the electric railway group therein has the protection of the whole fund, while if the carriers constituted an outside mutual no similar condition would obtain. The fund now has 8500 policyholders with a semi-annual premium income of more than \$700,000. In the first eighteen months the fund earned a surplus of nearly \$600,000, after paying losses of \$300,000, setting up reserves of \$900,000 for future payments and also creating a catastrophe reserve of \$150,000. The fund to-day, asserted Mr. Baldwin, is in the soundest possible condition.

MUTUAL INSURANCE

The spokesman for mutual trade insurance was E. L. McManus, Jr., general manager Brewers' Mutual Indemnity Insurance Company, New York, N. Y. Mr. McManus said that the brewers of Greater New York, because of their desire for economy and their great personal regard for their employees, decided after careful consideration to organize a trade mutual insurance company and limit its membership to brewers or allied trades. Accordingly, forty-eight brewers started the Brewers' Mutual Indemnity Insurance Company on July 1, 1914, with an annual premium of approximately \$365,000. The company has been in existence now twenty months, using manual rates with credits for meritorious conditions in the plants. It has paid all the benefits required by law and in addition many not required, has set aside all necessary reserves and has made a saving of 32 per cent of the premiums, or approximately \$190,000. This amount represents the sum that the brewers saved by operating their own company. As compared with a pure trade mutual insurance company properly managed, Mr. McManus asserted, no State fund or other company could hope to equal the cost or the service.

Mr. McManus said that subscribers to the State fund, while undoubtedly protected, could not expect the policy of the fund—admittedly a political creation—to remain year in and year out the same. Nor could they expect the same degree of diligent control to be exercised, as is the case in a trade mutual insurance company, the funds of which are at all times controlled by the men most interested, *i.e.*, those who have advanced the money.

In trade mutual insurance, according to Mr. McManus, there is no cause for worry over the rate charged, be it ever so high, because, after all is said and done, this form of insurance is nothing more or less than a strictly cash proposition. So much is put

up, so much is spent in benefits, and, necessarily, so much is left to go back to the subscribers. In the State fund, however, no cash dividend is received. If a company is fortunate enough to have a dividend coming to it from the State fund, its policy must be extended in order to get a credit for that amount.

In conclusion, Mr. McManus called attention to the fact that much is being said and written regarding governmental ownership and control of public service corporations. For these corporations to participate in a movement as radical as the State fund, is only a step removed from indorsement of governmental control and ownership. What the brewers have done the electric railroad corporations can do. Mr. McManus said that the records, books and methods of the brewers' insurance company were at the disposal of the carriers. He hoped that the electric railways would start their own company, run it for themselves and reap the pleasure of personal supervision over the payments to employees, who, after all, are the men that should be looked out for and not left to outside companies not interested in their welfare.

DISCUSSION ON COMPENSATION INSURANCE

Mr. Barnes asked Mr. McManus to state the approximate cost of the Brewers' Mutual Indemnity Insurance Company as compared to the cost under the State fund plan and under stock company insurance. Mr. McManus replied that the total mutual premium of \$365,000 for a year's business would also have been paid for stock company insurance, but that there would have been no return in the form of dividends to the policyholders under the latter plan. As for the State fund, this would have lost money on brewers' insurance. Mr. Baldwin, however, would not at all concede that any loss would have been suffered by the State fund, for it would have charged a sufficient premium to cover a special class of brewers and would have refunded the excess after making all proper reserves, without deducting anything for management expenses. Under this plan the brewers would properly have saved 20 per cent of their premiums.

With regard to the fact that dividend payments under the present law are credited to the next premium instead of being returned in cash, Mr. Baldwin said that the law was defective in that no provision was made for payment of cash dividends to any employers who withdrew from the fund. He stated, however, that he himself had introduced a bill into the Legislature this year to remedy this fault.

E. A. Maher, Jr., assistant general manager Third Avenue Railway, New York, N. Y., then mentioned the fact that until 1917 the expenses of the State fund are paid by the State, and asked whether the expenses after the beginning of 1917 would not be paid out of the premiums. Mr. Baldwin explained that out of every \$1 of State fund premium 64 cents represent the insurance payments and reserves to carry payments to maturity, 5 cents the special catastrophe reserve, 12 cents the expenses, giving a total cost of insurance and overhead of 81 cents and leaving a margin of 19 cents for dividends. Mr. Baldwin thought that this margin was sufficient to allow the State fund to assume the management expenses and make the transition to a self-supporting basis without advancing the rates or curtailing the dividends. He believed that it should even be possible to cut the expenses to less than 10 per cent with increased business.

James E. Hewes, general manager Albany Southern Railroad, related how for ten years his company had been paying 1 per cent of the gross receipts for stock company protection and had suffered only \$500 loss,

but as a result of an application to the State fund management had secured a decrease of 50 per cent from the stock company rate. Mr. Hewes testified that his company had received good service from the State fund. Mr. Baldwin remarked that the State fund was rendering service comparable to that given under any other insurance plan, and he mentioned the fact that one industrial company in the State with eight plants had tried out stock company insurance in three, mutual insurance in two and State fund insurance in the remaining three, but that now all plants were insured in the State fund. In general, he believed that the State fund was better as regards cost, and also gave far more satisfactory service to the policyholders.

In regard to electric railways in particular, Mr. Baldwin stated that on Dec. 31, 1915, the earned premiums for the electric railway group in the State fund amounted to \$68,162, while the losses and payment reserves totaled \$34,816, giving a loss ratio of 51.1 per cent. From this he concluded that the rates now charged are absolutely adequate and yield substantial dividends.

Mr. Hewes said that there might be some question as to whether the State would eventually grow lax in its efforts to reduce cost, but that this danger was not so important as the danger in mutual insurance that adverse legislation might increase the cost of insurance. He felt that with the State as a partner, legislators would be more careful about having arbitrary and pernicious laws rushed through by labor organizations. He also emphasized the point that the State fund is well balanced as regards the different risks, and this factor of diversity is an important advantage in making the State fund safer than the mutual plan of insurance. Mr. McManus favored the mutual plan, because he believed that electric railway employers were better acquainted than State officials with the conditions and the needs of employees.

With this discussion the business of the session was completed, and after votes of thanks to the speakers and the hotel management the meeting was adjourned.

Methods of Fare Collection

BY WILLIAM J. HARVIE

Engineer Allen & Peck, Inc., Syracuse, N. Y.

Transportation as supplied by the common carrier is of two kinds: "long distance," such as is provided by the steam railroads, and "local," such as is now generally supplied by the city, suburban and interurban electric railways. These two kinds of service are distinct and separate and in many ways require widely different methods in the treatment of the problems presented in their operation. The differences between the two have become less pronounced with the more recent high-speed electric interurban systems, but the two kinds do not exactly coincide. It is to the second or "local" type that the subject of this paper applies.

Industrial progress often develops in cycles, and the collection of car fares on the various systems of street and interurban railway in this country is no exception. Since the original "pay box" installed on the center panel of the front bulkhead of the old horse car, the electric railway industry has been subject to all sorts of whims and fancies with regard to fare collection systems, both simple and complex. We have thus been experimenting and trying out all the devices offered, in the hope of at last finding the one "best one." We have been led up many blind alleys, of course, but we have already safely completed the first cycle, and have progressed so far as now to be face to face with a host of different devices and systems more or less per-

fect. In what direction shall we turn next? Probably another cycle awaits us. Let us, however, study the problem a little, before we start on our new cycle.

In the past, much energy has been spent in perfecting devices for collecting fares, but infinitely less energy has been spent on the question of what the basis of the fare itself should be. Only recently has this question had the attention it deserves. In the writer's opinion the question of fare collection is inseparable from that of the basis of the fare itself. They must be considered together.

Looking back over the methods of the steam railroad or "long distance" group, we do not find that the energy spent upon devices for collecting fares has been greater than that spent upon the basis of the fare itself, but rather the reverse. We find also that the steam railroads have adhered as tenaciously to the basis of a charge dependent on the distance traveled, as we have to a charge of an unvaried sum for a varying distance dependent in many cases only on the location of the houses built along our line of road—a most absurd basis. In relatively few cases, mostly long interurban roads, is the basis that of the distance traveled.

The problem really is not as formidable as would at first appear and solution is possible if we approach the double problem in its broadest aspect. The fundamental principles which must be granted are: (1) The passenger is willing to pay a proper amount for being transported a desired distance; (2) the carrier desires to furnish transportation proportionate to the fare charged, and (3) the basis of charge shall be equitable and fair both to the passenger and to the carrier. These principles form the real basis of all transportation business. The first and second have to do more particularly with the collection system, the third with the amount of fare charged.

If we grant the third, we have at once a sliding scale of fares based on the cost of construction and expense of operation, while the first and second take into account the distance traveled over and above the initial charge. For example, assume a minimum charge of 5 cents and 2 cents per mile or fraction thereof. In the simplest case, that of a suburban or interurban road, the passenger may ride his first mile for the minimum fare and for each additional mile or fraction thereof he pays 2 cents and so on for other distances, so that a ride of 10 miles would cost him 23 cents and 20 miles 43 cents. In a city system the passenger would pay the minimum fare as above, as well as whatever charge per mile or fraction thereof was found to be warranted by the conditions. If it were 2 cents, then for 2 miles he would pay 7 cents; if 3 miles, 9 cents, and so on. The difference—the excess over 2 cents per mile—would constitute a "ready to serve" charge. The amounts taken as a basis above are of course arbitrary and should in each case be fixed according to the cost of service.

Such a "distance system" properly worked out as to unit rate and distances would eliminate entirely the troublesome overlapping fare zone and its accompanying ills, and would insure a return to the carrier based only on service rendered, which would be eminently fair to both passenger and carrier. The collection of fares would necessitate dividing the line into sections by means of markers of some sort, in order that both passenger and conductor might know the distance traveled. This would be accomplished in the case of the simple suburban line, by marking with numbered signs the quarter miles, say, or if stops were infrequent, the half miles. In the city system, the markers might be multiples of the city blocks. The collection might be on either the pay-as-you-enter or the pay-as-you-leave sys-

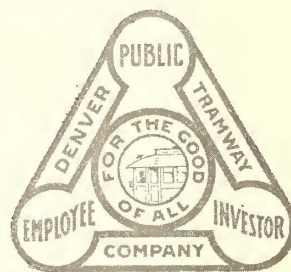
tem, as the conditions warranted. In any case the passenger would enter and leave the rear end of the car, passing the conductor both in and out. A device installed in place of the present fare box and operated by the conductor would produce a passenger hat check on which would be recorded merely the points between which the passenger was riding, and a duplicate of which would be automatically turned into the machine. Coupon books of suitable form and denomination would assist the passenger and conductor in making change.

The foregoing outline covers the essential points of such a collection system based on a "distance" charge, the details of which should not be more difficult to work out than many of the best systems in present use. The successful operation of such a system would, of course, depend to a large extent upon the co-operation of the traveling public, as is the case with any of the present systems. This co-operation should be readily obtained by publicity, provided the third fundamental principle were properly carried out. The writer is firmly convinced that once a reasonable and equitable basis is established, upon which to build a collection system, the need for continued experiments will have passed.

Denver Tramway Adopts New Trademark

The three great partners of every public utility, the public, the employee and the investor, an idea aptly put into concrete form by F. W. Hild, general manager

Denver (Col.) Tramways, in a recent address before the Denver Chamber of Commerce, has found expression in a design or trademark, shown herewith, which has been accepted and adopted by the Tramway Company.



DENVER TRAMWAY'S NEW TRADEMARK

"If any one of the partners suffers," said Mr. Hild, "the other two will sooner or later suffer also. The public is entitled to good service, the employee is en-

titled to good wages, and the investor is entitled to fair returns on the money which makes possible the enterprise."

To bring out the best ideas expressing his thought in a trademark, Mr. Hild inaugurated a prize contest. More than 1000 designs were submitted by aspirants in Denver and surrounding towns. A combination of the ideas of the first and second prize winners was finally adopted by the company.

Electric Locomotive with Smokestack

What is said to be the only electric locomotive equipped with a smokestack recently completed a trans-continental tour from San Francisco to New York, where it is used by the Pennsylvania Railroad in hauling trains under the Hudson River between its New York Terminal and Manhattan Transfer. The locomotive is being returned from San Francisco, where it was exhibited by the Westinghouse Electric & Manufacturing Company, which furnished the electrical equipment for it. The reason for the smokestack is that the Pennsylvania and Westinghouse companies, wishing to insure its safe and prompt return from San Francisco, have sent with it a personal tracer, and in order to give him comfort during storms, a cab containing a small coal stove and smokestack was erected.

C. E. R. A. Banquet and Final Session

Association Celebrates Tenth Anniversary with a Banquet at Which an Ivory and Gold-Mounted Gavel Was Presented to President Henry—Proceedings of Final Session and Remainder of Papers at the Dayton Meeting

ONLY one paper, that by J. Rowland Brown on "Gas Weld Rail Bonding," was presented at the final session of the Central Electric Railway Association held on Friday morning, Feb. 25. Essentially this paper was the same as the one Mr. Brown delivered before the Illinois Electric Railway Association meeting held in Chicago on Nov. 6, 1915, an abstract of which appeared on page 1087 of the Nov. 27, 1915, issue of *ELECTRIC RAILWAY JOURNAL*. Immediately following the presentation of this paper the report of the nominating committee was requested, and the following officers were duly nominated and unanimously elected:

President, A. Benham, general manager Ohio Electric Railway.

First vice-president, C. N. Wilcoxon, president Chicago, Lake Shore & South Bend Railway.

Second vice-president, F. W. Coen, vice-president and general manager Lake Shore Electric Railway.

Secretary and Treasurer A. L. Neereamer was re-elected.

The executive committee appointed for the ensuing year is composed of the following members: C. L. Henry, president Indianapolis & Cincinnati Traction Company; F. D. Carpenter, president Western Ohio Railway; H. A. Nicholl, general manager Union Traction Company of Indiana; S. W. Greenland, general manager Fort Wayne & Northern Indiana Traction Company; John F. Collins, general manager Michigan Railway; W. A. Carson, general manager Evansville Railways; R. A. Crume, general manager Dayton & Troy Electric Railway; John F. Keys, general passenger agent Detroit United Railway; E. B. Peck, vice-president Terre Haute, Indianapolis & Eastern Traction Company; S. D. Hutchins, representative Westinghouse Traction Brake Company; W. H. Bloss, representative

Ohio Brass Company, and L. T. Loftus, auditor Indianapolis & Cincinnati Traction Company.

Immediately following the election of officers, Mr. Benham, the new president, was conducted to the chair. Invitations were received from the Chamber of Commerce of Cincinnati, Ohio, and from F. R. Coates, president of the Toledo Railways & Light Company, to hold the November meeting of the association in their respective cities. W. A. Carson, Evansville Railways, read the report of the committee on resolutions. President Henry was congratulated upon his election as president of the American Electric Railway Association and thanked for the able manner in which he had handled the affairs of the Central Electric Railway Association as its president. The thanks of the association were also extended to the Terre Haute, Indianapolis & Eastern Traction Company for furnishing a special car to convey a party to Detroit and Jackson, Mich., which resulted in the complete interurban mileage of the Detroit United Railway and that of the Michigan Railway coming into association membership. The Interstate Public Service Company and the Indianapolis & Louisville Traction companies were also thanked by the association for furnishing an interurban car to the special party which was successful in bringing the Louisville & Interurban Railroad into the association. The association thanked the Ohmer Fare Register Company and the Peoples' Railway for their entertainment during the Dayton meeting. Resolutions thanking the non-members of the association who took part in the regular program were also reported, as well as resolutions condoling the families of C. M. Witt, storekeeper of the Union Traction Company of Indiana, and George Parker, general freight agent of the Detroit United Railway, members of the association, who had died re-



BANQUET AT ANNUAL CONVENTION OF C. E. R. A. AT DAYTON, FEB. 24

cently. An abstract of the paper read at the meeting on Thursday by H. M. Waite, city manager of Dayton, discussing the commission manager form of government in Dayton and its relations to public utilities, is included below. An abstract is also published of the paper by Q. W. Hershey on "Induction Motor Operation on the Norfolk & Western."

ASSOCIATION BANQUET

At the banquet on Thursday evening, President Henry acted as toastmaster and 237 members and guests attended. President Henry proudly announced the fact that the association now had 142 supplymen members and embraced more than 4000 miles of interurban railway lines. He emphasized particularly the cordial relations existing between the railway and supply members of this association, and urged the association's hearty support in bringing about a similar relationship in the American Electric Railway Association. A report of President Henry's remarks was published in the issue of last week. Judge Baggot of the Dayton Municipal Court gave an address of welcome in the absence of George W. Shroyer, Mayor of Dayton. Following this, S. D. Hutchins, representative Westinghouse Traction Brake Company, addressed the banqueters on the relation between the manufacturer's representatives and the railway members, and closed by presenting President Henry with an ivory gavel mounted in gold and jewels. Mr. Hutchins' address and a photograph of the gavel are shown elsewhere in this issue. On the gold band around the head of the gavel is the following inscription: "Presented to Mr. Charles L. Henry, president of the American Electric Railway Association, Central Electric Railway Association and dean of electric railway development, by the supply men members of the Central Electric Railway Association as a slight token of esteem. Feb. 24, 1916." An interurban car, with a diamond for a headlight, is also engraved on the gold band.

President Henry gracefully acknowledged this evidence of appreciation on the part of the supply men members of the association, following which a letter from the Hon. James M. Cox, ex-Governor of Ohio, was read, stating that he regretted that he was unable to be present at the banquet. In his stead, B. S. Josselyn, formerly president of the Portland (Ore.) Railway, Light & Power Company, addressed the association. Among other things he said that he was a strong advocate of applying the golden rule to railway operation. In his experience at Portland he had found the claim department expense was the heaviest carried by the company, and represented between 6 per cent to 8 per cent of the gross income. To change this condition Mr. Josselyn adopted the policy that the company would in no case of damage attempt to evade responsibility. He said that he felt that the majority of claims could be settled outside of court, and that if suits were filed they would be from one of three causes. Either the railway company denied its responsibility, or the demands of the claimant were exorbitant, or there was some doubt concerning the responsibility.

As a result of the adoption of this policy, nineteen out of every twenty cases were non-suited. Later this result became a political issue, and in several instances judges were forced to run for office on a platform opposed to the non-suiting of damage cases. Ending July 1, 1915, this policy had been in effect eight years, and for the entire period the money paid out for claims never exceeded 3 per cent of the gross income. Mr. Josselyn considered this an excellent record when the fact was taken into account that the cars operate on narrow streets, over steep grades, where blocks average

200 ft. long and where the headway of the cars during the rush hours was as great as seventy-five cars per hour.

F. H. Rike, president of the Greater Dayton Association, then addressed the banqueters on the "Functions of the Modern Civic Commercial Organization." Following this address, John Benham, of the International Register Company, announced the schedule of the proposed boat trip to be held at the time of the June meeting of the association. Arthur W. Brady, president of the Union Traction Company of Indiana, concluded the program with a brief description of the early days of the Indiana and Ohio associations, which later formed the original Central Electric Railway Association, and then discussed the development of the commission idea from its beginning to the present time.

Commission-Manager Government and Its Relation to Utilities

BY H. M. WAITE
City Manager, Dayton, Ohio

In general, a form of government for American cities modeled after that of the federal government has been found to be entirely too cumbersome, and a substitute form of government by commissions has been widely adopted by a large number of municipalities in this country. The adherents of a straight commission form of government, however, have found through experience that this plan has many defects, such as a lack of centralized authority, a confusion of legislative and administrative functions, and an ineffectiveness of attempting through the ballot to select trained officials for particular functions of government. On account of these conditions there has developed a sentiment for what is known as the commission-manager form of government, which is now in operation in at least seventy-three cities in the country.

When the charter commission of Dayton set out to formulate a new charter, it applied business experience in order to overcome the foregoing defects of the straight commission plan. The form adopted calls for a commission of five elected at large on a non-partisan short ballot, this commission having the power to employ a city manager at any salary deemed advisable. The manager can select five directors and administer the government as directed by the commission. The manager acts with his commission just as any executive acts with his board of directors. The directors cover the departments of law, welfare, finance, safety and service. The service director occupies a most important position, for this official has charge of enforcing all the obligations of privately-owned or operated public utilities.

The section of the new charter relating to franchises and public utilities is unique, practical and enforceable. The commission is authorized to make public utility grants subject to petition and referendum and to renew the same, with the restrictions that no exclusive franchise or renewal shall ever be granted and no franchise shall be renewed before one year prior to its expiration. In the grant the commission must prescribe the kind and quality of service, the rates, the use of public property and other terms of public interest. In all grants the right must be reserved for the city to purchase the property at a price fixed in the ordinance or to be fixed as provided by the ordinance. The value of the original franchise grant or renewal cannot be included in the purchase price. Other provisions cover the control of the commission over extensions and the location of tracks, etc., in the public streets.

The possibilities under this section of the charter

are indeed great, for instead of the usual bickerings and political plays which characterize old utility grants, the city of Dayton now presents the sight of the city officials working with the utilities in the drawing of franchises fair to both sides. Under the present plan, men of experience and expert knowledge prepare details for the commission, and there are no committees of council, no politics and no premature or demagogic publicity. This does not mean, however, that the city of Dayton has no publicity, for the charter was in reality founded on pitiless publicity and co-operation with the press in trying to give the public what is right and what it ought to have.

The old day of utilities in politics is over. In the past the government, to some extent, was debauched by representatives of public utilities simply because these concerns were forced to play the game. It is also not to be forgotten that not so long ago the dominant political party in the large city usually was guided in its inspirations and activities by the suggestions coming from the representatives of public utilities. In some instances, the heads of public utilities were chairmen of their respective political parties. Happily this day is past. As the cities progress and conduct their affairs upon a business basis, the necessity for the judgment of public utility men in the guidance of political policies is very unnecessary.

Induction Motors on Norfolk & Western

BY Q. W. HERSHEY

Westinghouse Electric & Manufacturing Company

The use of the induction motor on the Norfolk & Western electrification has brought out a number of valuable features in connection with its operation in railway service. Since only slip rings are used, commutation troubles are not present; constant speed operation is secured; automatic regenerative braking is instituted; and the simplest, hardest character of electrical equipment is made available.

In the successful handling of a long, heavy train, one of the features requiring special care is to avoid any tendency toward sudden changes in speed. This applies especially in taking up slack in starting, in down grade operation, or in reducing train tension. Through the use of the liquid rheostat this may be ideally accomplished. The resistance of the rheostat is varied through the amount by which the plates, or electrodes, are immersed in the liquid of the rheostat. Actually the plates themselves are immovable, while the liquid is made to change its level. This change is relatively regular. There are no fixed "notch to notch" operations, yet the level of the liquid may be changed either by an infinitely small amount or through the greatest variation possible. This practically gives an infinite number of positions of change, with the consequent proportionate tendency in the equipment to change its operating conditions. Thereby abrupt changes in speed, or tendency to change, may be avoided and there is eliminated all sudden bunching of the train, breaking of the draw-heads, etc.

With the steam locomotive, with its drivers rigidly connected through the side rods, the matter of slippage is ever troublesome. However, with the Norfolk & Western electric locomotives, the drivers are divided into four groups, or sets, each set being driven by a pair of motors which have a constant turning effort. Meters for the observation of the current that is taken by each pair of motors are installed, and by these the engineman can observe at all times the draft of current and the consequent tractive effort put forth by each of the four sets as its share in the effort of the engine.

Each pair of motors has its individual liquid rheostat which, independently or collectively with all rheostats in all motor groups, may be raised or lowered by the manipulation of small, conveniently-located levers that form part of the control system.

By this means the engineman is not only constantly advised as to the functioning condition of the several sets of drivers under his engine, but he has at his command a means for their control. If for any reason one set of drivers should slip, he knows instantly which one it is and immediately corrects the defect by reducing the amount of current actuating those drivers so that they may come again into normal functioning condition. This is done without reducing power to the other sets that are properly functioning. Also, in case it should occur that, because of wear of tires, all drivers are not of exactly the same diameter, with a consequent shifting of energy and effort, the engineman, merely by shifting his rheostats slightly, brings such drivers into proper functioning.

From the subdivision of drivers and their separate control, and the constant-speed characteristic of the motors, several important results may be observed: It is within the power of the engineman to reduce the tractive effort of any pair of drivers that has a tendency to slip. Since each engine has its drivers divided into four sets, the loss of adhesion of one set amounts to a maximum loss of but 25 per cent of the total adhesion of the engine. Also, where a set of drivers on one truck slips, only a very slight decrease in the speed of the train is enough to make the motors of the three properly functioning sets of drivers automatically take more current and to make up for the effort lost by the slipping drivers. The consequent avoidance of change in the train speed eliminates the effects of lost train inertia with resulting bunching and probable restarting. If drivers do slip, they do not "run away" to an excessive speed, but revolve at practically the same speed as before. The motors operate, with respect to speed, practically independently of voltage conditions, so that a slipping driver does not have, as it does in the series operation of direct-current motors, the characteristic of generating a high counter electromotive force thereby reducing greatly the current taken, with consequent complete loss of tractive effort.

In general, the operation of the electric engines has proved to be so simple that the regular Mallet locomotive crews have experienced no trouble in taking over the electric operation. In the single-track Elkhorn Tunnel, which forms part of the electric zone, the relieving of congestion has been especially notable in its effect on general movements over the system. It is interesting to note here that combined steam and electric operation has been maintained at times through the tunnel, thus demonstrating the sufficiency of the scheme of 11,000-volt trolley insulation that has been installed.

Under electric operation weather conditions do not necessitate reductions in train tonnage as was the case with steam. On the grade, 3250 tons is always the normal load. This is handled with two electric engines operating at 14 m.p.h., as against three Mallets which were formerly required and which made average speeds of about 7 m.p.h. Light time freights and passenger trains are handled on the heavy grades by the electric engines at 28 m.p.h. as against approximately 10 m.p.h. and 20 m.p.h., respectively, under steam operation. Frequently a passenger train coming into North Fork twenty minutes late will be taken from there by an electric engine and delivered on time at Bluestone Junction. It has been found advantageous and thoroughly practicable for two electric engines to take a

"filled out" train of 4700 tons from Flat Top to Bluefield. The dispatching of trains under electric operation has been found to be the most convenient from the ease of determining definite movements secured from known fixed speeds and the lack of uncertainty by the elimination of necessity for taking coal and water.

These electric locomotives have now demonstrated their reliability in the severest service in the winter months, as attested by records of nearly 45,000 engine-miles with no delay due to failure of engines in service. The electric engine-mileage per day has been increased 100 per cent over that of steam, with its consequent greater crew-mileage, and the nominal train tonnages over certain sections have been increased over former operation by approximately 50 per cent. All train speeds on the grades have been increased—tonnage train speeds have been increased more than 100 per cent on the heavy grades, and the average over the entire zone from the coal fields to Bluefield has been increased over 50 per cent. Congestion at the gathering points and at former coaling and watering stations and at the long tunnel has been eliminated, and, finally, because of more certain movement, longer time on the road between inspections, greater flexibility in dispatching, higher train speeds and greater train tonnages, nine electric engines are handling a traffic which, it is estimated, would require thirty-three locomotives of the Mallet type.

[The above reference to nine electric engines on the Norfolk & Western electric zone, instead of the twelve machines generally understood to have been purchased, may be explained by the fact that of the original twelve engines, one is normally held out of service for inspection, one was in a collision and is now being repaired, and one was only recently turned over to the railroad by the manufacturer. This leaves nine engines in actual service.—EDS.]

Gift of Gavel to President Henry

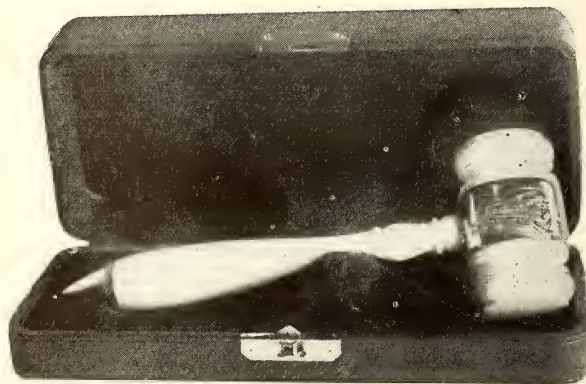
Presented by Supply Members of C. E. R. A. After an Address Outlining Relations Between Manufacturers and Railway Men

A VERY pleasant feature of the banquet on Feb. 24 of the Central Electric Railway Association was the presentation to President Henry by the supply members of the association of an ivory and gold-mounted gavel mentioned on page 452. The presentation speech was made by S. D. Hutchins, Columbus representative of the Westinghouse Air Brake Company and chairman of the supplymen members of the Central Electric Railway Association, and discussed the dependence on each other of the manufacturers and railway men and the need of the most harmonious relations between them. His remarks follow:

"It might be said that our activity in association matters is prompted by a selfish motive—that of obtaining a closer acquaintance and relationship with those with whom we do business, and, judging from this gathering here to-night, from this viewpoint our social relationships are eminently successful. However, we maintain (and feel from the attitude of the railwaymen members) that we have their concurrence that our relationship is of a broader significance, in fact, it assumes that of mutual concern and benefit from the standpoint of our being considerable of a factor in the development and successful operation of the public utilities, and not—as might appear—in the position of 'everything to get and nothing to give.' While our names may not appear on your monthly payroll, a large portion of the recompense we receive for service figures in the expense side of the ledger of your operating ex-

penses, and, while it is probably charged into cost of different items of material or improvements, it could be consistently charged to that of 'consulting specialists.'

"I am convinced, from my own experience of many years as a representative of one of the largest manufacturing companies and through perhaps unusual opportunities for observation during that period, that there is no single factor which can be made of greater practical value and material assistance to railway mechanical, operating and executive officers than the co-operation and active interest of the representatives of railway supply manufacturing concerns in connection with the numberless important and far-reaching problems that are incident to railroad operations. This co-operation and assistance is of greater value to the railroad companies to-day than it ever has been before, largely by reason of the specialization and highly scientific and technical development taking place in every art and industry. The reasons for this relationship and interdependence are both sound and substantial: First, the business of the railroads is primarily transportation; that is, the handling of passenger and freight traffic, which business has now assumed stupendous proportions. Second, the business of the 'supplyman' so called, is to study railroad conditions as they exist, to originate products or devices to meet real needs as they develop, and to show the railroad man how and why a particular product, apparatus or equipment meets a real need, not only to the profit or better-



GAVEL GIVEN TO PRESIDENT HENRY AT DAYTON

ment of the railroad but contributing to convenience and comfort, and providing additional factors of safety to which the traveling public is entitled.

"While there are exceptions, of course, the fact of the matter is that the representatives of practically all reliable railway supply houses are not merely salesmen, in the narrow sense of that term, but experts, educated in their respective lines far beyond what would be possible for any busy railroad official. In other words, the supplyman is able to bring to the railroad official not only a different angle of view but a wealth of data and experience along the line of the specific railroad problem in which he is particularly interested. Whether it happens that apparatus is purchased from such supplyman or otherwise, the opportunity is afforded the railroad man to acquire pertinent and valuable information which, in the nature of things, he cannot originate for himself through such imperfect media as correspondence or individual research.

"This, however, may be somewhat superficial, but with a brief time-saving interview with the supplyman you have a detail analysis and clear understanding of all the functions and advantages of the device, as well as the reasons for its production.

"It may well be said in this connection, however, that the technical journals, especially those serving this or-

ganization, bring to your notice in their well-designed and comprehensive advertisements what has and is being done by the manufacturers in the development of product or devices not only to increase the factors of safety of operation but the improved methods of doing things, so that the great procession can move forward in full step with the development and advancement of the times.

"I think what I have said fully concurs with what Arthur W. Brady, president Union Traction Company of Indiana, stated in a recent communication in the *ELECTRIC RAILWAY JOURNAL*, 'that the time has arrived for full recognition of the fact that the fundamental interest of those owning or operating electric railway properties and those engaged in manufacturing or selling the apparatus and other things essential to electric railway existence and operation are identical, that the protection and advancement of those interests require the harmonious efforts of owners, operators, manufacturers and dealers through and as one organization, and that the prosperity of electric railway properties and the prosperity of electric railway manufacturers and supplymen rise or fall together.'

"In this Mr. Brady has expressed clearly the principles that the supplymen, whose names appear on our roster, have always subscribed to, and which has distinguished the C. E. R. A. as a great big happy family, full of the spirit of co-operation, standing as it does to-day in the full bloom of strength and usefulness. I trust that you will accept this brief interpretation of our relationship and that we are in fact allied with you, not only in continually improving and enlarging the transportation facilities but also a factor in the molding of opinion to a calm, judicious and fair consideration of railroad problems by the public and by the legislators.

"The Central Electric Railway Association has always been exceedingly fortunate in its selection of the executive staff, especially the presidents who have presided over its deliberations and shaped its destiny, which is evidenced in its present flourishing condition. And we feel, Mr. President, that you—during the past year—have been particularly active and have accomplished much, notwithstanding you were in the meantime signally honored with the presidency of the American Electric Railway Association, which carried with it the additional burdens and responsibilities incident thereto.

"We, therefore, deem it fitting that the supplymen members of the C. E. R. A. express their appreciation, not only for what you have done during your incumbency in office but as dean of the promotion, development and advancement of electrically operated utilities in this country. And the very pleasant duty devolves on me, as chairman of the supplymen, to present to you this gavel of solid ivory mounted with solid gold and studded with jewels. This is the emblem of that authority which you have so judiciously exercised. I am, therefore, delighted to hand you this slight token of our esteem with the sincere and hearty wish that you will live many years to enjoy the fruits of your work so well done."

Old times were recalled at Evansville, Ind., recently when Eli ("Brick") Broshears entertained friends at a party to celebrate the thirty-eighth anniversary of the birth of his mule, "Jack B." Many friends of master and mule assembled, bearing carrots and other similar delicacies, at the home of the master, 514 Locust Street. Most of them in former days had ridden behind the mule, which pulled a street car on the Evansville system until 1891.

Cost of Operation in Cleveland

L. R. Nash Computes Fare Needed by Cleveland Railway to Cover Full Cost of Operation

THE Stone & Webster *Journal* for February, 1916, contains a general review by L. R. Nash of the operation of the Cleveland Railway under the Taylor franchise. Inasmuch as the *ELECTRIC RAILWAY JOURNAL* in the issue of Feb. 19 published the main details of this subject as reviewed by F. W. Doolittle, the following abstract of Mr. Nash's article will be confined to his comments upon the central question involved, the real cost of a ride in Cleveland and the fare needed to cover such cost.

In reaching the cost of transportation on a per car-mile basis, Mr. Nash would allow 6.7 cents for maintenance and replacements, this being 15 per cent of the actual average gross, or about 12 per cent of a normal gross per car-mile for maintenance plus 3.1 cents per ordinance car-mile for replacements on a sinking fund basis. This total is also nearly equal to the average actual annual cost of maintenance and renewals plus the annual proportion of actual cost of abandoned property to date. For operation he would allow 12.6 cents, the present actual allowance, and for taxes, interest and dividends, 7.25 cents, making total current expenses and charges of 26.55 cents. To this should be added 0.85 cent for increased expense for standard service, covering the \$300,000 needed to eliminate overcrowding; 0.74 cent for standard stop and speed practice, covering the \$250,000 needed to restore the usual approved arrangement of convenient stops and normal schedule speed, and 1.86 cents for return on the \$10,530,000 of confiscated investment. The cumulative total cost of operation for "test" service would thus be 30 cents per car-mile, to which should be added 2.6 cents for an 8 per cent return on the investment, making a final total of 32.6 cents.

The unweighted average of gross earnings per revenue passenger from 1910 to 1915 inclusive was 3.39 cents. On the basis of an actual cost of 30 cents, Mr. Nash calculates that the fare should be increased to 4.26 cents. The yield from the maximum or "a" rate of fare would be 3.97 cents, with supplementary income bringing a total slightly less than the 4.26 cents. Without additional stops, better service and other conveniences assumed, the cost might be reduced so as to require a fare per revenue passenger of about 3.85 cents. This, which may be called the actual cost per passenger of the present Cleveland service, is somewhat higher than the yield from the fare schedule "b" just below the maximum. This rate is 4 cents, seven tickets for 25 cents, 1 cent for transfers, and 1 cent rebate, the "a" rate providing for no rebate.

In conclusion, Mr. Nash states that the rates of fare so far charged have not fully paid for the cost of service, and that a 3-cent fare cannot pay for good service and properly maintain the property. The rate needed to make good past deficits and cover fully the future total cost of service will be approximately the maximum permissible under the franchise. To his mind there is no fundamental difference between the future fare necessary to pay the full cost of service in Cleveland and that necessary in other similar cities under equally favorable conditions. The confiscation by the city of 30 per cent of the legitimate investment in the Cleveland property more than accounts for any essential differences in cost of service between this and other cities. The co-operative spirit and economies in service successfully practised in Cleveland, however, would result in a substantial reduction in cost if applied in other cities.

Unevaluated Factors in Electrification

Operation of Electric Engines Reduces Maintenance
Cost of Track and Equipment and Effects Improved
Service Generally—Other Advantages Over
Steam Locomotives

IN the current issue of the *Electric Journal*, Q. W. Hershey, heavy traction department Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., outlines what he calls the "unevaluated factors of electrified railroad operation." In these he includes the items, favorable to electrification, which are not usually included in financial considerations, and which are in addition to the elimination of noise, dirt and smoke, limitations as to roadways in tunnels, etc., which were important factors in early electrifications. He states that it is possible now to calculate accurately whether or not electrification will be justified in any case by the resulting economy, but he also directs attention to the following matters which have an indirect economic bearing on the problem.

As compared with the steam locomotive, the easier riding qualities of the electric engines, the more uniform distribution of driver weight, and the less nosing and track pounding, all result in lower track maintenance costs. These qualities result from the flexibility of truck and cab arrangement, the less weight of side rods, the uniform wheel effort, etc.

Due to the uniform propulsive effort, the electric engine will deliver greater drawbar pull per driver weight than the steam locomotive, and if one truck slips, the other trucks can absorb the lost effort. The nicely graduated tractive effort within the control of the engineman in the electric engine contributes to lower maintenance costs of trailing equipment.

Regenerative braking has proved to be one of the most important features of the electric engine. It removes the strain from the cars of trailing equipment and eliminates the dissipation of energy through friction, resulting in a decrease in tire wear; it eliminates troubles from hot tires, and decreases the maintenance cost of air equipment. In addition, the jarring of trains due to letting down air on long grades, with all of its consequent troubles and cost, is eliminated. Further, the engineman has at his command for emergency purposes a fully-charged train line. There is also less necessity for outside riding on the part of brakemen for the purpose of setting up retainers on long, light trains descending grades, and finally, the return of power to the line effects a very considerable economy.

Double-end operation of the locomotive, eliminating all turning, lessens congestion and facilitates dispatching due to the increased flexibility.

With the higher speed usually resulting from electrification, block signals can be set farther apart, with resulting decreased maintenance cost, and freer operating conditions along the line.

In tunnels there are better operating conditions, making higher speed possible, due to the absence of moisture which, combining with the gases of the steam locomotive, usually produces bad trackage.

The operating efficiency of the electric engine is high due to several factors. As the generation of power is transferred to the power station, where the factors are constant, the irregularities of the locomotive as a power generating plant are eliminated, as the engineman deals only with the manipulation of levers. Having at his command an unlimited amount of power, he is under no strain to keep the equipment in condition to give high efficiency. The amount of inspection necessary with the electric engine is less than with the steam engine, and the engines may be on the tracks longer, thus decreasing

the necessary amount of equipment. Double-end operation makes the electric engine more adaptable for switching operation.

The release of the engineman from the strain of maintaining the mechanism, and the physical comfort of the engineman and his fireman during winter and summer, are conducive to safe operation.

The possibility of indicating the power drawn in the motor circuit by means of meters mounted in plain view along with the air gages, facilitates intelligent operation of the engine. At the same time, the generally better tractive conditions render fewer extra starts necessary.

From the standpoint of safety, the engineer's position in the electric locomotive, combined with the absence of steam and smoke, which might obstruct his view of signals and roadway, conduce to the reduction of accidents. Thus not only does additional security result, but the necessity for slow-downs to see signals is eliminated.

Finally, there is a general upbuilding of the community in which an electrified road operates, due to the better service.

Mr. Hershey points out that there have never been any very serious troubles in starting an electric system, and the railroad organization has always been able to meet the new problems resulting. The financial results of electrification have always exceeded the expectations, and this is attributable to the "unevaluated factors" outlined above.

Railway Companies to Distribute Safety-First Primers

Considerable interest is being manifested by the street railway companies in the children's illustrated safety-first primer, which was recently prepared by the Safety First Federation of America, New York, and which contains appropriate stories, rhymes and colored illustrations for vividly featuring to children the dangers of trolley cars, automobiles and fires. A number of operating companies are seriously contemplating distribution of large quantities of the primers and the safety society has lately received orders for 1000 copies from the Elmira Water, Light & Railroad Company, Elmira, N. Y., and for 500 copies from the Union Traction Company of Indiana, Anderson, Ind. The title covers of these primers when distributed will bear the name of the railway company instigating the campaign. Plans are also being made by the Federation, which have been approved by the New York Board of Education, for the distribution of 500,000 copies of these primers in the city of New York.

F. H. Elliott, executive secretary of the Safety First Federation, strongly urges the co-operation of local chambers of commerce, public safety committees and other organizations and individuals interested, with the street railways, in subscribing for the primers, because the books contain general safety rules that the whole public would naturally feel a vital interest in enforcing. Mr. Elliott, furthermore, favors the distribution of the primers by an organization which is outside of the railway companies, because the public then will not be inclined to be skeptical of the sincerity of the motives underlying the campaign.

The New York *Commercial* of Feb. 16 had a three-column article describing H. M. Byllesby & Company and the Standard Gas & Electric Company and the Northern States Power Company. In connection with the latter two organizations, the growth of the properties was shown in earnings and connected load figures.

One-Man Cars in Cities of Large Size

Experiences Are Outlined in Several Cities Having More Than 25,000 Population, Special Attention Being Given to the Question of Safety, the Operating Practice at Railroad Crossings and the Attitude of the Public

AN elaborate investigation of the subject of one-man car operation has recently been carried out by C. D. Cass, general manager Waterloo, Cedar Falls & Northern Railway, and through his courtesy the *ELECTRIC RAILWAY JOURNAL* is enabled to publish the results that were obtained. The data thus given provide an unusually valuable outline of the present status of the subject, in so far as it applies to cities of more than 25,000 inhabitants. The information was collected in the form of legally attested replies from various railways, city officials and others to a circular letter, the answers being in part as follows:

In Everett, Wash., a city of about 35,000 people, the Puget Sound International Railway & Power Company operates eleven cars in city service, of which four are of the one-man type, and it is the intention of the company to increase this number in the future. The one-man cars have been in operation for several months without having any accidents that were chargeable to the new method of operation, and the results have been absolutely satisfactory from the operating standpoint. The reason for introducing these cars developed from a decrease in revenue due to competition with jitney buses and private automobiles.

PLANS COMPLETE ONE-MAN SERVICE FOR SPOKANE

In Spokane, Wash., a city of 104,000 inhabitants, the Washington Water Power Company operates seventy cars, of which forty-one are of the one-man type. The latter have been entirely satisfactory from the standpoint of operation and safety and meet with favor from the general public. It is the intention of the company to increase the number in service so that, eventually, the entire city system will be operated with this type of car. Experience has shown that the number of alighting and boarding accidents have been decreased by the operation of the one-man cars, and the number of collision accidents have also been greatly reduced. It is not considered that the hazard at railroad crossings has been increased in any way. At such points the motorman brings the car to a standstill before reaching the danger zone, looks in both directions, and then proceeds. In this way the responsibility is placed entirely in the hands of one man, and thus there is eliminated the possibility of a mistake in signals given by a conductor in flagging a car across railroad tracks. In Spokane the majority of steam railroad crossings are protected by gates, which are operated by a tower man in the employ of the steam railroad company. In other places the steam railroad companies have placed gates at each side of the crossing which must be opened by a member of the train crew before the train passes, and at other points flagmen are provided.

In the city of Little Rock, Ark., the Little Rock Railway & Light Company has been operating one-man cars since November, 1915, and at the present time five such cars are in service. It is the intention eventually to put eleven additional one-man cars in service in the city, which has a population of 60,000. These cars are 30 ft. in length and have single trucks, the weight being about 22,000 lb. They operate just as safely, and in some respects more safely, than the cars upon which two men are regularly employed, being much more free

from boarding and alighting accidents and having practically eliminated step accidents. At railroad crossings, it is the practice for the motorman to stop the car, get off and go forward, look up and down the railroad track, go back to the car, and proceed over the crossing. This method of operation is carried out to comply with a State law, but if it were not for the statute, the company would not require flagging. The one-man cars have saved the company considerable money and have not interfered with the efficiency, reliability or safety of the passengers. The city is taking no action to prevent the operation of these cars, and there have been no complaints on the part of the patrons regarding the one-man service. The earnings of each car range from \$22.50 to \$25 per day.

Until two years ago, in the city of Waco, Tex., 35,000 population, one-man cars were operated exclusively ever since the beginning of street railway service, eight cars of this type being in operation at the present time. These cars were between 32 ft. and 38 ft. in length, weighing between 16,000 lb. and 22,000 lb., and had single trucks. About two years ago the company purchased some large double-truck cars, which were about 44 ft. long and weighed about 28,000 lb., and on account of the large size it was considered necessary to place an additional man on some of them. It has been found that the large double-truck cars are unprofitable, because the excessive cost of operating them with two men makes it impossible to give a sufficiently frequent service at a reasonable rate. The company, therefore, is planning to discontinue the use of the large cars operated with two men and to return to the use of the small single-truck one-man cars, thereby making it possible to increase the frequency of the service without increasing the operating costs.

With the one-man cars it has been the practice at steam railroad crossings for the motormen to bring the car to a stop at the track and then, without getting off the car, look up and down the track, proceeding over the crossing if it could be made in safety. The company's experience has proved conclusively that this method of operation at steam railroad crossings is just as safe as, if not safer than, where the conductor of a car goes forward upon the crossings and flags the car across. With regard to safe operation in general, the one-man cars are as free from accidents of any kind as any two-man cars that are run in the city. No complaints have been received with regard to these cars, and no action has ever been taken to compel the railway to cease operating them or to put more than one man upon them.

ACCIDENTS GREATLY REDUCED IN SAN ANTONIO

One-man cars have been operated in San Antonio, Tex., a city of about 115,000 population, for a number of years, thirteen being in operation at the present time. These cars are about 27 ft. long and have single trucks, weighing about 22,000 lb. each. That the one-man cars have reduced the number of accidents in comparison to two-man cars is indicated by the fact that during five months in the year 1914 the company operated eight two-man cars on a certain line, these being involved in a total of 157 accidents of all kinds. During the corresponding months in the year 1915, nine one-man cars

were operated on the same line, these being involved in a total of only fifty-three accidents of all kinds. With one-man cars at railroad crossings the motorman is required to flag himself across only because of the existence of a State law and not because it is considered to be necessary or productive of any additional safety. No complaints regarding the cars have been made, and they are being operated over various busy streets in the city of San Antonio. The company at the present time is contemplating the introduction of additional one-man cars.

In the city of Quincy, Ill., a city of 40,000 population, one-man cars have for years been in satisfactory service on lines which serve factory districts in the city. The one-man car is considered to be safer and much less liable to platform accidents than two-man cars. At railroad crossings arrangements have been made with the railroad company's watchman whereby he flags the cars across. No platform accident appears ever to have taken place on these cars.

The Topeka Railway Company, in Topeka, Kan., a city of 50,000 population, has operated eight one-man cars continuously since October, 1915. Prior to this time two similar cars had been operated continuously for ten years. At the present time twelve additional cars are being rebuilt for this service. The one-man cars are 31 ft. long and have single trucks, weighing about 22,000 lb. They operate on the main streets of the city just as safely, and in some respects much more safely, than cars upon which two men are regularly employed. Step accidents have been practically eliminated. It is the practice to have the motorman flag himself across all railroad crossings, whether on a one-man or a two-man car, because on account of this rule the motorman is always sure to stop his car before crossing the tracks. The introduction of the one-man unit has reduced operating expenses and has not interfered with the efficiency of the service. No complaints have been made by the city with reference to the operation of these cars. The earnings per car are between \$25 to \$35 per day.

The Lincoln Traction Company of Lincoln, Neb., which has about 68,000 population, has operated two one-man cars since October, 1914, and is considering an extension of this service. These cars operate over busy streets in the city just as safely as the cars upon which two men are employed. They have fewer boarding and alighting accidents than the types of two-man car that have open platforms. No complaints regarding the one-man cars have been made by the city of Lincoln, but there were some complaints from the patrons when the cars were first installed, although after the cars had been operated for a few weeks these complaints ceased, the public being entirely satisfied. The earnings of each car range between \$20 and \$30 per day.

During the past two winters, in the city of Duluth, which has a population of about 55,000, the Park Point Traction Company has operated its cars with one man for approximately 43 per cent of the time each day. The cars have given just as good service as with two men, and no accidents have occurred upon the cars operated by one man. During the winter time the cars could be operated as one-man cars for the whole of the day if it were not for the fact that an additional 2-cent fare has to be collected when transfers are issued by the conductor. In the same city the Duluth Street Railway operates one-man cars on one of its lines, this method of operation having been in effect for more than twenty years. The operation of these cars has been entirely satisfactory to the company and to the general public.

In the city of Clinton, Iowa, having a population of

about 26,000, fourteen local street cars are operated, and five of these are of the one-man type. This method of operation was inaugurated in March, 1915, and the results have been very satisfactory to the company and to the public, no questions having ever arisen regarding its propriety. Platform accidents have been practically eliminated.

CONDUCTORS NOT REQUIRED TO FLAG CROSSINGS IN WICHITA

In the city of Wichita, Kan., a city of 65,000 population, six one-man cars have been operated continuously since September, 1913. Since August, 1915, ten such cars have been operated, and at the present time three more are being rebuilt for this service. In addition to the above-mentioned cars it is proposed to install twelve more in the near future. The one-man cars now operated are 34 ft. long and weigh about 20,000 lb. each, seating forty passengers. Their operation has proved to be just as safe as that of cars upon which two men are employed, and, in fact, step accidents have been practically eliminated. At railroad crossings it is the practice to have the motorman flag himself across the tracks, this being true both with respect to one-man and two-man operated cars. The conductor of a two-man car does not flag railroad crossings, and the motorman is required to go forward, because the motorman is thus always certain to stop his car before crossing the track.

The one-man service has been thoroughly satisfactory, and during the summer of 1915 an extremely heavy travel to and from a park was handled just as successfully, and more safely, than it had ever been handled before with two-man operated cars. Since the introduction of one-man operation the company has been able to increase the frequency of service on several of its lines. The earnings of each car range between \$25 and \$35 per day. No complaint has been made by the city of Wichita in regard to one-man car operation, and although there were some complaints on the part of the patrons with reference to the regularity and convenience of the service when it was first begun, after a short time the complaints ceased and the public became entirely satisfied.

In Oklahoma City, Okla., which has a population of about 85,000, the Oklahoma Railway has operated one-man cars continuously since the year 1909, having at the present time nine of these cars in service. These are 40 ft. long and weigh about 36,000 lb., seating from forty-four to forty-eight passengers. They operate just as safely as the two-man cars, and they are moved across the various railroad crossings in the city by having the motorman flag himself. This method of flagging is required because the company has a contract with the steam railroad requiring the cars to be stopped and flagged by one of its employees. If it were not for this contract, the motorman would not be required to go forward at railroad crossings, as a clear view can be obtained in both directions without leaving the car. The city is doing nothing to compel the railway to discontinue the use of one-man operation and the company's patrons have never complained with reference to it. The service is considered to be reliable, convenient, satisfactory and safe.

The Washington Auto Bus Company, Seattle, Wash., affiliated with the Puget Sound Traction, Light & Power Company, has started an automobile bus line between Puyallup and Orting. The round-trip fare between Puyallup and Orting is 40 cents. Buses connect with the street cars, so that patrons can travel from Tacoma to Orting and back for 50 cents.

Safety First At New England Club

Doherty Campaign Described in Detail—Mr. Bullock Gives Facts About National Safety Council

ONE hundred and twenty-five members and guests of the New England Street Railway Club celebrated a safety-first night at the American House, Boston, on Feb. 24, President C. E. Learned being in the chair. After the usual business meeting addresses were delivered by George Oliver Smith, supervisor of safety Doherty Operating Company, New York, and by H. A. Bullock, staff assistant to the president Brooklyn Rapid Transit Company.

SAFETY CAMPAIGN OF DOHERTY ORGANIZATION

Mr. Smith said that about 100 utilities are now operated by the Doherty organization, which includes properties in all parts of the country and a total employee list of 13,000. Thirteen electric railways are included in these companies. About three years ago accident study was taken up in a comprehensive way, and practical methods of prevention were investigated by a committee which made an extensive trip around the country, visiting many companies interested in safety work. Superintendents, claim agents, executives and many others interested in accident prevention were interviewed. A preliminary report was then made to the executives of the home organization and a tentative plan for safety work formulated with regard to the Doherty properties. Backed by an appropriation the committee then began a tour including every property under Doherty management, all being visited inside of a year.

At these plants an exhaustive survey of safety conditions was carried out, including boiler rooms, store-rooms, substations, transmission lines, yards and all physical property. More than 1300 photographic negatives were taken showing dangerous conditions, and the subjects ranged from a piece of broken headlight glass in an alley between storehouses to unguarded belts, line shafting, etc. Lantern slides of local conditions photographed and of similar conditions elsewhere were prepared and meetings of employees called. Several moving picture reels showing accident prevention work were included. These slides showed the local employee the exact conditions prevailing on his own system and aroused intense interest. The local manager and other executives attended the meetings, and often these ran into the early morning hours, so great was the interest manifested. Every effort was made to approach the local employees tactfully and in a helpful spirit, rather than in a censorious manner. The betterment of the local property from the safety standpoint was the ideal set forth, and the response was most gratifying. Studies were made of the records of the local company in each case, including the economies effected by the management and the outlays of the claim department.

The next step was the inception of a local safety organization. This was planned to include every employee, and a feature was a central committee and above all, one employee specially charged with the responsibility for carrying forward the safety work. This employee, or local director of safety, gives from one-third to all his time to safety pursuits. At the close of the first year's inspection trip a central bureau was well established at New York to direct the safety work of all the Doherty companies, and a comprehensive system of records and correspondence was inaugurated. All kinds of accident prevention information are sent out from headquarters in a bulletin service emphasizing in a crisp, snappy style the lessons of accidents which come

to the notice of the central office. So far as possible the attempt is made to show the conditions existing before and after the accident in each case. The bulletins, of from four to six sheets each, are issued fortnightly, and are posted in every plant at several points, going to twenty-six states. The importance of changing the bulletins frequently was early recognized. In the local companies the co-operation received was remarkable. The increased esprit-de-corps resulting is alone worth the cost of the entire safety work, although it is a by-product of the campaign. So far as possible the safety work is kept from interfering with the regular duties of employees fitting it in wherever feasible. The financial aspects of accidents as affecting the companies were not emphasized, but stress was laid upon the loss in efficiency, personal suffering, jeopardizing of prospects, etc., sustained by the injured employee, and the local organizations always responded to this point of view. The relation of freedom from accidents to success in personal competition received full consideration.

From New York a staff of field inspectors now works, each covering ten or fifteen plants. These men watch the physical condition of the properties, hold meetings for safety discussions, conduct competitions and make examinations and recommendations for improvements. A slogan contest with a first prize of \$10 and lesser prizes running down to \$2.50 was recently carried out, with surprisingly successful results. One slogan was sent in by a Swedish track foreman in his mother tongue. A follow-up system is an important part of the work of the central bureau. Inspectors' recommendations are made in duplicate, one copy going to the local manager and one to New York. The requested date of completing a safeguard is utilized at headquarters to direct any necessary inquiries to the local plant, and when the work is completed as recommended, the local manager sends his approved record to New York, upon the receipt of which the original is destroyed by the follow-up clerk. Accident report blanks providing full information are utilized, special attention being given to the recording of the conditions prevailing at the time of the accident as well as the causes. If a man has to leave his job the injury is considered an accident.

Executive letters are sent to local managers whenever a new means of prevention is learned, unless the topic is included in bulletin discussions. Graphic records are kept at New York relative to causes. Careful analyses are made to correctly fix the responsibility for accidents, especially in connection with the department at fault. Thus, an accident occurring when a passenger alights may be due to a defective step, in which case the shop and not the operating department must be charged with the trouble. Numerous suggestions as to prevention are received and encouraged at the central bureau, and all suggestions are considered by a special committee which determines their practicability.

The Toledo Railway & Light Company, Toledo, Ohio, one of the Doherty properties, has 2000 men in the railway department. There are 116 men on the accident committee, which meets one evening a week throughout the year. The company furnishes each man with an appropriate emblem, and after six months' service on the committee an "Honor Service" emblem is given. In the various properties it has been found better to encourage resuscitation by the prone pressure method than by pulmotors and lungmotors, since the latter cannot be handled with safety by inexperienced persons. Prizes are given to first-aid teams. One of the most helpful devices in facilitating the removal of dangerous conditions is the "defect tag," which is placed on a machine or other equipment needing alterations. The

schools for motormen and conductors maintained by the Doherty organization were also described by the speaker. One of the most helpful devices in the interests of safety is a blotter issued every three months, which besides carrying a calendar, emphasizes safety points, mottos, slogans, etc.

WORK OF NATIONAL SAFETY COUNCIL

Mr. Bullock described the organization and activities of the National Safety Council, which now has about 1700 members embracing many branches of modern industry and a recently organized electric railway section including sixty companies. Twelve hundred delegates attended the annual congress of the Council last fall at Philadelphia. The headquarters at 208 South La Salle Street, Chicago, are a clearing house for accident prevention data and the four weekly bulletins issued by the Council are most valuable in carrying on safety propaganda in local companies. A regular weekly bulletin for the electric railway section will soon be issued by the Council.

COMMUNICATIONS

Purchasing Agent Calls a Halt

GEORGIA RAILWAY & POWER COMPANY
ATLANTA, GA., Feb. 28, 1916.

To the Editors:

In the course of years the Georgia Railway & Power Company has been evolved from a number of predecessors—I don't know how many, offhand. The names of these corporative ancestors have been forgotten by nearly everybody except the students of our genealogy and except also the manufacturers of things that electric and street railway companies are wont to buy. These manufacturers have not forgotten them. They are honoring to-day the memory of our dead and gone forebears. They are sending yet, addressed carefully to "Purchasing Agent" or somebody else of the Georgia Power Company, the Georgia Electric Company, the Atlanta Water Power & Electric Company and goodness knows how many other ancestors sleeping peacefully in the vaults of time, expensive catalogs and other mail matter that very nearly overcomes me with sheer weight of postage.

I always look over the advertising section first in your paper as well as in all other trade papers to which I subscribe, and I am often led to wonder how many of such advertising pages the manufacturers could buy in your periodicals with the value of the stamps they waste on me alone. How much the aggregate total of their waste is in this regard, taking the country at large, nobody knows, nor can anyone tell how much time and clerk hire and good ink and addressograph or pen wear-and-tear they throw away on sending me a dozen catalogs when one is all I possibly can use. I know only that they vex my spirit wofully and that they make me waste a whole lot of my time throwing stuff into the trashbasket or sending it back with pleas that they quit their extravagance.

My idea of a mailing list is, that while it is kept up to date and accurate, it is very valuable; but when it is neglected it can become one of the most expensive phases of any business.

Your directories of railway companies offer excellent investment for a number of manufacturers whom I could name. Those directories contain none of the defunct companies. They are not ancient histories. They are not corporative family trees. They are business

lists for use by business men, and the proper use of them, or their equivalent, with reasonably occasional revision of mailing plates or other equipment, would mean much in the course of a year to the folks I have in mind.

Of course, I am interested mildly in efficiency on the part of others; but, understand me, my primary concern here is selfish. I've got a lot to do, and there are only twenty-four hours in a day and seven days in a week. Examining mail matter, only to find it is something I looked upon yesterday three or four times and saw again this morning twice or thrice, is discouraging. I want to sound a temporary armistice, anyhow. I want to show a white flag. I'm anxious to call a halt just long enough to get my second wind at least. I've got my hands up and I'm yelling for peace. Too much is enough.

Please be good enough to pass the word along that one piece of mail matter addressed to W. H. Smaw, purchasing agent Georgia Railway & Power Company, is sufficient for all of the purchasing agents of all the companies from whom we have descended. Yours in half-serious protest,
W. H. SMAW, Purchasing Agent.

Mr. Foster's Hints to Technical Writers

UNITED RAILROADS OF SAN FRANCISCO

SAN FRANCISCO, CAL., Feb. 15, 1916.

To the Editors:

As a contributor to the department on "Equipment and Its Maintenance" of the ELECTRIC RAILWAY JOURNAL, and as one who has been in the harness for thirty years, perhaps a hint or two to your writers would be well taken.

In reading articles of the kind printed in this department, what I look for is "tricks of the trade," the little kinks that have been invented by heads of different departments, electrical engineers, superintendents and foremen. These bright jewels of economy and efficiency are hard to find out about, even when one is in personal contact with the inventor under favorable conditions. They are more difficult to see in actual use, and it is still more difficult to get whole-hearted explanations of their significance. It is almost impossible to get written descriptions of them into letters or into technical journals.

I may be a pessimist, but my general impression of all printed matter appearing in technical journals for the past thirty years has been that the men who know their work best cannot, will not, or at any rate do not, often write, and many of those who do seem to avoid getting down to the details that the practical man is after.

Some writers toss out an idea like a bone from the little toe of a mastodon, and seem to think that the average reader is like the paleontologists, who can construct a whole prehistoric animal from this toe bone as a starter. Obviously, the writer should expose his subject fully and from several points of view, and he should be exhaustive in his statements, even at the risk of irritating the editor.

S. L. FOSTER, Chief Electrician.

The Atchinson, Topeka & Santa Fé Railway sent a statement to each of its stockholders with their February dividend checks. The statement reads as follows: "You are one of about 40,000 owners of the shares of the Atchinson, Topeka & Santa Fé Railway. As such, use your personal influence for fair treatment of American railroads. Do what you can to secure reasonable rates, equitable taxation and intelligent legislation."

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.

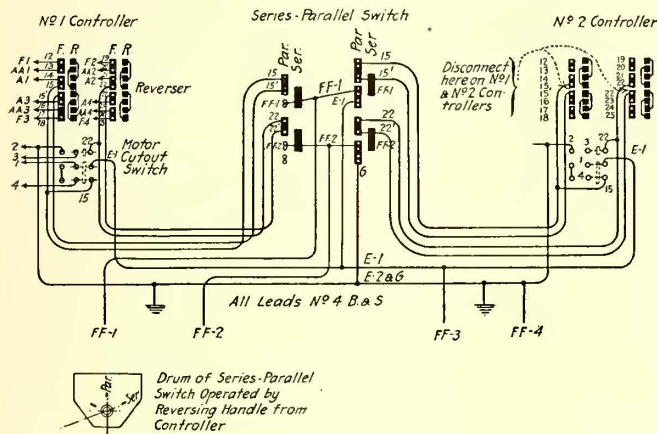
Series-Parallel Switch on Line Car

BY H. M. LLOYD

Equipment Engineer British Columbia Electric Railway,
Vancouver, B. C.

The British Columbia Electric Railway has for use on its interurban divisions four large line cars, built in the company's shops and designed for either construction or repair work. The cars are 40 ft. long and are mounted on Brill No. 27-E-2 trucks. Each car has a 28-ft. cab, centrally placed, with linemen's tower above, raised to the required height by pneumatic cylinders. The open platforms at the ends provide space for reels from which the wire or cable can be paid out as the car proceeds, while inside the cab are racks and lockers for all the tools, tackle, repair parts, etc., used in line work. In case of emergency one or two poles can be carried by shoving them through the end doors of the cab.

The motive power consists of four GE-57 motors, gear ratio 18:69, and two K-14 controllers. The car is also equipped with M.C.B. couplers and automatic air



ELECTRIC CIRCUIT DIAGRAM SHOWING SPECIAL SERIES-PARALLEL SWITCH CONNECTIONS

brakes, so that it can be used for switching work or hauling other cars with supplies, etc. When fully equipped the car weighs from 30 tons to 35 tons.

In work of this kind it is frequently required to move the car along, a few feet at a time, and trouble has been experienced with the existing equipment owing to the controller frequently arcing over when shutting off the current so soon after starting the car. The rate of acceleration was also often sufficient to carry the car farther than was wanted. To avoid the former trouble the motormen have been in the habit of leaving the controller on the first resistance step and moving the car by closing and tripping the circuit breaker.

To improve these conditions one of these cars has been equipped with a change-over switch which connects all four motors in series when starting, and in series-parallel with the controller in the full "on" position. The connections were made between the motor cut-out switches and reverser, as indicated in the accompanying diagram. For the change-over switch a motor cut-out switch, discarded from a locomotive equipment, was used by making a few changes in the position of the segments on the switch barrel.

To minimize the liability of the change-over switch being thrown with current on, it was arranged to be operated by the reversing key from the controller, thus making it necessary for the motorman to shut off his power before he could operate the change-over switch.

The result has been very satisfactory, after more than a year and a half in operation, and with both speed and starting currents reduced one-half, the troubles mentioned have entirely disappeared, and the car is much more efficient in its work.

Construction and Maintenance of Rail Joints and Bonds*

BY E. R. SHEPARD

Associate Engineer United States Bureau of Standards,
Washington, D. C.

In connection with the study of electrolysis and electrolysis mitigation the attention of the Bureau of Standards has been called to the past and present high rate of rail joint and rail bond failures and the consequence of such failures upon the electrolysis conditions throughout the country. With the idea of collecting information on the best present-day practices of bonding tracks a circular letter was prepared and copies were sent to 130 operating companies. The letter asked for information as to the number and types of bonds and joints in use and for the average life and causes of failure of each type; also for the manner and time of testing bonds and the criterion for replacement, etc. Replies were received from forty-two companies and information was also collected by a representative of the bureau who spent five weeks in the field and visited upward of fifty companies in the interest of the investigation. As a result of these investigations a number of conclusions have been reached of which the following paragraphs give a summary.

Soldered bonds of all types are falling into disuse, although a few companies employing thoroughly experienced and careful workmen still continue to use them. No one type of bond can be said to be better than all other types. Each has its advantages and disadvantages, and the selection of a bond for any particular service should be governed by the type of construction on which it is to be used, the grade of labor available for installation, and upon numerous other local conditions.

The problem of rail-bond maintenance is largely that of joint maintenance. No bond can be expected to last continuously on a loose and poorly-supported rail joint. The surfacing of all newly installed joints and the tightening of all bolts soon after installation and at regular intervals thereafter will do much to prevent loosening of joints and cupping of rails. Improved bolts having a high elastic limit and a great ultimate strength appear to be giving excellent results. It is recommended that bonds and joint plates be selected only after laying out a section of the joint on the drawing board and providing a proper clearance for the bonds.

The life of concealed bonds on exposed rails is much shorter than on rails in city streets owing to the ex-

*Abstract of paper to be published as Technologic Paper No. 62, Bureau of Standards.

pansion and contraction in the joint on the former type of construction. Such expansion and contraction can be overcome by the use of improved mechanical joints supplemented by expansion joints at regular intervals. It is believed that such construction would prove itself to be of ultimate economy and is recommended, at least on an experimental basis.

Both the compressed terminal and the pin terminal types of bonds are giving excellent results where proper attention is given to their installation. The former type requires more care in the expansion of the terminal, while the latter type requires greater accuracy in the drilling of the holes. Each has its peculiarities and should be selected only after due consideration to local conditions. A strict adherence to the code of bonding rules given in Richey's "Electric Railway Handbook" is recommended.

Stranded bonds appear to be giving better satisfaction than ribbon bonds, as the conductors of the latter type are more easily separated and broken. Exposed ribbon bonds should have a clip or band at the center of the bond to prevent this separation of the conductors.

The use of solder in connection with the application of mechanically applied bonds will undoubtedly add to their life if the work is carefully performed. Its use, however, does not always appear to be justified as good results under modern conditions can be obtained without it. Its use should depend entirely upon local conditions.

The use of tinned terminals and plastic alloys in connection with mechanically applied bonds appears to be a good practice. Their use is recommended where trouble from corrosion of terminals has been experienced.

Mechanically applied head bonds are comparatively modern and are, therefore, more or less in the experimental stage. However, their use is increasing and in most installations they appear to be giving fairly satisfactory results. They are short, cheap and easily installed. Their contact resistance appears to increase with time but not ordinarily to the point of failure. When installed in city streets they are subjected to vehicle traffic and some failures must be expected.

Electrically welded bonds have a low and permanent contact resistance. Theft of this type is difficult and owing to the shortness of the bond and its tenacious contact has been reduced to a minimum. Failures of the head bond from the breaking of ribbons have been quite prevalent but are being reduced by a modification in the design of the bond.

Welded joints are being used more than ever before but there is also a growing tendency to adopt improved mechanical joints and various forms of special joints, several of which are a combination of welded and bolted or welded and riveted joints. These special joints seem to be meeting the demands of service with fewer failures and better results generally than any of the standard types.

Power economy alone will not justify the best modern practice in bonding. Such practice, however, is justified and strongly recommended from the standpoint of good voltage conditions in the return circuit, which not only make for good electrolysis conditions but also for satisfactory operation. The present practice of basing the criterion for bond replacements upon a joint resistance which is defined in terms of the resistance of a given length of adjacent rail is shown to be somewhat irrational, but owing to its simplicity and ease of application the continuation of the practice is recommended. From 6 ft. to 10 ft. of rail as the limiting resistance for rail joints is shown to represent good

practice and it is recommended that these figures be not exceeded under ordinary conditions.

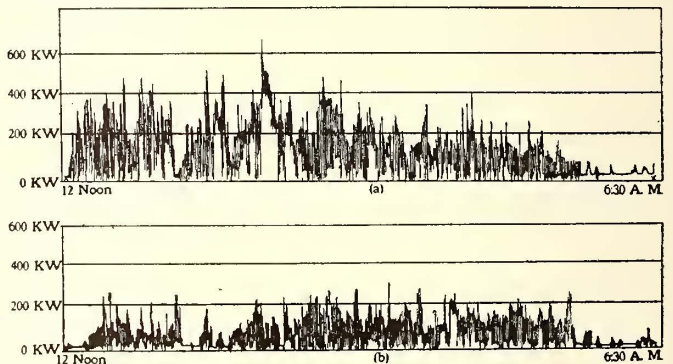
Track bonding is in a state of evolution. New inventions and improvements in methods and practices have been so frequent during recent years that many types of bonds and joints can still be said to be in the experimental stage. Carefully kept records and a free interchange of experiences on the part of the operating companies will do much toward the establishment of definite and standard practice in this particular field.

Electric Locomotives for Spotting Service

BY R. K. CULBERTSON

Engineer Westinghouse Electric & Manufacturing Company, Buffalo, N. Y.

The handling of steam railroad rolling stock around industrial plants requires much "spotting" and general shifting of cars, as well as hauling them from the steam railroad interchange points to the manufacturing plants, and vice versa. As railroads are compelled to charge for all service other than dropping cars at a plant, it will undoubtedly prove economical for industrial plants to purchase their own locomotives, or in some cases, where the industrial plants are close to



NIAGARA JUNCTION RAILWAY SUBSTATION LOAD RECORDS
(a) Heavy traffic fluctuations. (b) Average traffic fluctuations

gether, the problem may be solved by the formation of a corporation for the purpose of giving this service. Where electric power is available, the electric switching locomotive is the best and most economical means of meeting this condition.

The Niagara Junction Railway electrification, at Niagara Falls, N. Y., which is the most extensive of its kind in America, may be used in illustration. The main track of this road is about 4 miles in length, while the total length of sidings is approximately 11 miles. The function of the road is to act as an interchange or connection between steam railroads and a group of about twenty-five large industrial plants located along its right-of-way. In addition to this service the railway is called upon to make many local movements at the various plants, such as placing empty cars at specified points for loading, weighing, etc. The number of cars handled by two electric locomotives on this road is from 1200 to 2000 per month. Each is manned with a crew of three—engineer, conductor and brakeman or switchman.

The railroad companies pay the Niagara Junction Railway on a "per car" basis to the industrial plants, as do the plants for car delivery to the railroads.

A substation, located in one of the power houses of the Niagara Falls Power Company, supplies power to the railway. It comprises a 750-kw., six-phase, 25-cycle, 600-volt commutating-pole rotary converter; two 400-kva., 22,000-volt transformers and a control switch-

board. The load on this substation is variable, as is indicated by the accompanying diagrams. Catenary construction, with No. 0000 contact wire suspended in general at a height of 22 ft. is used.

The locomotives are of the standard gage, double-truck type, designed for freight and switching service. They were built for double-end operation, having a centrally located steel cab, with a sloping hood at each end. The general characteristic features of these locomotives are as follows:

Weights in Pounds		
Mechanical parts	83,000	
Motor equipment	26,940	
Control equipment	5,468	
Air-brake equipment	4,060	
Forced ventilation equipment.....	532	
Total	120,000	
Weight on drivers	120,000	
Weight per driving axle.....	30,000	
Dimensions		
Total length between coupler knuckles.....	35 ft. 2¼ in.	
Rigid wheelbase	7 ft. 4 in.	
Total wheelbase	25 ft.	
Diameter of outside driving wheels.....	36 in.	
Diameter of inside driving wheels.....	31 in.	
Performance		
Track Profile	Number of Cars, Each Weighing 45 Tons With Load	Maximum Speed, Miles per Hour
Straight level	50	10.50
½ per cent grade	24	9.75
1 per cent grade	14	9.75
2 per cent grade	8	9.75
The maximum tractive effort with clean dry rail is 30,000 lb.		

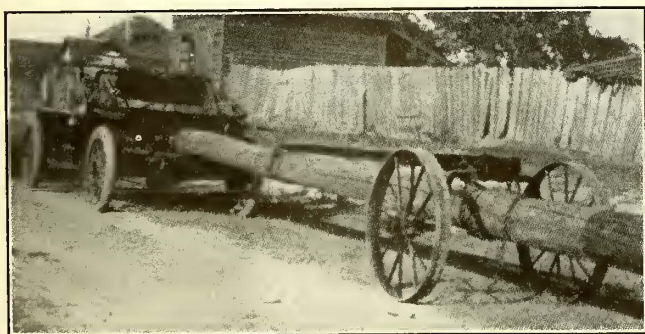
The electrical equipment consists of four Westinghouse commutating-pole, field-control, direct-current, 600-volt motors, with double-end unit switch control. Both the motors and control are particularly well adapted to meet the severe conditions incident to switching locomotive service. Current is collected from the trolley wire by means of a double-shoe pantograph. Extra long and drooping horns are used on both locomotives as a means of preventing damage which might otherwise be done to the overhead construction at turn-outs.

Transporting Poles with Automobile and Dolly

BY W. E. NEES

Superintendent of Railway Selma Street & Interurban Railway, Selma, Ala.

The article by S. L. Foster in the issue of the ELECTRIC RAILWAY JOURNAL for Feb. 26, page 411, describing the pole dolly and tongs used by the United Railroads of San Francisco is interesting in showing the



HANDLING POLES FOR EMERGENCY LINE WORK

practical application of the familiar dolly in line work. We have found the combination of a dolly and an automobile shown in the accompanying illustration very useful in transporting poles for emergency and repair work.

We made this dolly in our shops, and there is nothing

particularly novel about it, the axle being made of 2-in. square iron on which 1¾-in. journals are turned to fit the roller bearings furnished by the wheel manufacturer. The hickory tongue is 14 ft. long, and it is braced with axle irons to the axle. It is fastened to the axle with U-bolts so as to avoid the weakening of the axle which would result from drilling bolt holes in it.

Large-Capacity Units for Boston Elevated Railway

The Boston Elevated Railway has recently decided to make provision for its 8 per cent annual increase in load up to the year 1920 by the installation of a turbo-generator having the unusually large capacity of 35,000 kw., and to amplify the existing substation equipment by adding 4000-kw. rotary converters. The adoption of these large units was decided on because of their relatively low first cost per kilowatt and because, in addition, it has been estimated that the superior economy of a 35,000-kw. turbo-generator will save enough in coal during five years to pay for the increase in first cost over that of a 20,000-kw. unit, also postponing for one year any increase in boiler capacity. A feature of interest in connection with this machine is the decision to design it for a steam pressure of 600 lb., which will materially increase its steam economy when new boilers are installed, the company's plans providing that future additions to the boiler plant shall be made by purchasing units capable of generating steam at this higher pressure.

The three 15,000-kw. turbines now in operation at the South Boston station, where the new machine is to be installed, use steam at 200 lb., and the 35,000-kw. unit will be run at this pressure for the present. The machine, however, will be designed so that by the addition of probably six stages to the sixteen stages considered necessary for the present pressure and the 29-in. vacuum, the full 600 lb. can be utilized. The details of the arrangement have not been fully settled at this writing, but the additional stages will be provided either in an extension of the turbine casing or in a high-pressure section slightly separated from the main casing, with either a common shaft or a shaft and coupling between the two sections of the unit. In case the turbine casing is extended for the high-pressure section, the steam will be by-passed from the boiler header into the lower-pressure stage group; while if the high-pressure section is later added as an extension of the main casing, no by-passing will be required, the high-pressure section being omitted until the provision of the requisite boiler units is made. By thus fitting the number of stages in operation to the pressure available, economical operation will be obtained.

The company's decision to purchase a 35,000-kw. unit, with other improvements mentioned below, resulted from a report by the Stone & Webster Engineering Corporation of Boston, Mass., upon the power requirements of the road for the five-year period ending 1920. Regarding the use of higher steam pressures, Stone & Webster's engineers pointed out that the art of steam generation has reached a point where manufacturers consider it entirely practicable to build reliable equipment for operation at pressures ranging from 400 lb. to 600 lb., and that it seems probable that such equipment will be demanded by the best practice within a very few years. The company cannot, of course, take advantage of these pressures with the existing boiler plant, but the additional cost of designing a 35,000-kw. turbine for double the existing pressure is given as only about \$15,000.

The extent of the increased power requirements that

have made the new unit necessary is indicated by the fact that from 1905 to 1915 the company's d.c. load has increased 36,000 kw., or about 8 per cent per year. In the year 1912, when the a.c. system was first operated in Boston after the new South Boston a.c. plant had been completed and all but a few of the d.c. stations had been shut down, the load decreased 1000 kw. on account of improved efficiency in distribution, but the increase in output in 1913 and 1914 was at the rate of 8.36 per cent per annum. The company's policy is to carry all load increases on the South Boston station, thus reducing the importance of the present d.c. stations, four in number, with a combined capacity of 39,700 kw. The South Boston station supplies eleven substations on the system containing a total of twenty rotary converters with an aggregate capacity of 41,000 kw.

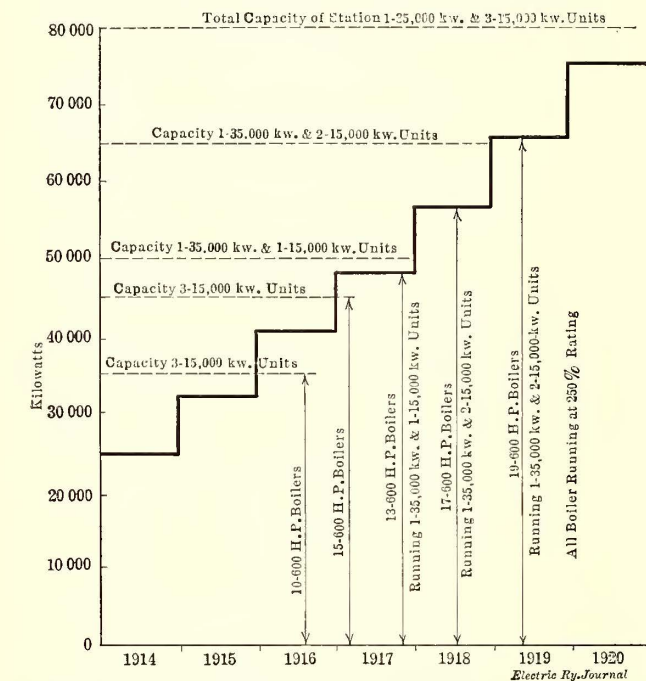
A study of the development of the whole load led to the conclusion that a 35,000-kw. machine would most satisfactorily handle the conditions. Such a unit can be installed for considerably less cost per kilowatt than a smaller unit and will have a higher efficiency over a

Another advantage of the larger unit is that the lower steam consumption of the station under the schedule of turbine operation which it will make possible will postpone the necessity for more boiler capacity for one year beyond the time when it would be necessary if a 20,000-kw. unit were installed. This is indicated in the accompanying graph which shows the expected loads on the South Boston station until the year 1920, it being assumed that the present d.c. stations will carry 50,000 kw. of the peak load. Assuming that all boilers are run at 250 per cent of rating, fewer boilers will be needed to carry the maximum load of 1917 with a 35,000-kw. unit in operation than are now needed to give the maximum rated output of the existing plant.

To provide for the increase in d.c. load there will be required each year the equivalent of about three 2000-kw. rotaries. To house these there would be needed space equivalent to one substation of the usual size per year. Seven of the vacant spaces in existing substations are on the outskirts of the system where rotaries cannot be installed in advance of the local needs, and it has been estimated that the load on these substations in the present winter will be less than 12,000 kw., so that if their load grows pro rata with the rest of the system, they will need less than 1000 kw. of capacity per year, or only the equivalent of one 2000-kw. rotary every two years.

However, the growth of load in the central section of the city may be estimated at about 5000 kw. per year, and to avoid an undue multiplicity of substations it has been decided that future downtown substations shall be of increased size. A large proportion of the cost of a substation is in land, buildings and switching equipment, all of which increase nearly in proportion to the number of units installed, so that a six-machine or eight-machine substation will have a unit cost but little below that of the usual two-unit or three-unit building. The 4000-kw. size will be adopted for future installations, since this not only reduces the cost and number of new substations but permits of the economical increase of capacity of existing substations whose 2000-kw. machines can be used to advantage in the outlying districts.

The present conduit loop, including the branch to and from the power house, is about 22 miles in circumference, and the greater part of the load to be carried will lie within this loop. A new conduit will be built in connection with the generating plant and substation improvements, with a new substation at Dewey Square, Boston, which will become one of the important stations on the system with the opening of the Dorchester tunnel. It is estimated that the cost of adding the 35,000-kw. unit to the South Boston station, exclusive of engineering and fixed charges, will be:



GRAPH SHOWING COMBINATIONS OF TURBINES AND BOILERS REQUIRED FOR FUTURE YEARS' REQUIREMENTS

wider range of load. Operated on the base load of the system, it is estimated that it will show a very substantial saving in plant operation over a 20,000-kw. machine. The following estimate, based on the use of 200-lb. steam pressure, indicates the approximate amount of these savings covering a period of five years after the unit has been placed in service:

Estimated output for five years beginning 1917,	1,180,000,000 kw.-hr.
Approximate cost of manufacture of power for the same period:	
With 35,000-kw. unit.....	\$3,200,000
With 20,000-kw. unit.....	3,400,000

While the curve of estimated maximum loads for the station indicates that a 20,000-kw. unit would provide for the expected increases in load for two or three years, the study of the load as affecting the operation of the individual units throughout the twenty-four hours of each day, shows that the saving in operating costs by the use of a 35,000-kw. unit on the large base load which it could carry would warrant the additional cost. The above tabulation shows that the additional cost of the larger machine, which is estimated at \$200,000, would be entirely repaid in a five-year period by the savings in operation.

Building extension ..	\$95,000	Combination exciter,	
Machine foundations .	13,200	200 kw.	\$9,000
Auxiliary foundations .	1,800	Generator air ducts...	2,000
Condenser tunnels....	36,150	Air washer	4,000
Condenser equipment..	70,000	Switchboard and wir-	
Piping and covering... 35,000		ing	60,000
35,000-kw. turbo-gener-		Incidentals	49,000
erator	315,000		
Total	\$690,150		

All cars of the West Penn Railways, Connellsville, Pa., are equipped with trolley pick-ups. Each car is fitted with a glass-covered box permanently installed in the vestibule over the bulkhead door opening, where it is convenient and always ready for service. At first the pick-ups were simply placed in the motorman's cabs of all cars, but frequently they were not to be found when they were required. In order to obviate this difficulty the glass box receptacle was adopted, and now whenever the glass is broken the motorman must report it to the superintendent of transportation.

Rosettes Proposed in Philadelphia

Andrew W. Crawford, secretary of the City Parks Association in Philadelphia, is urging the use of wall rosettes to support the span wires on certain streets in Philadelphia and thus allow the removal of the side poles. In a letter to the association, President Mitten of the Philadelphia Rapid Transit Company has promised the co-operation of the company and said that the idea might be carried out successfully in the narrower streets of Philadelphia, such as Chestnut and Walnut Streets. He also referred to an attachment made by the company at the Bellevue-Stratford to do away with the pole near the main entrance to that hotel in Walnut Street, but says that the company wishes to be sure that no injury will be caused to the building before giving a more general adoption to the plan. The system of rosettes for supporting span wires is used extensively in Europe.

A Combined Work Car, Snowplow and Sweeper

The Public Utilities Commission of the city of Port Arthur, Ont., has found the utility car shown in the accompanying halftone very useful for several purposes. This car was designed by S. Philp, master mechanic of the commission, and it was built in the commission's shops.

The car is 45 ft. long over all, and 31 ft. long with the plow and sweeper removed. The body is mounted on Brill 27 G-E-1 trucks, and the car is equipped with four Westinghouse 101-B-2, 500-volt motors. It has a Westinghouse air-brake equipment, and Peacock hand brakes.

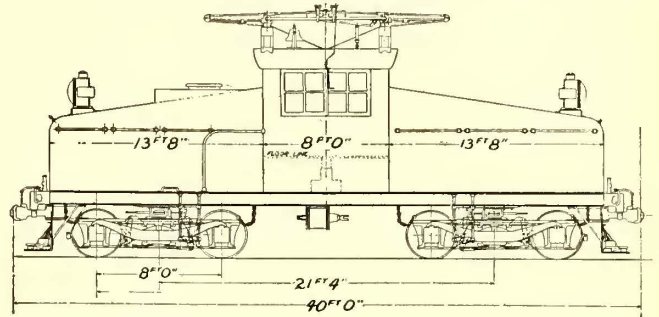
The plow is raised and lowered by means of a hand wheel, its own weight holding it in position when it is lowered. The vane is operated by a 3½-hp., 500-volt motor. When it is out to its fullest extent, it cleans a strip 14 ft. wide outside the track. The vane can also be raised to a height of 8 ft. at the extreme end, and in this position is useful in trimming down heavy snow drifts. The broom is operated by a Westinghouse 12-A motor, both broom and motor being on a special platform which can be removed when they are not required.

All of the appliances are operated from the cab, which is mounted on the front end of the platform, and the machine and equipment can be operated by two men.

Switching Locomotives for the Chicago Milwaukee & St. Paul Railway

Two electric locomotives for switching service in the electrified yards of the Chicago, Milwaukee & St. Paul electric zone are under construction by the General Electric Company at the present time. They are of the eight-wheel type, weighing 70 tons, and each is equipped with four geared motors. The general dimensions and weight are approximately as shown in the accompanying table.

The locomotive running gear consists of two swiveling, equalized trucks, with inside-hung motors. The wheels are 40 in. in diameter, and have 3-in. tires



70-TON SWITCHING LOCOMOTIVE FOR CHICAGO, MILWAUKEE & ST. PAUL ELECTRIC ZONE

shrunk on cast-steel centers. The superstructure is carried on a frame built up of longitudinal steel channels that are braced laterally with cross-sills, and over the whole is laid a steel floor. In the cab only one operating position is provided for the motorman, and in order to assist in giving him a clear view in all directions the floor has been raised approximately 2 ft. above the floor of the platform. The entire space within this main

DIMENSIONS AND WEIGHT OF SWITCHING LOCOMOTIVE

Length inside knuckles.....	40 ft.
Height over cab.....	13 ft. 10 in.
Height, trolley down.....	16 ft. 8 in.
Width over all.....	10 ft.
Total wheel base.....	29 ft. 4 in.
Rigid wheel base.....	8 ft.
Diameter of wheels.....	40 in.
Diameter of axles.....	7 in.
Main journals.....	6 by 11 in.
Minimum clearance under locomotive.....	4 7/8 in.
Weight—locomotive complete.....	140,000 lb.
Weight mechanical equipment.....	85,000 lb.
Weight electrical equipment.....	55,000 lb.
Weight per driving axle.....	35,000 lb.



COMBINED WORK CAR, SNOWPLOW AND SWEEPER USED N PORT ARTHUR CIVIC RAILWAY

cab is unobstructed except for the heater and the necessary controller and air-brake apparatus, all electrical equipment being located either in the end cabs or under the floor of the main cab, so that there is no possibility of injury to persons through accidental contact with high-voltage parts.

The four motors on each locomotive are of the GE-255 railway type, which has a box frame and commutating poles, and is designed for operation on 3000 volts when connected with two motors permanently in series. Single gears are used for the drive.

The control is a type M single-unit equipment providing ten notches with motors connected all in series, and nine notches with motors connected in two parallel groups. The fuse compartment, main switch and contactors are of the same type as used on the large road locomotives for the main line. The transition from series to parallel is accomplished by means of a large electro-pneumatically operated switch which also serves as a motor cutout switch.

Other details of the auxiliary apparatus are designed to conform as far as possible to the equipment of the road locomotives, all small switches, headlights, cab heaters and the pantograph trolley being exactly similar, and the air compressor having parts interchangeable with those of the road locomotives. However, the 3000-volt motor-generator set furnished to provide forced ventilation for the motors, and power for the control and headlights is of a smaller type than that used on the large engines.

The locomotive develops a tractive effort of 42,000 lb. temporarily and 13,480 lb. at a speed of 13.2 miles per hour, or 18,400 lb. for one hour at 12 m.p.h., both of the latter ratings being on the basis of forced ventilation.

Storage-Battery Car Shows Low Operating Cost

An example of the low cost of operation attainable by storage-battery propelled cars on lines of light passenger travel is shown by the performance of the Cambria & Indiana Railroad's 50-ft. 30-ton Edison storage-battery passenger car which was described and illustrated in the *ELECTRIC RAILWAY JOURNAL* of Dec. 19, 1914, and which has been run over the Colver Heights-Rexis section of this Pennsylvania line for the last fifteen months. During a recent series of runs made by this car, amounting to 738 miles, the total cost for platform labor and electric power amounted to \$102.60 or 13.9 cents per mile. This cost is comprised of \$67.20 for wages of motorman and conductor, at \$3.36 per day, and \$35.40 for electric energy, the latter figured on the basis of two cents per kilowatt-hour. No allowance in the operating cost has been provided for attendance in charging the batteries, as this service is now performed on alternate days by the crew, during the interim between the runs.

W. E. Dobson, general manager of the company, believes that the car, with its present battery equipment, is capable of making an increased mileage of 50 per cent, which would reduce the cost per mile materially, because the only additional cost would be in the amount of energy consumed.

This railway company has just evidenced its satisfaction with this type of car propulsion after three years of experience with it by ordering an additional Edison storage battery car from the Railway Storage Battery Car Company, New York. The new car will be of somewhat smaller size than the car described above. It will be 35 ft. 8 in. in length, and will be equipped with 165 Edison A-10 cells and four Westinghouse motors. The body will be built by The J. G. Brill Company.

Installing Auxiliary Contact Wire in Catenary Construction

In the March issue of the *Electric Journal* R. C. Thurston, supervisor of electric service Erie Railroad, Rochester division, gives the cost of adding a steel contact wire to the catenary overhead construction on the electrified division of the Erie Railroad, between Rochester and Mount Morris, N. Y. This is a 34-mile branch line, which was electrified in 1906. The 11,000-volt overhead line is of single catenary construction with 7/16-in. steel-span messenger wire and No. 000 high-drawn-copper contact wire. The installation of the auxiliary steel contact wire was described in the issue of the *ELECTRIC RAILWAY JOURNAL* for June 7, 1913, page 999. The data now given by Mr. Thurston form a valuable supplement to that article.

It was estimated that the addition of the supplementary wire would cost about \$12,000 for the 34 miles of main track and 3 miles of sidings and yards, the cost to cover renewals of the deflectors or their adjustments to the level of the new wire. The actual cost follows:

Material	\$8,176.24
Labor	1,036.60
Work train and crew	1,818.46
Supervisor, engineering	301.12
Total	\$11,332.42

The new wire has eliminated troubles with broken contact wire, as it was designed to do, but it has decreased the life of pantograph shoes to about 2500 miles.

Cast-Iron Sleeve for Expanded Steel Poles

As an extra precaution against corrosion of its expanded steel poles at the ground line, the Bates Expanded Steel Truss Company, Chicago, Ill., has introduced a cast-iron sleeve as illustrated herewith. The high corrosion resisting qualities of cast-iron combined with a cement mortar or asphalt filler as a seal against the entrance of moisture between the sleeve and the pole makes this an ideal protective device. These sleeves are made in two sections which are fastened together with one 1/2-in. machine bolt as shown in the accompanying illustration. Those designed for a 35-ft. 5-in. pole weigh approximately 75 lb. The walls of the sleeve are 3/4 in. thick. The sleeves are 18 in. long and are set 12 in. above the ground and 6 in. below. When placed in position on the pole there is a space approximately 1 in. wide between the pole and the sleeve. This interval, as mentioned before, is filled with cement mortar or asphalt to seal it, and thus prevent the entrance of water from the top or bottom of the sleeve.



CAST-IRON SLEEVE TO PREVENT CORROSION OF STEEL POLES

The sleeves are 18 in. long and are set 12 in. above the ground and 6 in. below. When placed in position on the pole there is a space approximately 1 in. wide between the pole and the sleeve. This interval, as mentioned before, is filled with cement mortar or asphalt to seal it, and thus prevent the entrance of water from the top or bottom of the sleeve.

LONDON LETTER

London Electric Railway and Omnibus Companies Pool
Profits—London County Council Tramways
Report Figures*(From Our Regular Correspondent)*

At meetings of the four electric railways controlled by the Underground Electric Railways, London, and of the London General Omnibus Company held recently, a perpetual agreement was approved between the several companies for pooling profits. The scheme consists of the payment of the half-yearly net profits of the five companies, after providing for transfers to reserve funds, into a common fund which will be distributed among the companies in certain proportions. Some idea of the vast amount of traffic handled by the five companies concerned is derivable from the fact that in 1914 the number of passengers carried totaled 819,000,000. The management of the various companies has done almost everything feasible to attract business by affording facilities of all kinds, and has initiated a system of through fares and through bookings. Despite these arrangements, only 42,000,000 of the passengers conveyed in 1914 were through passengers between the various systems controlled by the Underground Company. That this was so was due in part to the fact that each through ticket must be apportioned between the carrying companies, which made the provision of a complete and comprehensive system of through tickets practically impossible. The new arrangement is designed to do away with any need of apportionment of through bookings and will render possible a simple and effective system of through or interchange tickets, thus avoiding the expense of apportioning and clearing many millions of through fares, each of small amount.

Lord Claud Hamilton, presiding at the recent meeting of the East London Railway, said that the railway's main source of revenue was passenger traffic. He attributed the large increase in traffic to the electrification of the line, which was now entirely completed. In 1912 the railway carried 4,224,059 passengers, whereas at present it is carrying 8,497,284. The war may have had something to do with the increase, but too much importance need not be attached to that suggestion. Lord Hamilton believed that the facilities afforded, especially for through booking, had really brought about the great increase.

According to the annual report of the London County Council, the total length of the Council's tramways on Dec. 31, 1914, was 149½ route miles, of which about 143½ miles were electric tramways. During the year 1914 nearly 60,000,000 miles were run by the tramcars, while nearly 535,000,000 passengers were carried. The total capital expenditure upon the tramways undertaking to March 31, 1915, amounted to £13,315,723, of which £287,603 represented expenditure during 1914-1915. The total income for the year was £2,399,846 and the working expenses £1,700,571, leaving a surplus of £699,275. Debt charges and interest, however, amounted to £732,448, so that there was a deficit for the year of £33,172, which has been met out of the general reserve fund. The total debt incurred to March 31, 1915, amounted to £13,744,606. Allowing for debt repaid and sinking fund balances, and for surplus land valued at £122,216, the net debt at that date was £9,836,186.

Steady progress is being made with the equipment of additional suburban routes for electrical working on the London, Brighton & South Coast Railway. The lines which are now being converted from steam to electric traction on the single-phase system extend over a total of 220 miles of single track. It is unlikely that electrical services will be in operation between London and Brighton and other south coast towns for some years, but the work which is being done on the suburban routes is now approaching the final stages, and when the contracts now in course of execution are completed the main-line work will doubtless be taken in hand.

There have been a great many stoppages of late on the Edinburgh tramway system. At the annual meeting held recently, the chairman stated that the system at present was not in a state in which it ought to be. There are 13,000 pulleys on the system. These had been carefully examined and inspected. Out of that number about 5000 were either wanting or inefficient. The late engineer accounted for

many of the delays by the fact that they were entirely due to the number of new drivers on the system, many of the old ones having gone on service at the front. Before the end of March the whole system would be thoroughly overhauled.

One of the Gateshead & District Tramway cars ran down an incline backward recently and jumped the track in Saltwell Road. Four persons were killed and two severely injured. The car was on a steep grade and in a loop waiting for another car to pass. After waiting for some time for the down car to move, the driver of the up car fixed the brakes and went forward to ascertain the cause of the delay. During his temporary absence the car began moving backward down the hill, and finally overturned. At the time of the accident there were between thirty and forty passengers on the car. The four persons who were killed were not traveling in the car, but happened to be passing at the time and were knocked down when the car left the rails and were crushed beneath it when it overturned.

A somewhat similar accident to that at Gateshead resulted in the death of one passenger recently on the Dudley system of tramways. On arriving at a terminus the driver left the car, telling the conductor that he was going for his tea, which he intended to eat on the journey. It appears that the car started of its own volition before the return of the driver, and the conductor proceeded to collect fares as if everything was in order. It was not until the car had proceeded a quarter of a mile that a passenger called the conductor's attention to the fact that there was no driver. The conductor promptly applied the brake at the rear, but too late to save the car from being overturned. At the inquest the jury returned a verdict to the effect that the overturning of the car was due to gross carelessness on the part of the conductor, and that the driver deserved censure for his neglect. The conductor has been charged at the police court with manslaughter.

The Metropolitan Electric Tramways, Ltd., as the lessee of tramways owned by the Middlesex County Council, has deposited a bill for introduction into Parliament next session to relieve temporarily the Middlesex County Council "from any liability to proceed or to be compelled to proceed" with the tramway and street widenings authorized by Parliament in 1911. The preamble of the bill states that this relief is required "in the circumstances of the present war and the curtailment of expenditure by public bodies arising in consequence thereof." The relief is to extend until three years after the termination of the war. The bill also postpones until the same period the time granted by Parliament in 1913 for erecting trackless trolley vehicle equipment in Wood Green and Tottenham from Green Lanes to Ferry Lane.

The Board of Trade has inspected the tramway to Acock's Green which has been constructed by the tramways department of the Birmingham Corporation. Owing to the shortage of men in the employment of the department, and to the fact that extra care must be observed in running the cars in consequence of the restricted lighting, it has been found desirable to reduce the speed on all routes, and thus lengthen the time consumed in the journeys to and from the city. This involved a complete revision of the time-table.

The terms of the award in the arbitration between the Plymouth Corporation and the Devonport & District Tramways, which system was recently annexed by the corporation, are as follows: The arbitrator awarded that the corporation should pay the company in respect of (1) the company's tramway undertaking; (2) the light railway; and (3) the profits the company might have been expected to earn between Oct. 2, 1915, and Aug. 12, 1919—that is, the whole of the matters referred to in the agreement between the parties dated May 10, 1915, scheduled to the Plymouth Corporation Act, 1915—the sum of £103,970. Each party is to bear its own cost of the reference, and the arbitrator's costs are to be borne in equal shares by the corporation and the company. Mr. Sellon, for the company, claimed in round figures £257,000, while Mr. Hamilton, for the corporation, assessed the value of the undertaking and compensation payable at £93,000.

More than 190 women are now employed as conductors on the London County Council Tramways. They work on an average eight hours and twenty-four minutes a day. They are paid the same rates of wages as men conductors.

A. C. S.

NEWS OF ELECTRIC RAILWAYS

NEW YORK INVESTIGATION TO LAST UNTIL JULY 1

The Senate of New York on Feb. 29 voted by twenty-four to fifteen to give the Thompson legislative investigating committee until July 1 to complete its hearings and six months more to compile its report. Senator Thompson had previously offered a resolution extending the life of his committee from March 7 to Jan. 10, 1917.

In the meantime confirmation of the nomination of Travis H. Whitney and Charles S. Hervey by the Governor for appointment to the Public Service Commission for the First District of New York is being held up. Senator Thompson has announced himself as opposed to these appointments as unwise "in view of the disclosures that have been made in the course of our investigation." He said, however, that he was open to conviction with respect to the Whitney's record. Mr. Whitney is now secretary to the commission and Mr. Hervey was a deputy in the comptroller's office.

On Feb. 28 subpoenas were issued to the Interborough Rapid Transit Company calling for a record of financial details for a period beginning at its organization and of the Brooklyn Rapid Transit Company from 1908.

On Feb. 26 Mirabeau L. Towns, the lawyer, told the Thompson committee of receiving \$5,000 from the Interborough Rapid Transit Company for arranging conferences between President Theodore P. Shonts of the company and Mayor William J. Gaynor in the negotiations over the then proposed subway extensions, and how he swayed the Mayor from a plan of municipal ownership to favor the Interborough plan. Mr. Towns denied that there was ever anything ulterior in his dealings with the Interborough. The committee also heard T. H. Gillespie, vice-president of T. A. Gillespie & Company, the firm which got the contract from the Interborough for third tracking the elevated lines. Mr. Gillespie appeared in answer to a subpoena, but he refused to turn over to the committee certain papers bearing upon his firm's dealings with a branch firm in Pittsburgh. Senator Thompson immediately got into touch with District Attorney Swann, but later decided to ask the Senate to summon the recalcitrant witness before it.

On March 1 the committee went more thoroughly into the subway prior determination account to find out if the bonus allowed President Theodore P. Shonts of the Interborough is to be paid by the city. On the same day Mayor Mitchel ordered Corporation Counsel Hardy to make a thorough investigation of the matter. In a letter to Mr. Hardy the Mayor said it had been suggested that the bonuses given Interborough officials and other charges have been made to the construction account, and that any charges improperly made to this account must obviously work to the detriment of the city. He ordered Mr. Hardy to obtain an official transcript of the minutes of the Thompson committee and find out if there is a basis for the city's contesting any such charges.

HOLYOKE COMPANY OPPOSES MUNICIPAL OWNERSHIP BILL

William H. Brooks, attorney for the Holyoke (Mass.) Street Railway, appeared at a hearing before the committee on street railways at Boston on Feb. 17 in opposition to the bill authorizing the city of Holyoke to purchase the road. Mr. Brooks declared that, to every intent, the bill is unconstitutional, and as class legislation it should be vigorously condemned. He charged the proponents of the measure, who appeared in force in the previous week, with playing politics. Mr. Brooks said that the stockholders of the company would be glad to sell their holdings if they could get back what they had put into the road. The company has 371 stockholders who own the 13,400 shares outstanding. The largest holder owns only 800 shares. According to the terms of the bill the city could purchase the physical plant and equipment of the property without paying anything for good-will and other intangibles.

NEW SAFETY MOTION PICTURE IN BROOKLYN

The central safety committee of the Brooklyn (N. Y.) Rapid Transit Company has staged a new safety moving picture which has been produced by the Universal Animated Weekly and forms an interesting supplement to the now famous Brooklyn Rapid Transit safety motion picture, "The Price of Thoughtlessness," which was produced two years ago. "The Price of Thoughtlessness" had an extraordinary run in moving-picture houses throughout the country, and has become a standard among safety films dealing with accidents to children.

In safety instruction, as in many other things, there is always a demand for something new. Accordingly the central safety committee of the company undertook last fall to produce a new film. The result is "The Cost of Carelessness," a movie also dealing with child accidents, the scenario being developed by E. C. Clarke, supervisor of instruction of the surface lines; A. P. Gumaer, formerly chief clerk of the bureau of public safety, and H. A. Bullock, chairman of the central safety committee, in co-operation with the management of the Universal Animated Weekly.

The picture begins by showing Gen. George W. Wingate, president of the Brooklyn Institution for Safety, giving a safety talk to a group of boys and girls at a school building, and then presents a scene in school with Mrs. Katherine D. Larrabee, the lecturer of the Bureau of Public Safety, conducting a safety meeting. A unique feature of the picture is "a movie of a movie," in which the children are shown looking at the picture. "The Price of Thoughtlessness" and the scenes from that picture as displayed on the screen actually pass before the eyes in the new motion picture, "The Cost of Carelessness."

The picture shows the safety patrols at work and follows children to their play after school hours. Two of the boys try stealing a ride on the rear end of a trolley car and one of them jumps off directly into the path of an approaching automobile. He is "run over." The next scene shows a group of the boys playing "cat" in the street. One of them stumbles and falls on the car tracks, and this juvenile actor is actually struck by the car and picked up on the wheel-guard. Then the film shows how various boarding and alighting accidents occur, and passes finally to the reckless operation of automobiles.

The new movie was presented in public for the first time at the luncheon of the Brooklyn Institution for Safety at the Hotel Bossert on March 4. It will now be put into use in the public safety campaign.

ARBITRATION AGREED TO IN SPRINGFIELD, MO.

A strike of the employees of the Springfield (Mo.) Traction Company, conducted through the Springfield Division of the Amalgamated Association, was begun on Feb. 19, as an outcome of the demands for recognition by the company, submission by the company to arbitration in case of dispute and recognition of the privilege of seniority in the assignment of runs. Street car service in Springfield, which was suspended, owing to the refusal of strikers to work, was resumed in three days, and on Feb. 23 an agreement was signed by both parties. An abstract of this agreement follows:

1. The company officials agree to confer with representatives of the Division of the Association upon all questions within the spirit of the agreement, which may from time to time arise.
2. Upon failure to reach a mutually satisfactory agreement the matter in dispute shall be submitted to a temporary board of arbitration consisting of three disinterested parties of which one member shall be selected by the company, one by the Association Division and the third member by the two thus chosen. The day after the board has been chosen it shall meet daily, Sunday excepted, until a decision is reached. Each party shall bear the expenses of its chosen arbitrator.

and both parties shall share equally in paying the expenses of the third arbitrator. Each party must select its arbitrator within five days after the agreement to arbitrate or notice is given by either party to the other that arbitration is desired.

3. If any member of the division is found after proper investigation to have been unjustly suspended or discharged he can be reinstated by the company and shall be paid for all time lost. Any employee laid off for cause shall receive a hearing on written demand within twenty-four hours by the superintendent of the company.

4. Preference of runs shall be assigned in accordance with seniority of service with the company. The company has a right to consider efficiency in questions of seniority, and should the schedules or runs be changed they will be made up in substantially the same manner and form as they are at present in effect and have been for the past five or more years. The present scale of wages shall be maintained without change.

BIDS WANTED FOR MATERIAL

The St. Paul Southern Electric Railway, St. Paul, Minn., announces that it is in the market for the following material: 100,000 ties, cedar, tamarack or oak; 1600 7-in. 35-ft. cedar poles; 4000 tons of 70-lb. rails and fastenings; eight passenger cars; one electric locomotive; one snowplow; 36 miles of fencing; copper bonds, and No. 0000 copper wire. All correspondence regarding this equipment and material should be addressed to W. L. Sonntag, general manager, 1127 Merchants' National Bank Building, St. Paul, Minn.

SAMUEL GOMPERS DISCUSSES PUBLIC OWNERSHIP AND ORGANIZED LABOR

In its issue of Feb. 19 the *Union Leader*, the official journal of the electric railway employees of Chicago and published by the Amalgamated Association, quotes Samuel Gompers, president of the American Federation of Labor, as follows:

"The defeat by the labor unions of the proposed municipal street car system in Detroit has puzzled and taken aback the intellectual group of advocates of public ownership in general. They have been in the habit of hastily going ahead with their theories without taking into account the lessons the wage-workers have learned thereon, sometimes at a dear price.

"Discussion in the trade unions of the right of government or municipal employees to organize has brought to the forefront above all other considerations concerned in the question the fact that the right of labor to stop work at will must not be in the least restricted in any part of the public service. Methods, directly applicable, open to all the wage-earners interested, must be established by which grievances shall, beyond question, be rectified. Petitions must be acted upon and hearings for individuals or delegations granted promptly, while lawful association of the workmen remains untrammelled and duly protected. In short, all the aims of organized labor, in point of wages, workday and workshop conditions, must be equalled or bettered in practice, or else every usual form of the activity of organized labor, including the strike, is to be expected, as labor's fundamental right.

"While the municipal ownership proposition was under consideration in Detroit, representatives of the labor movement appealed to us for advice. The following telegraphic reply was sent:

"I would not vote in favor of municipalizing of the railroads unless it had at least this provision: right of the workers to organize and for the directors of the railroad to enter into joint bargain regarding wages, hours and conditions of employment. If proposition does not contain such a proviso, in my judgment it should be defeated."

"Trade unionists are convinced that to take away by arbitrary order both the laborer's supreme lawful right to dispose of his labor at his own will and the laborer's correlative rights to hearing, petition and association is to crush him and abandon him in helpless slavery. No municipal ownership scheme, with trade unionism left out, can be acceptable to trade unionists and liberty-loving citizens."

PRACTICAL PUBLIC RELATIONS

International Railway Hauls Garbage, Ashes and Other Refuse in Emergency—Keeps Its Lines Open in Blizzard

Through the immediate co-operation of E. G. Connette, president of the International Railway, Buffalo, N. Y., the strike of ash, refuse and garbage wagon drivers employed by the city did not have a serious effect upon any particular section of Buffalo. Large double-truck flat cars and the single-truck automatic dump cars were pressed into service over all lines and there was but little delay in making collections. In the downtown sections collections were made during the night and in many instances the service was more satisfactory than the wagon collection. The heavy snowfall during the weeks of Feb. 20 and 27, which threatened to impede traffic if allowed to accumulate during the strike, was quickly removed by the company's laborers and hauled away in flat and dump cars. The railroad work was under the direction of N. H. Brown, general superintendent of transportation, and Thomas Connette, superintendent of the Buffalo city lines.

William F. Schwartz, commissioner of streets, commenting upon the spirit of co-operation displayed by officials of the company, said that much credit was due to Mr. Brown and Mr. Connette for the thorough manner in which the work was handled, as the situation during the first day of the strike threatened serious proportions. There was an exceedingly heavy fall of snow, and with no wagon drivers or laborers available to remove the snow and carry on the regular work of collecting the refuse, ashes and garbage, the city officials were at a loss to solve the problem.

Despite the blizzard and heavy snowfall in Buffalo and western New York on Feb. 26 and 27, the city and inter-urban lines of the International Railway did not have any serious trouble in maintaining schedules. Large rotary snowplows were used on the Buffalo and Lockport, Lockport and Olcott and in some parts of the Buffalo and Niagara Falls divisions, and all available push plows and sweepers were pressed into service on the city lines of Buffalo, Niagara Falls and Lockport.

KANSAS CITY RAILWAYS ORGANIZES PUBLICITY DEPARTMENT

E. B. Atchley, formerly connected editorially with various Western newspapers, and recently special editorial writer on the *Kansas City Post*, has been made head of the new publicity department of the Kansas City (Mo.) Railways. This department is to be subordinately a "press agent" service, since most of its activities will be directed to work for the benefit of the employees of the company. It will have charge of welfare work and safety-first propaganda. It will also handle the advertising of the company.

While there is no purpose to seek newspaper publicity through this department, its function will be to see that correct information goes out, complete in detail, and consistent with facts in other departments and with the plans of the company. The present plan is to give the information in skeleton form, to be written by the persons seeking the stories. It is probable that daily bulletins will be issued on current happenings, to which the newspapers will have access.

Perhaps the most important feature of the work of the new department will be that for the benefit of employees. It will systematize and expand the welfare work already being done, arrange for gymnasium facilities for employees and supervise the athletic equipment in all carhouses. A loan department will probably be established for the benefit of employees. A monthly magazine is to be established for circulation among the men.

Frank J. Munagle, publisher and editor of the *Electric Railway Trainman* of Kansas City, will assist Mr. Atchley. The *Electric Railway Trainman* will discontinue its Kansas City personal department, and become more of a national magazine for trainmen. Miss Green, formerly secretary to John M. Egan, formerly president of the street railway, closely in touch with the company's activities, will also be in the department.

The same department will handle similar work for the

Kansas City Light & Power Company. The details of this work will be arranged after the separation of this company from the street railway has been completed.

WORK STOPPED ON PHILADELPHIA UNDERGROUND ROAD

Engineering difficulties experienced in excavating for the Broad Street subway beneath City Hall in Philadelphia, Pa., have resulted in the suspension of operations entirely. This action was taken by Mayor Smith, after conferences with Senator McNichol, president of the Keystone State Construction Company; his engineers, Director Twining and William H. Quimby, the chief engineer, in charge of construction for the department of transit. When the Mayor was asked concerning the shut-down, he said he had ordered to work stopped, pending a report from the department of transit. Director Twining issued a statement as follows:

"The Mayor made a statement that he had authorized that work be temporarily suspended on the contract for the section of the Broad Street Subway beneath the City Hall. The Mayor stated that Director Twining had discussed with him certain changes which he favored, and that he was expecting a detailed report to be submitted to him in a short time. He stated that he considered these modifications would be very much to the benefit of the city. These modifications, if adopted, may alter the work now under contract beneath the City Hall to some extent, and the Mayor considered it wise to suspend that work until the detailed report was received and given consideration. The Mayor stated that he had been informed by Director Twining that if the modifications proposed be adopted the work will probably cost less money and can be constructed more quickly than otherwise, so that the operation of the system would be expedited."

\$100,000 FOR PUBLICITY

The Brooklyn Rapid Transit Company spent \$100,000 for publicity in its subway campaign prior to the signing of the contracts two years ago, according to a statement made by Timothy S. Williams, president of the corporation. In explaining these payments Mr. Williams said:

"These were legitimate expenditures incurred in our appeal to the public on behalf of Brooklyn and Queens. We thought they were just as proper charges to our construction account as many of the city's expenditures which were charged to its construction account, but the Public Service Commission did not agree with us, and so the items are not added to its construction account, but have to be amortized out of earnings during a certain number of years. The expenses to which I allude aggregate about \$100,000, and nearly all of them were made up of bills paid to newspapers for advertising, the small balance being for other publicity purposes, such as printing and postage involved in circularizing, etc. The advertising was a very effective means of reaching the people, and was undoubtedly productive of much good in informing public officials."

PREPARING FOR BROADWAY SUBWAY OPERATION

With the idea of getting the new Broadway subway into operation early next year the Public Service Commission for the First District of New York is advertising for bids for station finish for seven stations on that line between Morris Street and Trinity Place on the south to and including Union Square on the north. Bids for this work will be opened on March 9 next at 12.15 o'clock and the contract will be awarded shortly thereafter. It is the intention of the commission to push this work so that it will be finished in time for the track-laying and signal installation in the spring. The construction contracts upon the lower part of the Broadway subway are nearly completed, and with good luck those between Bleeker Street and Twenty-sixth Street should be completed during the coming fall. The Canal Street subway, which is to connect the Broadway line with the Manhattan Bridge and the Fourth Avenue subway in Brooklyn, should be completed in March of next year, and then trains from the Fourth Avenue subway can operate through Canal Street to Broadway and north through Broadway as far as the completed

structure will permit, which will probably be between Fourteenth Street and Twenty-eighth Street. As the Fourth Avenue subway is already operating to Coney Island by the Sea Beach connection, this will make possible through operation from Fourteenth or Twenty-eighth Street to Coney Island during the next summer season.

\$180,000 TO BE SPENT FOR BUILDINGS IN TRI-CITIES

Car shops to cost \$80,000 and an inn to cost \$100,000 are two of the largest improvements the Tri-City Railway, Davenport, Iowa, will make in the tri-cities this season. Plans for the two improvements, both of which will be made in Rock Island, have been completed and officials announce work will begin immediately.

The new inn will be a historic structure on the heights overlooking Rock River. It will be erected on the site of three former inns, two of which were burned. The present structure will be fireproof. The construction of the new inn will follow closely the construction of a similar building on Campbell's Island, another favorite amusement spot.

Plans for the new car shops indicate the company will build one of the most modern plants of the kind in any city in the Middle West. The shops will afford the company an opportunity to rebuild and repair its entire equipment, consisting of nearly 200 cars. The shop building will be two stories. The upper floor will contain the offices and baths and rest rooms, etc., for the conductors and motormen. The first floor will contain modern machinery and equipment. The building will be of brick, steel and concrete and of architecture to conform with the adjoining carhouse constructed two years ago following a fire in which the company lost practically all its rolling stock.

Traction Company Guarantees Saving Over Municipal Light Plant.—The Fort Wayne & Northern Indiana Traction Company has made a proposal to the board of public works of Fort Wayne, Ind., to take over the lighting of the city streets and has guaranteed to save the city \$395,000 on a ten-year contract. The city has maintained a municipal lighting plant since 1907 and has engaged in both street and private lighting.

Signs of Spring.—Interborough Day will be celebrated at the Polo Grounds, New York, on April 11, when the New York Giants will meet the pick of the Interborough league players, who are employees of the elevated and subway roads included in the system of the Interborough Rapid Transit Company. The railroad shops will be closed that day and 5000 employees and their friends will attend the game. They will have the Interborough band of 150 pieces to provide the music. This will be the first event of its kind ever seen at the Polo Grounds.

San Francisco Ferry Loop Privilege Must Be Shared.—That the United Railroads, San Francisco, Cal., shall share the outer loop with the Municipal Railway or remove the tracks within thirty days was the dictum of the State Board of Harbor Commissioners, issued on Feb. 19. This is the outcome of the city's application filed several days ago and asking for the same privileges over the tracks of the ferry loop as the United Railroads enjoys. This ruling may secure for the city the right to operate cars on the loop as it was doing previous to the granting of the injunction. It is stated that permission will be secured from the property owners to allow the city to attach overhead wires to the buildings. Superintendent Cashin stated that only a short time would be necessary to install a new loop in case the United Railroads was ordered to remove its tracks.

Air Brakes and Toilets Ordered to Be Installed.—Members of the Ontario Railway & Municipal Board held a session in Windsor, Ont., on Feb. 21, and at its conclusion representatives of the corporation announced several important orders by the commission. Among the most important matters discussed was the question of having air brakes installed on cars of the Windsor-Tecumseh interurban line of the Sandwich, Windsor & Amherstburg Railway. Chairman McIntyre intimated that an order would be made to this effect, and also that toilets would have to be installed at once on the cars of this line. The board's engineers will investigate the operation of the service be-

fore any judgment is delivered. An application by the city to compel the company to lay tracks on Erie Street was not entertained by the board. Chairman McIntyre stated that this question was one with which the commission had not power to deal. The board will, however, see that if the city decides to make an extension of the line to Walkerville, they will not be interfered with.

Conflict of Provincial and Dominion Rights.—When the Dominion House of Parliament went into committee on private bills at its opening on Feb. 21, the question of conflicting provincial and dominion rights arose in connection with the consideration of a bill transferring to the city of Brantford, Ont., the right of operation of the Grand Valley Radial Railway, which has been acquired by the corporation of that municipality. W. F. Cockshutt explained that when the railway, which besides running over Brantford streets radiates to the cities of Paris and Galt, had gone into liquidation it had been acquired by Brantford and had hitherto been operated under license. It was now sought to transfer to the commission appointed to take it over the rights granted in the original act of incorporation of the road. William Pugsley said the proposition might be advanced that Parliament had no right to legislate in regard to purely local railways, which were not works for the general advantage of Canada, and Sir Robert Borden agreed that the bill should be inquired into by the Justice Department in this connection, and that the Ontario authorities should be notified in regard to it.

PROGRAMS OF ASSOCIATION MEETINGS

Wisconsin Electrical Association

As stated briefly in the *ELECTRIC RAILWAY JOURNAL* of Jan. 1, page 56, the annual convention of the Wisconsin Electrical Association will be held at Milwaukee on March 16 and 17, with headquarters at the Hotel Pfister. At the meeting the Railroad Commission of Wisconsin will define its attitude toward the security issues and outline the procedure to be followed in making application for an increase in capitalization. A member of the Wisconsin Tax Commission will explain the method of taxation of public service companies and why taxes have been increasing annually. The new schedule of rates for residence electric service now in effect in Milwaukee and the surrounding territory will be explained. A paper will be presented on street lighting rates and contracts which will state the underlying principles of rate making and cost accounting for street lighting service. There will also be a paper "Two Years' Experience in One-Man Car Operation." March 16, the first day of the convention, will be a joint session with the Wisconsin Gas Association.

New England Street Railway Club

The sixteenth annual meeting and dinner of the New England Street Railway Club will be held at the Copley-Plaza Hotel, Boston, Mass., on March 23. At the annual meeting at 3 p. m. the election of officers will take place, the annual reports of officers read and other business of the usual nature considered. Plans have been made to make the reception at 6 p. m. an unusually pleasant feature. The speakers' committee has succeeded in securing speakers of prominence and has announced acceptances from Capt. Halstead Dorey, aide-de-camp to Maj.-Gen. Leonard Wood, Headquarters Eastern Department, U. S. A., Governors Island, N. Y., and Camp Commander, First Training Regiment, Plattsburg, N. Y.; A. B. Leach, New York, president A. B. Leach & Company, former president of the Investment Bankers' Association of America and president of the Columbia Gas & Electric Company, Cincinnati, Ohio; Samuel W. McCall, Governor of the Commonwealth of Massachusetts, and James M. Curley, Mayor of the city of Boston. The toastmaster will be Guy A. Ham. The cost of tickets will be \$5 each. The tables will seat eight each. Seats and tables will be assigned in the order of the receipt of applications. So far as it does not conflict with the "first come, first served" policy, the personal preferences as to location, etc., when expressed in writing by the applicant for seats, will be considered by the committee in the assignment, and every possible effort made to follow them.

Financial and Corporate

COST OF RAILWAY SUPPLIES INCREASING

Data from Authoritative Sources Show Serious Condition
Confronting Electric Railways on Account of
Rising Prices and Slow Deliveries

The increasing cost of supplies is becoming a problem of serious importance to the electric railway industry, and even more important is the fact that deliveries on some commodities are beginning to look impossible at any price. Such conditions are not at all imaginary, for data collected by the *ELECTRIC RAILWAY JOURNAL* from both railway and manufacturing sources clearly indicate the reality of the upward price movement.

For example, one company says that 6-in. trolley wheels which were sold last year for \$1.20 are hard to get at \$1.90, and steel trolley poles are practically out of stock. According to other reports, trolley rope is up 2 or 3 cents per yard, being affected by the cotton market, as are also tapes for winding armatures. The last purchase of tapes in one case was made in February at an advance of approximately 15 per cent above the normal. Cotton waste, purchased on contract last year at 5½ cents per pound for colored and 6½ cents per pound for white, is now 8 cents and 10 cents respectively.

Rail bonds are said to have steadily advanced in price during the last year, the increase now being about 40 per cent. Field and armature coils have, during the last three months, taken rapid strides in price, ranging from 30 to 40 per cent over previous prices. Dry batteries cost to-day 33.3 per cent more than a short time ago. Plate glass figures about 25 per cent higher in price than it did a few months ago, and window glass from 35 to 40 per cent higher. Bolts, nuts and washers have jumped about 50 per cent, and car axles had jumped about \$1.50 per hundred pounds in December with a very long delivery period to be expected. Ball-bearing prices are way up. High-speed twist drills have increased in price about 300 per cent and at that are very hard to obtain. Gears and pinions have taken a tremendous jump in price. Iron castings, owing to the cost of coke, pig and labor, have advanced in one case 65 per cent at local foundries. Metal parts cannot be had short of from six to nine months' delivery.

The following testimony of a prominent railway purchasing agent aptly describes the trade conditions in the copper, as well as the iron and steel, market:

"One of the largest producers of copper trolley wire has advised us that it is promising deliveries of not less than ten months and does not care for the business at that. A scrap metal dealer said that he had never seen such conditions in his thirty years' experience, especially on copper and brass. He cited a couple of recent purchasers of this scrap who were never known before to purchase such material. In fact, they would not accept it as a gift, but to-day they are hounding him for it.

"Iron and steel are simply beyond us, and if any store-keeper dares to requisition for it we simply get dizzy when we see the items, no matter how small they may be. We had occasion the first of the month to purchase some cold rolled steel, and of course had to buy from jobbers on account of the small quantity. We were obliged to pay more than a 100 per cent increase over the normal price. We have been obliged, notwithstanding the stock put in, to purchase quantities of bar iron and steel. It is a common thing after we secure quotations and place our orders to be notified that the dealer cannot fill this or that item, for his stock was depleted during the one, two or three days intervening between the time of the quotation and the time of receipt of the order."

The coal situation in several cases has assumed a very serious aspect, on account of the great congestion at transfer points and terminals, and some railways are said to have been required to pay extremely high prices for coal regardless of their contracts. In view of the expected labor difficulties in the coal field, the outlook is deemed anything

but favorable. Moreover, there have recently been substantial advances in automobile tires, broom stock, leather, paper, lumber and all sorts of chemicals, especially those entering into the manufacture of paints. Gasoline is selling at a fancy price. Indeed, one purchasing agent said: "I could enumerate every article costing more money to-day than in normal times, but such a list would comprise practically every article I purchase."

One of the companies furnishing the foregoing data anticipated its 1916 requirements in a "tremendous" variety of materials so that in its case the only present disturbing factor is deliveries. This company has not yet considered any substitutions, but it is felt that if the present conditions continue for another year or two, these may be necessary.

FINANCING RAILWAY CONSTRUCTION

Fresno Interurban Railway Desires to Raise Money from Abutting Landowners as Unsecured Creditors

A plan to finance the construction of an electric railway with money advanced by owners of land increased in value by the improvement, who shall be reimbursed from surplus earnings of the line but who shall not receive any security for repayment from any source other than from surplus earnings, has been sanctioned for the Fresno (Cal.) Interurban Railway by the California Railroad Commission. The company plans to build a line from Fresno to the Center-ville district, with branches to Clovis and to Gould colony, a total of 26 miles, which can be built for \$17,300 a mile or \$449,800. Already 4.5 miles of single track are in operation.

According to the plan proposed, landowners subscribing to the construction of the line are to receive certificates of indebtedness, but money thus raised is to be used solely for refunding the \$350,000 of bonds that the company has been authorized to issue. According to the plan, certificates of indebtedness will be sold to landowners under terms that payment be made on the basis of 10 per cent thirty days after the line has been completed to or opposite the property of the subscribers and the balance before ten years, with interest at 6 per cent from the time of the 10 per cent payment. For the unpaid 90 per cent balance the company proposes to take out mortgages on the property of the landowners, who would thus become unsecured creditors because the company would give no security for the payment and cancellation of the certificates of indebtedness. It is stipulated, however, that any surplus remaining after the payment of operating expenses, sinking fund instalments, interest on bonds and other fixed charges shall be used as follows: (1) For the payment of 6 per cent interest on all money paid by the landowners who sign the proposed agreement; (2) for the payment of an amount to the landowners who sign the proposed agreement equal to the interest due the company from these landowners on unpaid subscriptions; (3) for the payment and cancellation of bonds, and (4) for the payment and cancellation of the certificates.

The foregoing plan was approved by the commission on the condition that copies of the decision be shown every landowner asked to subscribe, in order that he may know just what is proposed. In discussing the plan Commissioner Loveland said:

"The landowner is to become an unsecured creditor of the company, and the company is to have a lien on the property of the landowner for unpaid subscriptions. If the landowners, who expect to be benefited by the construction of the line, desire to aid in its financing, this commission will not restrict them from so doing, and I do not desire to cast unnecessary doubt on this enterprise. This commission, however, has no means of determining whether the surplus earnings will be sufficient to pay the principal of and the interest on the certificates of indebtedness. The applicant will be required to furnish a copy of this decision to each landowner before he is called upon to sign the proposed agreement. It will also be necessary for the applicant to submit to this commission for approval a copy of the proposed agreement which it expects the landowner to sign, as well as a copy of the proposed certificate of indebtedness which it proposes to issue. I suggest that the certificates be made negotiable, that they be issued for a term not exceeding fifteen years and that they be made a lien on the property, subject to the lien of the first mortgage bonds."

ANNUAL REPORT

Oregon Electric Railway

The statement of income, profit and loss of the Oregon Electric Railway, Portland, Ore., for the twelve months ended June 30, 1915, follows:

Railway operating revenues.....	\$984,395
Railway operating expenses.....	695,647
Net revenue, railway operations.....	\$288,748
Taxes assignable to railway operations.....	78,918
Operating income	\$209,830
Non-operating income:	
Income from lease of road.....	\$496
Miscellaneous rent income.....	102
Net income from miscellaneous physical property.....	3,739
Total	\$4,337
Gross income	\$214,167
Deductions from gross income:	
Rent for leased roads.....	\$462
Miscellaneous rents	1,404
Net loss on miscellaneous physical property.....	1,234
Interest on funded debt.....	100,000
Interest on unfunded debt.....	473,023
Miscellaneous debits	150
Total deductions	\$576,273
Net deficit transferred to profit and loss.....	\$362,106

The gross earnings of this company, which is a 194.52-mile interurban line controlled by the steam Spokane, Portland & Seattle Railway, showed a decrease of \$197,409 or 16.6 per cent, as compared to the preceding year. The operating expenses and taxes decreased \$86,105 or 10.0 per cent, so that the operating income decreased \$111,304 or 34.6 per cent. Non-operating income increased from \$553 in 1914 to \$4,337 in 1915, but the deductions from income increased from \$321,687 to \$576,273. As a result, although no dividends on the preferred stock were declared as compared to \$12,000 for the preceding year, there was a deficit of \$362,106 for the fiscal year comparing with a deficit of \$54,308 for the preceding year.

The decreased earnings are said to have been caused by the competition of other lines and by automobile trucks and jitneys, besides the general business depression. It is reported that since the beginning of the current fiscal year the operating revenues have shown an increase, but the net earnings are far short of paying the fixed charges, on account of the large interest on unfunded debt. This debt, said to be nearly \$8,000,000, represents the advances made by the Spokane, Portland & Seattle Railway for the extensions from Salem to Eugene and Albany to Corvallis, and for double-tracking and other improvements south of Portland. Most of the stock and bonds of the Oregon Electric Railway are held by the steam line, but \$200,000 of 6 per cent preferred stock is outstanding. Until about a year ago, it is said, the company was buying the stock in at par and interest for retirement.

WORCESTER INCREASE IN STOCK OPPOSED

Mayor Wright of Worcester, Mass., has petitioned the Public Service Commission of that State for a reopening of the hearings on the petition of the Worcester Consolidated Street Railway for permission to issue \$1,880,000 of additional capital stock. In a statement which he made the Mayor was quoted as saying:

"This action has been taken because I know, from information that I have already accumulated, the discrepancy between the capital stock and the bonds of the Worcester Consolidated Street Railway and the actual or estimated cost or value of the electric railway property for the use of the public, and that this will in the future make some difference in arriving at the reasonable rate of fares to be charged. In fact, I feel that, sooner or later, the Worcester Consolidated Street Railway, following the lead of other companies, will ask for the right to increase fares in Worcester. If the evidence and facts as to the methods of financing and managing the Consolidated Street Railway property in Worcester are made known, it is my opinion that there will be no increase in fares in that city, where the company is now receiving 5 cents for about 3 cents' worth of service."

EMPIRE UNITED NOTES IN DEFAULT

Principal and Interest of \$681,900 of Guaranteed Notes Unpaid—First Mortgage Bondholders Issue Circular About Reorganization Plan

The Empire United Railways, Inc., Syracuse, N. Y., on Feb. 16 defaulted on the principal and interest then due at the offices of the Bankers Trust Company, New York, on \$681,900 of one-year guaranteed notes. These notes are spoken of as part of the \$869,000 of notes put out to take up notes issued before the merger by the Rochester, Syracuse & Eastern Railroad. A list of the guarantors of the notes and the amount of their claims includes the following: Burns Lyman Smith, \$94,068; Clifford D. Beebe, \$81,919; William Nottingham, \$81,919; Hendricks Holden, \$81,919; Willis A. Holden, \$81,919; Clarence W. Seamans, \$81,919, and John A. Roebing's Son's Company, \$81,919.

The committee of holders of the first mortgage 5 per cent bonds of the Rochester, Syracuse & Eastern Railroad due on May 1, 1945, of which committee Arthur W. Loosby is chairman, issued a circular dated at Syracuse on Feb. 18. The committee said that it believes that any plan of reorganization should preserve the integrity, as to both amount and lien, of the existing issue of the Rochester, Syracuse & Eastern Railroad bonds and pay the defaulted interest thereon. The committee also says that the receivers at the instance of the committee prepared and presented to the court on Feb. 15 a comprehensive report which in every way confirmed the judgment of the committee. The receivers are quoted by the committee as saying in substance: "We believe that (a) the system can be operated as a whole so that the interest on the underlying first mortgage bond can be paid with a surplus after the interest of \$123,389; (b) the three constituent properties, if operated separately, should pay the interest on their first mortgage bonds with a small margin."

The committee says that for the year ended June 30, 1915, owing to various causes tending to diminish travel, the receipts of the company were at as low a point as they ever reasonably can be expected to fall. This statement shows total operating income of \$1,345,524 and a deficit for the year of \$132,396.

It is stated that for the fiscal year ended July 1, 1917, the receivers expect a total income of not less than \$1,338,050. The operating expenses they expect to cut \$118,422, and after payments for taxes and major fixed charges, there would be a balance of \$123,389, which amount would be applicable to the payment of \$125,571 interest upon junior obligations. The committee further says that the report of the receivers indicates that the Rochester, Syracuse & Eastern property should earn for the fiscal year commencing July 1, 1916, \$768,450 and that the surplus balance should be \$5,837. The foregoing figures do not take into consideration theoretical computations for depreciation, which it is felt, however, should not materially change them.

HONOLULU LINE WINS CAPITAL CASE

Circuit Court Dismisses Injunction Against \$392,500 Stock Increase—"Actual Cost" Limit Set by Franchise Is Not Present Value

Judge Stuart in the Circuit Court at Honolulu has dismissed the injunction suit brought by the Territory of Hawaii against the Honolulu Rapid Transit & Land Company to prevent the railway from increasing its capital stock from \$1,207,500 to \$1,600,000. A previous reference to this case was made in the *ELECTRIC RAILWAY JOURNAL* of Nov. 27, page 1096. The Territory contended that the "actual cost" of the property, stated in the franchise to be the criterion for security issuance when increased by 25 per cent, should not be construed as being the original cost but the present value. Although the present value was shown to be far in excess of the present issue of stock, the court decided in the company's favor that as a matter of law the actual cost was the basis to be used, and that the company had a clear right to increase its stock to at least \$1,600,000. The government has given notice of an appeal to the Supreme Court of the Territory.

Early in the case, before the company had entered upon its evidence, a written agreement was filed showing an

undisputed actual cost of \$1,603,057, with disputed amounts totaling \$568,919, making a total of \$2,171,976. The disputed amount covered admittedly actual expenditures for overhead expenses and for investment in the Hawaiian Tramways and the Pearl Harbor Traction Company, the point at issue being whether these were items legally to be included in the basis for stock issuance. The addition of 25 per cent to the above-mentioned total would give an authorized stock limit of \$2,714,970. From this basis one engineer for the Territory asserted that \$624,955 should be deducted for depreciation in order to secure the present value, while another expert for this side estimated the depreciation at \$983,571.

In order to have full information about present value in case of a review by higher courts, Judge Stuart allowed the Territory a mass of evidence in regard to depreciation, but in his decision he concluded that it was all faulty and calculated to mislead the court in its endeavor to get at the actual depreciation instead of adopting a theoretical amount. Judge Stuart held that the company's evidence was framed upon a more proper basis and was more satisfactory, but he did not believe that the actual depreciation in the plant was anywhere near even the amount allowed by the company. Be that as it might, however, he considered that the cost agreement superseded all question of depreciation, as far as arriving at a conclusion in this particular case was concerned, even if depreciation was involved.

Judge Stuart said that in fixing rates the amount of stock issued was only one of the many elements that might be considered. The company is authorized to issue stock to the amount that the plant legitimately costs, plus 25 per cent, but this might have very little relation to the present value upon which rates might be based. He asserted that it is on the value of the plant at the time of the rate fixing that the rates are based, and what the plant may have cost has but little, if any, relation to this question.

NEW JERSEY FRANCHISE ASSESSMENTS

The 1915 assessments levied by the State Board of Taxes and Assessment of New Jersey upon 322 corporations and five individuals under the municipal franchise act amounted in the aggregate to \$1,505,776. This was an increase of \$40,192 over the 1914 tax. The taxes paid by the various utilities are shown by the following table:

Classification	Number	Gross Receipts	Tax
Street railway	33	\$16,087,761	\$804,388
Water	115	3,993,123	79,862
Gas and electric light (or power)	118	23,186,414	463,728
Telegraph and telephone	43	7,570,213	151,404
District telegraph messenger	3	73,773	1,475
Sewer and pipe line	15	245,914	4,918
Total	327	\$51,157,201	\$1,505,776

Binghamton (N. Y.) Railway.—At the recent annual meeting of stockholders of the Binghamton Railway Mortimer B. Fuller was elected a director in place of W. L. Connell.

Boston (Mass.) Elevated Railway.—The West End Street Railway has petitioned the Massachusetts Public Service Commission for authority to issue \$815,000 and \$1,581,000 of negotiable thirty-year bonds bearing interest at not more than 6 per cent. The proceeds are to be used in connection with the retirement of \$815,000 of 4 per cent bonds, dated May 1, 1896, and maturing May 1, 1916, and \$1,581,000 of serial debenture bonds dated Aug. 2, 1915, and maturing on Aug. 1, 1916.

Chicago & Milwaukee Electric Railroad, Highwood, Ill.—In a statement which appeared in the *Milwaukee Leader* recently it was suggested that the Milwaukee Electric Railway & Light Company might be planning to purchase the Chicago & Milwaukee Electric Railroad, which, as noted in the *ELECTRIC RAILWAY JOURNAL* of Dec. 18, 1915, is advertised for sale under foreclosure on April 1. R. B. Stearns, vice-president and assistant general manager of The Milwaukee Electric Railway & Light Company, has denied that the company contemplated the purchase of the other railway. In a statement to the *Leader* he said: "If you knew more about the Chicago & Milwaukee Electric you would know that no one could possibly buy it except the bondholders. The property is worth about \$5,000,000, and there is about \$16,000,000 in securities outstand-

ing. Its bondholders are chiefly Canadian parties. You can find out the situation from the records of the receivership in Judge Geiger's court."

Fort Wayne & Decatur Traction Company, Fort Wayne, Ind.—The Fort Wayne & Decatur Traction Company has been incorporated to succeed the Fort Wayne & Springfield Railway, the property of which was sold at receiver's sale on Dec. 2 to Charles H. Worden, Fort Wayne, as noted in the *ELECTRIC RAILWAY JOURNAL* for Dec. 18, 1915, page 1234.

Interborough Consolidated Corporation, New York, N. Y.—Holders of the voting trust certificates of the Interborough-Metropolitan Company have been notified by the board of trustees that the agreement dated March 6, 1906, will expire March 6 next, and that certificates may be exchanged for certificates of the capital stock of the Interborough Consolidated Corporation, successor to the Interborough-Metropolitan Company, to the amount and of the class called for by the respective voting trust certificate. The voting trustees are August Belmont, Edward J. Berwind, Thomas DeWitt Cuyler, Theodore P. Shonts and Cornelius Vanderbilt.

Kansas City (Mo.) Railways.—The Kansas City Railways has received from the Public Service Commission of Missouri the necessary authorization for the issuance of mortgages and notes as provided in the reorganization plan. The Public Utilities Commission of Kansas has taken the application of the company for the issuance of securities under advisement.

Kansas Electric Utilities Company, Lawrence, Kan.—Announcement has been made that the Kansas Electric Utilities Company has sold to Chicago, Grand Rapids and New York bankers \$1,500,000 of first mortgage ten-year 5 per cent bonds. The Kansas Electric Utilities Company was organized in 1915 and acquired the Lawrence Railway & Light Company, Emporia Railway & Light Company and Parsons Railway & Light Company. In addition to the Kansas companies, the Kansas Electric Utilities Company also owns all the capital stock of Sidney (Ohio) Electric Company, Union City (Ind.) Electric Company and United Lighting Company of Albion, Pa.

Lancaster & Southern Street Railway, Millersville, Pa.—John H. Myers and John M. Groff have been appointed receivers of the Lancaster & Southern Street Railway.

Los Angeles (Cal.) Railway Corporation.—The Railroad Commission of California has authorized the City Railway Company to issue at par to the Los Angeles Railway Corporation \$280,000 face value of principal of its bonds dated Feb. 1, 1911, to refund a similar amount of indebtedness to the company incurred for betterments.

Los Angeles & San Diego Beach Railway, San Diego, Cal.—The Railroad Commission of California has authorized the Los Angeles & San Diego Beach Railway to pledge its first mortgage 5½ per cent sinking fund gold bonds at a ratio of not to exceed \$100 of bonds for \$70 of notes as collateral security for a six months' note to the Southern Trust & Savings Bank, San Diego, for \$5,000 at 7 per cent and as collateral security for a similar note for the same amount to the American National Bank, San Diego.

Lykens & Williams Valley Street Railway, Pottsville, Pa.—The Lykens & Williams Valley Street Railway has been reorganized under the name of the Lykens Valley Railway with a capitalization of \$200,000. The Harrisburg Trust Company, which was trustee under the company's mortgage, last autumn took charge of the line temporarily at the request of the bondholders' protective committee, with which nearly all the bonds were deposited. According to information just now available, the trust company at the expiration of the required notice sold the road under the provisions of the mortgage. The property was first released by the court, as it was in the hands of the Schuylkill & Dauphin Traction Company, which was in turn in the hands of a receiver appointed by the court. The title of the Lykens property was taken over individually by the members of the protective committee, who are still working on the reorganization plan. Dr. John Oenslager, Harrisburg, has been appointed by the new management to take charge of operating the road temporarily.

Mountain Railway, West Orange, N. J.—The sale of the property of the Mountain Railway as junk was postponed from Feb. 24 to March 3 on the application of the Public Service Corporation of New Jersey, which has a judgment against the company for \$1,600. The company operated 2 miles of track and two cars. Service was abandoned months ago.

Norton & Taunton Street Railway, Norton, Mass.—The bondholders' committee of the Norton & Taunton Street Railway, which purchased the property of the company at foreclosure sale on Feb. 7, 1916, has filed with the Public Service Commission notice that if the Supreme Court confirms the sale a new company named the Norton, Taunton & Attleboro Street Railway will be formed to operate the company purchased. The notice says that the fair replacement value of the railway and property so acquired is not less than \$250,000 and it is agreed to issue \$120,000 of 5 per cent first mortgage bonds and \$150,000 of common stock and requests the commission to determine the fair replacement cost of the company and to approve the issues.

Northern Ohio Traction & Light Company, Akron, Ohio.—The Ohio Public Utilities Commission has authorized the Northern Ohio Traction & Light Company to issue \$1,518,400 of 6 per cent preferred capital stock at not less than 95 a share, to be used as follows: The payment of the uncanceled balance of the cost for applicant's 1914 additions and improvements, \$8,431.07; the payment for applicant's 1915 additions and improvements, \$851,431; the payment for applicant's 1916 additions and improvements, \$1,000,000. Thomas H. Hogsett has been elected a director of the Northern Ohio Traction & Light Company to succeed B. Mahler.

Public Service Corporation of New Jersey, Newark, N. J.—The monthly financial report of the Public Service Corporation of New Jersey for January shows a gross increase in total business over the corresponding month last year of \$327,404 or 10.4 per cent. The balance available after payment of operating expenses, fixed charges, sinking fund requirement, etc., for amortization, dividends and surplus, was \$505,165. The increase in surplus available for dividends over the corresponding month of 1915 amounted to \$69,249.

Public Utilities Company, Evansville, Ind.—The Public Utilities Company has called for payment on April 1 at the office of the Citizens' Savings & Trust Company, Cleveland, Ohio, trustee, bonds numbered eighty-one to ninety inclusive of the Evansville & Princeton Traction Company. They are to be redeemed at 105 and accrued interest.

Railways Company General, Camden, N. J.—At the annual meeting of the Railways Company General, the directors were re-elected and William H. Crook, Jr., was added to the board. The retiring officers were re-elected.

Schenectady (N. Y.) Railway.—Harris, Forbes & Company, New York, N. Y., and Perry, Coffin & Burr, Boston, Mass., are offering jointly \$2,256,000 of Schenectady Railway 5 per cent first mortgage thirty-year gold bonds referred to in the *ELECTRIC RAILWAY JOURNAL* of Feb. 25, page 423. The bonds are dated March 1, 1916, and are callable on any date on and after March 1, 1919, at 102½ and interest. The interest is payable on March 1 and Sept. 1, at the office of the United States Mortgage & Trust Company, New York, N. Y.

Third Avenue Railway, New York, N. Y.—The directors of the Third Avenue Railway on Feb. 28 decided to pay 2½ per cent interest on the income bonds for the last six months and declared the usual dividend of 1 per cent for the quarter, both payable on April 1. Announcement was made that 225 of the adjustment bonds had been bought as the nucleus of a sinking fund. The Third Avenue Railway earned a gross operating revenue of \$898,808 in January—a gain of \$26,645 over the same month last year. The net income, after interest and rental charges had been met, was \$72,708—an increase of \$44,575. The company earned in the seven months ended Jan. 31 a net income of \$502,368—an increase of \$65,950 over the corresponding period in 1914.

Underground Electric Railways, Ltd., London, England.—The Underground Electric Railways, Ltd., announces that the revenues of the company will enable it to pay full

interest to Dec. 31, 1915, on its 6 per cent first cumulative income debenture stock and on its 6 per cent income bonds, and to carry forward about £38,500.

Washington (D. C.) Interurban Railroad.—The Public Utilities Commission of the District of Columbia has approved the transfer of the Washington Interurban Railway to the Washington Interurban Railroad. The property was sold under foreclosure on Dec. 23, 1915, and the sale was ratified by the District Court of the United States for the District of Maryland on Jan. 26. The commission has also authorized the issue and sale by the Washington Interurban Railroad of \$50,000 par value of common stock divided into shares of the par value of \$50 each, and \$150,000 face value of first mortgage 5 per cent thirty-year gold bonds secured by a first mortgage on the franchise and property to be acquired. The securities are to be issued with the understanding that the Washington Interurban Railroad use so many of them as are necessary for the payment of the purchase price; that the remainder of the securities shall be apportioned among the bondholders who elected to participate in the purchase; that the common stock be sold at not less than its par value, and that all discounts and expenses in connection with the sale of the bonds authorized to be issued, together with the difference between the face value of the securities authorized and the value of the utility hereafter to be determined by the commission, be amortized out of the income of the company before Jan. 1, 1945.

DIVIDENDS DECLARED

Chicago (Ill.) City Railway, quarterly, 2 per cent.
 Louisville (Ky.) Traction Company, 2½ per cent, preferred; quarterly, 1 per cent, common.
 Rochester Railway & Light Company, Rochester, N. Y., quarterly, 1¼ per cent, preferred.

ELECTRIC RAILWAY MONTHLY EARNINGS

AURORA, ELGIN & CHICAGO RAILROAD, WHEATON, ILL.					
Period	Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Jan., '16	\$148,860	\$97,092	\$51,768	\$40,725	\$11,043
1 " " '15	144,145	96,297	47,848	39,802	8,046
7 " " '16	1,173,181	747,043	426,138	282,824	143,314
7 " " '15	1,241,521	751,360	460,161	279,387	180,774

CITIES SERVICE COMPANY, NEW YORK, N. Y.					
Period	Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Jan., '16	\$663,543	\$18,215	\$645,328	\$42,966	\$602,362
1 " " '15	425,900	12,928	412,972	40,833	372,139
12 " " '16	4,717,443	178,143	4,539,300	492,132	4,047,168
12 " " '15	3,945,594	126,250	3,819,344	431,667	3,387,677

COLUMBUS RAILWAY, POWER & LIGHT COMPANY, COLUMBUS, OHIO					
Period	Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Dec., '15	\$300,315	*\$164,527	\$135,788	\$41,189	\$94,599
1 " " '14	278,561	*151,427	127,134	43,463	83,671
12 " " '15	3,113,175	*1,846,437	1,266,738	476,281	790,457
12 " " '14	3,066,298	*1,886,746	1,179,552	520,438	659,114

GALVESTON-HOUSTON ELECTRIC COMPANY, GALVESTON, TEX.					
Period	Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Dec., '15	\$163,213	*\$106,446	\$56,767	\$36,597	\$20,170
1 " " '14	192,136	*102,226	89,910	36,298	53,702
12 " " '15	1,936,228	*1,206,457	729,771	433,309	296,462
12 " " '14	2,424,119	*1,810,859	1,113,260	441,125	672,135

NORTHERN OHIO TRACTION & LIGHT COMPANY, AKRON, OHIO					
Period	Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Jan., '16	\$367,141	\$211,605	\$155,536	\$53,580	\$101,956
1 " " '15	280,838	181,978	98,860	50,251	48,609

PHILADELPHIA (PA.) RAPID TRANSIT COMPANY					
Period	Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Jan., '16	\$2,153,920	\$1,200,537	\$953,383	\$816,777	\$136,606
1 " " '15	1,998,395	1,173,758	824,637	812,413	12,224
7 " " '16	14,570,892	8,160,473	6,410,419	5,712,570	697,849
7 " " '15	13,943,519	8,072,479	5,871,040	5,660,369	210,671

THIRD AVENUE RAILWAY, NEW YORK, N. Y.					
Period	Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Jan., '16	\$898,808	\$541,731	\$357,077	\$284,369	\$72,708
1 " " '16	872,163	576,640	295,523	267,390	28,133
7 " " '16	6,536,931	4,047,546	2,489,385	1,971,665	1592,368
7 " " '16	6,474,477	4,063,573	2,410,904	1,931,975	1526,418

TWIN CITY RAPID TRANSIT COMPANY, MINNEAPOLIS, MINN.					
Period	Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Jan., '16	\$830,283	\$543,199	\$287,084	\$145,952	\$141,132
1 " " '15	772,045	531,540	240,505	143,956	96,549

WESTCHESTER STREET RAILROAD, WHITE PLAINS, N. Y.					
Period	Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Dec., '15	\$17,514	*\$20,515	†\$3,001	\$1,723	†\$4,692
1 " " '14	18,421	*21,922	†3,501	1,312	†4,806
6 " " '15	133,742	*129,733	4,009	9,840	†5,648
6 " " '15	141,805	*138,562	3,243	7,537	†4,220

*Includes taxes. †Includes non-operating income.

Traffic and Transportation

PLAYING THE GAME

Pennsylvania Official Says Statement That All Cards Are On Table Is Not Enough

Some time ago the Pennsylvania Railroad displayed on bulletin boards all over its system large posters asking the people to give the management the benefit of their advice. The responses to that bulletin were very interesting. A great many dealt with some personal grievance, but for the most part they showed a most helpful spirit on the part of the public. In referring to the campaign in a speech which he made before the Traffic Club of Baltimore on Feb. 29 Robert C. Wright, freight traffic manager of the Pennsylvania Railroad, said:

"The thing that is needed in our business life—which I might say has been lacking the last few years—and the thing which is particularly necessary in the relations between the carriers and the public, is confidence. The railroad companies have been urged to take the public into their confidence, but they can't take the public into their confidence until the public has confidence in them. I have tried it and I know. You tell a man your cards are all on the table and try to take him into your confidence, but unless he has confidence in you he suspects that there are some aces up your sleeve.

"The first step in mutual confidence between the carriers and the public is to restore the public's confidence in the carriers. I realize perfectly that the public's lack of confidence in the railroads has been more or less justified in the past, due to the practices of the carriers, but let by-gones be by-gones. We must look ahead—not behind. It is unfair to refer continually to the abuses of times gone past, in an effort to keep alive hostility toward the railroads.

"I sometimes wonder if people realize how a railroad such as ours is being ground continually between the upper and nether millstones. Baltimore wants something and tells us what great things we are doing for Philadelphia and New York. Philadelphia wants something and her papers chide us about favoring Baltimore and New York. Pittsburgh wants something and we are reminded how we favor Baltimore, Philadelphia and New York. Chicago wants something and we are berated because they say we discriminate against her in favor of Pittsburgh, Baltimore, Philadelphia and New York. And so it goes.

"Let us have confidence in each other. If we don't understand the other's viewpoint, let us talk it over, and if we still cannot reach the same conclusion, let us then submit it with no feeling to the proper commission or court, in order that a settlement may be reached. Then let's be good sports and stand by the decision and not keep on complaining that the other fellow won't do what we want. Above all, let's believe that each wants to be fair. Let us give each other a chance to show why he thinks he is fair and retain through any difference of opinion confidence in each other, which will make for a furtherance of the mutual help of business men and railroads, which goes to make the prosperity of the nation."

INCREASE IN ST. LOUIS BRIDGE FARE SUSPENDED

The 10-cent fare between St. Louis and Granite City over the McKinley Bridge, announced by the Illinois Traction Company to become effective on March 1 was suspended pending a hearing on the case by the Interstate Commerce Commission. E. D. Bell, the general superintendent, said:

"We have decided to provide 'excursion rates' for the month of March. Round-trip tickets will be sold for 10 cents, which to all practical purposes will continue the effectiveness of the 5-cent fare for thirty days. Conductors will sell these tickets on all cars and the return coupon will be accepted as the regular fare during that period. This will give the city and the company an opportunity to appear before the Interstate Commerce Commission if it is so desired, and arrive at a thorough understanding, the interests of the public not to be affected in the meantime."

Permission to make the increase was granted by the Interstate Commerce Commission a few days ago after the application of the company had been on file twenty days, no protest having been received in that time. Cards were at once posted in the interurban cars announcing the new rate would be effective on March 1. City officials said that the failure of the city to protest was due to a misunderstanding of the time allowed and the method of procedure.

Under the rules of the Interstate Commerce Commission, if no protest is received against an increased rate within twenty days, the new rate is allowed. Ten days thereafter is allowed for the filing of protests, but the increased rate may be put in effect in the meantime and the protest is put on the "complaint docket" of the commission. The Illinois Traction System's application was filed on Jan. 27, and although the city did not protest within twenty days, it still had ten days in which to file a protest. The railroad company's agreement to suspend the rate is a concession to the city. This agreement means that the application for increase will be put on the "suspension docket" and that present fares will remain in force until the matter is finally heard by the Interstate Commerce Commission.

MILWAUKEE SERVICE SUIT SETTLED

A compromise settlement of all the Milwaukee service cases has been reached under which The Milwaukee Electric Railway & Light Company has agreed to pay \$10,000 of the total penalty of \$186,000 sought to be recovered in the Dane County Circuit Court by the State for alleged violations of orders of the Railroad Commission. S. B. Way, vice-president and general manager of the company, said that the officers of the company went over the alleged violations at considerable length and ascertained that in a great many cases there were disturbances in operation due to blocked railroad crossings, open bridges, etc., on the lines beyond the control of the company that resulted in the alleged overcrowded conditions complained of. He is quoted as follows:

"As a practical matter it is impossible to design schedules which will successfully anticipate traffic that may originate at a certain point at a certain time. At times overcrowding is bound to occur. To play safe, we would be required to operate much more service than was contemplated by the commission. We had the choice of entering into an extended trial of the merits of the alleged violations and the reasonableness of the order on the one hand or paying a moderate judgment on the other hand. We decided that the value of the time of the employees and officers required to present our case satisfactorily would be greater than the amount of money involved in any judgment which might be reasonably imposed. We have accordingly determined that it is more advantageous for our company to pay the judgment than it was to enter into the extended defense that would be required were we to try the case properly on its merits.

"While we are reasonably confident that we would have ultimately won our case had we proceeded to a complete trial on its merits, it might prove more expensive in the long run to win than it is to pay the judgment. Statements alleging that the company had pleaded guilty to 100 counts and had been fined \$10,000 are not in accordance with the facts. The stipulation between the attorney general and the company's attorneys, which was approved by Judge Stevens, reads in part as follows:

"It is hereby stipulated by and between the parties, by and with the approval of the court, that, as a compromise and settlement of all of the causes of action in plaintiff's complaint, judgment may be entered against the defendant in favor of the plaintiff in the sum of \$10,000 without costs and that such judgment when entered shall be a full and complete discharge of all penalties, obligations, liabilities and indebtedness of the defendant to the plaintiff for or on account of or in any way arising out of or connected with the matters and things alleged in any and all of the 186 causes of action in plaintiff's complaint."

"It is thus apparent that the compromise settlement agreed upon is a complete settlement of the entire case and involves no admission on the part of the company as to guilt in respect to certain counts as alleged in the city attorney's interview."

BUS PETITION DENIED

The Public Service Commission for the Second District of New York has again denied the application of William B. Gray for certificates of public convenience and necessity for two auto-bus routes in New Rochelle, paralleling the North Avenue and Winyah Avenue routes of the Westchester Electric Railway. The order of the commission says that no complaints against the service of the electric railway on these routes had ever been lodged with the commission prior to the hearing held on the application of Mr. Gray. When complaints against its service were made at these hearings the company promptly promised to try to remedy them and has already taken steps to insure more frequent and more regular service on the routes concerned. The commission says that in view of this it would be an unwarrantable exercise of its discretionary powers to permit conditions of competition on these routes which might in the end work to the harm rather than the benefit of the public by making both the operations unprofitable, if not ruinous. Mr. Gray's petition, therefore, is again denied with permission to renew it if it should appear in the future that the electric railway is unwilling or unable to furnish adequate service on the North and Winyah Avenue routes. A previous order of the commission granted certificates to this applicant for numerous other routes in New Rochelle where his buses did not come into direct competition with the electric railway. It was in connection with the previous application of Mr. Gray that the commission laid down the principles to govern it in all future applications of the kind. These principles were referred to at length in the *ELECTRIC RAILWAY JOURNAL* of Oct. 30, 1915, page 929.

LOUISVILLE BOARD OF TRADE BOOSTS RAILWAY

An instance of how a street railway may be favorably recommended to the business men of its community is supplied in the latest number of the weekly bulletin of the Louisville Board of Trade. The leading item in this particular number of the publication relates to the Louisville Railway. It follows in part:

"Louisville has the best street railway system in the United States, everything considered. At least that is what the traveling community say and they ought to know.

"It might be said that the service could stand improvement at one or two points, but, as a general thing, it can truthfully be stated that our service in this city is second to none anywhere else.

"The *Bulletin* particularly wishes to call attention to the magnificent repair shops built and operated by the Louisville Railway. These shops, in their fireproof construction, saw-tooth roofs for natural lighting, mercury vapor lamps for artificial illumination, thorough system for transporting and storing materials and other features, are a worthy example of car maintenance standards; and that is the opinion of the *ELECTRIC RAILWAY JOURNAL*, which is the best authority in matters of this kind in the country.

"The general manager of the line will be glad to furnish anyone interested with a permit to visit these shops, and they are well worth a visit. The people of Louisville, as a whole, do not know the big things we have in Louisville."

HEARINGS ON JITNEYS IN ROCHESTER

The Public Service Commission of the Second District of New York, with Commissioner Emmett sitting, has been holding a series of hearings at Rochester on the applications of sixty-seven jitney operators to continue to operate in that city after the expiration of their licenses to operate. These licenses were granted to them before the public utility law was amended to bring the jitneys under commission jurisdiction.

Attorney Daniel M. Beach appeared for the railway. Attorney Powell for the jitney operators sought to prove the need of the jitneys by offering in evidence a traffic count taken over a period of one week and designed to show the irregularity of the service of the New York State Railways, Rochester Lines.

The company's evidence was cumulative. Robert A. Badger, secretary of Curtice Brothers Company, said that if he was Mayor he would not allow the jitneys to operate

on any street where there was a car line. The security holders of the company should be protected. Edward Walsh, editor of the *Labor Herald*, said that the jitneys were irresponsible and tended to deprive railway employees of their jobs. A. Frank Warren, Ward N. Britton and J. George Kaelber, all real estate men, testified that the street cars have done a great deal to build up the outlying sections of the city and, in many instances, have done so at a loss to the railway company. Mr. Kaelber, representing the Browncroft Realty Company, said he knew the street railway was losing money on the line which traverses the Blossom Road extension, but that the service to that section of the city was fast developing a desirable residence district which could not otherwise be made attractive to home-seekers. The hearing was to be continued on March 2.

ONE-ARM FAKER AT LARGE WHO OPERATED IN THREE CITIES

About seven o'clock in the evening on Feb. 22 the Lynchburg Traction & Light Company, Lynchburg, Va., was notified that a one-armed white man was near the corner of Fifth and Main Streets in Lynchburg claiming that he had fallen from one of the company's cars and been hurt, and that he wanted help. Inspectors of the company investigated the matter immediately. The man gave his name as C. L. Bell and claimed that he had fallen in trying to get off a crowded car that had not stopped at the street intersection where he wished to leave it, and that his back had been severely and painfully injured and that he could not walk without assistance.

The company at Lynchburg had just received advice from the Durham (N. C.) Traction Company that this man claimed to have been injured in a similar manner in that city a few days ago and that the company in turn had been warned by the Georgia Railway & Power Company, Atlanta, to look out for him. Bell was accordingly taken to a hospital for examination because the company at Lynchburg had been advised from Durham that he had an ulcer on his left leg near the ankle. As soon as the doctor examined this leg the man showed symptoms of nervousness and wanted to leave the hospital. Meanwhile the local police authorities had been notified and one of the city detectives was sent to the hospital to investigate. After learning the facts the police authorities gave him the option of leaving town immediately or going to jail and he disappeared. This man's description is as follows: Luther Carl Bell. Home: Savannah, Ga. Occupation: machinist, construction foreman, traveling salesman, etc. Age: about forty. Height: 6 ft. Weight: 215 lb. Black hair, dark complexion, left arm amputated, right leg $\frac{3}{4}$ in. shorter than left. Ulcer on left leg near ankle.

WASHINGTON COMPANIES CO-OPERATE IN SAFETY CAMPAIGN

The Washington Railway & Electric Company and the Capital Traction Company, Washington, D. C., have begun the distribution of a series of safety-first blotters among the pupils of the graded and ungraded schools in the National Capitol. The plan to impress the children in the public schools by means of blotters with the need of being vigilant in the streets was approved by the police department and the superintendent of schools.

On each blotter is a picture of an accident or near accident. Children are shown about to be run down by street cars and automobiles while they are at play. The first blotter distributed shows a large coasting sled crowded with children about to be struck by a street car, and warns the "kiddies" to "coast away from the tracks." The distribution of blotters will cover a period of twelve months, both railways jointly reaching all the enrolled pupils with one blotter each month.

Two years ago the Washington Railway & Electric Company distributed a specially designed blotter as part of its own safety-first campaign, but the campaign now under way is the first time that the two companies have joined in such a movement. It is believed that by reaching the child the attention of adults will also be gained, becoming of value to the local authorities in its efforts to decrease the number of street accidents due to vehicular traffic and thoughtlessness on the part of the general public and visit-

ors to the nation's capital. The plan of campaign has received considerable publicity in the Washington newspapers, which have designated the railway companies' cooperation and expense attached thereto as a real public service.

Skip-Stop Hearing Postponed.—The hearing on skip stops in St. Louis, set to be held on Feb. 18, before the Public Service Commission of Missouri in that city, was postponed indefinitely.

One-Man Car for Rutland.—The Rutland Railway, Light & Power Company, Rutland, Vt., proposes to transform one of its single-truck belt line cars into a one-man pay-as-you-enter car. The work will be done at the company's Park Street carhouse.

New Denver Publication.—The Denver (Col.) Tramway has begun the publication of a four-page weekly $4\frac{1}{2}$ in. wide by $7\frac{1}{2}$ in. high. As yet it is unchristened, but a prize of \$25 in cash is to be awarded on March 4 to the person suggesting the name considered most suitable by the judges selected to pass upon the suggestions made by readers.

Postponement of Fare Case Asked.—The Public Service Commission of Massachusetts has taken under advisement the petition to postpone action on the application of the Massachusetts Northeastern Street Railway for permission to increase its fare unit to 6 cents until a decision has been reached in the Bay State Street Railway fare case, which also involves an increase in the fare unit to 6 cents.

Hearings on Request for Increase in Fare in New Jersey.—The Board of Public Utility Commissioners of New Jersey is conducting hearings on the petition of the Burlington County Transit Company, Mount Holly, N. J., for permission to charge higher fares. The corporation wishes to increase the fare between Moorestown and Mount Holly, and from Mount Holly to Burlington from 10 cents to 15 cents.

Subway Flood in New York.—The New York subway was blocked on Feb. 25 from 10 a. m. until 2 p. m., between Ninety-sixth Street and Grand Central stations, because of flooded tracks under Times Square. The primary cause of the flood, according to Robert Ridgway, chief engineer of subway construction for the Public Service Commission, was the inability of the sewers in the Times Square region to carry off the heavy downpour between 4 p. m. on Feb. 24 and noon Feb. 25. Train service had to be suspended for several hours.

Reduction in Fare Asked.—The Warren & Jamestown Street Railway, Jamestown, N. Y., has been asked by the residents of Russell, 7 miles north of Warren, for a 10-cent fare between these two points, a new freight terminal in their town and extra service during the morning and evening rush hours. Samuel Q. Smith, secretary and treasurer of the company, says the requests will be taken up by the management. As stated in the *ELECTRIC RAILWAY JOURNAL* of Feb. 26, page 424, the Public Service Commission recently upheld the company's rate of 10 cents between Frewsburg and Jamestown.

Supplemental Bill of Complaint in Trenton Case.—In a supplemental bill of complaint just filed, the Trenton & Mercer County Traction Corporation, Trenton, N. J., has asked the United States District Court to set aside the order of the New Jersey Public Utility Commission forbidding the company to discontinue the sale of strip tickets at the rate of six for a quarter and charge a straight 5-cent fare instead. The company alleges that the board lacks jurisdiction and that the order is discriminatory. The court is also asked to issue an injunction restraining the board from fining the company \$100 a day for violation of the ruling.

Hearing on Skip Stop for Newark.—There was a brief hearing on Feb. 23 before the Board of Public Utility Commissioners of New Jersey on the petition of the Mayor and Borough Council of Verona for adoption of a skip-stop traffic rule on the Bloomfield Avenue line of the Public Service Railway. C. H. Walker, representing the borough, stated that Verona, Caldwell, Glen Ridge, Bloomfield and Montclair were in accord in favoring a modified skip-stop rule. The only obstacle remaining, he said, was the city of Newark, whose sanction is asked for the cancelling of certain corner stops in order to speed up the service between Newark and Caldwell.

New Jersey Jitney Bill Amended.—A committee substitute for the Kates bill to regulate jitneys has been reported favorably in the New Jersey House of Representatives by the municipal corporations committee. The substitute, eliminating the more drastic features of the Kates measure, to which exception was taken by jitney owners, was agreed upon at a conference. The new bill omits the requirement that consent of the Public Utility Commission be obtained before cars can be operated, and also that for a bond. As a substitute for the bond, indemnity insurance will be required. Another provision of the amended measure is that a tax of 5 per cent on gross receipts of cars, payable to the municipalities in which they operate, shall be in lieu of all other taxes. This, however, does not exempt jitney owners from taking out a motor vehicle license nor the drivers from having licenses from the State motor vehicle department.

Safety Patrols Proposed for Allentown Schools.—The organization of safety patrols to consist of older boys and girls and recruited at each school building in the city has been proposed to the school board of Allentown, Pa., by the Lehigh Valley Transit Company through E. C. Spring, who has been foremost in promoting safety-first work for the company. Mr. Spring outlined the system developed with success in Brooklyn. This patrol, consisting of ten or twelve of the larger boys of a school building, would have as its duties the care of the children of that building. They would arrive in the vicinity of the school fifteen minutes in advance of the regular assembling hour, take up positions assigned by the chief of the patrol at street intersections in the vicinity of the school and at any points where accidents might occur to children and as far as possible keep the children off the public highways. The patrols would meet once a week to discuss the subject of safety and the prevention of accidents.

Dallas Employees to Compete in Safety-first Campaign.—Richard Meriwether, general superintendent of the Dallas Consolidated Electric Street Railway, the Rapid Transit Railway and the Metropolitan Electric Street Railway, Dallas, Tex., is offering \$300 in prizes to employees for the best record in safety work. A board of safety will supervise and have charge of the work in all departments. In the transportation department the men will be enrolled in sixteen divisions. Since March 1 a record of all accidents has been kept. At the end of each month the division having the fewest accidents will be scored sixteen points, the next best fifteen points and so on. At the end of the year the division scoring the greatest number of points will be declared the best in accident prevention. A prize to this division of \$200 will be given on Jan. 1, 1917. The second prize will be \$100. The prizes will be divided among the members of the successful division. Each division will elect from its members a captain who will advise with the members as to the best way to increase the efficiency of the safety-first plan. He will distribute monthly a set of questions and the man turning in the best answers for a year will be awarded \$10 in gold. A similar plan will be adopted among the shop employees.

Zone System for New York City Lines.—As a result of conferences between the committee of the Public Service Commission, the transit committee of the Board of Estimate, and representatives of the Long Island Railroad, the Interborough Rapid Transit Company, and the Brooklyn Rapid Transit Company, the operating companies have been requested to submit a definite proposition for the operation of rapid transit trains over the tracks of the Long Island Railroad from Corona to College Point and Whitestone, and to the city line at Little Neck, in accordance with the report of Alfred Craven, chief engineer of the Public Service Commission. This report, which recommends the acceptance of the railroad company's proposition on condition that a two-zone system be established, in one of which a 5-cent fare and in the other a 10-cent fare would be charged, shows that the operation of rapid transit trains for a 5-cent fare to Whitestone and to the city line at Little Neck would result in a deficit of approximately \$180,000 the first year, whereas with a two-zone system, providing for an additional fare beyond College Point and Broadway, Flushing, the deficit would be only \$26,000 the first year, and this would be entirely wiped out in a short time by the natural increase in traffic from that section.

Personal Mention

Mr. Frank H. Miller, superintendent of motive power of the Louisville (Ky.) Traction Company, has been elected president of the Louisville Jovian League.

Mr. C. H. Read, formerly chief accountant in charge of accounting matters for the Rock Island & Southern Railway System, located at Davenport, Iowa, has been appointed auditor of the Kansas City, Kaw Valley & Western Railway, at Bonner Springs, Kan.

Mr. Roger W. Toll has resigned as chief engineer of the Denver (Col.) Tramway. Mr. Toll has been in charge of all matters pertaining to civil engineering, track and roadway construction and maintenance, bridges, viaducts, subways, etc., since his appointment as chief engineer in January, 1913.

Mr. Edward A. West, connected with the Portland Railway, Light & Power Company, Portland, Ore., as efficiency engineer, has been appointed chief engineer of the Denver (Col.) Tramway to succeed Mr. Roger W. Toll, resigned. It is expected that Mr. West will assume his duties in Denver on March 10.

Mr. H. C. Faithorn has been appointed traffic manager of the Chicago, Lake Shore & South Bend Railway, Michigan City, Ind. Mr. Faithorn has taken up the work begun by Mr. W. H. Ogborn, resigned, and will have charge of the passenger traffic as well as the development of a general freight handling business.

Mr. E. W. Hill, formerly treasurer and assistant treasurer of the Electric Bond & Share Company, New York, N. Y., has been elected a vice-president of the company. He will be succeeded by Mr. A. E. Smith. Mr. E. P. Summerson and Mr. William Reiser have each been made assistant secretary and treasurer.

Mr. Fred A. Vogel has been appointed assistant division superintendent of the Sherman, Baker, Harper, Springwells and Chene extension lines of the Detroit (Mich.) United Railway vice Mr. Leon Snyder, transferred. Mr. Fred O. Sauer has been appointed inspector of service for the same lines to succeed Mr. Vogel.

Mr. James L. Weir, assistant joint agent of the Detroit United Lines at the Detroit station, has tendered his resignation to become associated with the Detroit office of the Standard Accident Insurance Company. Mr. Weir has been connected with the Detroit United Lines since Feb. 6, 1902, filling various positions in the freight department of the company.

Mr. H. C. Eddy, who recently resigned as engineer for the Public Utilities Commission of the District of Columbia, has received a temporary appointment with the Navy Department and is now located at the naval proving ground at Indian Head, Md., supervising the enlargement of the power station and the installation of several additional boilers, coal conveyor, etc., and remodeling the present boiler plant.

Mr. F. R. Slater, who for the last three years has been general superintendent of the Texas Power & Light Company, with headquarters at Dallas, has been appointed acting general manager of the company, succeeding Mr. George S. Haley, who resigned recently. Mr. Slater is a graduate of Cornell, class of 1894, and after work on the design of the new power station for Columbia University entered the organization of the Otis Elevator Company as a designing engineer. In 1899 he joined the forces of the Manhattan Elevated Railway, New York City, which was then converting its lines from steam to electric operation. Later he became a member of the engineering staff building the New York subway, serving as assistant engineer in charge of direct-current distribution and later as principal assistant engineer of the Interborough Rapid Transit Company. In 1907 Mr. Slater formed with H. N. Latey the consulting engineering firm of Latey & Slater, from which he withdrew in 1912 to go to Dallas. At the time of the St. Louis exposition in 1904 Mr. Slater served as a member of the advisory council of the Electric Railway Test Commission.

Mr. Albert Benham, general manager of the Ohio Electric Railway, Springfield, Ohio, was elected president of the Central Electric Railway Association at its annual meeting, held in Dayton, Ohio, on Feb. 24 and 25. Mr. Benham was born in Ohio in 1868 and entered railway work with the Fifth Avenue Cable Company, Pittsburgh, Pa., in 1891. He continued in the service of that company and the Consolidated Traction Company, Pittsburgh, in various departments until January, 1901, when he resigned to become connected with the Cincinnati (Ohio) Traction Company. He served as inspector and later as assistant general superintendent of the Cincinnati Traction Company until March, 1906, when he was made general superintendent of the Indiana, Columbus & Eastern Traction Company, with headquarters at Columbus, Ohio. In 1908 Mr. Benham was appointed assistant general manager of the Ohio Electric Railway, and in July, 1913, was made general manager.



A. BENHAM

Mr. Frank H. Sommer, counsel for the Board of Public Utilities Commissioners of New Jersey, has been elected by the council of New York University to be dean of the University Law School, of which he is a graduate. Mr. Sommer succeeds Dean Clarence D. Ashley, who died on Jan. 26. Mr. Sommer has been a lecturer in the school since he was graduated in 1893. He was born in Newark forty-three years ago. He was formerly a member of the Board of Public Utilities Commissioners of New Jersey and when his term of office expired on May 1, 1911, he was retained as counsel to the commission in accordance with the provision of the new utility law which gave the board authority to engage counsel. Previously, the commission had referred to the Attorney General of the State all questions which required an expression of legal opinion.

Mr. R. L. Lindsey, who has been elected vice-president of the Durham (N. C.) Traction Company in addition to general manager, was born on a farm near Kinston in North Carolina. He attended school until he was ten years old, when he went out to work. At fifteen he had mastered telegraphy, at seventeen stenography and typewriting and at twenty he had twice read the course prescribed by the State of North Carolina for a lawyer's license. He was admitted to the practice of law in the courts of North Carolina at the age of twenty-one. For four years thereafter he was secretary to Gen. J. S. Carr, president of the Blackwell Durham Tobacco Company. Mr. Lindsey entered public service work in May, 1899, as secretary, treasurer and manager of the Durham Electric Lighting Company. He promptly overhauled the station and installed a twenty-four-hour service. He also changed the customers over successfully from flat rate to meters. In February, 1901, the Durham Traction Company was organized by R. H. Wright, J. S. Carr, and others, through the purchase of the Durham Electric Lighting and the Durham Ice companies and the acquisition of the old horse car line franchise. On its organization the Durham Traction Company elected Mr. Lindsey auditor. He continued in that capacity until April, 1905, when he was made general manager. He is a Mason, a Shriner, a Pythian and an Elk and is a member of many local civic and commercial bodies.



R. L. LINDSEY

OBITUARY

M. D. Thatcher, one of the principal owners of the Pueblo & Suburban Traction & Lighting Company, Pueblo, Col., prior to its being taken over by the Arkansas Valley Railway, Light & Power Company, died at his home in Pueblo on Feb. 22.

L. T. Garnsey, Los Angeles, Cal., is dead. Mr. Garnsey was one of the promoters of the Los Angeles & Redondo Railway, now included in the system of the Pacific Electric Railway, and was president of the company for some time. He was also a large real estate operator. Mr. Garnsey was born in Great Bend, Pa., seventy-one years ago.

John M. Eshleman, Lieutenant-Governor of California, died at Indio, Cal., on Feb. 28. Mr. Eshleman was born in Villa Ridge, Ill., on June 14, 1876, and was graduated from the University of California in 1902. He was admitted to the bar in 1905, and in 1907 was elected a member of the California Legislature. From 1907 to 1910 he was district attorney of Imperial County, Cal., and from 1911 to 1914 he was president of the Railroad Commission.

James Sweeney Thompson, North Tonawanda, N. Y., a director of the International Railway, Buffalo, N. Y., and one of the most widely-known bankers in western New York, died in the Johns Hopkins Hospital in Baltimore, Md., on Feb. 18. Mr. Thompson was born in North Tonawanda on Oct. 11, 1855. He was a director of the Marine Bank; vice-president of the Central National Bank, Buffalo; vice-president of the State National Bank, Tonawanda; vice-president of the First National Bank, Tonawanda, and was connected with other business and financial institutions. He was active in advocating the construction of the proposed high-speed line of the International Railway between Buffalo and Niagara Falls, now under construction.

George E. Miller, superintendent of transportation of the Lehigh Valley Transit Company, Allentown, Pa., died on Feb. 22 after a short illness, of catarrhal pneumonia. He was forty-nine years of age. Mr. Miller was born in Pottsville, Pa., and started life as a printer. For six years he was a compositor on the Pottsville *Chronicle*. He then entered the service of the Philadelphia & Reading Railway and for three years was in charge of the yards at St. Clair. For five years thereafter he was superintendent of the electric light and power plant at Port Carbon, Pa. Eighteen years ago Mr. Miller entered the electric railway field as master mechanic of the Jackson (Miss.) Street Railway, where he remained nearly a year. He then became master mechanic of the Chattanooga (Tenn.) Traction Company and a year later was appointed superintendent of the company. He next went to Dubuque, Iowa, as general superintendent of the Dubuque Light & Traction Company. Six years later he returned to Chattanooga and in 1910 was brought to Allentown by Mr. R. P. Stevens, then president of the Lehigh Valley Transit Company. Mr. Miller was one of the pioneers of the safety-first movement, and it was a source of intense pride to him that in the last five years he carried 150,000,000 passengers without the loss of life of a single paid passenger. He was also active in the interest of the welfare of his employees. A widow and eight children survive.

The directors of the Interborough Rapid Transit Company, New York, N. Y., have unanimously voted to establish a pension system for the benefit of all of its employees. The pension system will apply to employees who shall have attained the age of seventy years and have been in the service of the company or its predecessors not less than twenty-five years, and also to employees who shall have been twenty-five or more years in such service and have become physically disabled. The acceptance of the pension allowance will not debar an employee from engaging in other business. There are at present nearly forty employees more than seventy years of age whose length of service ranges from twenty-five to forty-two years. The regulations to govern the pension system are to be administered by the director of welfare, who shall act as chairman; the vice-president and general manager, the general auditor and the treasurer. At the first meeting of the newly appointed pension board, as named above, the superintendent of the voluntary relief department was elected secretary of the board.

Construction News

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

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

RECENT INCORPORATIONS

Fort Wayne & Decatur Traction Company, Fort Wayne, Ind.—Incorporated to succeed the Fort Wayne & Springfield Railway, which was sold at receiver's sale on Dec. 2 to Charles H. Worden, Fort Wayne, as noted in the *ELECTRIC RAILWAY JOURNAL* for Dec. 18, 1915, page 1234. Capital stock, \$200,000. Incorporators: William J. Vesey, Edward X. Ehinger and G. M. Leslie.

***Newport & Alexandria Interurban Railway, Newport, Ky.**—Incorporated to construct an electric line from Newport to Alexandria, via Fort Thomas, Cold Spring and Silver Grove, 15 miles. Capital stock, \$100,000. Among the incorporators are C. D. Miller, Huntington; Blair P. Wilson, Huntington, and Capt. Gottlieb Hartweg, Cincinnati.

Cleburne (Tex.) Traction Company.—Application for a charter has been made by this company to succeed the Cleburne Street Railway. Capital stock, \$15,000. Incorporators: F. C. Cotton, Fort Worth, and Lawrence Hewitt and Daniel Hewitt, both of Cleburne.

FRANCHISES

Riverside, Cal.—The Council of Riverside has denied the application of the Pacific Electric Railway to abandon the lower end of its Brockton Avenue line and that portion of its Victoria Avenue line which extends across the Victoria Bridge.

Kankakee, Ill.—The Kankakee Electric Railway has applied to the Public Utilities Commission of Illinois for permission to remove its tracks on South Washington Street, south of Hawkins Street. The Council of Kankakee refused to give the company this permission.

Peoria Heights, Ill.—The Peoria & Chillicothe Electric Railway has asked the Council for a franchise in Peoria Heights. [Jan. 22, '16.]

Battle Creek, Mich.—The Michigan Railway Company has received a franchise from the Council to construct an extension in Post Addition.

Trenton, N. J.—The New Jersey & Pennsylvania Traction Company has received a franchise from the Council to double-track West Hanover Street from Green's Alley to Calhoun Street.

***Easi Cleveland, Ohio.**—J. L. Free, president of the J. L. Free Company, Cleveland, has asked the Council to advertise for bids for a street railway line on Noble Road. He says that if no other bids are received his company will build the line, but other allotment owners, who will be benefited, will be asked to participate. He estimates that a single track will cost about \$40,000.

***Salt Lake City, Utah.**—Le Grand Young has asked the Council for a franchise to construct a line on Twenty-first East Street from Tenth South Street, through Holliday, up Big Cottonwood Canyon to the mines and Brighton.

TRACK AND ROADWAY

Municipal Railways of San Francisco, San Francisco, Cal.—The contract for furnishing and installing electrical conductors and appurtenances for the Church Street municipal railway has been awarded by the Board of Public Works to E. Earl Browne.

Aurora, Mendota & Western Railroad, Aurora, Ill.—The Public Utilities Commission of Illinois has denied the petition of the Aurora, Elgin & Chicago Railroad asking that the Aurora, Mendota & Western Railroad be compelled to operate its cars over the tracks of the Aurora, Elgin & Chicago Railroad from Montgomery to Aurora and has granted a certificate of convenience and necessity authorizing the construction of the new line. [Oct. 9, '15.]

Galesburg Railway, Lighting & Power Company, Galesburg, Ill.—It is reported that this company will spend about \$225,000 in improvements of various kinds in Galesburg.

Rapid Transit Company of Illinois, Murphysboro, Ill.—Plans are being considered by this company to build a line between Murphysboro and Mount Vernon. [Sept. 11, '15.]

Illinois Traction System, Peoria, Ill.—This company contemplates the construction of a line between Champaign and Bloomington, 50 miles.

Peoria, Canton & Galesburg Railway, Peoria, Ill.—It is reported that the proposed interurban line of the Peoria, Canton & Galesburg Railway is to be revived this year. The Public Utilities Commission of Illinois has given its approval to the plan. Horace Clark, Peoria, president. [Nov. 21, '14.]

Union Traction Company of Indiana, Anderson, Ind.—This company is constructing an extension to its bridge on the Muncie division.

Evansville (Ind.) Railways.—This company has planned to extend its service by automobile bus to New Harmony, Ind., and Morganfield, Ky., and by gasoline boat to Uniontown, Ky. The company is also constructing two fast, twin-screw gasoline boats for use between Rockport, Ind., and Owensboro, Ky.

Tri-City Railway Company, Davenport, Iowa.—This company has deeded to the city of East Moline a strip of land which formed a part of the right-of-way between Twelfth and Thirteenth Streets. The company reserves the right to use the land and to relay tracks therein should it extend its system up State Street.

Boston (Mass.) Elevated Railway.—This company has awarded a contract to H. Nawn Contracting Company, Boston, for the construction of foundations for its Mystic River bridge. The work includes seventeen piers of concrete on pile foundations and thirty-eight small concrete foundations for the viaduct.

Detroit (Mich.) United Railway.—The formal acceptance by the Detroit United Railway of the city's proposal for the extension of the Kercheval and Forest Avenue car lines has been filed with the city clerk. The Kercheval Avenue line will be extended to connect with the Jefferson Avenue line, single-track connections being built on Hart and Lyncaste Avenues. The Forest Avenue tracks will be extended east from Gratiot Avenue to the city limits.

Houghton County Traction Company, Houghton, Mich.—Plans are being made by this company to extend its line from Hancock to Dollar Bay.

Muskegon Traction & Lighting Company, Muskegon, Mich.—It is reported that this company is planning extensions and improvements to its system during this year at a cost of about \$35,000.

Laurel Light & Railway Company, Laurel, Miss.—Plans are being made by this company for building a lake at Interurban Park for swimming and boating purposes.

Kansas City Railways, Kansas City, Mo.—The Wyandotte Board of County Commissioners on Feb. 10 approved plans prepared by L. R. Ash, engineer, for the construction of the Central Avenue bridge and viaduct in Kansas City, Kan. Advertisements for bids have been ordered and they will be opened on March 6. The bridge will be 3092 ft. long and will be double-decked. The lower deck will be on the level with the road and will have an 18-ft. roadway. The upper deck will connect with the Central Avenue viaduct and will have a roadway 30 ft. wide, a 6-ft. sidewalk and two street car tracks. The estimated plans contemplate the expenditure of \$650,000. This new bridge and viaduct proposes a great elevated highway across the Kaw bottoms from Riverview to James Street, which finally will be extended to the State line to connect with the Twelfth Street viaduct built by Kansas City, Mo. The Kansas City Railways will pay one-half of the cost of that part of the bridge utilized by the car tracks and the balance will be paid by the county. R. L. McAlpine, county engineer.

City Electric Company, Albuquerque, N. M.—An additional order has been placed by this company for track material to be used on its extension to the University of New Mexico. It is expected that the line will be in operation by June 1.

New York Municipal Railway Corporation, Brooklyn, N. Y.—The Public Service Commission for the First District of New York has sent to the Board of Estimate & Apportionment for approval the route and general plan for Route No. 64. This is a modification of Route No. 49, known as the Culver line or Gravesend Avenue route in Brooklyn. Route No. 49 is included in the dual system contracts as one of the branches of the Fourth Avenue subway, to be operated by the New York Municipal Railway Corporation. This route connects with the Fourth Avenue subway through the Thirty-eighth Street Cut, and continues from Tenth Avenue over the private right-of-way of the Prospect Park & South Brooklyn Railway Company to Gravesend Avenue at about Cortelyou Road, and thence down Gravesend Avenue and Shell Road to Coney Island. The construction contracts for the elevated railroad have already been awarded, and for some months the commission has been negotiating with the company for the required easement. The commission and the company have not been able to agree as to the value of the easement. The commission, therefore, decided to modify the route by continuing the elevated railroad from Tenth Avenue through Thirty-seventh Street to Gravesend Avenue, thus avoiding the company's right-of-way. Route No. 64 provides for this modification.

Interborough Rapid Transit Company, New York, N. Y.—Bids for track-laying in the Lexington Avenue subway were opened during the week by the Public Service Commission for the First District of New York. The contract is divided into three parts, namely, the Lexington Avenue line, the Jerome Avenue line and the 149th Street loop. The city will furnish rails and other track materials and the contractor will be required to do only the work of installation. He must begin work on the Jerome Avenue line and the Lexington Avenue line within thirty days after the delivery of the contract, and must complete the tracks on Jerome Avenue within six months and on the Lexington Avenue line and 149th Street loop within nine months after the delivery of the contract. The lowest bidder was the Empire Construction Company at \$276,433.

Toronto (Ont.) Civic Railway.—Bids will be received by the Board of Control, City Hall, until 12 o'clock noon on March 14 for the supply and delivery of special track work for the St. Clair Avenue carhouse.

Lehigh Valley Transit Company, Allentown, Pa.—Among the improvements to be made by this company is the double-tracking of its line between Bethlehem and Easton. An order has been placed by the company for automatic signal equipment covering every line of the company not heretofore equipped with automatic devices. These include the local lines in Allentown, Macungie, Nazareth, Egypt and Easton.

Philadelphia, Pa.—It is reported that the construction of the steel superstructure for the elevated railway on Frankford Avenue will be begun on April 1 and it is estimated that the line will be placed in operation nineteen months later.

Vercheres, Chambly & Laprairie Tramway, Montreal, Que.—The railway committee of the Legislative Assembly on Feb. 24 passed the bill to incorporate the Vercheres, Chambly & Laprairie Tramways Company. The company will operate electric lines in St. Lambert, Longueuil, Boucherville, Varennes, Vercheres, Chambly, Chateauguay and Laprairie parishes, and has power to enter Montreal through agreement with other companies. One important change was made regarding route. The plan of the promoters proposed to construct the line within 2 miles of Boucherville. Dr. Desaulniers, deputy for Chambly County, insisted that it be located nearer, and it was fixed at 1 mile from the parish church of the town. It was also provided that in cases where municipalities would not allow the railway entrance that the Quebec Public Utilities Commission could be appealed to for arbitration. [Feb. 5, '16.]

Charleston-Isle of Palms Traction Company, Charleston, S. C.—This company reports that it would like to receive information relative to amusement attractions for a beach resort. W. W. Fuller, general superintendent.

Citizen's Street Railway Association, Clarksville, Tenn.—The organization of this company, which has recently taken over the Clarksville & Dunbar Cave Railway, has been completed. Work of clearing the track will be begun shortly and the road will be placed in operation as soon as possible.

Tacoma Railway & Power Company, Tacoma, Wash.—Details of the damage done by recent storms to the tracks and equipment of the Tacoma Railway & Power Company are not yet known, but engineers for the company state that a conservative estimate places the total at \$25,000. The greater part of the damage was to the tracks. An expenditure of \$5,300 will be made immediately to repair some of the damaged pavement.

Milwaukee Western Electric Railway, Milwaukee, Wis.—An increase of \$1,250,000 in the capital stock of this company was voted at its annual meeting. [Feb. 5, '16.]

SHOPS AND BUILDINGS

Jamestown, N. Y.—Tentative plans are being made by the traction interests of Jamestown for the construction of a large union trolley terminal at West First and Washington Streets. Certain street changes have been suggested to the City Council before the plans can be carried into execution. Plans which have been submitted to the City Council call for the completion of the improvements within two years after the street changes have been made.

Jamestown, Westfield & Northwestern Railway, Jamestown, N. Y.—The Kellogg Iron Company, Buffalo, has begun construction on a new carhouse for this company at Jamestown.

New York, N. Y.—Bids will be received by the Public Service Commission for the First District of New York until March 9 for station finish work on seven stations of the new Broadway subway. The contracts for the work will be let as soon as possible to permit the completion of the work so the subway can be placed in operation next spring as far north as Twenty-eighth Street. The stations for which bids will be received extend from Morris Street and Trinity Place on the south to and including Union Square on the north.

Toronto (Ont.) Suburban Company.—Plans of new offices and waiting rooms to be erected on Keele Street near Dundas Street have been approved by this company. The cost is estimated at \$10,560.

Chambersburg, Greencastle & Waynesboro Street Railway, Waynesboro, Pa.—This company reports that it expects to build a new carhouse and repair shops.

POWER HOUSES AND SUBSTATIONS

Southern Illinois Railway & Power Company, Chicago, Ill.—This company is installing new power plant equipment consisting of an Allis-Chalmers turbine generator of 5000-kw. capacity. The boiler equipment will be enlarged to correspond with the generator improvement. The boiler room will be extended about 50 ft.

Wisconsin Railway, Light & Power Company, Winona, Minn.—This company will erect a new and modern steam reserve station in Winona to take the place of the present emergency plant. The proposed new plant will cost \$200,000.

Cleveland, Southwestern & Columbus Railway, Cleveland, Ohio.—This company has purchased the power plant of the Crawford County Gas & Electric Company at Crestline. Improvements and changes will be made in the plant.

Toledo, Bowling Green & Southern Traction Company, Findlay, Ohio.—This company has recently placed a contract with the General Electric Company for a 1000-kw. turbine.

Lehigh Valley Transit Company, Allentown, Pa.—This company has placed an order with the Westinghouse Electric & Manufacturing Company for a 10,000-kw. steam turbine to be installed at its Front Street power house at Allentown. An order has also been placed with this company for several 60-cycle converters to be installed at the substations at Catasauqua, Siegersville and Slatington. The 25-cycle rotary converters will be taken out of these substations and will be installed in new substations to be erected on the top of the Lehigh Mountain and at Quakertown. The substations at Ambler and Fort Washington will be increased by the addition of new rotary converters. This equipment was referred to in a general article on Lehigh Valley improvements published in the *ELECTRIC RAILWAY JOURNAL* of Feb. 19, page 376.

Carbon Transit Company, Mauch Chunk, Pa.—Extensive improvements are being made to the power plants of this company at Hacklebernie and East Mauch Chunk. New engines and generators are being installed.

Manufactures and Supplies

ROLLING STOCK

Lincoln (Neb.) Traction Company is building four cars. Sioux City (Iowa) Service Company is building fifteen cars.

Hutchinson (Kan.) Interurban Railway is building three cars.

Berkshire Street Railway, Pittsfield, Mass., is constructing a convertible car in its shops.

Washington (D. C.) Interurban Railway is reported as expecting to purchase new cars.

Grand Rapids (Mich.) Railway is building an electric locomotive in its shops.

Benton Harbor-St. Joe Railway & Light Company, Benton Harbor, Mich., is reported as being in the market for additional cars.

Rockland, Thomaston & Camden Street Railway, Rockland, Me., has ordered one closed car body from the Laconia Car Company.

Indianapolis Traction & Terminal Company, Indianapolis, Ind., is reported as considering the purchase of twenty-five or thirty cars.

Bangor Railway & Electric Company, Bangor, Me., has ordered three center-entrance cars with radial trucks from the Laconia Car Company.

City Light & Traction Company, Sedalia, Mo., is reported as having ordered seven light Haller-type cars from the American Car Company.

Grand Rapids, Grand Haven & Muskegon Railway, Grand Rapids, Mich., is reported to be in the market for several interurban passenger cars.

Cumberland & Westernport Electric Railway, Cumberland, Md., has increased its recent car order from the Southern Car Company from three to five cars.

Boston (Mass.) Elevated Railway is reported as expecting to purchase some new cars for elevated service, in addition to the surface cars for which it is now in the market.

Cambria & Indiana Railroad, Colver, Pa., has ordered an additional storage-battery car from the Railway Storage Battery Car Company, as noted elsewhere in this issue.

Harrisburg (Pa.) Railways is reported as considering the purchase of seven new cars. This news was received as this paper was about to go to press and has not been confirmed.

Albuquerque, (N. M.) Traction Company is reported as expecting to purchase at once additional cars for use on its new University line which is expected to be in operation on June 1.

Johnstown (Pa.) Passenger Railway, noted in the ELECTRIC RAILWAY JOURNAL as expecting to purchase ten double-truck cars, has ordered this equipment from the St. Louis Car Company.

West Penn Traction Company, Pittsburgh, Pa., is reported as having ordered from the Cincinnati Car Company seven city cars for Wheeling, W. Va., and six interurban cars for the Connellsville line.

Kankakee & Urbana Traction Company, Urbana, Ill., has purchased two gondola cars from the St. Louis Rail & Equipment Company. This railway company is also in the market for an express car.

Tri-City Railway, Davenport, Iowa, has re-entered the car manufacturing business and has just completed the first cars of a small order for the Iowa Railway & Light Company, Albia, Iowa. The cars have single trucks and are equipped with sliding doors and folding steps.

St. Paul Southern Electric Railway, St. Paul, Minn., announces that it is in the market for eight passenger cars, one electric locomotive and one snowplow. All correspondence regarding this equipment should be addressed to W. L. Sonntag, general manager, 1127 Merchants' National Bank Building, St. Paul, Minn.

Massachusetts Northeastern Street Railway, Haverhill, Mass., lost eight closed cars and four open cars, two four-motor plows and two service cars in a fire which destroyed its carhouse in Merrimac on Feb. 29. A report states that orders for new cars have been placed.

Chicago, Lake Shore & South Bend Railway, South Bend, Ind., has purchased two 72-ton Westinghouse-Baldwin electric locomotives, equipped with four 190-hp. motors capable of pulling a 6000-ton trailing load. This company has also ordered seven 50-ton composite gondola, two 50-ton float and nine 40-ton steel frame box cars from the Western Steel Car & Foundry Company.

TRADE NOTES

Curtain Supply Company, Chicago, Ill., has received an order to equip with ring fixtures and Rex rollers the Pantasote curtains provided for the 200 new city cars ordered by the Pittsburgh (Pa.) Railways.

U. S. Metal & Manufacturing Company, New York, N. Y., has transferred its Southern office from Atlanta, Ga., to the Munsey Building, Washington, D. C. J. T. Martyn, formerly with the Pressed Steel Car Company, has been appointed manager in charge, succeeding H. K. Porter.

Ohio Brass Company, Mansfield, Ohio, has received an order for 40,000 third-rail insulators from the New York Municipal Railway, Brooklyn, N. Y., and for 3000 35,000-volt transmission insulators to be used for replacement purposes by the Havana Central Railroad, Havana, Cuba.

Ohmer Fare Register Company, Dayton, Ohio, on Feb. 28 held a dinner which was given by the president, John F. Ohmer, to his employees. The dinner was followed by addresses, and a distribution of \$200 in prizes, a regular custom of the company, for employees making the best suggestions for the betterment of the company's system and plant.

Holden & White, Chicago, Ill., is the name of a new firm formed by R. R. Holden, formerly with the Wesco Supply Company, St. Louis, Mo., and lately a manufacturers' agent in Chicago, and W. McK. White, formerly sales manager of the Esterline Company, Indianapolis, which will represent a number of manufacturers of high-grade railway materials and equipment. This firm has affiliated representatives in fifteen cities in the United States and Canada, and in addition to personal visits will conduct merchandising campaigns for the various manufacturers it represents. At present this firm is located at 39 South La Salle Street, Chicago, Ill.

Lauren J. Drake, Jr., resident manager at Indianapolis of the Galena Signal Oil Company, on Feb. 23 was elected vice-president and director of that company. He will move to New York shortly. Mr. Drake is a native of Iowa, where he was born in 1880, and in 1900 went to work in the Whiting, Ind., refinery of the Standard Oil Company. His experience there included work in all of the divisions of manufacturing and selling. Later he was appointed manager of the Republic Oil Company at Columbus, Ohio, and for the last eleven years he has been resident manager of Galena Standard Oil Company at Indianapolis. Mr. Drake has attended many electric railway conventions and has a large number of friends among electric railway operators.

ADVERTISING LITERATURE

Railway & Industrial Engineering Company, Pittsburgh, Pa., has issued a folder which contains illustrations of some of its representative outdoor, indoor and portable substations.

Cleveland Battery & Electric Company, Cleveland, Ohio, has issued a folder describing Hywatt dry battery cell, suitable for use with car buzzer systems and for other uses. In the construction of this battery the familiar round type of zinc container is abandoned and a flat type is adopted, similar to the lead plate construction of the storage-battery cells. In the round cell the zinc container, which is the fuel supplying the electrical energy, becomes thinner with use and will eventually be eaten through in spots. The cell is then rendered useless and the remaining zinc and other materials become waste products. In the flat type, however, the zinc sheet can be entirely consumed and will deliver current up to the last. The cell, owing to its greater depolarizing area, maintains a higher voltage under load than the round cell.