

Electric Railway Journal

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Safety Car Standardization Has Several Aspects

THIS paper has so persistently and emphatically advocated standardization of railway equipment that there can be no doubt as to the position of its editors on this important subject. Recently, the safety car, embodying as it does the most decided step ever taken toward standardization, has been the cause of some rather sharp conflict between manufacturers and purchasers. The latter have been inclined to make too great moment of some minor changes in the fittings or finishings of the car interior and sometimes of more vital car parts. The former have been very insistent that the car should be bought "as is" without an alteration in specifications, just as one purchases an automobile or motor truck.

In general, the advantages which are to be derived from taking a car "off the shelf," so to speak, far and away offset the small advantage, real or imaginary, that the local railway company may derive from some slight changes to conform to present practices in its shop, or to keep from adding anything new to the storeroom supply. However, there are two other aspects to this problem of rigid adherence to a standard product which should be mentioned.

The first is that there should be no stifling of sound development or improvement of the safety car or any of its equipment. There has been manifest a tendency to discourage if not kill any suggested changes, even before they receive due consideration, simply because they were changes. Nevertheless, the fact cannot be overlooked that some very worthy changes in body framing and truck and motor design have been brought out, and are now concurred in by the manufacturers, as the result of the study and experience of railway engineers. It would be folly to say that the present car is the ultimate of perfection and that no further improvement can be conceived. So, it seems to us that the manufacturers cannot expect the present car to be continuously accepted without question or suggestion, but rather that they must expect to have ever before them possibilities of improvement which they must not condemn but must consider and dispose of according to the merit of each individual case, taking all factors into consideration. But, in general, it may be said that the argument of changes to meet local conditions should be almost completely banished.

There is also a merchandising consideration which perhaps does warrant deviation from the standard. If, for example, a railway management has sound reason to believe that cushioned, more comfortable seats will encourage even more riding than the attraction of frequent fast service, then that is a justification to substitute something better for the slat seat of the standard. On such proposals the

manufacturer should simply make two bids, one on the standard and one on the car as desired by the purchaser. The latter can then determine whether the differential between the two is justified.

The second aspect referred to has to do with the products of different manufacturers. Competition is very desirable, and the industry will always be anxious to have several manufacturers of safety cars. This brings up the necessity for the purchaser to make certain that the principal parts, at least, of his safety cars, as made by different manufacturers on different contracts, shall be interchangeable. That is to say, it should be possible to set the car body of one manufacturer on the truck of the other, and of course to interchange wheels, axles, bearings, gears, motors, etc., on the trucks of the different manufacturers.

With this in mind, it would seem that the various manufacturers would serve the industry better and get closer to a car so standardized as to require the least number of deviations from the standard, if they would among themselves agree upon the fundamental dimensions making such interchange of parts possible. An alternative which would accomplish this same end would be the adoption by the American Electric Railway Engineering Association of a safety car standard for the industry. The difficulties of bringing this about are perhaps greater and the process slower than for the manufacturers to accomplish the same object. But the safety car, being a new thing, should lend itself well to standardization by the association along the lines mentioned, and this work should be done before the complications have increased unduly. Surely, if the engineers cannot agree upon a standard for this new car, there is little hope of material progress with older types of equipment.

Where Standardization Is In Danger of Falling Down

AMONG those who heard the reports and discussion at the convention meetings of the Engineering Association this year the impression prevails that standardization is a more important consideration now than ever before. In his opening address President Phillips stated that the most frequent criticism heard of the Engineering Association is that the standards adopted by it are not generally used and that a lack of interest is manifest in regard to them. The revision of the method of adopting association standards as planned is a step forward toward overcoming this trouble, and the campaign of publicity launched by the standards committee will do much to remove any cause for criticism.

The attitude adopted in the past by some railway officials toward association standards seems to have been in favor of their adoption where the standards conform to the particular types used in local service. But where this is not the case they are not used because their adoption would mean that the number of maintenance parts to be kept in stock would have to be increased. This in fact appears to be the principal obstacle to their wider use. All recognize their advantages when once applied, but the necessary changes to inaugurate the plan involve some inconvenience so the standards are rejected. Obviously, standardization cannot be effected as long as this attitude prevails. Some inconvenience must be experienced to secure the greater gain.

During the period of material scarcity, railways were fortunate to get anything they could to keep their cars in operation. As a result we now find all sorts of combinations. Different types of motors are operating under the same car and several types of car fittings and fixtures are found applied to it. There is a big field for standardization work as soon as financial conditions can be adjusted sufficiently to permit the railways to enter into the work in the manner desired. The result of war-time experience seems to be a broadening of the views of operating engineers regarding the supposed advantages of their particular hobbies. They have found by the enforced use of other parts that much that they previously considered essential in reality caused waste of money and good material and was directly detrimental to economical operation.

The Engineering Association now has up for solution this urgent problem of securing the wider adoption of the standards. The tendency towards unified construction among manufacturers and consistent practice among the railways should be encouraged. Members should inform themselves of all previous efforts and practices adopted and support their association actively in its efforts to the above end.

Obstacles Encountered in Establishing the Zone System in New Jersey

THE plea of the Public Service Railway to abandon its zone-fare system and return to the flat-fare system will be read with regret by many electric railway managers. Most of them, we believe, have appreciated the important nature of the Public Service Railway experiment. From a traffic standpoint they have realized the many advantages of a zone fare, and they have hoped that a workable method could be developed for collecting and accounting for zone fares and at the same time retain the conductor on the rear platform when passing through congested centers. Certain of the features of the New Jersey system seemed complicated, but it was generally felt that the advantages of having the conductor on the rear platform outweighed to a great extent the advantages in the actual collection of fares afforded by the European system of zone-fare collection. In consequence, it was hoped that the Public Service plan or some adaptation of it would prove satisfactory.

It is possible that certain features of the plan, as adopted, would have been fatal to it in any event. However that may

be, and we shall discuss these technical features later, we believe that the many obstacles which the system encountered, entirely apart from the plan itself, were sufficient to account for its downfall.

In the first place the plan was launched in the middle of a bitter political campaign, which up to that time had been conducted without issues appealing to the popular imagination. No increase in rates is popular, and as the zone system avowedly increased the average fare and as it affected practically the entire state, it was seized upon by the rival political candidates as a medium for selfish advantage. In consequence, a tremendous amount of abuse entirely unwarranted was heaped upon the Board of Public Utility Commissioners, the railway company, its officials, and indeed upon everyone who had been connected in any way with this attempt to solve an important operating problem. Naturally these attacks greatly prejudiced public opinion.

Again, although the new system was inaugurated only after months of hearings and a most thorough consideration of the entire problem, the people of New Jersey generally speaking, were poorly informed concerning the radical changes involved and the equity of any zone-fare system to the patrons of a railway. It is true that the company ran a series of advertisements in the daily papers and carried posters and placed leaflets in the cars describing the new plan. A moving picture film was prepared showing exactly how the new system of fare collection would operate and what the trainmen and passengers would do. This film was shown several times in some ninety moving picture theatres before the new system became effective and also during the first week of operation. Yet in spite of all this publicity, a large part of the people of the state were practically unacquainted with the new system when it actually became effective especially with the reason why it was, in principle, the fairest method of charging for car journeys.

Public ignorance was most pronounced in the so-called Southern Division, comprising the lines in and around Camden. The people of Camden read Philadelphia newspapers, which carried practically no details of the progress of the investigation by the commission of the merits of the proposed plan, and of the day-to-day testimony developed from March to July, concerning the present financial needs of the railway company and the way in which they could be met most equitably. Moreover, as the Newark *Evening News*—the largest and most influential newspaper in the state—remarked, the stories which did appear in the Philadelphia papers from time to time were remarkable for their inaccurate statements and incomplete presentation of the facts. In consequence, the announcement by the commission of the zone system of fares came as a thunder-clap to the people of Camden and its neighboring suburbs.

The situation in the Southern Division was perhaps further complicated by a simultaneous publicity campaign launched by the Philadelphia Rapid Transit Company concerning its achievement in maintaining the 5-cent fare on its lines. Neither the Rapid Transit Company nor the newspapers pointed out that the operating conditions in Philadelphia and Camden, two neighboring cities, were most widely dissimilar; that the tributary population and

density of traffic were almost five times as great on the Philadelphia system as on the Public Service Railway and that the cost of service per passenger carried was therefore very much greater in New Jersey than in Philadelphia. The people in Camden took Mr. Mitten's propaganda as applying literally to their system. Public discontent was fanned into a flame of open revolt by the shipyard workers, due largely to the fact that instead of discharging these men at the entrance as formerly, the cars carried them to a post-payment area about 700 ft. beyond, thus delaying their arrival at the works. Later, prepayment was substituted on this particular line, but a boycott had been begun throughout the district in favor of the former 5-cent fare. Such a return was also urged by the Mayor, who claimed that the Public Utility Commissioners had power to make distinctive rates for different communities.

On the Northern Division, comprising the greater part of the state and of the company's mileage, the system operated with reasonable smoothness, though, as explained in the statement of the company, it was slow. Another objection which the company mentioned in its plea to the commission was that the system was unpopular with the employees. The motormen considered that the work required of them in issuing entrance checks distracted their attention from the operation of the car while the conductors naturally were not pleased at being obliged to collect fares under an unpopular plan, as they became the recipients of a great deal of abuse from passengers who were dissatisfied with the higher fares. President McCarter therefore asked for permission to return to the old plan of flat fares.

We hope that this does not mean the end of the zone system in New Jersey, even if it should seem wise temporarily to suspend it. After somewhat more time is taken to work out the best rate of fares and method of collection, with the experience of the last five weeks as a basis, better results should be secured. The company stated at a hearing last summer that a 7-cent flat fare would not be sufficient and that the fare, if a flat fare was charged, would have to be 9 cents. But this would encourage the jitneys more, we fear, than even the existing zone fare.

As to the lessons of the past month, the advisability of a 3-cent minimum for a single zone seems doubtful, as evidence seemed to show that a 5-cent minimum good for a ride of two zones or less would be as acceptable to the public. The chief advantage of the 3-cent fare, from an operating standpoint seems to be that it allows a ride through two zones on two cars to be made for 6 cents. In other words with a 3-cent minimum, transfers can be eliminated without requiring a 10-cent fare for the ride mentioned. The importance of this advantage of dispensing with transfers, however, is open to debate.

The uniform charge of 2 cents per zone after the first zone proved also somewhat high—not high perhaps compared with the local fares on the adjoining steam railroads but high compared with jitney fares and steam railroad sixty-ride monthly commutation tickets and much higher than the former trolley fare. Probably some adjustment in this class of fare for through rides could be made to advantage.

Finally in the method of collection the experience of the Public Service Railway shows that some improvement could also be made. What the permanent apparatus planned would have done was of course not determined, but the apparatus and methods temporarily employed were undoubtedly slow. Here is a chance for the inventor and designer of fare collecting equipment as well as for the committee on fare collection, and we hope that all will endeavor to see whether something cannot be designed to work on the prepayment plan.

The Age of Rails and Its Relation to Tracks and Cars

IN MANY WAYS the age in which we are living may be called the age of rails. Mankind owes much of its progress to the genius who first conceived the idea of increasing the facility of moving heavy loads by some means other than that of a wagon upon a dirt road. The development of this country from a collection of isolated states separated by vast rivers, miles of prairie land and high mountain ranges into one big union closely knit together has been due more to the use of rails than to any other agency. The Union Pacific Railroad may be said to have recreated the nation, when it united East with West.

Along similar lines, large cities would still be collections of hamlets were it not for the swift communication furnished by the street railways and rapid transit railroads. The war just closed could hardly have been prosecuted so swiftly and successfully had it not been for the transport of materials, troops and big guns by means of rails which ran almost right up to the first-line trenches. As the ancient Romans built their famous roads for the easy and rapid movement of their impedimenta so today we build military railroads for exactly the same purpose. Thus rails are seen to be one of the greatest aids to progress either in peace or war.

We have been led to the expression of these thoughts by the undercurrent of opinion which seems to take the view that the automobile and the gasoline engine will soon supplant either the rails of the electric street railways or the electric motors used for the propulsion of cars upon the rails.

Those who were fortunate enough to hear the address of N. W. Storer on the latter subject at the recent Atlantic City Convention were convinced that there are no well-grounded fears that the gasoline engine will replace the electric motor for car propulsion in the passenger transportation field. Likewise, anyone who will carefully analyze the conditions under which automobile buses are operated in large cities, will find no good reason to fear the immediate abandonment of the rail. It still remains as the best means of supporting large, rapidly-moving masses with the least wear and tear upon both roadways and equipment. The rail will stay with us for a long time to come, and the problem confronting us is not related to its abandonment. On the contrary, we must study its greatest possible use with respect to track design in its relation to the light-weight car.

Brooklyn Installs Electrically Heated Oven

An Electrically-Heated Forced Ventilated Oven With Thermostatic Control Provides Increased Facilities for Baking and Drying Electrical Car Equipment

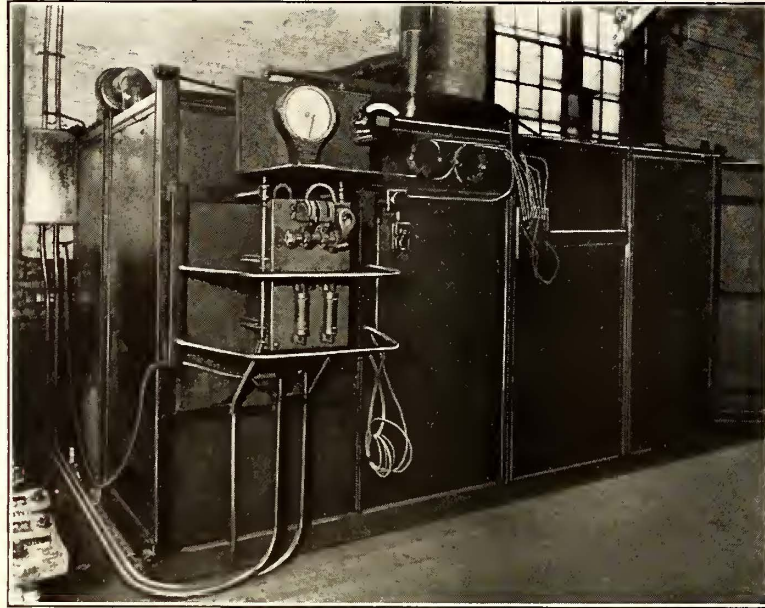
THE Brooklyn Rapid Transit Company has had a steam-heated oven at its Fifty-second Street surface repair shop for a number of years. This has been used for baking and drying all classes of electrical equipment repaired at that shop. A description of this oven with its various applications was given in the *ELECTRIC RAILWAY JOURNAL* for March 15, 1913. Due to the large increase in car equipment which this road has purchased during the past few years, its facilities have proved inadequate, so that it was necessary to install an additional oven. In making this installation the company has availed itself of the many advantages ascribed to electrically-heated ovens, such as economy of operation, reliability of service, increased production, safety and ease of operation, cleanliness and reduced fire hazard.

CONSTRUCTION OF THE OVEN

This new oven is of the kiln-type, and it is 13 ft. long by 7 ft. high by 7 ft. wide outside, with a capacity for accommodating eighteen armatures at one time. It consists of an insulated room, into which the electrical equipment to be baked is placed by hand and suspended or hung up in place on suitable angle-iron racks. The walls are constructed of two thin sheet-metal linings with powdered insulation between them, thus practically constituting one sheet metal box within another with insulation in the intervening space. The floor of the oven is similarly constructed and sets up above the shop floor a distance of 6 in. The intervening air space is screened in at the front end with a punched sheet metal guard to prevent the accumulation of dirt and refuse.

An angle-iron framework inside the oven provides a substantial support for armatures in the process of drying and baking, and also provides hanging support for field coils, armature coils, insulating cloth, and other material used in the repair of railway equipment, so that they can be conveniently baked and dried.

An air-operated hoist is provided at the front of the oven for picking up heavy pieces of electrical equipment. An accompanying illustration shows an armature being placed in the oven by means of this hoist. A yoke is arranged at the bottom of the hoist with notched teeth at each end. Supporting caps with rods attached are placed over the ends of the armature shaft to be lifted and rods with projections at the sides fit into the various notches so as to provide a very flexible arrangement that will fit



VIEW OF SIDE OF THE OVEN SHOWING CONTROL APPARATUS AND RECORDING THERMOMETER

any size of armature to be handled.

The electric heating equipment for the oven consists of thirty Westinghouse type-C oven heaters installed along the side walls near the bottom of the oven. A protecting wire screen has been installed over the top of the heaters to prevent accidental contact by workmen or contact of any of the material placed in the oven through its falling off from its support. This protecting wire screen is attached directly to the out-turned flanged end-plates of the heaters and extends down over the heating element a short distance

and also up along the side walls, thus completely inclosing the electrical connections.

The heating element of the Westinghouse oven heaters consists of a resistor ribbon wound on a number of fire-clay bushings assembled on two steel tie rods between two pressed steel end plates. The ends of the ribbon are secured to four steel terminals which are clamped to the steel tie rods; the rods, therefore, becoming the terminals for the heaters. These rods are insulated from the end frame where they pass through the ends and are threaded for bolting on the connectors. Special connectors are furnished to meet any requirements. Cold-rolled-steel busbars are recommended and may be mounted directly above the heater on insulators bolted directly to the end frame. Connectors are secured to busbars by steel clamps.

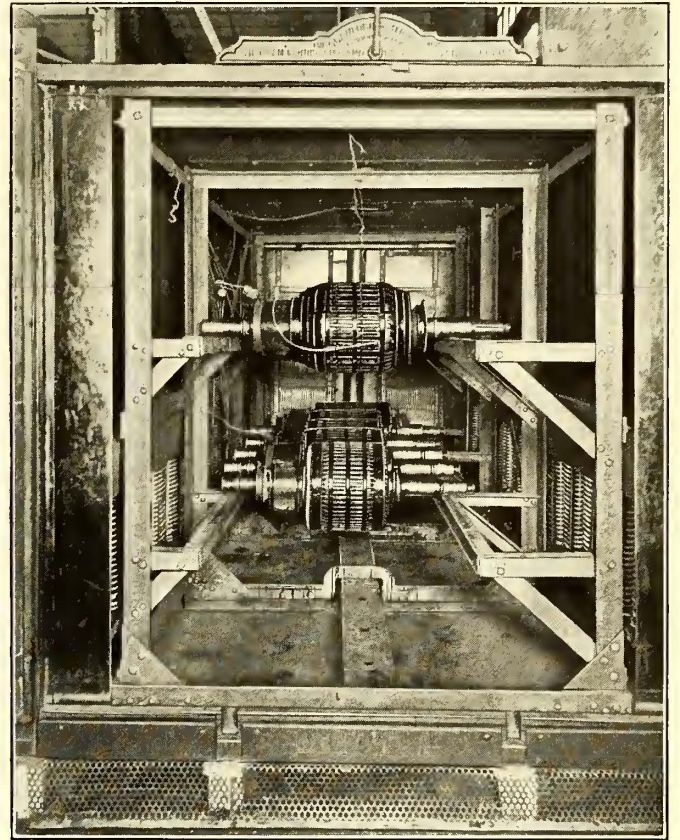
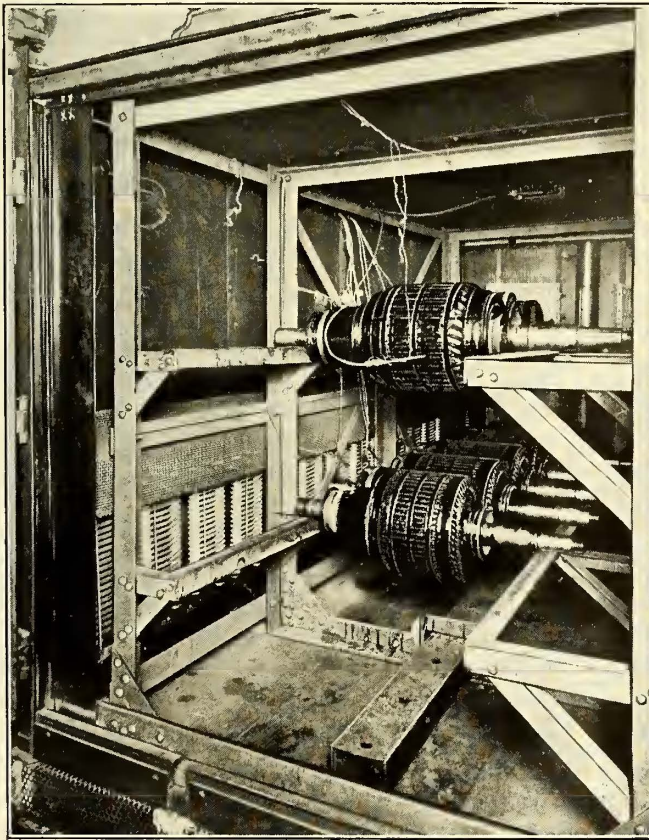
The thirty heaters used in the B. R. T. oven are connected in six circuits of five heaters each. Each heater has a continuous capacity of $2\frac{1}{2}$ kw. at 120 volts. The current taken by each circuit of five heaters is 20 amp. At present only twenty heaters are in use in four circuits, as it was found that this number was sufficient to heat the oven quickly and provide convenient regulation of the temperature.

The control equipment, installed on the outside of the oven near one end, consists of the Westinghouse standard type-F magnet switch with protecting fuses for closing and opening the circuits through the heaters. Automatic temperature control is provided by a suitable relay in conjunction with a thermostat, by means of which the temperature within the oven is kept between 235 deg. and 245 deg. Fahr. (112 deg. to 118 deg. Cent.). In the operation of this temperature control all of the heaters are cut in and out at the same time. No heaters are left in circuit while the temperature is dropping to the lower limit.

In order to provide a record of the temperature in the oven during a particular baking operation, a Bristol record-

ing thermometer has been installed. A dial record for one operation is shown in an accompanying illustration. A record number is placed on each dial together with the dates of the baking so that a record of the temperature condition which existed in the oven at the time the work was done is obtained, and a possible clue is afforded to determine the cause for any trouble which may develop later in service. The record on page 748 shows that material was placed in the oven between 11 and 11.15 a. m. and that the oven was again opened at 1.45 p. m. when additional material was inserted. After that time the baking process continued until 7.15 the following morning, when a new record was installed on the temperature indicator. The material in the oven, however, was not removed at that time, and a record of the temperature in the oven after this time will be found on the succeeding record.

external surfaces of the oven. When material is placed in the oven it is usually at room temperature. It must be heated to the maximum temperature desired. After the work has reached its maximum temperature no additional heat is absorbed by it regardless of the length of time it may be held at that temperature, as a certain amount of heat is required for raising the temperature of a given substance through a given range of temperature irrespective of the length of time consumed in heating. However, if the heating is accomplished in one hour a certain amount of power will be required, but if the heating is accomplished in half the time, double the amount of power expressed in kilowatts will be necessary with exactly the same kilowatt-hour consumption. The total weight of the material supporting parts, etc., heated, multiplied by the degrees rise in temperature and by the specific heat of the metal is the heat



INTERIOR VIEWS OF OVEN SHOWING ARRANGEMENT OF HEATERS AND ARMATURES IN PLACE READY FOR BAKING

The effect that the quantity of material in the oven has on the time taken to cool and heat it to the temperature limitations of the thermostat is shown by a comparison of the chart before and after 2 p. m. In the first part of the chart after the material had been placed in the oven it took fifteen minutes to raise the temperature of the oven to 248 deg. Fahr. During the next hour the automatic control cut off the heat eight times and in the following hour seven times. At 1.45 p. m. the oven was opened and additional material was put in. The time that the oven was open was insufficient for it to cool entirely off. After the oven was again closed it took fifteen minutes to increase the temperature from 165 deg. Fahr. to 240 deg. Fahr. During the next hour heat was automatically cut off seven times and in the following period six times per hour.

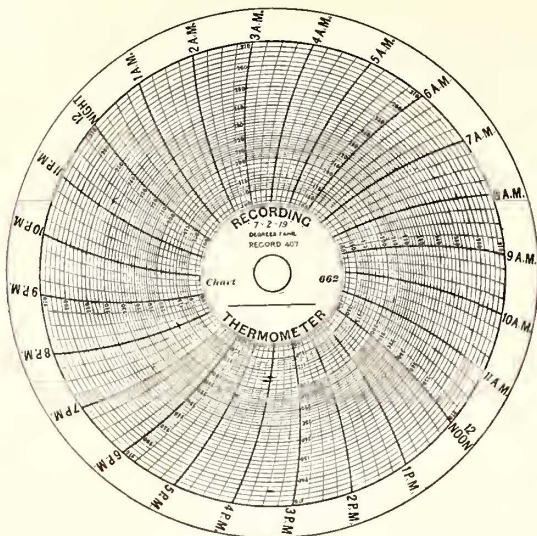
The heat supplied is used for raising the temperature of the work, oven walls and heating equipment, for raising the temperature of the parts used for supporting and carrying the work, for raising the temperature of the ventilating air and for supplying the radiation losses which occur from the

required in British thermal units. This divided by 3412 is the energy consumption in kilowatt-hours.

The amount of power required for heating the air used in ventilating the oven depends on the initial and final temperatures of the air, the weight of air entering and its specific heat. With the kiln-type oven used in this case air is taken in at room temperature and is discharged at the oven temperature.

VENTILATION IS NECESSARY

In order to carry off moisture as it is forced out of the equipment being baked, an efficient system of forced ventilation is a great advantage. In the present oven, as installed in Brooklyn, air is taken in through a ventilating duct at the bottom of the oven. This duct is of rectangular shape, 6 in. x 3½ in. and it is provided with holes in the top through which the air enters. The air is thus taken in at the oven temperature and is drawn through the receiving duct at the bottom of the oven and sent outside the oven through a pipe 6 in. in diameter which may be seen at the back in the



TEMPERATURE RECORD FOR A BAKING OPERATION

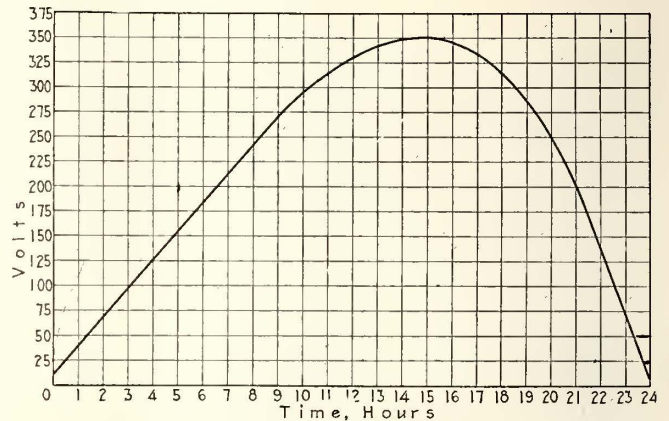
interior view of the oven. At the top of this pipe is located the ventilating blower which is driven by a direct-current 550-volt $\frac{1}{4}$ -hp. motor, having a speed of 1850 r. p. m. The arrangement of the ventilating pipes at the top of the oven is shown in an accompanying diagram and may be seen in the view of the exterior of the oven. From the motor or ventilating fan, the air is forced through a 5-in. pipe into a 10-in. pipe leading through the roof to the outside air. The top of this pipe is protected by a metal hood. From the bottom of this vertical pipe two pipes lead back to the top of the oven at each end. Three dampers for regulating the flow of air are installed in the ventilating pipes as shown in the accompanying diagram. One damper is located in the pipe leading from the ventilating fan to the upright pipe and is operated by a lever which extends to the back of the oven. Two additional dampers are installed in the two pipes leading from the bottom of the upright pipe to the opening in the top of the oven. These dampers are interlocked and are both operated from the same lever at the front of the oven. Efficient operation is obtained by regulating these dampers.

The problem which the shop foreman has to solve is to get out a certain amount of material in the shortest possible time. On wet or damp days when there is an accumulation of moisture in the atmosphere, it is necessary that the air in the oven be changed more frequently than would be necessary on a dry hot day. By watching the indications given by the recording thermometer, the man in charge is enabled to tell the length of time consumed in heating up and cooling off the oven and, by means of a series of voltage

readings described later, he is able to tell the speed at which the drying is taking place. The dampers are then adjusted to meet the conditions and give the most rapid and efficient drying and baking.

To provide for hand regulation of the controlling apparatus, two push-button switches are provided. A double push-button switch, located alongside the magnet switch, enables the operator to cut the equipment in and out at will. As a safety precaution to insure that the heating circuit is never closed when the doors are opened, an additional push-button switch is installed at the front of the oven. This is operated by a projection on one of the doors so that the heating circuit is opened whenever the doors are open.

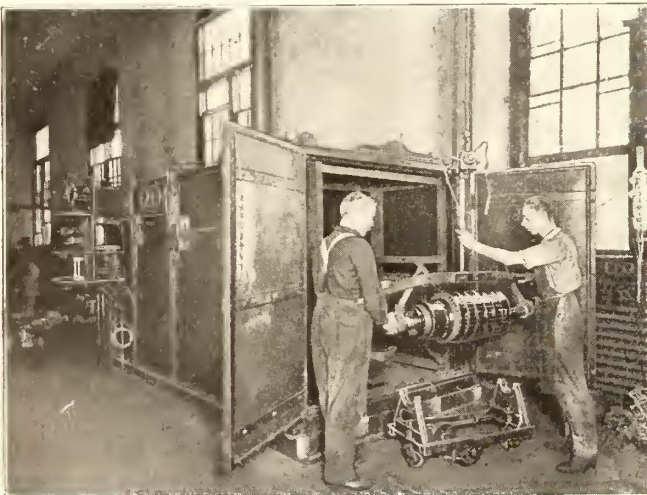
To provide a check for the efficient operation of the oven and to make certain that no armatures are removed before



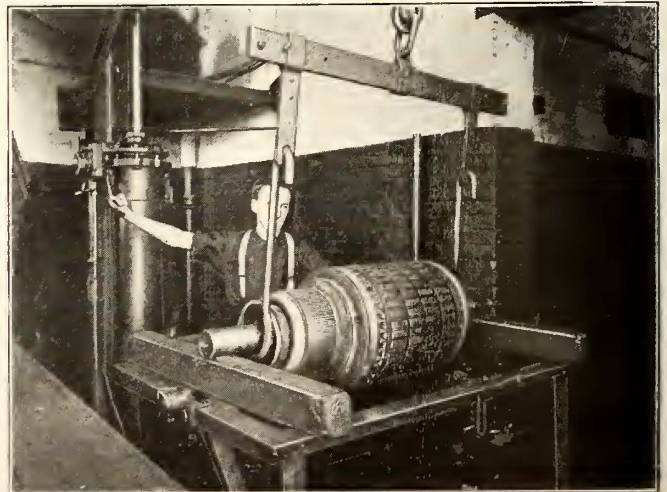
GRAPH SHOWING THE PROCESS OF DRYING OUT OF AN ARMATURE

they are properly baked and dried out, readings representing insulation resistance are taken at convenient time intervals with a voltmeter. As an aid to making the necessary connections for these readings, each armature as it is installed has a lead connected to the commutator. The armature shaft and core are grounded by the armature shaft resting on the inside metal supporting framework which is provided with a good contact to ground. The various connections leading from the commutator of each armature are all brought to a dial contact switch located on the outside of the oven.

The construction of this contact device may be seen from an accompanying illustration. For testing purposes one side of a voltmeter is connected to line and the opposite side is connected to the center of the movable contact arm of the contact apparatus. By moving this arm to its various positions the circuit is completed to the commutator of the armature, and the reading obtained by the



PLACING AN ARMATURE IN THE OVEN BY MEANS OF AN AIR HOIST



LOWERING AN ARMATURE INTO THE DIPPING TANK

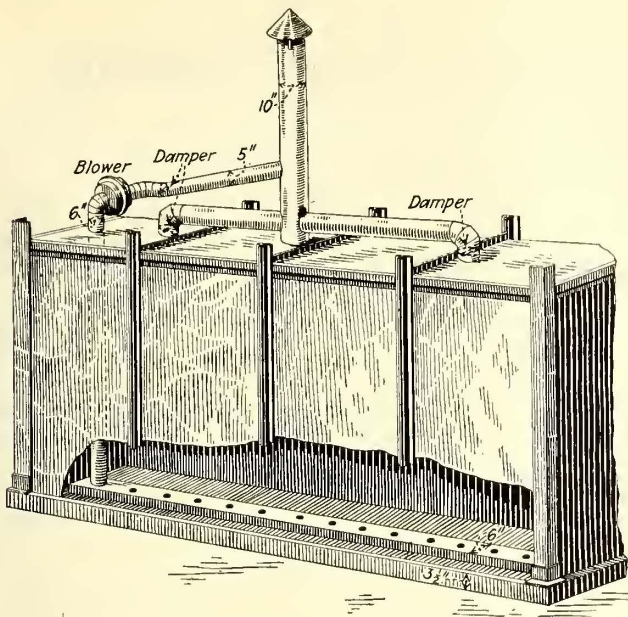


DIAGRAM OF VENTILATING PIPING

voltmeter provides a means of measuring the insulation resistance of the combined armature coils. An accompanying graph has been plotted from a series of readings taken on one particular armature. By referring to this graph it will be seen that the first measurement taken just after the armature had been installed showed but 10 volts. This voltage increased uniformly for approximately twelve hours, and a maximum voltage reading of 350 volts was obtained at the end of the fifteenth hour. This indicates that the insulation resistance of the various windings had decreased during this period, due to the forcing of the moisture out of the coils which provided a circuit of less resistance to the spider and shaft of the armature and so to ground. After fifteen hours of baking, the voltage readings decreased and the insulation resistance increased, so that at the end of twenty-four hours a reading of 10 volts was again obtained.

In baking armatures after they have been dipped in the insulating compound it is the practice of the Brooklyn Rapid Transit Company to require that they remain in the oven until they show a voltage reading of 10 or less. As these voltage readings increase for the first part of the baking period it is necessary to take several voltage readings at convenient intervals to make certain which side of the curve the readings fall on. Records in the form of the

graph shown are not kept for every armature, but the usual procedure is to take a reading after the armature has been in the oven from five to six hours and then to take readings every three or four hours until a voltage of 50 volts or less is obtained, when readings are taken at more frequent intervals.

The practice of the Brooklyn Rapid Transit Company is to dip all armatures complete as they come into the shop for repairs. The process employed was described in the *ELECTRIC RAILWAY JOURNAL* for June 15, 1918. A modification of the method described there, however, is used by the Brooklyn Rapid Transit Company in that it dips its armatures in a horizontal rather than dipping them in a vertical position. An accompanying illustration shows the type of dipping tank provided. The armature is lowered into the bearing supports at each end of the tank and by operating the lever which is shown at the front of the tank, the height of the compound is brought up so that it will cover the lower half of the armature. The armature is then revolved slowly so that all parts enter the compound. After the armature is dipped it is allowed to drain for some time before it is placed in the oven.

Erratic Setting of Overhead Circuit Breakers

AN EASTERN railway operating surface cars equipped with type K control and overhead circuit breakers received a number of reports from motormen, stating that the circuit breakers were blowing continually. It was the practice of this company to reset all circuit breakers at the bench and the method used consisted of connecting one side of the circuit breakers to line and the other side to an ammeter. The negative side of the ammeter was connected to ground through a water rheostat. This water rheostat consisted of a barrel of water containing salt. One electrode was placed at the bottom of the barrel and the other electrode was adjusted by lowering it into the water so as to obtain different current values.

The cars reported for circuit breaker trouble were ordered into the shop and the man in charge of this work started to make the test. He found that he was unable to obtain an accurate setting due to a decided variation in the current values at which a circuit breaker would blow. For example, at one time, the breaker would open at 190 amp., the next time it would blow at 250 amp., and if tried again immediately it would blow at 110 amp. A careful test was made to determine if all connections were correct, and all wires properly insulated, but this inspection showed that everything was normal. The inspector then came to the conclusion that the ammeter was at fault and required recalibrating. The meter was accordingly sent to the manufacturer for recalibration and, upon its return, the resetting of circuit breakers was again attempted, but the results were the same as that previously experienced.

The master mechanic of the road was then called in an endeavor to determine the cause of the unusual condition. He found that a number of defective armatures had been piled in close proximity to the testing bench. This mass of magnetized iron caused a magnetic field which extended around the ammeter and resulted in inaccurate readings. The armatures were removed to another location and the testing then was carried on satisfactorily.

The National Industrial Conference Board has just published a pamphlet giving statistics of changes in the cost of living during the five years ended July, 1919. This pamphlet shows, among other things, that the increase between July, 1914, and July, 1919, was 73 per cent, and between March, 1919, and July, 1919, it was 7.3 per cent. The methods by which these figures are derived are given in the pamphlet.

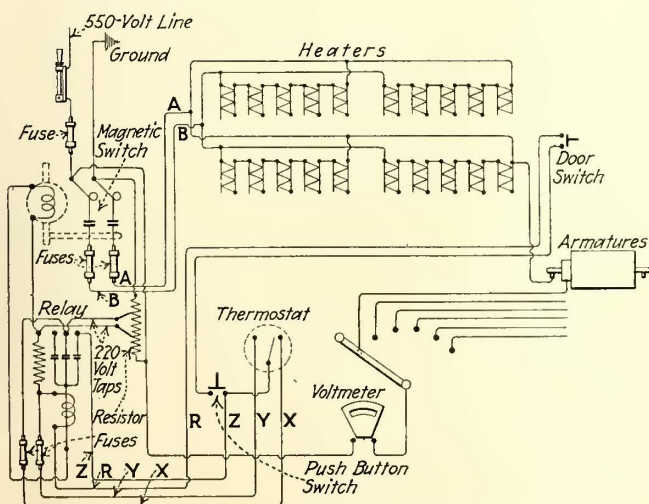


DIAGRAM OF ELECTRICAL CONNECTIONS

Transference of Load in Cars While Braking

The Author Describes the Methods Used in Calculating the "Flywheel" of the Rotating Parts of Electric Car Equipment and Shows How the Load is Transferred Throughout a Train During the Retardation Period

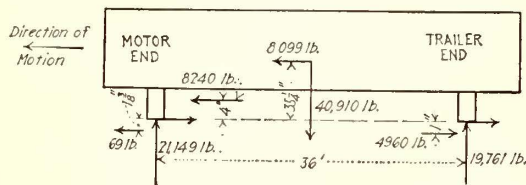
By T. F. BURKE

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IN THE DESIGN and operation of electric railway cars it is often desirable to estimate the theoretical coefficient of friction between wheels and rails necessary to prevent skidding of the wheels during braking.

The following article outlines the calculations for determining the theoretical minimum coefficients of friction to prevent skidding for an electric railway train. In order to make the calculations as general as possible it is assumed that the train is composed of both motor and trailer cars, and that each car has one two-motor truck and one trailer truck. All trucks are assumed to have two axles.

In general the method consists (1) in determining the



FORCES ACTING UPON BODY OF MOTOR CAR

rate of retardation of the train as a whole, including the added inertia effect of the rotating parts; (2) in determining the transfer load due to inertia, drawbar pull and brake-rod pull, thus giving the wheel loads during braking; (3) in determining the tangential force exerted by the rail against the wheel and (4) of expressing this force in per cent of the wheel load.

The calculation of the effect of angle of brake hangers, location of the brakeshoe on the wheel, etc., are not given here. They are taken up and discussed very clearly and at great length elsewhere, notably in the various writings of R. A. Parke. His articles give very clearly the effects of inertia in transferring the load, but cover single-car operation, operation of trains of cars of like design and operation of cars in which the inertia of rotating parts is not of as great importance as in modern electric railway operation.

Practical consideration must be included in the design of new cars and analysis of operation of existing equipment, which cannot be gone into at length here. Among such considerations are the following: (a) The proportion of wheel load below the spring suspension, which is generally greater for motor trucks than for trailer trucks. (b) The fact that the greater the rotative energy in a system of wheels, axle and armature, the less is the liability of skidding while the car is passing over a small slippery spot on the rail. (c) The use of the same pattern of brake-shoe on both motor and trailer wheels.

These items all tend to increase the coefficient of friction necessary to prevent the skidding of trailer wheels over that for motor wheels.

Assume a train comprising seven motor and three trail cars, with dimensions and other data given in Table I.

The kinetic energy in a pair of wheels, axle and gear when rotating is relatively greater than that in a non-rotating body of equal weight traveling at the same speed by the square of the radius of gyration of the rotating body divided by the square of the radius of the wheel.

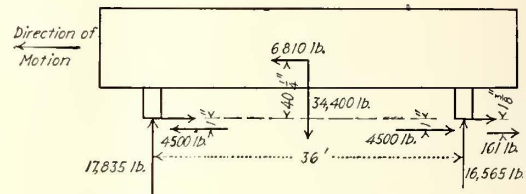
In the case of the armature, shaft and pinion this value

must also be increased by the square of the ratio of the number of gear teeth to the number of pinion teeth, using the radius of the motor wheel in the above.

The equivalent truck weights that contain the same amount of energy as that due to the rotation of rotating parts may then be found from:

$$W = \left(\frac{R}{r}\right)^2 \times W_r \text{ and } W = \left(\frac{R}{r} \times \frac{G}{P}\right)^2 \times W_r,$$

where W is the equivalent non-rotating weight
 R , the radius of gyration of the rotating part
 r , the radius of the wheel



FORCES ACTING UPON A BODY OF TRAILER CAR

W_r , the weight of the rotating body
 G , the number of gear teeth
 P , the number of pinion teeth.

By the use of these equations and by substituting the values previously assumed it is found that the rotation of each group of trailer wheels and axle increases the energy

TABLE I—DATA FOR USE IN COMPUTING BRAKING POWER OF TRAIN

	Motor Car	Trail Car	
Weight of body:			
Motor end	20,400 lb.	17,200 lb.	
Trailer end	20,510 lb.	17,200 lb.	
Total weight	40,910 lb.	34,400 lb.	
Weight of trucks:			
Motor truck	26,240 lb.	9,300 lb.	
Trailer truck	10,210 lb.	9,300 lb.	
Total weight	77,360 lb.	58,000 lb.	
	Motor Truck	Trailer Truck	Both Trucks
Wheelbase	80 in.	66 in.	66 in.
Diameter of wheels	34½ in.	31½ in.	31½ in.
Weight of pair of wheels, axle and gear	3,090 lb.	1,940 lb.	1,940 lb.
Radius of gyration of wheel group	10.8 in.	10.5 in.	10.5 in.
Gear ratio	60:16	.....	.....
Weight of armature shaft and pinion	1,800 lb.	.....	.....
Radius of gyration of armature group	6.67 in.	.....	.....
Nominal service shoe pressure; one pair of shoes:			
Front wheels	26,180 lb.	13,640 lb.	12,375 lb.
Rear wheels	21,420 lb.	11,160 lb.	10,125 lb.
Ratio of emergency to service pressures	60:50	60:50	60:50
Height of center plate above rail	29¾ in.	29¾ in.	29¾ in.
Height of brake pull rod above rail	33¾ in.	28¾ in.	28¾ in.
Pull in brake pull-rod service application	8,240 lb.	4,960 lb.	4,500 lb.
Height of center of gravity of truck above rail	18 in.	18 in.	18 in.
Height of center of gravity of body above rail	65 in.	.....	70 in.
Center to center of trucks	36 ft.	.....	36 ft.
Height of couplers above rail	28¾ in.	.....	28¾ in.
Coefficient of friction of shoes on wheels	35 per cent	.....	35 per cent
Brake rigging efficiency	70 per cent	.....	70 per cent
The center of gravity of each body is assumed midway between the center of trucks.			

of the moving train by an amount equal to the energy of a non-rotating weight of 876 lb., moving at the same speed as the truck. The corresponding weights for each armature, shaft, pinion group, and for each motor wheel, gear and axle group are 3840 lb., and 1229 lb. respectively, or 5069 lb., for each combined group of motor wheels, gear, axle, armature, shaft and pinion.

This gives the following data:

- Equivalent weight of one motor car
= 77,360 + (2 × 5069 + 2 × 876) = 89,250 lb.
- Equivalent weight of one trail car
= 53,000 + (4 × 876) = 56,504 lb.
- Equivalent weight of motor truck
= 26,240 + (2 × 5069) = 36,378 lb.
- Equivalent weight of motor-car trailer truck
= 10,210 + (2 × 876) = 11,962 lb.
- Equivalent weight of trailer-car trailer truck
= 9300 + (2 × 876) = 11,052 lb.
- Equivalent weight of ten-car train
= (7 × 89,250) + (3 × 56,504) = 794,262 lb.
- Actual weight of ten-car train
= (7 × 77,360) + (3 × 53,000) = 700,520 lb.

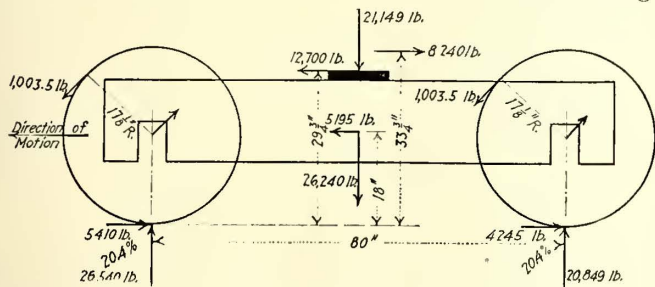
i. e., rotation increases the energy of the train by 13.38 per cent, that of the motor car by 15.37 per cent and that of the trail car by 6.61 per cent.

A brake-rigging efficiency of 70 per cent was assumed, so the actual shoe pressure on the entire train is 70 per cent of the total nominal shoe pressure, or 449,260 lb. The total friction generated by the brakeshoes is 35 per cent of the total actual shoe pressure, or 157,241 lb. This is the total "equivalent weight" of the train multiplied by 0.19797; therefore the rate of retardation of the train will be 0.19797 times the acceleration of gravity, or 0.19797 × 21.93 = 4.34 m.p.h.p.s.

The total shoe friction of one motor car is 35 per cent of the total actual shoe pressure of one motor and one trailer truck, or 17,738 lb., while the total force required to retard the car is 0.19797 × 89,250, or 17,669 lb. This leaves a balance of 69 lb., required to act through the drawbar in retaining trail cars.

Likewise the total shoe friction of a trail car is 11,025 lb., as compared with 11,186 lb., required to retard the car. This leaves 161 lb. by which the motor cars must retard each trail car through drawbar pull.

In so far as the transfer of weight is concerned, it is immaterial whether the drawbar reaction consists of a single



FORCES ACTING UPON MOTOR TRUCK OF MOTOR CAR, MOTOR TRUCK LEADING

force at one end of a car, or is the algebraic sum of forces acting at both ends of the car, since the drawbars are all assumed to be at the same height from the rail. In analyzing the transfer of loads we shall therefore consider the drawbar reaction to be a push of 69 lb., forcing the body of the motor car forward, and to be a pull of 161 lb., forcing the body of the trail car back.

Referring to the diagram showing forces acting on the body of a motor car, let us consider first the motor truck as leading. The first force to consider is that due to the inertia of the car body, which acts horizontally forward

through the center of gravity and is equal to 0.19797 times the weight of the body, or 8099 lb. This force acts 35 1/4 in. above the center plate.

Next in importance are the motor and trailer-truck pull-rod forces which act horizontally, forward 4 in. above and rearward 1 in. below the center plates respectively.

The drawbar reaction is a forward pull of 69 lb., acting horizontally 1 3/8 in. below the center plate. The moments of all of these forces, except the last, about any point in the plane of the center plates is in such a direction as to lift a portion of the load from the rear truck and transfer it to the forward truck.

These forces have the following moments about the forward center plate:

- 8099 × 35 1/4 = 285,490 lb.-in. due to inertia of car body
- 8240 × 4 = 32,960 lb.-in. due to motor-truck pull-rod
- 4960 × 1 = 4,960 lb.-in. due to trailer-truck pull-rod
- Total = 323,410 lb.-in.
- less 69 × 1 3/8 = 95 lb.-in. due to drawpull

leaving 323,315 lb.-in. tending to lift the load from the rear and add it to the front truck.

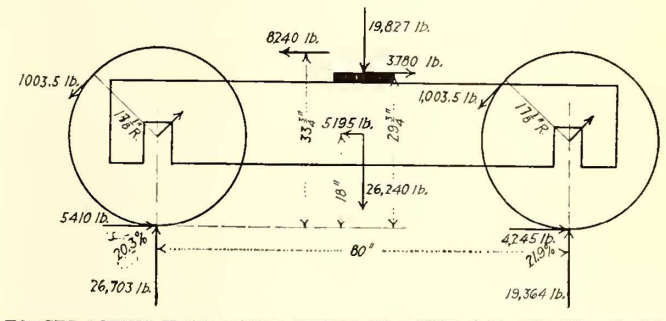
Dividing this by the center-to-center distance of the trucks, 432 in., gives 749 lb. transferred from the rear truck to the front, leaving 19,761 lb. on the rear trailer truck and 21,149 lb. on the front motor truck.

When the trailer truck is leading, the calculations are similar and result in a total net transfer of 573 lb. from the rear to the front truck, leaving 19,827 lb. on the rear motor truck and 21,083 lb. on the front trailer truck.

In considering the transfer of load on a trail car, the calculations are similar to those for motor cars, except that since the two pull rods are in the same plane and have the same pull their effect may be neglected, and also it is immaterial for the same reason as to which truck is in the lead.

The forces acting are shown in the accompanying diagram of forces acting on a trail car body. They result in a transfer of 635 lb. from the rear to the front truck, leaving 16,565 lb. on the rear truck and 17,835 lb. on the front one.

In calculating the forces acting on the trucks, let us first take the case of the motor truck when at the forward end of the car. The shoe friction required to retard the motion



FORCES ACTING UPON MOTOR TRUCK OF MOTOR CAR, TRAILER TRUCK LEADING

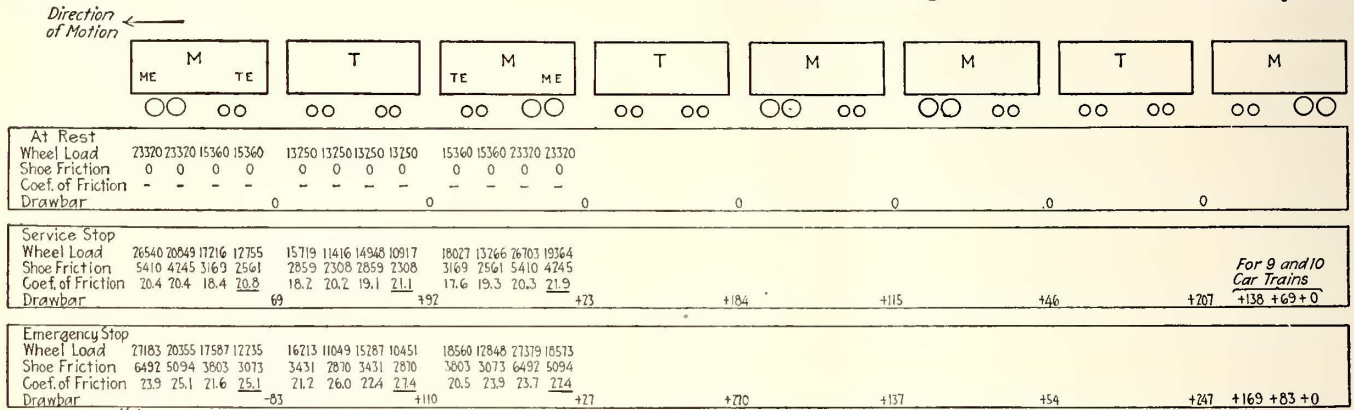
of translation of the truck is 0.19797 × 26,240 = 5195 lb. That to retard the motion of rotation of the wheels, axles, gears, pinions, armatures and shafts is 2 × 0.19797 × 5069 = 2007 lb., or a total of 7202 lb. shoe friction to retard the truck.

The total nominal shoe pressure on the motor truck is 47,600 lb., therefore the total shoe friction on the motor truck is 0.35 × 0.70 × 47,600 or 11,662 lb. This leaves 4460 lb. by which the motor truck retards the body and by which the body pushes ahead on the motor truck.

By referring to the diagram of forces acting on the

motor truck we see that in this case the brake pull rod is pulling the truck back with a force of 8240 lb., while the net reaction of the body on the truck is a push of 4460 lb. forward; therefore the body center plate must be pushing the truck forward with a force of 8240 lb.+4460 lb., or 12,700 lb., as shown.

Since the truck is retarding the rotating parts by clockwise torques, the inertia of the rotating parts is reacting on the truck as a whole with the counter-clockwise torques as shown.



Note: + Drawbar Reactions Indicate Tension; - Indicate Compression. If the Direction of Motion is Reversed the Drawbar Reactions are Reversed

GRAPHICAL TABLE OF DISTRIBUTION OF LOAD, SHOE FRICTION AND DRAW BAR REACTIONS DURING BRAKING

The forces shown react with the following moments:

$$12,700 \times 29\frac{3}{4} = 377,825 \text{ lb.-in. center plate reaction}$$

$$5195 \times 18 = 93,510 \text{ lb.-in. inertia of truck translation}$$

$$2 \times 1003\frac{1}{2} \times 17\frac{1}{8} = 34,370 \text{ lb.-in. inertia of rotating parts}$$

tending to lift load from rear to front axle.

$$\text{Total} = 505,705 \text{ lb.-in.}$$

$$8240 \times 33\frac{3}{4} = 278,100 \text{ lb.-in. pull rod reaction}$$

tending to lift load from front to rear axle.

$$277,605 \text{ lb.-in. net moment}$$

tending to transfer load from rear to front axle.

Dividing 277,605 lb.-in. by 80 in., the truck wheelbase, gives 2845 lb. transferred from the rear to front axle, leaving 26,540 lb. on the front axle and 20,849 lb. on the rear.

The nominal shoe pressure on the leading pair of wheels is 26,180 lb., therefore the shoe friction on these wheels is $0.35 \times 0.70 \times 26,180$, or 6414 lb. The retarding of the rotating parts requires $0.19797 \times 5069 = 1003\frac{1}{2}$ lb., leaving 5410 lb. tangential force between wheel and rail. Similarly the tangential force on the rear pair is 4245 lb.

In the case with the trailer truck leading, the direction of the force exerted by the pull rod on the truck is reversed, which also results in changing both the magnitude and direction of the horizontal force exerted by the body center plate upon the truck center plate. The net moment of the several forces acting becomes 293,525 lb.-in., which tends to lift 3669 lb. from the rear axle and add it to the front, leaving 26,703 lb. on the front axle and 19,364 lb. on the rear axle.

Similar calculations for the trailer trucks give the results shown in Table II.

From this table it is evident that theoretically, under the assumed conditions the liability of skidding is about equal for all three trucks as the minimum coefficient of friction to prevent skidding is about the same, namely, 21.9 per cent for motor truck; 20.8 per cent for motor-car trailer truck, and 21.1 per cent for trail-car trailer truck.

The calculations for an emergency stop are similar to

those for a service stop, and as they have been made for the latter car it is unnecessary to go through the entire process again, as both the coefficient of friction and the brake-rigging efficiency can be assumed the same as for service stop. The rate of retardation, therefore, and the forces in brake rods are 20 per cent greater for emergency, resulting in 20 per cent greater transfer of load, shoe friction and drawbar reactions.

For example, take the forward pair of motor wheels, the motor truck leading. With the car at rest they carry

23,320 lb. and during a service stop 26,540 lb., i. e., 3220 lb. is transferred to them. During an emergency stop this difference is increased by 20 per cent. They therefore carry

TABLE II—DISTRIBUTION OF LOAD ON TRAILER-TRUCK AXLES

	Front Axle			Rear Axle		
	Wheel Load Pounds	Rail Friction Pounds	Minimum Coefficient of Friction Per Cent	Wheel Load Pounds	Rail Friction Pounds	Minimum Coefficient of Friction Per Cent
Motor car—						
Motor truck leading.						
Motor truck	26,540	5410	20.4	20,849	4245	20.4
Trailer truck	17,216	3169	18.4	12,755	2561	20.8
Motor car—						
Trailer truck leading.						
Motor truck	26,703	5410	20.3	19,364	4245	21.9
Trailer truck	18,027	3169	17.6	13,266	2561	19.3
Trail car—						
Front truck	15,719	2859	18.2	11,416	2308	20.2
Rear truck	14,948	2859	19.1	10,917	2308	21.1

$23,320 + (1.2 \times 3220) = 27,184$ lb. The shoe friction becomes $1.2 \times 5410 = 6492$ lb., and the minimum coefficient of friction that will prevent skidding is 23.9 per cent.

Similarly for the other wheels the figures in Table III are obtained.

TABLE III—LOADING ON AXLES IN MAKING EMERGENCY STOP

	Front Axle			Rear Axle		
	Wheel Load Pounds	Rail Friction Pounds	Minimum Coefficient of Friction Per Cent	Wheel Load Pounds	Rail Friction Pounds	Minimum Coefficient of Friction Per Cent
Motor car—						
Motor truck leading.						
Motor truck	27,184	6492	23.9	20,354	5094	25.1
Trailer truck	17,587	3803	21.6	12,235	3073	25.1
Motor car—						
Trailer truck leading.						
Motor truck	27,379	6492	23.7	18,573	5094	27.4
Trailer truck	18,560	3803	20.5	12,848	3073	23.9
Trail car—						
Front truck	16,213	3431	21.2	11,049	2870	26.0
Rear truck	15,287	3431	22.4	10,451	2870	27.4

The minimum coefficient of friction that will prevent skidding during an emergency stop then becomes: for motor wheel, 27.4 per cent; motor car trailer wheel, 25.1 per cent; trail car trailer wheel, 27.4 per cent. This is very uniform for the various conditions. For the reasons pointed out in the beginning, the trailer wheels are most liable to skid. This is desirable, as the costs involved in turning flat wheels are much less for the trailer trucks.

The rate of retardation would be $1.2 \times 4.34 = 5.21$ m.p.h.p.s.

The drawbar reactions become 83 lb. for a motor car forcing the car ahead, and 193 lb. retarding each trail car.

Chemical Fire Protection for the Car-Storage Yard

Chicago Elevated Has Built Ten Cars Equipped with Chemical Apparatus, Including Two 100-Gal. Operating Tanks and a 500-Gal. Auxiliary Supply Tank Particularly for Use to Extinguish Fires Where Water Mains Are Not Available

THE Chicago Elevated Railways, has several car storage yards where there are no fire water mains in the immediate vicinity. It has been impossible, therefore, to install hydrants and connect with the city water mains, and as a result fire cars equipped with chemical fire-fighting apparatus have been resorted to for protection. It is not assumed that these yards are as well protected as those provided with water, but the cars prove a very effective means of protection and have so far been very successful. Ten cars are in use in Chicago, one in each of ten different storage yards of the elevated system. All of these cars were built in the shops of the company, most of them several years ago. The bodies were designed especially for the purpose and were placed on either standard passenger trucks or those of the arch-bar type depending upon which happened to be available.

The general construction and appearance of the cars are shown in the accompanying illustrations. They are of two types, differing only in a few details of construction and in the type of the fire-fighting equipment. The four cars first constructed are of the type shown in the illustrations on page 754. The over-all length is 24 ft. 11 in., and the over-all width 7 ft. 11 in., while the cab is 18 ft. 10½ in. long and the over-all height from the top of the rail is 12 ft. 3½ in. None of the fire cars are equipped with motors but those of this type are equipped with air brakes. Current for lighting and heating the cars is obtained through the customary contact with the third-rail. These cars are sheathed with Transite so that no wood is anywhere exposed on the outside of the car.

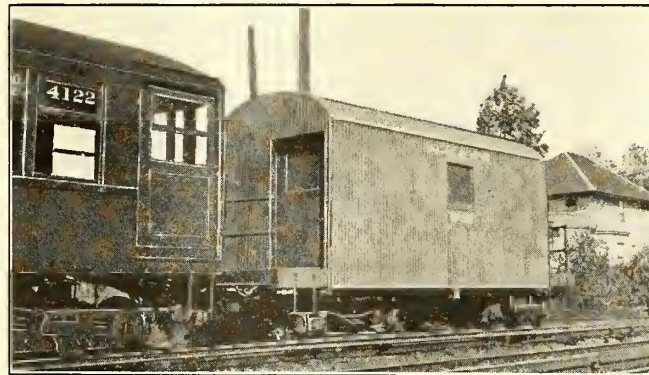
The fire equipment was furnished by the American La France Fire Engine Company and consists of two 100-gal.

tanks filled with water with 46 lb. of soda in solution in each. Immersed in this solution is a brass cylinder containing 1 gal. of sulphuric acid. In case of fire the cap is removed from the acid cylinder by lifting a rod in the top of the tank and the jar is inverted by turning a handle at the side of the tank. The crank or agitator at the front of the tank is then turned vigorously, thus mixing the acid, soda and water. When the pressure reaches 70 lb., which normally takes about three or four minutes, the solution is ready to play on a fire. In the meantime the motor car which is always coupled to the fire car has conveyed the equipment to the scene of the fire. Two 150-ft. lines of rubber hose are supplied and, by the arrangement of valves, both lines can be used simultaneously or both tanks can be discharged through either line. When not in use the hose is kept coiled up in wire racks above the tanks.

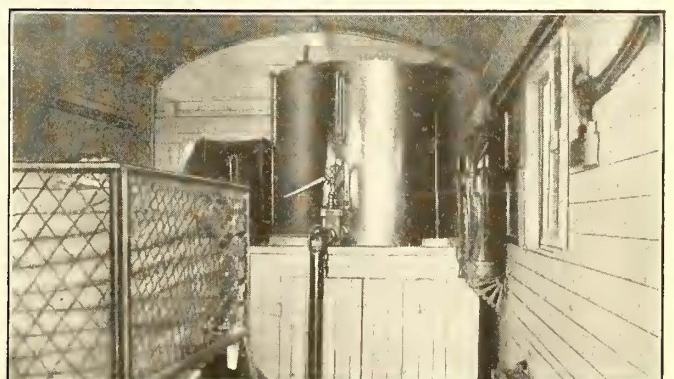
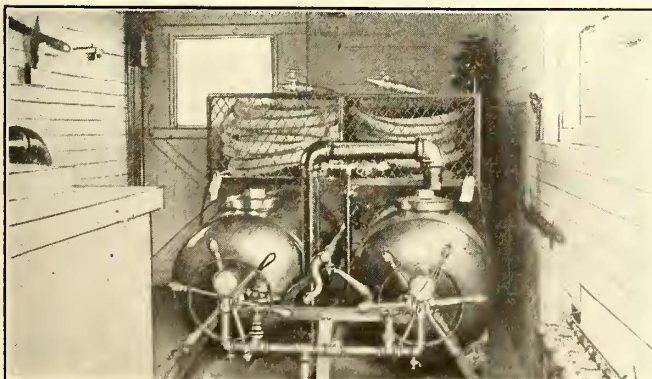
The equipment is located in one end of the car. In the opposite end is a 500-gal. auxiliary water supply tank which is used to refill the fire tanks. This is accomplished by air pressure direct from the motor car. Enough acid and soda are kept available to recharge immediately each of the fire tanks once. To accomplish this immediately after discharge the acid cylinder is returned to its normal position and the blow-off valve is opened to reduce the pressure. The cap and cylinder are then removed and the blow-off valve is closed. The tank is then filled with water, a new charge of soda is dissolved in it and a new cylinder of acid is immersed.

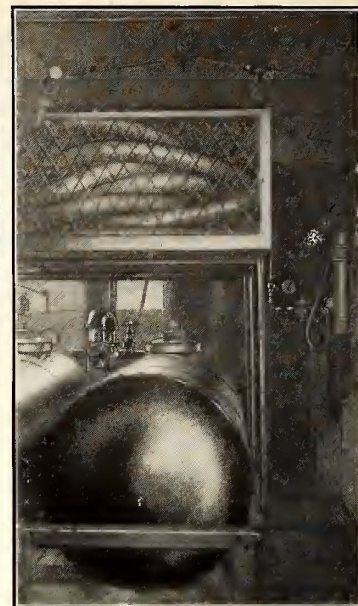
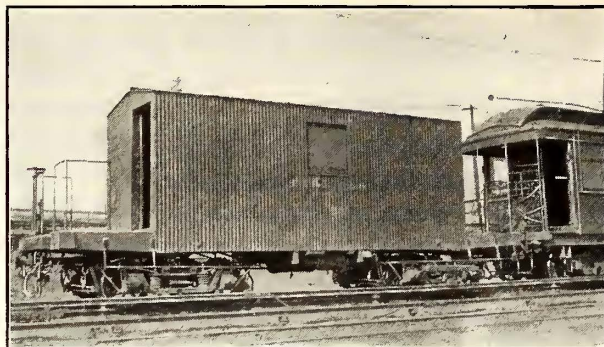
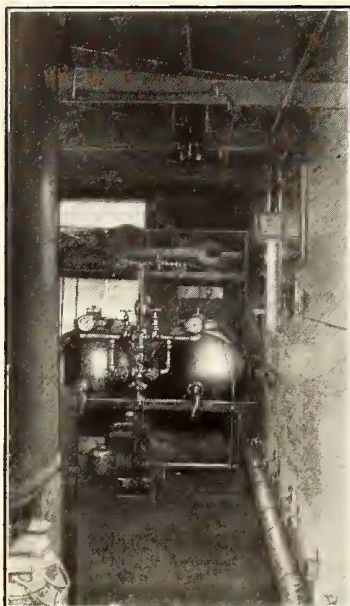
There are also, in the fire cars, two 6-gal. portable fire extinguishers made by the same company and working on a similar principle. Other equipment consists of two fire axes, two pike poles, one saw and two oil tail-lights. Com-

CHICAGO ELEVATED RAILWAYS' CHEMICAL FIRE-EXTINGUISHING APPARATUS FOR PROTECTING CAR-STORAGE YARD



At top, the latest type of fire car built by the Chicago Elevated Railways. At left, the operation of these tanks is more simple than on the older car. At right, the fire tanks are filled from auxiliary supply tank by gravity.





At left, tanks A and B can be used simultaneously through two hose lines or alternately through the same hose. In center, one type of fire car used by Chicago Elevated Railroads. At right, auxiliary water supply tank in background with air connection.

plete directions for operation are placed in glass frames on the wall. Although the cars are electrically lighted by six 23-watt tungsten lamps controlled by a switch at the doorway, an oil lantern is kept burning during all hours of darkness.

The type of car later constructed is illustrated in the halftones on page 753. This car has an over-all length of 27 ft. 4 in., and an over-all width of 8 ft. 5 in. The cab is 19 ft. long and the over-all height is 12 ft. 3½ in. This car has an arch roof and is sheathed with corrugated iron. Current for lighting is secured through the third-rail contact.

The fire equipment of these cars is furnished by the same company. It consists of two 100-gal. tanks with a somewhat different arrangement from that already described. In this case the acid bottle has a floating cork and in case of fire the entire tank is revolved, thus emptying the contents of the bottle into the water. A half revolution of the tanks by means of the handles at the front mixes the acid, water and soda and, as in the other case, the pressure is shown on the indicators. The auxiliary water supply tank has a capacity of 300 gal. and the water for refilling passes into the fire tanks by gravity and by the aid of a small hand pump.

It is, of course, necessary to heat the cars in the winter, which is done by the watchman, who maintains the same heat in the fire car as he does in the passenger cars. The watchman also takes care of the oil lantern.

A motor passenger car is coupled to the fire car as long as there is any other equipment in the yards. Thus the last car to leave the yard is the motor attached to the fire car. This, however, does not necessitate the permanent tying up of a passenger equipment, for when this car is needed all other cars are out and there will be no need for the fire equipment.

There are always men in the yard available to man the fire equipment so that special help for this purpose is not necessary. On a fire signal the nearest dispatcher or yardman takes charge as motorman, while the next lines up the switches and then operates the fire car as outlined. Others immediately begin moving cars away from the fire. Controller handles are kept in the fire car so that there may be no delay in getting the equipment under way by whoever arrives on the scene first. The fire tanks are recharged every six months, at which time a fire drill is carried out to see that all equipment is in good order. Fire drills without discharging of the tanks are held twice a month. The

interior of the cars is white and the tanks are painted red and have brass trimmings.

Very seldom has necessity required the use of the fire cars, but all have seen some service. They have been shown to answer the purpose admirably and there has never yet been a case where the congestion in the yard was so great that the fire car could not reach its objective. If necessity demanded, the cars could be run out of the yards to serve near-by stations on the elevated structure or the structure itself, but under ordinary circumstances the city fire department can satisfactorily handle such cases.

Prospects of Railroad Electrification

IN THE Oct. 16, 1919, issue of the *Canadian Engineer*, F. H. Shepard, director of heavy traction Westinghouse Electric & Manufacturing Company, has an article analyzing the world-wide situation in the matter of railroad electrification. After enumerating certain specific advantages of electrification he refers to fundamental principles in this statement: "An electrical method will in the beginning take the place of an older practice because of some economic superiority. Then its almost unlimited inherent possibilities are developed, and in time results are accomplished that would be impossible at any cost with the older methods. There is good reason to suspect that the electric operation of the railroads is capable of a similar development and will in time revolutionize our present transportation methods and provide us with services we know little or nothing about today."

Mr. Shepard says further that since the United States has an abundance of coal railroad electrification there has been determined solely by the local conditions. Differing from North American, European and South American countries, with the exception of England alone, lack an adequate supply of fuel, but many of them have large amounts of water power, while France has a moderate amount. These resources combined with the high cost of fuel make extensive railroad electrification in these countries inevitable sooner or later. The neutral countries will probably be the first to undertake this work, Switzerland having a well-established program covering a term of years, while both Norway and Sweden are giving active consideration to definite projects. Steps preliminary to electrification are being taken in England, France, Italy, Belgium, Spain, Brazil and South Africa.

Limiting Features in the Life and Performance of Chilled Iron Wheels

A Discussion of the Effect that Braking Pressures and Mating of Wheels Have on Wheel Life, Together with Methods of Measuring Worn Wheels for Removal as Given by the Association of Manufacturers of Chilled Car Wheels

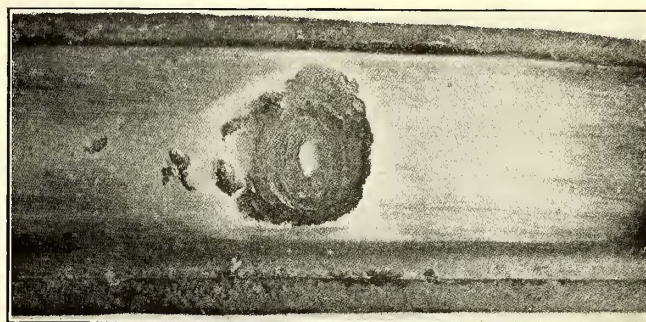
GEORGE W. LYNDON, president, and F. K. Vail, consulting engineer Association of Manufacturers of Chilled Car Wheels, have prepared a valuable study of the chilled wheel in its various aspects. Some parts of this are abstracted below.

The life of chilled iron wheels is reduced somewhat, due to the fact that the tread of the wheel is used for applying the brakes to retard the speed of cars. These braking operations develop high temperatures in the tread of the wheel in a short time, producing thermal cracks regardless of the type of metal of which the tread is composed. The coefficient of friction between the wheel and the rail is very irregular which causes the wheel to slip and cause flat spots. The friction of the brakeshoe is also of variable quantity and depends upon the velocity of wheel rotation and shoe pressure. At 10 m. p. h. the coefficient of friction in a modern brakeshoe will reach 40 per cent or more. With a coefficient of friction as high as this the tendency to skid is very great if the friction between the wheel and rail is very much less. Some average values for the coefficient of friction between the wheel and rail under different conditions are: clean dry rail, 20 to 25 per cent; clean, thoroughly wet rail, 18 to 20 per cent; oily and moist rail, 15 to 18 per cent; sleety rail, 15 per cent; snow-covered or frosty rail, 10 per cent.

A comparison of these values shows why the number of flat wheels is very much greater in winter than in summer. The percentage of slid flat and comby wheels de-

veloped in January and February is easily three times as great as that for July and August.

hastening the time when the wheel must be removed from service on account of wear. Not only does slippage shorten the life of the wheel but, on account of the difference in diameter, the small wheel grinds the rail and a sharp flange is the result. The continual grinding against the rail also very materially increases train resistance, rail wear and the tendency for derailment on curves having worn rails.

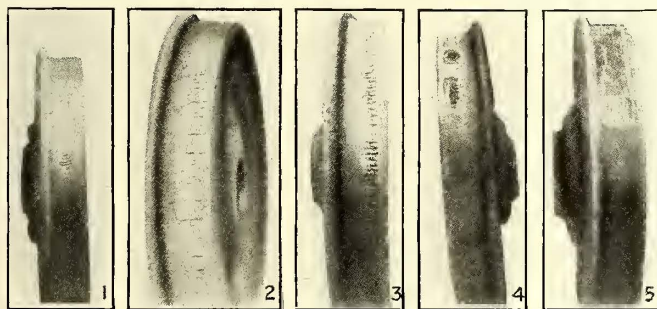


TYPICAL SHELL-OUT IN WHEEL

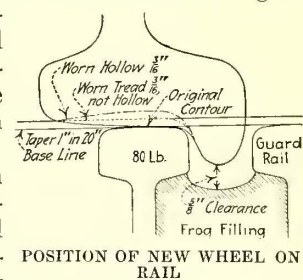
veloped in January and February is easily three times as great as that for July and August. Extreme care must be used in mounting wheels to insure proper gaging. Not only must the distance from flange to flange be accurate, but the wheels must be uniformly spaced from the center of the axle. In pressing the wheel on the axle recording gages should be used on the wheel press to permit a study of the conditions of mounting on each axle. The pressure should increase uniformly from beginning to end.

Another common defect in wheels is known as "shell-out." Years ago it was supposed that shelling occurred on account of defects in the metal in the tread of the wheel; that possibly there was some foreign material, as slag or sand, imbedded in the metal which gave rise to this defect. It was found that the defect existed only in the class of service having maximum amount of skidding and under equipment of considerable weight. It was also found that where a shelled spot occurred in one wheel the mate wheel had a similar defect in the same plane.

The conclusion reached from this study was that the tremendous amount of heat generated at the small contact area between the wheel and rail during the period while the wheel is sliding is responsible for the peculiar result. The metal at this spot is heated almost to the melting point and is immediately cooled, giving it a very high temper. The subsequent pounding on the rail causes the metal to disintegrate, starting at the surface at the center and increasing in depth as the disintegration recedes from the center. This condition is aggravated by the improper boring and mounting of wheels, and also by irregularities in braking power between different cars, irregularities in the equipment itself arising from unequal



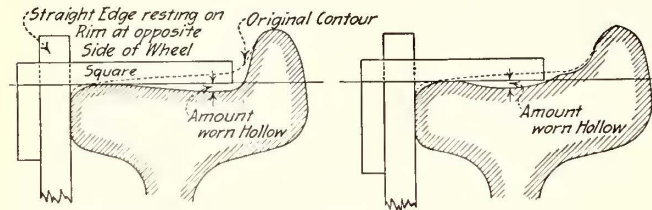
DEFECTS IN WHEELS. 1 AND 2—BRAKE-BURNT. 3—COMBY FROM BURNT BRAKE. 4—SLID FLAT, SHOWING HEAT CRACKS. 5—COMBY FROM SLID FLAT



POSITION OF NEW WHEEL ON RAIL

piston travel, improper brake hangers and other improper adjustments.

The amount by which a wheel may be worn in tread before removal from service is left largely to the judgment of the car inspectors. The idea behind the M. C. B. rule on this point is that when a wheel is sufficiently worn to permit the rim to project below the top of the rail, where it is likely to receive blows from frogs and crossings, or



APPROXIMATE METHOD OF MEASURING AMOUNT BY WHICH WHEEL IS WORN HOLLOW

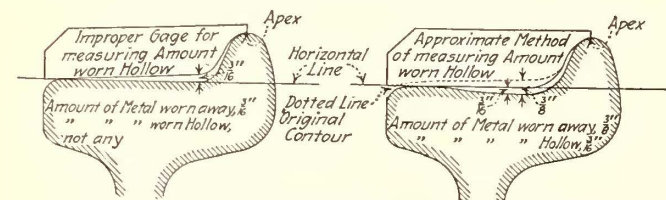
when the flange becomes so high that the apex is likely to strike the bottom of flangeway, it should be removed from service. Wheels that are excessively hollow are likely to damage tracks and crossings on account of the overhanging rim, and of the high flange, which causes excessive pounding and rapid deterioration of the track at these points.

An accompanying illustration shows the position of a new wheel on the rail. It will be seen that a wheel of the taper shown can be worn $\frac{3}{16}$ in. at the throat, and still the rim will not project below the top of the rail. If the rail were wide enough to cover the whole wheel tread, the wear would continue evenly across the tread, in which case it could be worn to any depth without becoming hollow, and the rim would not project below the top of the rail.

It is the practice in track work to allow a minimum of $\frac{5}{8}$ in. for flange clearance at the bottom of flangeways in frogs, crossings, guard rails, etc. This allows the tread to wear down $\frac{5}{8}$ in. before the flange will strike frog and crossing fillings on new rails.

Methods for measuring the amount to which a wheel is worn hollow are shown in accompanying illustrations. One of these consists of using a straight edge which is laid across the face of the wheel resting on the rim at opposite sides, to which a square can be applied. This eliminates all reference to the original contour, height or flange and amount of wear near the rim, and simply shows the amount worn hollow. It is evident that the point of contact of the square must be at the highest point on the tread near the rim.

The second method shows a gage for measuring the approximate amount that a wheel is worn hollow. This



GAGE FOR MEASURING APPROXIMATE AMOUNT BY WHICH WHEEL IS WORN HOLLOW

gage is constructed so that when it has a bearing at the apex of the flange and on the highest point of tread near the rim, the bottom of the gage is horizontal with reference to the wheel when in service, and since the apex of the flange and the tread near the rim wear but slightly as compared with the tread of the wheel, the amount that the tread may be below the gage represents the amount that the wheel is worn hollow. The upper half of this illustration shows a wheel in which the taper has been worn away and no wear has taken place on the tread near the rim. The wheel, therefore, is cylindrical and is not worn at all

hollow, although the gage shows $\frac{3}{16}$ in. wear. It is thus demonstrated that this is an improper method for measuring the amount worn hollow.

In regard to the amount a wheel shall be worn hollow, the M. C. B. Association proceedings for 1905 recommend that wheels be allowed to wear down $\frac{3}{8}$ in. before they are condemned unless worn through the chill. Wheels of the ordinary taper can be worn $\frac{3}{8}$ in. from the original contour at the throat before they can become worn $\frac{3}{16}$ in. hollow. It is also evident that if the rim wears down, a total of more than $\frac{3}{8}$ in. can be secured before the wheel is worn sufficiently to condemn it. It is also evident that it is possible to modify the taper and especially the drop-off taper in such a manner that more than $\frac{3}{8}$ in. wear can be secured before the wheel is $\frac{3}{16}$ in. hollow.

Use and Misuse of Arc Welding Apparatus

Protection of the Operator's Eyes, Head and Hands Is Essential, and the Apparatus Should Be Screened to Protect Near-by Workmen

By H. L. UNLAND

Power and Mining Engineering Department, General Electric Company, Schenectady, N. Y.

MANY of the accidents which occur during welding operations are the result of misconception of the nature of the equipment and its proper use. By the use of a few simple precautions many such accidents can be avoided.

In the first place the eyes should be thoroughly protected from the light of the arc, as very brief exposure may bring on painful results. A mask is commonly used. Care should be taken that no chinks or holes exist in the mask, and the inside should be kept painted dull black to prevent reflection of the light from behind. The construction usually employed consists of a thin sheet of aluminum formed to the proper shape and provided with an adjustable band for supporting it from the operator's head. There is an opening in the front provided for a window of glass which may be either a number of individual sheets of different colors or a single compound sheet. The colored protective glass should be sufficiently dense to reduce the light intensity to a value not objectionable to the eye and still leave the definition of the area immediately around the arc clear. Different color combinations are used, but the most general seems to be a combination of red and green glass. It is advisable to keep a piece of clear glass on the outside, since in welding this outside surface may be struck by particles of molten metal which will roughen it.

A hand shield is frequently used for metallic electrode welding. It consists of a light wooden frame with provision for a protective glass window. The protective glass is the same as used in the mask, and a light box frame surrounding the window is fitted to the operator's face to prevent light from the side reaching the eye.

A proper construction for an electrode holder is essential for rapid and careful work. This should grip the electrode securely and the clamping arrangement should be such as to facilitate changing electrodes easily. It should be constructed so that excessive heat will not reach the operator's hands and the weight should be reduced so as to facilitate manipulation. Its construction should be such that all operating parts are protected from accidental contact to avoid injury to the workman.

Carbon electrodes should be rods of hard, homogeneous, uncored and uncoated carbon. The diameter necessary will vary with the current to be used, and the length will depend on the particular class of work to be done. The average

lengths range from 9 to 12 in. For welding iron and steel the metallic electrode should be a high grade of low-carbon steel wire. A large number of tests were made by the Emergency Fleet Corporation to determine the best chemical analysis of wire for this purpose. The wire now supplied by the various manufacturers meets these requirements and can be purchased either direct from the maker or through jobbers, and can be obtained either in rolls or in short lengths. In ordering, "electric welding wire" should be specified since wire for acetylene welding is often treated in such a way as to render it unsuitable for electric welding. Electrode wire 18 in. in length is satisfactory for the usual operations, since it is about the greatest length that an operator can handle.

On account of the intermittent nature of the work it is possible to use smaller cables for welding circuits than is standard for the same current capacity on other work. In metallic electrode welding a length of at least 15 ft. of extra-flexible cable should be connected to the electrode-holder. For the ground connection or return cable, standard, extra-flexible cable insulated with varnished cambric for low-voltage circuits and covered with double waterproof braid may be used. For carbon electrode welding the arc is not as unstable as for metallic welding and therefore a heavier cable can be used.

It is difficult to give universally applicable figures covering amperes, speed, etc., for electric arc welding, due to the effect of conditions under which the work is done, the character of the work, and to a very large extent to the skill of the operator. The following figures are given as approximations and are based on favorable working conditions and a skilled operator.

METALLIC ELECTRODE WELDING

Light work 25 to 125 amp., heavy work up to 225 amp.

Electrode Diameter, Inches	Amperes	Corresponding Plate Thickness, Inches
1/16	25-50	Up to 3/16
3/32	50-90	Up to 1/4
1/8	80-150	1/8 to 3/8
5/32	125-200	1/4 up
3/16	175-225	3/8 up

NOTE: The same sized electrodes may be used with various thicknesses of plate. The heavier plate will require the use of the heavier current.

Approximate speeds and corresponding data for welding sheet metal with the metallic electrodes are:

Thickness of Plate Inches	Speed-Foot Per Hour	Cost Per Foot Dollars	Comparative Cost Per Foot Acetylene
1/16	20	2.12	1.78
1/8	16	3.12	4.66
1/4	10	7.13	13.10
3/8	6.5	12.30	36.10
1/2	4.3	19.80	Much higher
3/4	2.0	41.70	Much higher
1	1.4	61.30	Much higher

NOTE: The above figures are based on average figures for materials and labor. They will probably vary considerably for different localities and will vary slightly with the type of equipment, but the relative costs of gas and electric welding will in general hold true.

CARBON ELECTRODE WELDING USES

The carbon electrode can be used for welding and for building up metal in a large number of cases where the metal is not subjected to high strains or where it is under compression only. This process can be used to a very large extent in rough cutting of plates and surfaces.

The average current ranges for different types of work are: Light welding, 150 to 200 amp.; medium welding, 250 to 350 amp.; heavy welding and medium cutting, 400 to 600 amp.; very heavy welding and heavy cutting, 600 to 1000 amp.

The maximum values of currents permissible for carbon electrodes are:

Diameter of Electrodes Inches	Maximum Amperes
1/4	100
1/2	300
3/4	500
1	1000

Graphite electrodes permit the use of somewhat higher current densities, but the higher cost of graphite electrodes is a serious handicap in their use. Lower current values than the above may be used, but higher values will result in undue burning of the electrodes.

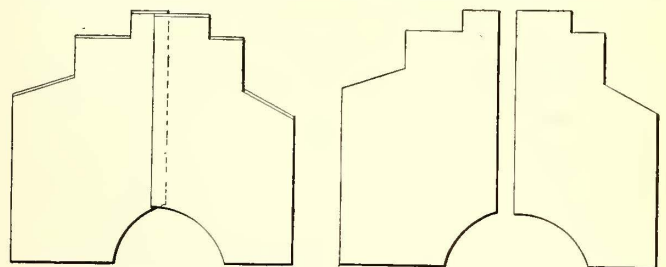
For depositing or building up metal by means of the carbon arc on flat surfaces where the work is accessible and all conditions favorable the following figures may be used:

Current Amperes	Pounds Per Hour	Cubic Inches Per Hour
200	1.5	5.4
300	3	10.8
400	4.5	16.2
500	6	21.6

NOTE: For continuous work the above figures may be used, but for short jobs of ten minutes or less, the rate will be double the above.

Improved Lubrication with Changed Motor Axle Boxes

CONSIDERABLE difficulty was formerly experienced at Wilson Avenue shops of the Chicago Elevated Railways in maintaining proper lubrication in the motor axle bearing oil boxes of the GE-55 and GE-211 motors. These boxes are so large that unless an enormous quantity of



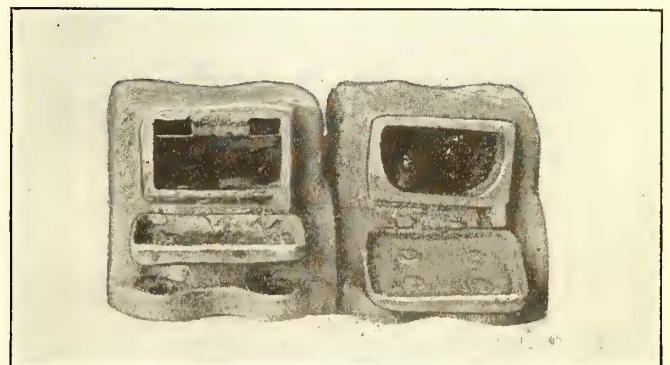
Tilted Forward to show Overlapping

PATTERNS BY WHICH PARTITION IS MARKED OUT FOR CUTTING

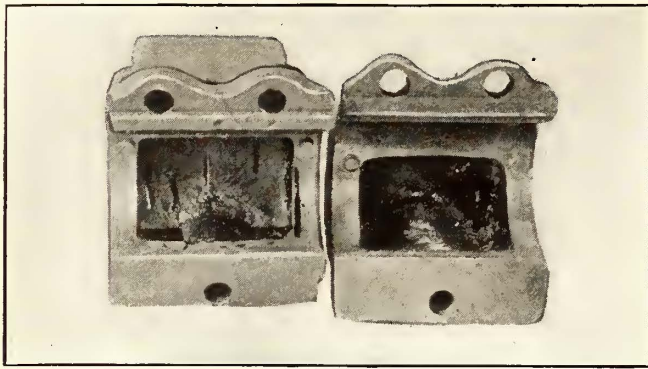
waste is stuffed into them the waste will soon pack down in the bottom of the box away from the axle and become of little further use. On the other hand, if a sufficient quantity of packing is used to fill the box a correspondingly large quantity of oil must be used, much of which serves no useful purpose.

To eliminate this trouble a partition is being welded into the boxes which divides the box practically in half. In order to get this inside the box it is essential that it consist of two parts, and No. 18 gage scrap sheet iron from old cars is used for the purpose. The proper patterns, as shown in an accompanying illustration, were first made by the cut-and-try method and from these the parts were marked out. These are shaped and installed as is clearly shown in the views of the completed boxes being electrically welded at the narrow end and around the circular edge.

Due to the inclination of this partition the force of gravity causes the packing to maintain constant contact with the axle. At the same time any surplus oil drains



REMODELED BOX AT LEFT—PIECES WELDED AT TOP EDGE—OIL AND WASTE PLACED IN SEPARATE COMPARTMENTS



REMODELED BOX AT LEFT—SLOPE OF PARTITION FORCES PACKING AGAINST AXLE

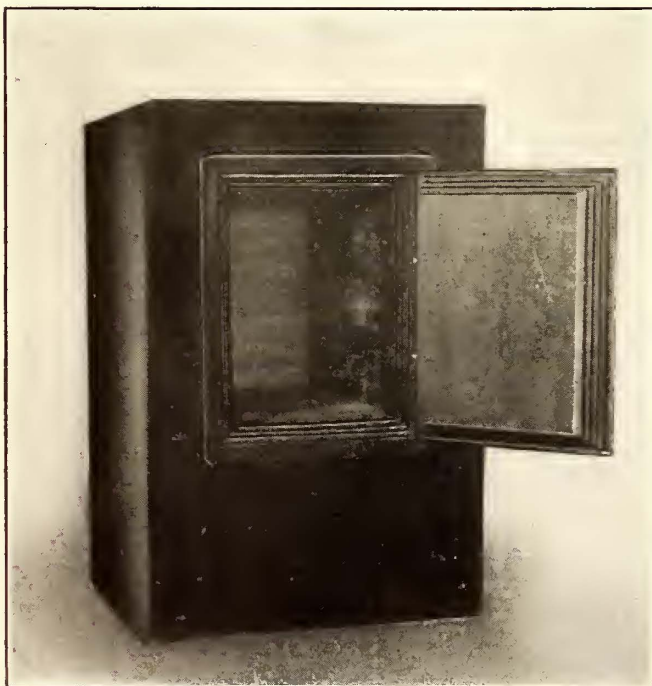
away from the packing and is absorbed by it only as needed for lubrication.

It is said that due to this slight change in the boxes at a very slight expense the amount of oil and packing necessary per car-mile has been greatly reduced and at the same time proper lubrication conditions are maintained.

Providing Safe Storage for Fare-Box Vaults

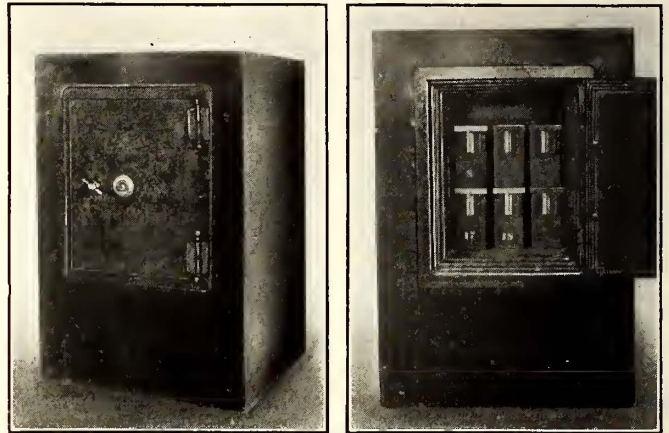
ALL of the city cars of the Indiana Railways & Light Company, Kokomo, Ind., are equipped with Cleveland fare boxes. The vaults from these boxes are pulled twice a day, the second pulling taking place at the carhouse when the car is turned in for the night. These vaults are kept at the carhouse in a safe over night and are taken to the office every morning. The number of vaults to be pulled at night was recently increased by the equipment of additional cars with fare boxes, and as the full capacity of the safe was already being used it was thought that a new safe would have to be purchased. This necessity was obviated, however, when M. S. Ferguson, master mechanic, devised a method of increasing the capacity of the safe then in use.

The original interior dimensions of the safe were 16 in. wide, 22 in. high and 12 in. deep. By the use of an



THE NEW SAFE IS AS STRONG AS THE OLD

oxyacetylene torch the back of the steel safe was cut off and the safe was then set up on a brick foundation. A new wooden box corresponding in width and height to the interior of the safe was built onto the back, increasing the depth to 26 in. A wooden form 36 in. wide, 54 in. high and 40 in. deep was then built around the old safe and 1-in. steel plates were set on all sides half way between the form and the walls of the safe. Concrete of a 1 : 3 : 5 mix was poured into the form and further reinforced with $\frac{3}{4}$ -in. steel rods tied with wire. This gives a heavily-reinforced wall of concrete 5 in. thick on sides, back and top of the old safe. A No. 14-gage steel plate facing was placed on



STORAGE CAPACITY WAS DOUBLED BY INCREASING DEPTH THE VAULTS STACK UP NICELY

the front of the safe and fastened in place by bolts anchored in the concrete. The new safe was then painted with black Eraderrust.

The old safe held twelve vaults from the Cleveland boxes while the new one holds twenty-four and the cost of doubling the capacity has been very small as compared with the cost of a new safe.

Convention Statistics

THE registration figures, together with other statistical information for the recent Atlantic City convention compare very favorably with those of the two previous conventions held at the same place. While the attendance was not as large as in 1916, the exhibit space was exceeded. As for the new exhibitors in 1919 there were sixty-five that did not exhibit in 1916, while fifty-five who had exhibited in 1916 were not listed in 1919.

	1919	1916	1914
Officers of associations.....	30	66	31
American	367	248	196
Accountants	49	125	101
Claims	54	81	75
Engineering	284	547	360
Transportation	167	300	158
Total railway members.....	951	1,367	921
Individual members	48	44	73
Guests	315	231	144
Ladies	727	725	416
Manufacturers	1,125	904	900
Total other than railway members.....	2,215	1,904	1,533
Grand total registered.....	3,166	3,271	2,454
Exhibit space (square feet).....	62,219	57,392	64,855
Number of exhibitors.....	155	145	165

An analysis of the records of the American Electric Railway Association giving an up-to-date list of companies now operating or about to operate one-man cars shows a total of 2409 cars. This includes one-man cars of all types; about 65 per cent being of the modern safety-car design.

Railway Shop Maintenance Kinks

Some Unusual Schemes Which Have Been Used to Keep Equipment in Service and to Reduce Maintenance Costs

BY J. S. DEAN

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

ALMOST every shop superintendent or master mechanic on an electric railway system has developed unusual schemes for handling certain details of his work that are ingenious and often effective in accomplishing the results sought. An interchange of ideas regarding such shop kinks will be helpful to other master mechanics. Some of these that have come to the writer's notice are presented herewith on their own merits and without comment. The reader is left, if interested, to prove or disprove their value by a fair trial. To save space the suggestions are given in condensed form, which will be convenient for reference.

PROVIDING PROPER FIT FOR GEARS AND PINIONS

1. When the pinion fit is loose, a paper liner may be placed over the shaft before applying the heated pinion.
2. Some master mechanics use a thin sheet of metal liner instead of the paper liner.
3. The taper fit may be welded and the shaft remachined to give a tight pinion fit.
4. When the pinion goes on the shaft too far, thereby causing poor alignment of the sides of gear and pinion, a paper liner should be used to keep the pinion from riding up on the shaft too far.
5. When armatures are changed the pinions should be changed also so as to keep pinions and gears that have become well meshed always working together, to reduce noisy operation.

REMEDIES FOR WORN SPLIT-MOTOR HOUSINGS

1. When housings or motor-frame seats become worn and the housing works loose, strips of canvas treated in white lead may be used to get a good tight clamping action of the frame on the housing.
2. In place of canvas, strips of advertising cardboard, well shellacked, have been used with success by some operators.
3. Worn housings may also be turned off, and metal rings may be shrunk on the machined surfaces and then turned to size to give a good clamping fit.
4. Worn housings can be welded up at fit and remachined to give better clamping action.
5. Worn tapped holes in housings may be welded up, using bronze; they can then be redrilled and tapped to standard size.

INSURING PROPER BEARING FITS

1. Armature bearings should be pressed into housings. By using a special fixture to mount the bearings in the lathe, the finishing bore on the bearings can be made concentric with the housing fit.
2. Solid bronze armature bearings that have worked loose in the housings may be effectively tightened by the following methods:
 - (a) By forcing a steel drift pin through the bore, thus expanding the metal. In doing this the bearing should be placed in a solid retainer (an old pinion bored out to the desired enlarged size) to limit the expansion and prevent castings from breaking.
 - (b) By tinning the outside of the bearing shell with a heavy layer of babbitt metal.
 - (c) By turning the bearing shell down and pressing on

a piece of steel tubing which can be then turned to the desired dimension to give a tight fit in the housing.

3. A piece of copper may be set in the lower halves of split malleable-iron armature bearings, to allow a soft seat for armature journals. In case the babbitt melts out of the bearings this prevents the armature core from getting down on the pole faces.

4. Where trouble is experienced with hot car journals, a wider bearing seat than the standard M. C. B. bearing has given very good results.

5. The use of small helical springs under the lower half of a split armature or axle bearing to hold the bearing in place and to provide a spring support for the dead load has proved to be a source of great economy on one traction property.

6. Liners of thin fiber placed between axle bearings and bearing seats to take up wear in parts and to clamp bearings securely have been successfully used by some electric railway operators.

7. Instead of a split axle bearing one may use a solid bearing that is placed on the axle before the wheels are pressed on. If bearings require changing before wheels must be removed, the solid, worn bearing may be cut off and a split bearing used during the remaining life of the wheels.

8. When motors are changed the split axle bearings should be kept matched up with their respective seats on the axles.

REMEDIES FOR BRUSH-HOLDER AND CARBON BRUSH TROUBLES

1. By replacing the steel supporting pins of an insulated-pin-type brush-holder with paraffine-treated maple pins to provide better insulation, satisfactory service has been obtained on small light-weight brush-holders.
2. Successful operation has been obtained by replacing broken porcelain insulators with similarly shaped insulators made of hard wood, of friction tape or of cord well shellacked.
3. Porcelains may be removed entirely and the insulating tubes may be sand-papered and painted with a good grade of air-drying insulating varnish with good results.
4. The size of worn brush-holder carbon boxes may be restored by placing a steel gage in the carbon box and by subjecting the sides of the box to a heavy pressure, thus closing them to the standard size.
5. Malleable iron brush-holder castings have been used successfully to replace worn out brass castings.
6. To get further life from worn carbons, a metal saddle about $\frac{3}{8}$ in. long may be mounted on top of carbons. This also prevents contact tips from wearing and breaking the top of carbons.
7. When a carbon is worn down in length, another worn carbon may be placed on top of it, to permit the use of the entire length of the original carbon.

ARMATURE TROUBLES

1. When the armature end play becomes excessive, hard fiber washers may be used over the shaft between wiper and bearing flange. This same scheme is also used at axle bearings.
2. Brass washers are sometimes used on armature shafts between bearing flange and wiper, to take up the excess end play.
3. To improve commutation and increase the life of commutator brushes the surface of the commutator may be ground with an abrasive stone. The slotting or undercutting can then be filled with a commutator cement.
4. Old tops of two-piece armature coils may be used to repair damaged armatures that have been changed over so

as to use one-piece coils. The damaged coil can be sawed off at the rear and the top half only removed and replaced by the top half of the old two-piece coil. This saves taking up a throw of the armature coil.

5. Armature leads of a strap-wound armature that have become loose in the commutator neck can be made tight by driving in pieces of hacksaw blade between the commutator neck and the loose lead.

6. The front core band of armatures may be sometimes covered with solder and turned off to give a diameter $\frac{1}{8}$ in. larger than the core. This band can be painted black and used as an indicator for the inspector in checking armature bearing wear.

7. A number of roads are operating armatures successfully by drifting armature leads down tight in the commutator neck, and not soldering these connections.

8. Armatures are sometimes operated with front and rear canvas or linen hoods (sometimes called heads or caps) left off to improve the ventilation and to save the expense of labor and material in renewing.

9. Before winding an armature some roads press the coils between two heavy hardwood planks clamped together by bolts. This allows the coils to be wound more easily without damaging the insulation.

MISCELLANEOUS PRACTICES

1. A sand blast is frequently used to clean carbon dust, etc., from the inside of controller boxes. This also can be used on commutators, grid resistors, etc.

2. Malleable-iron or sheet-steel commutator covers may be replaced by a similar cover made of wood. This is lighter, cheaper and noiseless.

3. Gaskets made from advertising cardboard may be used for air compressor heads. This material is reported to be as good as, and much cheaper than, the hard, red fiber ordinarily used.

4. Commutator covers may be slotted to advantage to allow better ventilation for old-type motors. This reduces the operating temperatures of motors that are overworked in service.

5. When motor connections in cars are being tested by running the car up and down a shop track or by slipping the wheels, a little water sprinkled on the track will cause the wheels to spin more readily.

6. One operator running in loop service cars that are equipped with old non-commutating-pole motors, has greatly improved the operation of these motors by shifting the brushes in a counter-clockwise direction.

7. The use of various types of cast or sheet-metal oil boxes with wicks to replace the grease method of lubrication on old-style motors has worked satisfactorily.

8. Air cylinders rigged up with plungers have been used to force mandrels out of babbitted armature bearings.

9. The wearing parts of trucks may be hardened by means of electric welding.

In considering these schemes it is well to keep in mind the fact, which is characteristic of human nature, that an idea or a pet hobby of any man when put in practice on his own equipment has all the details carefully worked out, developed and sometimes nurtured under his personal supervision. Under these conditions, difficulties are sometimes overcome that almost force the plan to work successfully—while with the customary care and attention ordinarily given to the rest of the equipment it might be pronounced a failure. On the other hand, there is no doubt but that some of these schemes will strictly on their own merit at once strongly appeal to the mechanical instinct of a number of operating men and prove of advantage if given a tryout on their own equipment.

Fine-Grained Sand for Concrete

IN A RECENT issue of the *Canadian Engineer*, F. E. Giesecke, professor of architectural engineering University of Texas, describes a systematic study which the engineering division of the University of Texas is planning with reference to the value of different grades of sand in concrete construction. The author states that there are many deposits of fine-grained sand which are generally considered too poor to be used in concrete construction and which have to be rejected under most specifications in force at the present time. With the exercise of proper care these might be used to advantage.

He gives as an example a sand having this sieve analysis: 78 per cent retained on a 200-mesh sieve, 43 per cent retained on 100-mesh sieve, 4.8 per cent retained on 65-mesh sieve and 3 per cent retained on a 48-mesh sieve. This sand would be rejected by most specifications, but when tested in concrete it made a fairly good showing. The concrete was made up with a blend cement and with Colorado River gravel carefully screened and rescreened, so as to contain no material finer than $\frac{1}{4}$ in. The proportions used were 14.3 per cent each of blend cement and fine-grained sand, and 35.7 per cent each of gravel $\frac{1}{4}$ to $\frac{3}{4}$, and $\frac{3}{4}$ to $1\frac{1}{4}$ in. respectively. Compared with the best concrete prepared in the laboratory of the University of Texas and with the same percentage of cement thoroughly rodded, this concrete was about 69 per cent as strong. While the author does not wish to be misunderstood as advocating the use of such extremely fine sand in concrete construction, nevertheless he states that there are many deposits of sands which are too fine to pass current specifications and yet which are sufficiently coarse to produce good concrete if used in the best possible manner.

I. C. C. Report on Railway Statistics

THE Interstate Commerce Commission has issued its thirty-first annual report on the statistics of railways in the United States, covering the year ended Dec. 31, 1917. The report calls attention to the fact that between 1915 and 1917 there was an increase of 41 per cent in the number of electric locomotives operated by railroads having operating revenues above \$1,000,000 annually (*i. e.* "Class I" roads). The data reported are as follows:

ELECTRIC LOCOMOTIVES IN OPERATION ON STEAM RAILROADS			
	Number of Freight Service Type	Number of Passenger Service Type	Total Number
Eastern District	86	190	276
Southern District	14	..	14
Western District	40	12	52
Total, Dec. 31, 1917.....	140	202	342
Total, Dec. 31, 1916.....	129	190	319
Total, June 30, 1916.....	114	153	267
Total, June 30, 1915.....	98	150	243

The total number of steam locomotives in use is practically 61,500, a very slight decrease from the total for June 30, 1915, and an increase of about 700 over that for June 30, 1916.

Treating Rails in Place

The Sandberg "In-situ" process of treating railheads has been mentioned in this paper from time to time. It is a process for hardening rail-head surfaces by heat treatment and it has been used for some time in England in several places.

One of the first roads to use the process was the Croyden Tramways, which had some rail treated one and one-half years ago. The results have been very satisfactory, and more rail has been treated from time to time. So far, new rail or rail properly resurfaced before treatment, which has been subjected to the Sandberg process shows no signs of corrugation.

Iowa Association Adopts Mid-Year Meeting

Two-Day Operating Men's Session Held at Davenport with Papers, Discussion and Inspection Trips Proved So Successful That It Will Become Annual Event

THE operating men of the Iowa Electric Railway Association met for a two-day mid-year convention at Davenport, Iowa, on Sept. 17. A brief account appeared on page 587 of the issue of this paper for Sept. 20, but further particulars are now given.

J. H. Seisseger, general superintendent Mason City & Clear Lake Railroad, in speaking on safety cars, the first topic taken up, said that the Mason City lines of his company consists of two routes, respectively $2\frac{1}{2}$ miles and 5 miles in length. There are two one-man safety cars on each line, giving a headway from 5.30 a. m. to 12.35 a. m. of fifteen minutes on one line and thirty minutes on the other. The cars were placed in operation on July 1, 1918, replacing 31-ft. open-platform cars operated by two men. From July 1 to Sept. 1 two men were used on the safety cars, the conductor being placed at the front end with the fare box. On Sept. 1, one-man operation was announced and begun on Sept. 12, the fare box having been changed to a location beside the controller. Neither the public nor the motorman missed the conductor. The expression of one trainman who at first refused "to do two men's work" was later that "good tools are a darn sight better than a poor conductor." There has not been a platform accident since the safety cars were placed in service. Mr. Seisseger is for the safety car "first, last and all the time."

The company has about 10 miles of interurban route and hauls a good deal of heavy freight as well as doing an extensive switching service. All freight handling is done by crews of two men, it having been demonstrated here that larger crews do not work efficiently. The average distance carload freight is handled is $3\frac{1}{2}$ miles.

MAINTENANCE OF WAY DISCUSSED

On the forenoon of the second day, R. J. Smith, engineer way and structures, Tri-City Railway, Davenport, discussed the paper by R. H. Findley at considerable length. He considered track construction standards to be fairly well determined at present. Solid concrete sub-construction is not advisable, except under special conditions. Tamped ballast on a good subgrade is better. The amount of excavation governs the kind and quantity of ballast to be used. With solid concrete construction steel ties give good service. Money spent on proper drainage is well spent. Creosoted ties are in very general use, and Mr. Smith favors a creosoted hardwood tie, 8 ft. long. The 7-ft. tie may be desirable, as it limits the paving zone. There is, however, little saving in the first cost of the tie, and in fact its first cost may be greater while the tie is less stable. It will generally be found that an A. E. R. A. standard rail section will fit any particular case. There is at present little agreement on the necessity for tie plates, but they are not used on the Tri-City system. Tie rods are generally used with high rails. Brick is a good pavement for ordinary traffic, and granite block for especially heavy service. A monolithic construction is desirable, with the brick or blocks laid on a 1:4 mix grout bed while the grout is still soft. Joints should be filled with grout. This construction also permits the use of old brick with excellent results. The experience of the speaker with bitulithic filler has been unfortunate.

Maintenance consists largely of joint and paving repair. For this a small, lightly-equipped gang is best. Their

equipment should include a small concrete mixer, a welder and a grinder. For extensive work an extra gang of from fifteen to twenty men is advisable, and these should be thoroughly equipped. Special work maintenance includes rigid and frequent inspection. The important thing is to keep it tuned up. Frequent consultation between the superintendents of way and transportation will reduce costs.

An astounding amount of equipment is needed in construction and maintenance work. A power shovel is probably the most important, and a crane with clamshell and hook is also necessary. Pneumatic tampers are very important. Four or five men with such a tamper will take the place of twenty with hand equipment and accomplish twice as much work. Welders and grinders should not be overlooked, and the latter are absolutely essential. Mr. Smith has found the resistance welder troublesome and considers the motor generator set more desirable. Power pumps are necessary. In the way of small tools, jacks and drills should receive more attention and should be carefully maintained. A track shop separate from the main car shops is advisable for these minor repairs. An important point is the necessity to watch the market to see whether repairs are really economical. Some jacks designed for service heavier than 10 tons should be included in the equipment, as these will relieve the much abused 10-ton jack.

Ties should not necessarily be selected to equal the life of the rail under ordinary traffic but should equal the life of the track. The life of the rail is generally about twenty-five years, while the life of the track is generally limited to thirteen to fifteen years, due to municipal changes in grade, paving, etc. The zinc chloride treatment of ties results in electrolytic action on rails and spikes and should never be used under any circumstances. This action is not as noticeable in steam railroad track and is apparently accelerated in electric railway track by the leakage of current. Office records may be too elaborate. These should be simple, but money spent on efficient records is well spent. An office check should be kept on the work of the welders and grinders and this may be profitably shown to the operators of this equipment. The keynote of the whole situation is the reduction of man power, and this is accomplished by efficient machinery.

R. H. Findley, author of the original paper, closed the discussion. Track construction, he said, is like building a house. The foundation should be constructed to last as long as the structure. Creosoted ties will generally last twenty-five years, which time is considered to be the life of the rail. Where changes in grade or paving are probable, such as in the business district, it may be advisable to use a cheaper tie. Mr. Findley also has never found any need of tie plates and agrees with Mr. Smith that the zinc chloride treatment of ties should not be used.

SHOP INSPECTION STARTS DISCUSSION ON SLACK ADJUSTERS, METERS, WHEEL GRINDING, ETC.

On commenting on the paper by John Sutherland and on the shop inspection trip, T. E. Wood, master mechanic Omaha & Council Bluffs Street Railway, asked information concerning night inspection of cars at Davenport, stating that this force in Omaha had been cut down to one man. He also inquired concerning the grinding of new wheels, stating that in Omaha all new wheels are ground.

In reply, Mr. Sutherland said that very little night work is done in Davenport but some oiling is done at the Rock Island shops. New wheels are not ground. All car inspection is done on a fifteen-day basis rather than by mileage. All cars are equipped with lightning arresters, but arresters on the poles and line would be better. "Pull-ins" have been reduced 90 per cent since Anderson slack adjusters were put on. No brake inspection is necessary and brake trouble has been practically eliminated since these adjusters were placed in service. Increased mileage is also obtained from the wheels, the increase being from 38,000 or 40,000 to about 56,000 miles.

F. V. Skelley, assistant superintendent, Tri-City Railway, Davenport, briefly described the use of the Economy meter on his property. Small blank forms, 3 in. x 5 in., are supplied in pads of 100 to the motormen. Readings are taken morning and evening, together with a record of the mileage. These reports are sent to the transportation department, and a tabulation for each motorman is made for a fifteen-day period. These records are posted, the records of men below the average appearing in red. The interest which the men take depends upon how much the work is pushed by the department heads. Supervisors instruct the men who do not operate properly and maintain low records, for it has been found that older motormen form a habit of operation which it is hard to change.

W. G. Brooks, Westinghouse Electric & Manufacturing Company, urged that greater interest be shown in the discussions and suggested that at the next meeting every man come prepared to describe his best device or method of accomplishing a piece of necessary work.

THE SAFETY CAR AGAIN DISCUSSED

Following the talk on transportation by J. H. Seiseger, the safety car naturally came foremost. Nic Le Grand, National Safety Car & Equipment Company, said that the three main objections to the purchase of the safety car have been the attitude of the public, the attitude of the unions and the lack of funds. The best evidence of the success of the cars is the fact that all companies who have purchased safety cars once have purchased a second time. There isn't a city in the country, said Mr. Le Grand, that cannot use some safety cars to advantage. Some railway companies have insisted on slight changes in the original design, but it is pleasing to note that the length, width, seating capacity and major standards have in no case been changed.

T. C. Roderick, assistant general manager Tri-City Railway, said that he is thoroughly in favor of the safety car and believes that it could be used on practically any line in Davenport. Results of operation in other cities have shown that riding is increased 15 to 40 per cent and the cost of operation reduced in about the same degree. Maintenance is also reduced about 50 per cent. "Do not go to a makeshift or to rebuilt cars," said Mr. Roderick, "but buy the best that can be obtained."

W. O. Jacobi, superintendent electric lines, Omaha & Council Bluffs Street Railway, in discussing the paper by John M. Drabelle, described the electrolysis conditions on his property and what had been done to alleviate them, as was described on page 850 of the Nov. 10, 1917, issue of the *ELECTRIC RAILWAY JOURNAL*. Speaking of the new automatic substation at Omaha, Mr. Jacobi said that if the trolley wire breaks and hits the rail this opens a contactor at the station and kills the line. The wire can then be picked up by the motorman who leaves his controller on the second point. The motorman by notching up his controller four times, can then put the line in service again. Edward Taylor, General Electric Company, explained various features of an automatic substation.

Closing the discussion, John M. Drabelle said that his property is now trying out a complete automatic boiler. This boiler has a continuous rating of 250 to 300 per cent of nominal rating. The equipment includes automatic draft control, automatic feed water regulator and stoker equipped with automatic fan and ram control. Substation operators, said Mr. Drabelle, just make an extra hazard.

After closing the discussion, President Ingalls announced that all commercial representatives were cordially invited to become members. In answer to his request for an expression of opinion on the success of the meeting and the merits of having a similar mid-year convention annually, it was moved and passed that a similar meeting lasting for two or more days be held annually and that the general plan of the session this year be followed with such improvements as were found desirable.

President Ingalls appointed the following standing committees:

Way and Structures: R. H. Findley, Omaha; W. L. Wilson, Des Moines; P. W. Wood, the Buda Company.

Shops and Equipment: John Sutherland, Davenport; C. M. Feist, Sioux City; W. H. Beattys, Westinghouse Traction Brake Company.

Traffic and Transportation: J. E. Negus, Fort Madison; A. H. Smith, Dubuque; Nic Le Grand, National Safety Car & Equipment Company.

Power and Distribution: John M. Drabelle, Cedar Rapids; W. O. Jacobi, Omaha; Edward Taylor, General Electric Company.

Claims and Accounting: M. Marcussen, Davenport; D. M. Finch, Des Moines; B. Bohanson, Clinton.

Publicity: W. G. Brooks, Westinghouse Electric & Manufacturing Company; L. E. Gould, Economy Electric Devices Company; Lesley C. Paul, *ELECTRIC RAILWAY JOURNAL*.

A central committee composed of the chairman of each of the above committees and with John Sutherland as chairman, will make arrangements for the next meeting.

On Thursday afternoon the delegates were taken by automobiles for an inspection of the government arsenal at Rock Island.

How to Maintain Track *

BY R. H. FINDLEY

Superintendent Track and Roadway Omaha & Council Bluffs Streets Railway

THE topography of the city, soil formations, climate and traffic conditions, municipal requirements and regulatory ordinances are controlling factors in track maintenance. In our city the streets have been extensively graded and filled, and we have tracks laid in paved streets which have been filled as much as 75 ft. We all know the difficulties connected with such work and the resultant maintenance costs. Embankments seem to settle for indefinite periods. Streets involving cut and fill cause settlement of water mains. Invisible leaks result which in turn damage all surface work.

Then, again, we are confronted with the installation of service pipe connections of all sorts and the ditching of streets for mains and conduits. The tunneling under street railway tracks for gas, water and sewer connections and careless backfilling cause untold damage to tracks and pavement between the rails. Such work eventually causes a failure of the pavement and chuck holes in the track, with their resultant hazards to vehicles and expenses in repairing.

By a proper regulatory ordinance this evil could be overcome. Ditches can be adequately tamped through the use of compressed air or other mechanical means. Water is generally used for settling trench excavation, but its use

* Abstract of paper presented at mid-year meeting of the Iowa Electric Railway Association, Sept. 17 and 18, Davenport, Ia.

is too easily abused if not enough water is employed when the dirt is pulled in with a power back-filler.

Great care should be taken to have adequate surface and sub-drainage. In our city, we think it unnecessary to provide for sub-drainage under all track laid, on account of the irregular and steep grades of most of our streets, but at low points we have found it desirable to take care of the sub-drainage as well as the surface drainage. Provision for proper surface drainage should particularly be made at special work points at street intersections. Water is perhaps the worst enemy to any piece of track or paving, and its elimination should always receive first consideration.

We feel that the use of the standard rock-ballasted type of construction is best for our own local use, modified to suit sub-soil conditions as they are met with in the work, through the use of concrete sub-slab construction. This is recommended practice and is quite generally employed by electric railways over the country.

EXPERIENCE WITH TIES

There always has been and always will be a great difference of opinion on the selection of ties. We have adhered to the use of a 6-in. x 8-in. x 7-ft. creosoted tie in paved track, while the general trend among the larger cities has been towards an 8-ft. length or towards steel tie construction. Up to 1915 we used as standard the white oak tie, both hewn and sawed. Our results with these were not satisfactory. Difficulty was experienced in getting good timber. The producers do not care to cut up good white oak timber into ties, when it can be sold much higher by board measure. Since 1915 we have used the creosoted red oak as standard.

In 1912 we installed several thousand 8-ft. creosoted ties in open track. These were purchased by inspection at the plant, and were treated with $2\frac{1}{2}$ gals. of oil to the tie. We did not specify an expensive grade of creosote oil but accepted a commercial grade of medium priced oil, having what we thought was a satisfactory analysis. This oil was somewhat low in the tar acids or toxic properties and heavy in the anthracine series, which is the most involatile and insoluble part of the distillate. The oil had a specific gravity of 1.09 at 130 deg. F. These ties are laid in cinder-ballasted open track, and their perfect condition today gives us reason to expect at least sixteen to twenty years life. On warm days these ties still "bleed" the oil, showing the insolubility of the preservative. The use of an 8-ft. red oak tie treated with $2\frac{1}{2}$ gals. of good creosote oil of proper analysis is bound to show economy for permanent open track.

During 1913, in 5 miles of paved track, we used five different kinds of treated red oak 6-in. x 8-in. x 7-ft. ties. These were installed in rock-ballasted track on lines of heavy travel and consisted of the following types: Card process, zinc chloride, creosote 2 gal. of oil to the tie, $2\frac{1}{2}$ gal. to the tie and 4 gal. to the tie. We have an exact record of these ties for our own future reference and feel very strongly inclined toward the use of treated hardwood ties. We must use a type of tie in paved track which will remain sound throughout the life of the rail to insure us in the future against some of the expense of paving and track maintenance. The use of a poor tie has been perhaps the worst mistake of the past. With the high labor costs today, let us use the best type of wooden tie or, as an alternative, use a steel tie.

We have been averse to using an extremely rigid type of track construction, having had considerable rail breakage through joint failures on some track installed about twelve years ago. On a non-resilient track, the noise is objectionable to the public, cars are badly racked, rail corrugation develops more rapidly, and rail crystallization is bound to take place much sooner. On one section of track in the Stock Yards district of our city, we cross a number of cattle

passes over which our rails are imbedded in the reinforced concrete top, providing an extreme form of rigid construction. The rails in this concrete are very badly corrugated, while those in the remainder of the track show little sign of such trouble. Some corrugation has also appeared in short sections of our rock-ballasted construction now and then. After they are ground out these corrugations usually disappear for good unless accompanied by lateral corrugations at the gage line, which are somewhat difficult to remove.

RAIL-JOINT MAINTENANCE

Maintenance of rail joints among most of us requires considerable expense. A heavy traveled section of track should have a welded joint, and a proper weld requires expense and care in the making to insure permanency. The trend today is toward lighter equipment, and as the weight of cars is reduced, our joint expenses should become correspondingly less. With any mechanical joint a high-tension bolt should prove economical. Grinding of newly-installed joints is universally recognized as good practice. The arc welder is well adapted to making repairs and is indispensable for joint work of all sorts.

LABOR-SAVING TRACK TOOLS USEFUL

Roadway maintenance men must take advantage today of all devices and tools possible for elimination of labor. Men desire to pick their jobs and if forced into the "heavies," such as shoveling rock, handling ties, coal, etc., they expect more wages or hunt another job. A 5-ton single-truck crane to handle ties and rail from stock piles to the job is "worth its weight in gold." We have used one for years and have also employed it for handling and installing all special work, moving rollers, rail girders, concrete mixers, air compressors, stone crushers, hydraulic rail benders, etc., back and forth from the yard to the job. The present-day economies of such equipment show a tremendous saving of labor. We are now using such a crane for removing the remains of some of the old cable railway, consisting of concrete slabs with cast-iron yokes, laid under the tracks and their miscellaneous underground structures, preparatory to grading a downtown hill in the city of Omaha. By being properly equipped for such work, we will cover the cost of removing this concrete and iron, out of the salvage.

An electric shovel for making excavations will lower the cost of loading wagons or dump cars to about one-fifth that of hand shoveling and will replace at least twenty men where its use is practicable. Such equipment is indispensable if a company wishes to accomplish anything.

Pneumatic tie-tamping outfits are very efficient for those using plain ballasted construction and produce a much better tamped track at less expense than hand tamping.

Derricks equipped with clam shells for handling rock and sand, and locomotive cranes where the volume of work warrants their use, are indispensable. There were times during the war when by the use of our 15-ton electric locomotive crane we saved as much as \$100 a day on demurrage alone in handling steam coal. Crushed stone is unloaded from gondola cars for one-fifth of the cost of hand shoveling, and with fixed charges included, our cost today is less than if such material was unloaded by hand.

A stone crusher of portable size earns more for us than its original cost each year in reclaiming crushed rock and ballast from old materials formerly hauled and wasted at the dump. A crusher is particularly desirable in cities located some distance from quarries. Dump cars, electric track drills, portable saws, hydraulic rail benders by which girder rail may be bent for curves, small job cranes mounted on flat cars and modern concrete mixer machinery should all be mentioned as labor savers, invaluable to any railway. In this line I do not want to overlook a type of portable toilet which we use whenever accommodation for track men

cannot be found handy. It is of a chemical type and mounted on four small wheels and can be pulled around and located near the gangs. These toilets are desirable from the men's standpoint as well as our own and are well worth using.

TYPES OF SPECIAL WORK COMPARED

Special track work, involving as it does a large investment, should receive considerable study from roadway men. In plain curve construction alone, the selection of the type of rail is very important for obtaining maximum life out of curves. Most of the standard guard rail sections are essentially side bearing rails, that is, one in which the web supporting the ball is directly under the gage line of the rail. In the double guarding of plain curves, which a few years ago we thought necessary, we observed that the outside rails of plain curves failed long before the inside rails, due entirely to the position of the rail support. Through the use of a single guard and more of a center bearing rail on the outside of the curves we are obtaining almost double the life. This has been our standard for the last six years.

We are all familiar with the use of the arc welder in maintaining special work. We find it invaluable for uses in and about special track work, such as building up and maintaining joints and hard center plates after they have been reset. If our hard center plates were of some weldable material rather than manganese we would have more success in maintaining intersections. A few years ago we installed a 90-deg. girder crossing which was under heavy traffic and had forged heat-treated Mayari steel plates instead of manganese. Mayari is a chrome nickel steel. This installation has taught us to believe that other alloy steels for hard center uses are perhaps more desirable than manganese. The physical properties of manganese include a low elastic limit. In fact, what is needed for a hard center, with a flangeway cut through the middle, is a steel having a high elastic limit to prevent the stretching of the fibers at the intersection and the consequent breaking off or chipping so noticeable on manganese. Manganese has its field for switch pieces, tongues, frog castings, etc., but for hard centers I feel that better service could be obtained from some more suitable alloy. After four years of heavy traffic in a downtown intersection, these chrome nickel centers are perfect and show hardly any appreciable sign of wear.

We have used the thermit process for making heavy welds on broken switches and mates and have installed some thermit welded sections for 90-deg. girder crossing repairs. There is a field, not extensively developed at the present time, to which we look for future economies, in the use of the thermit process in special work maintenance. In connection with all welding around special work, a light type of portable grinder will be found very useful and can be made easily in any well-equipped shop.

Clearance type curves which make operation safer for the public and save time at congested points should be installed if possible. All complicated layouts are better supported if long switch timbers or ties of different lengths are used. When these ties are air tamped on a good bed of crushed stone very satisfactory results are obtained.

SOLID MANGANESE FOR HEAVY TRAFFIC

Solid manganese construction has its field, depending upon service conditions. We find the solid manganese railroad crossing is the type to use under heavy traffic, for instance at such locations where a carbon rail crossing will last only three or four years, providing, however, that the proportionate cost of manganese is not more than two to one. The solid 90-deg. type of manganese girder construction for paved streets, with flange bearing entirely across the crossing, is very satisfactory for use in heavy traveled locations. One gets away from loose center troubles, has

less paving maintenance and keeps on better terms with traffic officers. We all know how loose centers spatter the mud. A switch piece of few parts gives the least trouble, and for this reason solid cast manganese is well adapted for such locations. However, we have recently been trying the bolted manganese hard-center switches and mates on account of the high price of the solid manganese. Bolted hard-center construction on a machined bed bearing has given us the best satisfaction and the least number of loose center troubles.

Railways which operate single-end cars have usually an uneven wear of wheel flanges. Trucks crowd one rail or the other, and as a result one wheel flange will be worn very thin while a double flange effect results on the opposite wheel. Such a state of the wheels is particularly hard on special work, because of the lateral motion of the car in crowding through the narrow throatways at special work. Hardened center plates should have long easy graduated throatways up to the intersection so that the car may go easily through the intersection plates without the lateral jar sometimes so noticeable. Such a situation, if not taken care of, will rapidly loosen any hard-center, and for such conditions as these we find the bolted plates more satisfactory than a keyed-in fastening.

SOME HINTS ON PAVING

Paving is one of our largest items of expense. The brick block thoroughly grouted seems to give the greatest satisfaction in our city. The more expensive dressed granite block is very well adapted to paving tracks when well grouted in place. We have been compelled by the city to use an asphalt filler for brick pavement in our tracks, but on account of the poor success with the soft filler we have gone back to the use of cement grout, in and along the tracks only, the city using the asphalt on the remainder of the street.

Creosoted block when laid against a groove or trilby rail makes a very satisfactory pavement for car tracks. With T-rail the results are not so good, especially on viaducts and bridges. Attention must be given them now and then to keep out the water, through the application of a squeegee coating of bituminous filler.

We have never used concrete pavement between our rails, and in fact there is only a limited amount of such street construction in Omaha. The natural limestone on our market is poor for surface usage. We have, however, adjacent to our tracks some very fine examples of concrete pavement which, after about seven years, has worked into ruts, and this resulted in a move to add about a 2-in. coat of asphalt. As a result of this, we have anticipated a request for a change in track elevation, and as a remedy we have proposed a double crowned pavement whereby some water from the sides would be drained into the tracks and removed through gratings in the tracks. Such developments are always possible with concrete pavement and should be taken into consideration when a track is laid in a concrete paved street, as by establishing a cross-section of a street which would provide in the future for surfacing with asphalt with no interference with the tracks at such a time.

In conclusion: Our biggest problem of maintenance today is our labor. We must make up for the shortage by the use of machinery and all types of labor-saving devices. Labor costs can be reduced if our men have good tools to work with. The system of tool maintenance should receive close attention. Picks, drills, hammers of all kinds, chisels, etc., should be sharpened well and properly tempered by a real blacksmith and a sufficient reserve supply kept on hand so that men will always be well equipped. Economy is the watchword clear down the line. Only through advanced methods of doing work can we keep the costs down.

Power Distribution for Street and Interurban Railways *

BY JOHN M. DRABELLE

Electrical Engineer Iowa Railway & Light Company, Cedar Rapids, Iowa

THE power distribution systems for electric railways are, in general, divided into two groups: The alternating-current high-voltage distributing system to the substations, and the direct-current distributing system. The high-tension lines should be designed to give the maximum of mechanical strength at the minimum investment cost, and the same applies equally well to the calculation of the line copper.

There are many good types of lines that can be chosen. For moderate voltage, up to and including 13,200, the flat-arm construction is probably the simplest and cheapest and of the maximum mechanical strength. On lines for higher voltages, the spacing of conductors is such that the flat arm becomes so long that it is impracticable to handle and in general, is mechanically weak, especially under such strains as those produced when one or two wires heat. The best conductor arrangement, therefore, is the equilateral triangle, either using a ridge pin and a two-pin arm, or the metal type, the "Keystone," the "Bo-Arrow" and the "Wishbone." Particular attention should be paid to the selection of insulators. A cheap insulator is an expensive luxury.

Where only single-circuit lines are involved, the protective and relay equipment is quite simple and in general the following rule can be laid down: Bellows or inductive-type inverse time-limit relays for substation protection are ample so far as the relay equipment is concerned, and of the two types, the induction type, as developed by both the Westinghouse and the General Electric Companies, is comparatively inexpensive and reliable, and far ahead of the bellows type.

Aluminum-cell lightning arresters are at present the last word in efficiency. Both of the large manufacturing companies have modified their arresters by using either the sphere gap of the General Electric, or the impulse gap of the Westinghouse Company. The value of charging resistance is no longer in dispute, especially when telephone interference is involved and it is particularly desirable on interurban lines that have telephone lines for railway dispatching purposes underneath their high-voltage lines.† In general, lightning arresters should be overhauled each spring, new electrolyte put in and new trays installed where needed.

Single-circuit lines should be sectionalized at each substation so that the maximum amount of high lines can be kept in operation at all times during a case of trouble. Where two or more high-tension lines operate in parallel, the relay problem becomes very complicated, and in general, is handled by the use of inverse time-limit induction relays set very high at the power house or generator end of the line. At the receiving, or substation end, of the line some type of wattmeter relay, having both current and potential coils, is used.

DIRECT-CURRENT SYSTEM GIVES MOST TROUBLE

The direct-current distribution system is subject to far more losses and mechanical troubles than the high-tension line. The trolley and feeder are provided with sectionalizing equipment so that trouble may be quickly isolated and the rest of the system kept in operation. To accomplish this end section breakers in the trolley should be used, as well as section switches in the feeders.

The calculation of the direct-current trolley system, especially where inter-connections are involved, such as in city work, may be extremely complicated. The solution of the problem starts with the time card, the weight of the equipment and the rating of the motors. From these data, the speed-time curve for the various lines is worked out, and from this the load in amperes and kilowatts. From this point on it is a matter of applying Ohm's law and utilizing the wire tables.

The negative return or rail circuit is not to be overlooked or neglected in calculating line losses. I know of nothing in the system that will cause bigger power loss than the average return circuit of street or interurban railways, unless it is regularly inspected and the bonds are kept to the maximum of efficiency. Testing bonds is not an easy job and whoever undertakes it should endeavor to get accurate readings which may be used for analyzing causes of trouble. There are quite a number of good forms of bond testers on the market, and the money which is spent for one of these is well spent.

The protective equipment for the direct-current railway circuits at the power house or substation comprises an instantaneous carbon-break circuit breaker and a lightning arrester outfit. The aluminum-cell arrester has made good in this field also. While it is more expensive than the spark-gap type or magnetic blowout type, and requires attention and maintenance, it does protect the equipment.

One of the later developments in the direct-current distribution system for street railways, is the automatic feeder switch which normally ties all of the trolley system of the town together and isolates it in case of trouble. This feeder switch is being used quite successfully in several Iowa towns and it gives the maximum use of trolley wires and feeders by having them all tied together in one common network, cutting down losses and making the general system voltage higher over the entire town. A device similar to this, but applying more especially to the substation, is the automatic reclosing circuit breaker. This device saves a substation attendant considerable work, and also closes a circuit with greater certainty, as a rule, than does the average substation attendant of today.

SELECTION OF SUBSTATION EQUIPMENT

The selection of substation equipment opens up a wide range of topics for discussion. The rotary converter is cheaper and its efficiency is higher than the motor generator set but, on the other hand, the latter can be used for the correction of power factor and is slightly more reliable and stable than the rotary, particularly the 60-cycle type. A big development, however, in the substation line which is not yet fully appreciated is the automatic substation. Its advantages and disadvantages are set forth in tabular form below:

POINTS, PRO AND CON, REGARDING THE AUTOMATIC SUBSTATION

Advantages:

1. Elimination of attendants.
2. Reduction in idling losses (runs only when power is required).
3. Located at points of maximum demand and ruling grades.
4. Automatic feeder protection and accelerating of trains.
5. Impossible to over-load.
6. Smaller units than hand-operated stations, due to automatic current-limiting features of equipment.
7. Mitigation of electrolysis problem in city work.

Disadvantages:

1. Slightly higher first cost.
2. More complicated than hand-operated substation.

One of the greatest advantages of the automatic substation is the current-limit control feature. This control is accomplished by means of relays, contactors and resistors. The relays are normally closed and the contactors shorten the resistors until one and a quarter of full-load current of the machine has been reached. Then the first relay opens, inserting a definite amount of resistance between machine

* Abstract of paper presented at mid-year meeting of the Iowa Electric Railway Association, Sept. 17 and 18, Davenport, Ia.

† There has been a later development known as an oxide film arrester. This is a development of Dr. C. P. Steinmetz and V. E. Goodwin of the General Electric Company. This arrester has the peculiar property that charging is unnecessary.

and trolley. If the overload continues and increases the second relay opens, and if it still continues to increase, the third relay opens, inserting all of the resistance between the machine and trolley. To prevent the burning out of the resistors, due to long-continued overload, there is installed a thermostat device which will shut down the substation until the resistors have a chance to cool.

Now let us consider just for a moment what can be accomplished under heavy traffic conditions: Visualize an amusement park with the usual line-up of cars waiting for the people to go home. The rush starts; very shortly several cars are moving, taking practically the full-load rating of the machine. Another car starts, and the motorman, being careless in the handling of his controller, causes a heavy rush of current to take place. What happens to the substation? The current-limiting contactor relays get to work, cutting down the trolley voltage slightly until the poorly handled car has accelerated up to speed and is only taking free-running current. With the hand-operated substation the circuit breaker would have been tripped out. The "automatic" kept all of the cars moving and prevented any one motorman from taking all of the available power of the substation.

Again let us consider the application of the "automatic" to city service where the peak-load figures may be from 1200 to 1500 amp. This peak load today is 800 to 900 amp. due to the current-limiting feature of the "automatic." This feature also permits the use of smaller rotaries than would be usually employed in a hand-operated substation.

Another feature of the automatic substation particularly applying to city work is that we can have a large number of small substations rather than a few large units or direct feeding from the power house. Without these small units heavy, negative, return currents have to be handled and rather high voltage drop occurs even with the most careful bonding between rail and water mains, telephone cables, power cable and the like. Thus it is possible to reduce the electrolysis problem to a minimum.

Maintenance of Equipment *

BY JOHN SUTHERLAND

Master Mechanic Tri-City Railway, Davenport, Ia.

IT HAS been frequently said that the price of success in any branch of railroading is "eternal vigilance." This is especially true in the maintenance of railway equipment. There are much greater opportunities of effecting economies in this line than in most of the other branches of railroad operation.

The modern method of shop maintenance is well established and rests almost entirely on preventing trouble in service, through proper inspection and scrutiny of the apparatus at reasonable intervals, rather than the old system of keeping a force in the shop to fix things up after trouble develops. It would be difficult to find a road to-day which is not making an attempt to follow up the prevention method. A good, effective system for inspecting the apparatus, once thoroughly established and properly continued, is bound to have beneficial results.

There is no class of labor in railway operation which calls for more conscientious work than that of inspection. It is no easy task for the foreman to check up the efficiency of an inspector; so much depends upon the individual conscientiousness of the man that it is essential to give considerable weight to this human characteristic in the selection of inspectors. Due consideration must be given not

only to the selection of the men but to the surroundings and facilities in connection with their work.

The inspection of equipment in this enlightened age is comparatively simple on account of the development of the ventilated interpole motor and ease of accessibility to give the different parts a thorough inspection; flashovers are practically eliminated and this enemy of inspectors gives them more time for other parts of the equipment.

The continuous capacity air compressor has put the intermittent service machine in the discard, and the old difficulty of leaky pipes and leaky valves between inspections is amply taken care of with this continuous machine, as on the old intermittent type a leak almost invariably burnt out the armature and the maintenance was excessive on any of the old type of compressors. Another noteworthy feature of the continuous machine is the splendid design of accessibility for ease of inspection. The buzzer is a great improvement over the old monitor bell, and the inspector has no dry batteries to bother with. We have experienced very little trouble with any of our buzzer equipments. The lighting systems have been changed on a number of our cars to center lighting. Previously we had ten 23-watt lamps on the sides of cars and now have five 23-watt lamps in the center with a selector switch. This is a big time saver for trainmen or inspectors. If the circuit goes out he turns the selector switch and short-circuits the bad lamp and at the same time brings in a dummy light in the corner of the car to make a complete circuit of five lights. If the trainman is anyway energetic at all, he will take out the dummy light at the end of the line and put it in the socket where the broken lamp is, turn back the selector switch to normal position and then he has all lights in the center burning.

Installation of controllers with individual blow-out coils for each finger is a step in the right direction, and the ample capacity of the fingers with the improved tension is worthy of mention. Another admirable feature is the wooden controller cover instead of the old steel type. We have not had a controller blow out in eighty double-end equipments since 1913 with the K-35-G or the K-36-J and can only attribute this immunity to the improvement just mentioned over the old K-10 and K-12 type of controller.

A marked and commendable advance has been the elimination of the bulkhead in all the latest design of cars. We are now removing all bulkheads and putting in pipe stanchions and a dividing rail for the conductor between the entrance and exit doors. A big saving in weight and maintenance is accomplished by removing obsolete bulkheads, as all master mechanics of the progressive type are advocating weight reduction. Cars without bulkheads are easier of access and less liable to accidents as they have pipe stanchions to which passengers can hold on, while with bulkheads there is nothing which passengers can grasp. Another bad feature of the bulkhead is that the swing door is liable to catch the fingers or the clothes of a passenger when going out or in. Car seats of the pressed steel type are a great improvement over those of the old castings type, and the maintenance of this modern seat is nil compared with the old type. Another marked feature is the solid gear over the split type. The inspector has forgotten how to look for loose gear bolts.

There are many other gear factors that enter into low maintenance cost, and one of them is a well-kept storeroom. It is not a paying proposition to keep a car costing from \$10,000 to \$12,000 out of service any length of time while waiting for material to repair it. Every company should have a first-class man in its storeroom, and he should be held responsible for all repair parts and also keep his stock up to the minute. His main problem is the cost of investment for the supply of repair parts, and with this in view he will never overstock on anything, although it is always

* Abstract of paper presented at the midyear meeting of the Iowa Electric Railway Association, Sept. 17 and 18, 1919, Davenport, Ia.

more economical to have the repair parts in the storeroom than hold the cars out of service. Another feature is to keep records of the different parts of the equipment. By this method it is possible to detect any faulty inspection promptly and place the blame where it belongs. A company cannot be too careful with records, as this is the only means it has to determine the ways for more economical maintenance. There never was a time like the present for practicing economy, as material has doubled in price.

There is nothing more discouraging to a master mechanic than to have the manager say, "Look at these figures, this other road is about the size of ours but its maintenance is 10 per cent lower. Investigate this and find the reason why they can make such a showing." Maintenance comparisons look well on paper, but no two cities have the same conditions to contend with. The city with the low maintenance cost probably has the following advantages: The line voltage is good, the feeders are adequate for the service, the track is in first-class condition and well bonded, the equipment is of the most modern type and the cars are light and properly selected for the service, while the city with the high maintenance has everything just the opposite. Maintenance and inspection work vary in every city, and no hard and fast set of rules will apply to all properties, as the different kinds of equipment have their own specific peculiarities and a schedule of inspection must be made to suit their requirements.

Letters to the Editors

More About Wood-Block Paving

WISCONSIN VALLEY ELECTRIC COMPANY

WAUSAU, WIS., Sept. 29, 1919.

To the Editors:

I noted with great interest the articles in your Aug. 16 and Sept. 20 issues in regard to the repair of wood-block pavement. In 1911 we paved a portion of our track with woodblocks. The city at that time insisted on a $1\frac{1}{2}$ -in. sand cushion. This sand cushion, however, ran as high as 2 in. to $2\frac{1}{2}$ in. in places. The result was the same as mentioned in Mr. Crandell's article. The pavement buckled and we have had endless trouble ever since it was put in.

In 1916 the writer tore out one block of this pavement on a double track and instead of using the sand cushion we put concrete 1:2:4 mixture on top of the old paving base, struck this off with a template and placed the blocks on it immediately. We then rolled them with a garden roller and let them set for twenty-four hours. The filler was then poured, which consisted of an asphalt filler instead of the pitch filler which was used at the time the pavement was originally put in. Up to the present time the blocks which we put in this way show no failure of any kind. The writer personally believes that the filler had something to do with the failure of this pavement originally as in cold weather we have often noticed cracks in the pavement which would be as much as an inch wide, and, of course, when the weather would moderate, water and slush would get under the blocks and the result would be shifting of the sand cushion and buckling of the pavement.

Mr. Swartz in his article published in the *ELECTRIC RAILWAY JOURNAL* of Sept. 20, advocates the laying of blocks so as to nose under the rail. This is the way our blocks were put in originally. When we later put the blocks on the concrete as mentioned, we placed them longitudinally with the rail. They then fit close to the web of the rail

and this method seems to be working satisfactorily. The wheel flange passes along the center of the block instead of over one end, as it would if it were placed with the end of the blocks against the web of the rail, in which case the dirt, ice and snow which accumulate in the flangeway have a tendency to work in between the web of the rail and blocks. If this accumulation of ice and snow gets hard enough the pressure of the passing wheel will have a tendency to press down the end which is against the web of the rail and tip the outer end of the block up in which case the pavement will eventually buckle.

I believe as does Mr. Swartz that it is advisable to use a block with $\frac{3}{8}$ -in. lugs instead of using a spacer. Personally, I feel that wood blocks should not be placed in car tracks at all, but of course the city authorities cannot always be made to see our point regarding the kind of pavement to be used along the car tracks.

W. C. RASMUSSEN,
Superintendent, Railroad Department.

Results With Wood Block Paving

THE BARRETT COMPANY

CHICAGO, ILL., Oct. 11, 1919.

To the Editors:

In your issue of Sept. 20, A. Swartz, of the Toledo Railway & Light Company, invited replies to his criticism of an article by J. S. Crandell, published in the Aug. 16 issue, relative to repairs and construction of creosoted wood-block track areas. I do not wish to enter into a discussion of the merits or demerits of the two types of construction described by Mr. Crandell and Mr. Swartz, but I desire to discuss some of Mr. Swartz's conclusions, as to the proper type of construction for wood-block pavements in street car areas.

After an experience of practically twenty years with both the manufacture of wood blocks and the construction of wood-block pavements, I am not an ardent advocate of the use of wood block in street car areas. Personally, I believe a good stone-block pavement is more desirable. If, however, it has been decided to construct a wood-block pavement, it has been my experience that every detail of treatment and construction must be carefully observed to assure even a small measure of success.

Summing up Mr. Swartz's conclusions I find he believes that: (1) Pavement between car tracks should be level. (2) A nose block should be used next to the rail. (3) A $\frac{1}{2}$ -in. sand cushion should be used under the blocks. (4) The block should be provided with a lug at least $\frac{3}{8}$ in. deep. (5) A pitch mastic filler is more desirable than a straight pitch filler. I shall take up these items in order.

1. I believe with Mr. Swartz that too much crown is not advisable. It is my impression that in Toledo in the past year or two a gutter construction was used, that is, the pavement was dipped towards the center of the track instead of being crowned. I had the pleasure of inspecting some of this construction and it appealed to me as very practicable. The only criticism that I had to offer at the time was that there seemed to be an insufficient number of drains provided. It is of course essential when blocks are laid either level or dipped towards the center, that an adequate number of drains at right angles to the rail be provided. The essential feature in wood-block track construction, in connection with drainage, is to get the water away from the rail as rapidly as possible. My experience indicates that water gets in under the blocks in the space between the blocks and rail.

2. Many things can be said in favor of the nose block when used on the outside of the rail. My experience, however, with the noses or flange block inside of the rail in connection with a T-rail has been very unsatisfactory. It

is practically impossible to keep the flangeway free from dirt, and unless this is done the flange of the wheels will ride the dirt and break the block directly under the flange thus permitting the entrance of water.

3. Mr. Swartz's experience with a sand cushion and his conclusions therefrom are rather surprising, in view of the fact that a sand cushion has been practically condemned in connection with wood-block paving by the committees of nearly all technical societies, including the American Wood Preservers' Association, as well as users of wood blocks throughout the United States. The method of laying the blocks directly on concrete with an intermediate paint coat of bituminous material has long been recognized abroad and has been in use in this country successfully for the past ten years. Within the past three years, practically every city using any considerable quantity of wood blocks has adopted this form of construction as standard.

Mr. Swartz refers to results in Toledo as not having been satisfactory. I am sure he must refer only to the track construction, as I have good reason to believe that the bituminous paint-coat method of construction used in the past two years in Toledo has been extremely satisfactory. Probably Mr. Swartz's difficulties are not due to the fact that blocks were laid on the bituminous paint coat directly on the concrete, but to some other phase of his construction. I am under the impression that the type of construction used in Toledo between the tracks last year, which I believe was the first track laid directly on concrete, was radically different from that used in any other city, in that the gutter type of construction was used—that is, the blocks were dipped towards the center instead of laid level or crowned. It is just possible that this type of construction had something to do with the unsatisfactory results Mr. Swartz refers to.

4. Mr. Swartz states that he prefers a lug block having a lug $\frac{3}{8}$ in. deep. A lug of this depth would in my opinion invite considerable trouble. The use of a $\frac{3}{8}$ -in. lug would result in a joint between the blocks of about $\frac{1}{2}$ in., as it is not possible to lay blocks up to within the depth of the lug even with ramming. A joint of this width would soon have dirt ground into it by the traffic, especially during periods of hot weather, that would unquestionably result in bulging of blocks sooner or later. It is not possible absolutely to waterproof a block by the injection of any quantity or quality of creosote oil. It is therefore necessary, in order to prevent expansion, so to construct the blocks in the pavement as to make pavement as a whole and the blocks individually as near waterproof as possible. For this reason, a construction which seals the bottom and the sides of the blocks, and produces the minimum opportunity for water to get in between the blocks, will give the best results. Properly applied a pitch filler can be used in connection with a rectangular block without a lug and the sides of the blocks thoroughly waterproofed. The use of the rectangular block, however, requires considerable care in construction or else all the joints will not receive the filler. From this viewpoint it might, therefore, be advisable to use a lug or some sort of spacer to separate the blocks.

5. The Crandell spacer does not provide a large joint and therefore should be as effective as a small lug and far more satisfactory than a large lug. I am inclined to agree with Mr. Swartz that if a large lug is used, that is a lug $\frac{3}{8}$ in. or larger, then a mastic filler consisting of 50 per cent pitch and 50 per cent hot sand will be more satisfactory than a straight pitch filler. With the use of a large lug there is a tendency to use entirely too much filler, which either floats the blocks or squeezes out onto the surface. A straight pitch filler can be used in connection with a lug block but requires care and judgment in its application.

WALTER BUEHLER,

Engineer of Paving and Wood Preservation.

Association News

Arrangements Made for Coal Supply

DR. H. A. Garfield, who has been reappointed fuel administrator, collaborating with Director-General Walker D. Hines of the railroad administration has arranged for the coal situation to be handled at Washington through the Central Coal Committee of the railroad administration. The principal duties of that committee are to care for the movement of coal. Acting in co-operation with the central committee are seven regional and various district committees which have been appointed as needed throughout the country, whose function is to distribute coal as the necessity and requirements arise in accordance with the Nov. 1, 1919, priority list of the railroad administration. All public utilities are fourth in the order of priority on this list.

The National Committee on Gas and Electric Service has been revived by the national railway, electric light and gas associations. Headquarters have been established by George W. Elliott, secretary, in the Railway Associations offices in the Munsey Building, Washington. In consultation with Manager W. V. Hill of the American Association, Secretary Elliott has effected the appointment of those who will represent the public utilities in connection with the supply of coal. These appointments being:

To the regional committees: *Southwest*—C. L. Holman, Laclede Gas Company, St. Louis, Mo.; *Southern*—Rawson Collier, Georgia Railway & Power Company, Atlanta, Ga.; *Northwest*—John P. Gilchrist, vice-president, Commonwealth Edison Company, Chicago, Ill.; *Central*—George F. Mitchell, assistant to president, Peoples Gas Light Company, Chicago, Ill.; *Western and Northern New York*, J. T. Hutchings, Rochester (N. Y.) Railway & Light Company; *Southern New York*, Clifton W. Wilder, New York (N. Y.) Edison Company; *Allegheny*—J. A. Pearson, United Gas Improvement Company, Philadelphia, Pa.; *Pocahontas*—J. W. Hancock, manager, Roanoke Railway & Electric Company, Roanoke, Va.

To the district coal committees: *Boston and New England*—C. H. Hodskinson, Edison Electric Illuminating Company, Boston, Mass.; *Cincinnati*—W. W. Freeman, president, Union Gas & Electric Company, Cincinnati, Ohio; *Detroit*—B. E. Morrow, Consumers Power Company, Jackson, Mich.; *Kansas City*—P. J. Kealy, president, Kansas City (Mo.) Railways; *Omaha*—J. E. Davidson, vice-president, Nebraska Power Company, Omaha, Neb.; *Des Moines*—E. G. Schmidt, president, Des Moines (Ia.) City Railway; *Peoria*—R. S. Wallace, vice-president, Central Illinois Light Company, Peoria, Ill.

The understanding relating to the appointment of the public utility representatives is that each representative will handle the situation impartially for all electric light, gas and electric railway companies in his territory. All public utility matters must first be investigated by these representatives and their recommendations will then be accepted by the regional or district committees and relief granted in so far as possible.

On Nov. 7, 1919, Secretary Burritt notified all electric railway companies by letter that all coal on the rails Nov. 1, had been commandeered by the railroad administration and that in order to secure an additional supply new orders must be placed with the public utility representative assisting the regional or district committee. In applying for such assistance it is of the utmost importance that careful and accurate data be given of the number of days supply on hand, the daily consumption, together with information as to the kind of service performed.

If the necessity arises additional regional committees with a public utility representative co-operating will be appointed.

News of the Electric Railways

FINANCIAL AND CORPORATE . TRAFFIC AND TRANSPORTATION
PERSONAL MENTION

Favors Municipal Ownership

Local Transportation Committee of Chicago Council Approves Mayor Thompson's Plan

The specter of municipal ownership and operation is again being held over the Chicago traction properties. This time the proposal originates with Mayor Thompson whose plan—outlined in the *ELECTRIC RAILWAY JOURNAL* for Sept. 13, page 535—was approved by the local transportation committee of the City Council on Oct. 29. The prompt endorsement of this measure by the committee was a surprise to all interested parties. The explanation was made that "if the plan fails it's the Mayor's funeral, not ours."

There are many hurdles yet to be encountered by the Mayor's proposition. It will probably be indorsed by the City Council at an early date. The Mayor would then have authority to spend up to \$250,000 in the employment of engineers and experts to formulate the details of his scheme. Within nine months this commission would be expected to make a report. Then would come the preparation of various measures for the State Legislature and, in the event of their passage, the submission for popular approval. At the end would come the important step of fixing a fair price for the existing properties and making payment to the investors. It would probably take three years to carry out this program.

ALDERMEN ADVISE CAUTION

While giving a tentative indorsement to the Mayor's plan, several of the Aldermen and their special counsel, Walter L. Fisher, took occasion to advise caution in advertising that the program could be carried out for a 5-cent fare. They wanted the Mayor to seek refuge in a service-at-cost arrangement. He would not be restrained, however, and said that even with present high costs he could duplicate the Chicago properties and make a profit on a 5-cent fare. It might even be possible to operate for a lower rate.

The city's lawyers did not relax their efforts, meanwhile, to have the 5-cent fare restored by the State Public Utilities Commission. Several hearings were held, mostly on questions of valuation. Announcement was made by the city that if a favorable ruling is not handed down soon a bill will be filed in the courts to enjoin the collection of a 7-cent fare or to have the 1907 contract declared void.

Troops Patrol Knoxville

Trainmen and shop employees of the Knoxville Railway & Light Company, Knoxville, Tenn., walked out on Oct. 18, completely tying up railway service. The strike followed the breaking off of negotiations between the company and the men and the adoption of a strike resolution on Oct. 17.

The strikers asked for a wage scale of 55, 60 and 65 cents an hour. The company offered a scale of 40 to 46 cents. The men also called for time and a half for overtime and for the installation of two straight shifts of nine hours each. The present wages of 36, 38 and 40 cents an

hour were fixed by the War Labor Board with the understanding that the men might reopen the question at the end of six months. The employees claimed that, since the board was no longer in existence, the decision of the board ceased to be binding.

An attempt by the company to resume service on Oct. 26 led to rioting. One thousand National Guard troops were ordered to the city owing to the inability of the police to preserve order. The presence of the troops enabled the company to run a number of cars on Oct. 27. At a meeting of the Central Labor Union on Oct. 27 it was decided to call a general strike on Nov. 1 if in the meantime the railway employees had not won their case.

St. Louis Wage Award Changed

Changes in the award directed by the Public Service Commission of Missouri last August in working conditions and wages of the employees of the United Railways, St. Louis, Mo., have been ordered by the commission. This makes more definite certain conditions, especially in the matter of payment for overtime. The company is directed to put into effect as soon as possible, or at least by Jan. 1, the adjustment of pay on the basis of an eight-hour day with a minimum of nine hours, without an overtime penalty, to conductors and motormen on the following schedule:

Time of work not to exceed nine hours for 40 per cent of the runs; not to exceed 12½ hours for 40 per cent of the runs; not to exceed fourteen hours for 20 per cent of the runs. On Sundays and holidays, the runs shall not exceed eight hours and payment shall be made for actual time with a minimum of six hours. Seventy-two per cent of the runs shall be straight runs, 15 per cent to be completed within a spread of ten hours and 15 per cent to be completed within a spread of twelve hours.

Overtime shall be paid on the basis of time and one-half at the regular scale of wages. When delays are caused by accident or blockade, straight time shall be paid. Dating from June 1, 1919, the wages paid conductors and motormen shall be: for first year of service, 50 cents an hour; second year, 55 cents; third year and thereafter, 60 cents. The period of service shall be computed from the first pay day following the date of employment.

In the original award, conductors and motormen were allowed one day off every ten days. This is changed to allow them one day off every seven days. An additional allowance of 50 cents a day over regular wages is ordered for conductors and motormen breaking in new men. They are allowed seven and one-half minutes each for taking cars out and putting them in the shed. Duplicate reports of all accidents and disorders are required to be made. Thirty minutes time is allowed for the work.

Adjustment of hours of work for other employees are: workmen in material yards, nine hours a day; porters, janitors, car cleaners, ten hours a day; watchman, twelve hours; hostlers, 10½; repairmen and switchmen, nine hours. Electrical workers are allowed an increase in their present wage scale of 45 per cent from Sept. 1, 1919. Present wages in the original award are defined to mean wages in effect on Aug. 5, 1919. Unclassified employees are given a classification and any increase of 45 per cent over the wages they were being paid Sept. 1, 1919.

Low Fare Cry No Bait

Victory of Governor Coolidge Sweeps Aside Efforts to Make Five-Cent Fare a Political Issue

The re-election of Governor Calvin Coolidge, of Massachusetts, on Nov. 4 marks a high tide in the history of the old Bay State. The stand of Governor Coolidge for law and order which made him a national figure following the desertion of their posts by unionized members of the Boston police force has been emphatically approved by the electorate, and the defeat of the forces which threatened to disrupt the policy of Governor Coolidge is welcomed by all good citizens regardless of party affiliations.

The defeated candidate for the governorship, Richard H. Long, Framingham, attempted among other things to make the restoration of the 5-cent fare upon the electric railways of the State an issue to attract votes. Despite the acute financial condition of many of the railways and the existing high fares, the public refused to be led astray from the real issues of the campaign, and very little discussion of electric railway problems and affairs marked the political contest as carried out in the appeals which were made to the voters.

PUBLIC CONTENT WITH PRESENT PROGRAM

It is evident that the public rested content, so far as the election was concerned, with the knowledge that Governor Coolidge's call for a special session of the Legislature this month to consider the forthcoming report of the special investigating commission headed by former Congressman Charles G. Washburn offers a more hopeful solution of traction difficulties than the near-promises of the unsuccessful aspirant for the gubernatorial chair.

In no uncertain tones, therefore, Massachusetts has declared her determination to support government of the people, by the people and for the people against the selfishness of any particular class or group which attempts to place its own interests before the common welfare.

President Pardee Addresses New England Club

J. H. Pardee, president of the American Electric Railway Association, addressed the first fall meeting of the New England Street Railway Club at Boston, Mass., on Sept. 25. He spoke optimistically of the future of the industry, looking forward to its rehabilitation under private ownership and operation and public control. New capital to the amount of more than \$200,000,000 a year is needed in order that the industry shall develop as the public requires. The public interest is paramount, the speaker declared, and the co-operation of the public is essential to the continuance and expansion of service. A. C. Colby, master mechanic of the Connecticut Company, Bridgeport, Conn., led an informal discussion upon the subject of one-man car maintenance, before the usual dinner.

New Construction Planned in Harrisburg

Officials of the Harrisburg (Pa.) Railways have filed with the Public Service Commission of Pennsylvania a statement that they will construct a new carline from North Seventh and Herr Streets to North Eighteenth and Herr Streets, reaching the northeastern section of the city. At present the nearest carline to this district is in State Street, about half a mile away.

The company proposes to replace the single track in North Seventh Street, from North to Herr Streets, with two tracks, extend two tracks east from Seventh to Cameron and one track east from Cameron to Eighteenth. No estimate of the cost has been made. Officials stated to the commission that the new line will be made possible as soon as franchises are granted by city officials.

The plan to extend a car line to this district of the city was made after residents in the section complained to the Public Service Commission about lack of adequate service. They asked also for a crosstown line in one of the numbered streets, probably Seventeenth or Eighteenth, but the railway officials contended that sufficient revenue could not be derived from this line if it were constructed. Plans for crosstown service in the eastern part of the city will be developed later.

One-Year Wage Agreement at Richmond

The Virginia Railway & Power Company, Richmond, Va., on Oct. 17 signed an agreement with its employees whereby a new wage scale was established effective for one year. The agreement came as the result of a series of conferences between officials of the company and union representatives which began in July. A 5 per cent increase in wages was granted, effective from Oct. 16, making the Richmond rate from 37 cents to 42 cents an hour, according to length of service from one to four years, and the Norfolk rate 43 cents to 47½ cents an hour. The 6-cent fare is already in effect in Norfolk and the agreement provides that, should a 6-cent fare be granted in Richmond, the Norfolk wage scale is immediately to apply in that city also. It was estimated that the increase would cost the company \$150,000 a year, one-third of it in Richmond.

The company maintains the principle of the open shop, and while dealing with the union officials as representatives of large groups of employees, reserves the right to deal with other employees or groups of employees. The 5 per cent increase is to apply to all employees from the grade of superintendent down, whether or not they are members of the union.

All questions except those in connection with wages and hours, and those affecting operating costs, are to be submitted to arbitration.

Railway Offered to Cities

Powell Evans, president of the Schuylkill Railway, Girardville, Pa., has proposed ownership of the lines of the company by the public in a communication addressed to the County Commissioners and Councils of the communities served by the railway. He said in part:

I would be willing at this time to effect a sale of this property on a basis of value equal to a just appraisal and at an interest rate which is fair at the present time; and could assure the delivery of a sub-

stantial majority of the controlling stock and the underlying securities at a pro rata price out of the amount of the purchase according to the priorities and rights of all concerned therein, respectively. This plan would obviously return nothing for the stock and shade the values of the junior securities now outstanding. It would, however, provide the communities served with the ownership and management of their local transportation.

If your communities will study and adopt this plan, I am inclined to believe that all the security holders concerned would concur. In the meantime there must be an immediate settlement of the urgent need of greater income.

Wage Arbitration in Portland, Ore.

Union officials and railway officers have agreed to submit to arbitration the demands of the trainmen of the Portland Railway, Light & Power Company, Portland, Ore., for increased wages. The platform men have presented to the company demands for a maximum wage of 80 cents an hour, with wage increases for all shop men, carhouse men and laborers working in the maintenance of way department, more than 1800 men in all. The platform men now receive 52 cents an hour the first three months, 54 cents the next nine months and 56 cents after a year's service. The new demands provide for 76 cents, 78 cents and 80 cents an hour for similar periods.

Franklin T. Griffith, president of the company, asserts that the wage scale asked for is unreasonable and absolutely beyond the power of the company to pay. The demands, if met, would represent an increased labor cost to the company of 172 per cent over the labor cost of 1917, according to Mr. Griffith.

An arbitration committee of three will be appointed to investigate and report on the matter.

News Notes

Wage Agreement at Petersburg, Va.—Conductors and motormen on the Petersburg lines of the Virginia Railway & Power Company, Richmond, Va., have accepted a wage increase of 5 per cent offered by the company.

Ashtabula May Purchase Railway.—The City Council of Ashtabula, Ohio, on Oct. 14 voted to approve the offer made by directors of the Ashtabula Rapid Transit Company, whereby the city may acquire the holdings of the company for \$296,000. An expert appraised the property at \$363,000.

Car Strike in Lima, Peru.—The strike movement, just settled among the port workers at Callao and the railroad employees, has spread to the electrical employees of Lima, Peru. The electric light and power plants and the electric railways are completely tied up by a strike which broke out on Oct. 5.

Strike at Sheffield, Ala.—Thirty-five trainmen of the Sheffield (Ala.) Company went on strike on Oct. 12, demanding a wage scale of 55 to 60 cents an hour and changes in working conditions. The contract between the employees and the company which expired on Oct. 11, provided for wages of 35 and 40 cents an hour for an eleven-hour day.

Service Restored at Eureka, Cal.—Service was resumed on October 4 on the lines of the Humboldt Transit Company, Eureka, Cal., following a shutdown lasting two weeks as the result of a strike. The men demand a wage of 55 cents an hour. The pay question, which has not yet been settled, will be submitted to arbitration.

Would Have City Purchase Line.—The Corporation Counsel of Spokane, Wash., is preparing an amendment to the city charter to permit the purchase by the city of the power plants and city lines of the Spokane & Inland Empire Railway. It was planned to submit the proposed amendment to the voters at the November election.

Wages Adjusted in Hamilton.—The Minister of Labor at Ottawa, Ont., has been advised that the Hamilton (Ont.) Street Railway and its motormen and conductors have adjusted their dispute, obviating the necessity of appointing a board of conciliation to deal with the matter. Concessions granted by the company include an increase of 4 cents an hour in wages.

Cars Stop at Bluefield.—Service on the railway lines of the Appalachian Power Company, Bluefield, W. Va., is at a standstill as the result of a strike of the trainmen. The men recently organized a local union and became affiliated with the Central Labor Union. They now demand recognition of the organization by the company and arbitration of any disputed points which may arise.

Men Reject Shore Line Offers.—The offer of R. W. Perkins, receiver of the Shore Line Electric Railway, Norwich, Conn., to take back the striking employees as individuals and not to sign a contract with the men as a body, was turned down by the men, who also agreed not to call the strike off. Service over the lines of the company was resumed some time ago, so that the strike continues in name only.

A Commissioner of Franchises.—The City Council of Cleveland, Ohio, on Oct. 14 adopted a resolution, requesting Mayor Harry L. Davis to appoint a commissioner of franchises, as provided in the city charter. While this will change proceedings to some extent in relation to franchise matters, the appointment of a commissioner was considered imperative in view of the coming controversy over the gas rates.

Trainmen Study Mr. Mitten's Testimony.—The Philadelphia (Pa.) Rapid Transit Company has distributed among its employees a circular giving the main facts brought out in the testimony of President T. E. Mitten before the Federal Electric Railways Commission at Washington. During the first two weeks in which the company's saving fund plan for its employees has been in effect 2500 accounts were started.

New Car Line Proposed for Cleveland.—An ordinance is now before the City Council of Cleveland, Ohio, which grants the Cleveland Railway the right to construct tracks on West Third Street to Scranton Avenue, to Jefferson Avenue, S. E., thence up Broadway hill and along Broadway, S. E., to East Thirty-first Street. This track will furnish service to the employees of factories, furnaces and lumber yards in what is known as "the flats." The cost will be about \$200,000.

Men Walk Out at Northampton.—Sixty trainmen of the Bangor & Portland Traction Company, Bangor, Pa.; the Northampton Traction Company, and the Northampton, Easton & Washington Traction Company, Northampton, Pa., went on

strike for higher pay on Oct. 13. The companies, which compose the so-called "Hay System" operate the local lines in Northampton and interurban lines in western New Jersey and eastern Pennsylvania.

Recommends City Take Over Line.—Thomas F. Murphine, superintendent of Public Utilities of Seattle, Wash., has recommended to the City Council the purchase of the Greenwood Avenue line from a subsidiary of the Puget Sound Traction, Light & Power Company for \$81,482 or at an appraised valuation, the line to be absorbed into the municipal system, thus eliminating the present necessity of patrons of the line paying two fares. The matter has been referred to the utilities and finance committees.

Minneapolis Franchise Vote Dec. 9.—The City Council of Minneapolis, Minn., by formal motion has set the date of the special election on the proposed cost-of-service franchise for the Minneapolis Street Railway as Dec. 9. An attempt by the Socialist members of the Council to have the motion referred to a committee, and to have the date set one month later, were both voted down. The motion, which was submitted by Alderman John Walquist, chairman of the committee on street railway matters and extensions, was passed by a vote of sixteen to eight, only the seven Socialists and Alderman Peterson voting against it.

Loop Subway Proposed.—A subway loop, to circle the great shopping, hotel and theatrical district between Times Square and Thirty-fourth Street, New York, N. Y., suggested by the Thirty-fourth Street Board of Trade, has received the indorsement of Travis H. Whitney, former chairman of the Public Service Commission for the First District of New York; Milo R. Maltbie, public service consultant, and the transportation committee of the Forty-second Street Property Owners & Merchants' Association. It is to be submitted to the Public Service Commission, and is already under consideration by the New York Board of Trade & Transportation.

Union Officials Ousted.—As an outgrowth of the strike of conductors and motormen in the employ of the Muskogee (Okla.) Traction Company some time ago, Jesse Green and G. W. Ritchie, president and secretary, respectively, of the local union, have been ousted by their organization, and C. B. Burk and W. H. Clucks have been elected in their stead. It is said that the ousting of Green and Ritchie will bring an end to the strike. The company agreed to recognize the union, which was the main point of contention in the strike, if new officers were chosen by the union. On this basis the strikers were put back to work. Cars were operated about a month by non-union labor.

City Wants to Know About Interurbans.—C. W. Hobson, J. F. Strickland, the Dallas (Tex.) Railway and their bondsmen, who guaranteed fulfillment of the conditions of the service-at-cost franchise granted the Strickland-Hobson interests covering the operations of railway lines in Dallas, have been asked by the City Commission to make definite report at an early date regarding the construction of two interurban lines, each at least 30 miles in length, called for by the terms of the franchise. On January 8, 1917, the city entered into an agreement with the traction interests and during the war the time for fulfillment of the contract, on account of war conditions then prevailing, was extended.

Forecasts Massachusetts Legislative Report.—The Boston Post says that the special committee of the Legislature appointed to consider the needs of the electric railways in that State in its report will favor lower fares on the Boston Elevated Railway, 7 and even 6 cents being suggested. The basic idea underlying conclusions in both majority and minority reports is that the elevated should not be looked upon as an ordinary business enterprise, but as a great public utility with a social, economic, industrial and community value. It will be recommended that the present method of levying subsidy on basis of number of car riders be abandoned as inequitable, and that future apportionments among cities and towns involved be 50 per cent on basis of population and 50 per cent on valuation.

Strike in Middletown.—A short strike on the lines of the Walkill Transit Company, operating in Middletown, N. Y., and between that city and Goshen, has been ended. Employees of the company objected to plans which the company advanced for the operation of one-man cars and went out in order to enforce their demands. During the time the men were out the company operated only one car. This was manned by former Judge H. B. Royce as motorman and by W. M. Gould, general manager of the railway, as conductor. It is said that under the terms of the strike settlement the company will postpone for the present the installation of the one-man cars in Middletown under the plan which the officers first had in mind.

Wants Strike Responsibility Established.—A petition asking an investigation of the strike of the employees of the Pittsburgh (Pa.) Railways last August has been filed with the Public Service Commission of Pennsylvania by A. E. Anderson, Pittsburgh attorney who filed suit for several millions in damages against the Amalgamated Association following the strike last May. In his petition Mr. Anderson refers to the legal obligation of a public service corporation in Pennsylvania to maintain at all times reasonably adequate service, and points to the two-week suspension during the strike as a failure to meet this obligation. He wishes the commission to establish, by investigation, who is culpable when public service employees abandon their posts in the face of a contract and after arbitration.

Favorable Wage Action on I. T. S.—The men on nearly all divisions of the Illinois Traction System, Peoria, Ill., have voted to accept the company's recent wage offer on recommendation of the State mediator appointed by Governor Lowden. From Aug. 1 to Oct. 1, retroactive, the pay will be 55 cents an hour for motormen and conductors and 42 cents for brakemen; from Oct. 1 until Dec. 1, 1920, a period of fourteen months, 60 cents for motormen and conductors and 47 cents an hour for brakemen. The present pay is 50 cents for motormen and conductors and 37½ cents for brakemen. One feature of the proposition in regard to the brakemen is a little different than in former contracts. The brakemen are raised the same number of cents that the motormen and conductors are raised and not the same percentage. The original demands for the motormen and conductors was 75 cents an hour.

Improvements Held Up in Cleveland.—Because of a refusal to relay its tracks on East 140th Street at this time, Fidler Sanders, Street Railway Commissioner, has ordered the Cleveland (Ohio) Railway to do no further repair work until it takes

some steps toward doing this special work. As a result improvements on about 7 miles of track are being delayed. This includes the completion of the East Thirtieth Street crosstown line and a section of track on Euclid Avenue. Joseph Alexander, vice-president of the railway, inquired of the City Council whether Commissioner Sanders had been authorized to issue such orders. It was ascertained that the instructions were to make some move that would result in the improvement of the East 140th Street line, but that no specific instructions had been issued. Mr. Sanders said he acted as he thought necessary.

Strike Investigation Squabble.—Governor Smith, of New York, in a letter sent on Oct. 24 to Raymond F. Almirall, foreman of the Extraordinary Grand Jury in New York, refused to supersede District Attorney Edward Swann in the investigation of charges that arose from the strike of the Interborough Rapid Transit Company employees. The Extraordinary Grand Jury undertook investigation of the Interborough strike at the instance of the District Attorney after receipt of a letter from Mayor Hylan, who wrote that certain correspondence and information that had reached him seemed to indicate that collusion may have existed between employees and officials of the Interborough Rapid Transit Company to bring about the strike as propaganda in the move for getting increased fares on the transit lines. Mr. Swann made statements intimating that the jury had been packed with men prejudiced to the interest of the railway. The jurymen resented this and appealed to the Governor for relief.

Court Acts on Des Moines Matters.—At least a temporary or makeshift settlement of the local railway problems in Des Moines, Ia., was reached recently when Judge Martin J. Wade, of the federal court, approved that portion of the request of the receivers of the Des Moines (Ia.) City Railway for service reductions. The reductions proposed are principally on loop-district service. It is said that the cuts in the loop district will affect a saving in a year's time of about \$26,000. Judge Wade recently set a date for hearings on the objections of the trainmen to a reduction in the wage scale and the protests of residents of the districts outside of the city against an increased fare. The reductions in loop service are to be submitted to the city car supervisor, Scott Goodrell, before going into effect. Officials of the union have announced that pending the final settlement they will abide by their contract even though there is a cut in service.

Increase in Pay for Clerical Force.—In order to stop resignations the Tri-City Railway & Light Company, Davenport, Ia., has instituted a top-to-bottom raise in salaries averaging 14 per cent on the former wage paid and totaling \$1,800 monthly. The raise affects office employees, men and women, numbering more than 225, both in the Iowa and Illinois branches of the company. When the trainmen received a 60-cent scale after their strike in August many office employees, earning less money than the trainmen, asked for jobs on the cars. Many others resigned and numerous requests for raises in pay were made. Although short of funds the company decided it could not dispense with the services of veteran and efficient employees and instituted the sweeping raise. Since the 60-cent scale of the trainmen went into effect the company has also put into force a bonus of 7 cents an hour for its linemen. They formerly drew 63½ to 68½ cents an hour. Their scale now varies from 70 to 75 cents.

Financial and Corporate

Appointment of Receiver Denied

The appointment of a receiver for the Union Traction Company of Indiana, which was asked for in the Federal Court at Indianapolis, Ind., by John F. Anderson, Philadelphia, has been denied by Judge A. B. Anderson. The question of foreclosure of a mortgage against the company will come up later.

The complaint brought by Mr. Anderson, who is holder of \$10,000 of bonds of the company, alleged that the company failed to pay the principal of the bonds when it matured on July 1.

Affidavit filed by Arthur W. Brady, Anderson, president of the railway, showed that some time before the bonds fell due the company obtained the consent of the Public Service Commission of Indiana to a plan for the extension of the bonds, and that at the time the suit was brought the consent of the trustees and almost 91 per cent of the bondholders has been obtained to the extension.

The affidavit further stated that the assets of the company at a fair valuation are worth several millions of dollars more than the total liabilities, exclusive of stock capital liabilities, and valued at the present cost of reproduction are worth several millions of dollars more than the total liabilities.

The affidavit said also that the company is not insolvent and is able to provide for the payment of all debts as they fall due.

Bankrupt Companies May Be Included in Merger

The creditors of the Grafton Light & Power Company, Grafton, W. Va., and of the Grafton Traction Company, now in bankruptcy, met recently before the referee to receive a report relative to a merger of power interests in which the property of the two defunct corporations in Grafton named above is expected to be included.

Attorney Coniff, representing the trustee, asked for a further delay of proceedings owing to the fact that the Maryland Commissioners had not yet passed on the question of the merger of the properties as contemplated. After considerable discussion it was decided to continue the case. The time of the next meeting will depend on the action of the Maryland Commissioners on the application for the merger of the Maryland and West Virginia properties named in the proceedings, of which the properties at Grafton are a part, but the meeting will be not later than Nov. 18, and may be much sooner if the commission disposes of the merger question earlier.

In the meantime it was agreed that releases should be prepared by attorneys in New York, sent out to all creditors of the two bankrupt concerns, who should execute these releases which will include a consent to the dismissal of the bankrupt proceedings upon payment of the debts, and mail them, with sight drafts attached to a designated bank in New York with directions to deliver the releases upon payment of the drafts. By doing this, while waiting on the Maryland Board of Commissioners, all parties will be that much nearer a settlement when the board acts,

provided that action is favorable to the merger. Definite notice of the next general meeting of creditors will be sent out by the referee in advance of such meeting.

Ohio Electric Gets \$259,742 Judgment

In an opinion handed down on Oct. 24 by Common Pleas Judge Stanley W. Matthews at Cincinnati, the Ohio Electric Railway was awarded judgment against the United States Express Company for \$259,742, with interest at the rate of 6 per cent. The suit was based upon an alleged breach of contract for carrying express matter over 571.61 miles of track of the Ohio Electric Railway for the express company.

The contract went into effect on June 1, 1909, for ten years, at a guaranteed minimum of \$65,744. Under it the railway was to be permitted to carry its usual freight business, merchants' dispatch business and baggage of passengers. At the time the railway was carrying the mail under a government contract. On Jan. 1, 1913, the parcels post order went into effect. This reduced the amount of express business materially. One year later the Interstate Commerce Commission ordered a reduction in the schedule of express rates. The United States Express Company put the new rates in effect, but the business was so reduced by the parcels post that the express company gave notice that it would terminate its contract with the railway on June 30, 1914.

Suit was immediately filed by the railway for the recovery of \$10,000 due for the first year of the second five-year term. Amendments were filed as further payments accrued and the suit was heard after the contract date had expired and for the entire amount due for the five years.

The court held that the railway had performed its contract in relation to its merchants' dispatch business; that the carrying of mail and parcels post by the railway was not a violation of its contract to give the express company exclusive right for forwarding express matter; that the right to terminate the contract accrued only when a law, regulation or order impaired the contract in a substantial degree, and that the order of the Interstate Commerce Commission was not such a law, regulation or order; that only fair and uniform rates were contemplated by the contract, and that it must be presumed that the rates fixed by the Interstate Commerce Commission were fair, reasonable and non-discriminatory.

Judgment Against Davenport Interurban

A court action which will either mean resumption of railway service at Muscatine, Ia., on a 7-cent basis or the selling and possible scrapping of the city lines there took place recently when Judge M. J. Wade in the Federal Court handed down a judgment of \$1,168,000 against the Clinton, Davenport & Muscatine Interurban Railway in favor of the Tri-City Railway & Light Company.

The latter company financed the building of the interurban and the acquisition of its Muscatine division properties. The

Clinton, Davenport & Muscatine Railway has never been able to pay off these notes. To collect its judgment the Tri-City Railway & Light Company may ask the sale of the Muscatine City lines on a writ of execution. These lines have never been a paying investment. The city of Muscatine has fought every move the company has made to put the properties on a paying basis, including a request for a 7-cent fare.

There has been no railway service in Muscatine since Aug. 1 as a result of the fight against the company. The city is also fighting the operation of one-man cars there in an action which is now before the Supreme Court of Iowa.

Judge Wade's decision gives the parent company a chance to sell the entire Muscatine system and draw out of a money-losing proposition which has brought incessant trouble through the hostile attitude of a political faction there.

Railway May Be Saved

Vigorous efforts will probably be made to save the Blue Hill (Mass.) Street Railway from being junked, according to advices from the towns of Milton, Canton and Stoughton, the municipalities served by the company.

It was expected that service would be discontinued on Oct. 1, but a special meeting of citizens will shortly be called in Canton to discuss maintaining service until after the special session of the Massachusetts Legislature to be devoted to electric railway problems is well under way.

Sentiment in Milton, whose townspeople include many persons of wealth, is also understood to favor assisting the company to continue service.

The system is operated with six 5-cent fare zones between the Mattapan terminus of the Boston Elevated Railway and Stoughton, hourly service being provided from end to end and half-hourly service between Canton and Milton.

The company is in the hands of a receiver, George Spalding. No one-man cars are operated, and there is practically no jitney competition in the towns served by the company.

Road Once Abandoned Shows Profit

William E. Massey, appointed trustee of the Ocean City Electric Railway, Ocean City, N. J., by the Court of Chancery from June 12 to Sept. 30, on Oct. 27 made his report to the City Commissioners, the city and the owners of the road having jointly asked for the appointment. The statement shows that the total amount received by the trustee was \$22,647; total operating expenses, \$16,678; taxes paid for the current year on the property and franchise, \$1,559, and the amount in hand after all deductions is \$3,475. The physical condition of the property, the trustee states, is better than on June 10, when he took charge. In the order of the court the trustee was to serve without pay, but was to be allowed his actual expenses. For these he makes no claim. The trustee adds that there is one disputed claim growing out of the operation of the railroad, wherein the claimant contends that there is a liability resting upon the trustee for damages alleged to be due. Until this matter is adjusted he cannot present his final report. The road was abandoned, and the conditions under which service was restored were referred to previously in the ELECTRIC RAILWAY JOURNAL.

Seattle Blows Its Own Horn

The Seattle (Wash.) *Municipal Railway News* published in the interest of the municipal railway in that city, recently said:

Seattle has had six months of municipal ownership and operation of its street railway lines, the first of October marking the beginning of the second half of the year. Six impossible months, according to the uncompromising declaration of many prophets both at home and abroad. Nearly every issue of a street railway publication that comes to hand quotes some wise professor to the effect that municipal ownership can at the best be nothing more than a brief nightmare. Many at home have made the unqualified prediction that the whole venture would run into the ground in less than six months. Unless, of course, the people would be willing to pay out much hard cash to meet excess obligations.

Still, the months have passed, the trainmen are still wearing the S. M. insignia in their caps and the cars are being dispatched from an unassuming office on the fifth floor of the County-City Building.

The 2000 odd employees of the street railway are still drawing their wages and salaries and nobody has yet said that they were not paid out of the earnings of the system. Auditor Hyatt is authority for the statement that the street railway department has even paid the first and only interest instalment on the purchase price which has fallen due since the city came into possession of the lines.

Wages have gone up since the city purchased the lines. The service has improved materially. With all, we still ride for 5 cents, with the understanding that, unless unforeseen reasons arise, we shall continue to do so.

At some later day the exact figures to tell the story of the first half year will be forthcoming. Meanwhile, the system continues a "going concern" and worth more than when the city purchased it.

Financial News Notes

Orders Service Abandoned.—The Public Service Commission of Pennsylvania on Oct. 22 issued an order authorizing the Hanover & McSherrytown Street Railway to abandon tracks and service over several streets in Hanover.

Asks Authority to Abandon Service.—Because of poor business, the Miamisburg & Germantown Traction Company has asked permission of the Ohio Public Service Commission to abandon its line between Miamisburg and Germantown, Ohio.

Mr. Perkins Made Receiver of Shore Line.—R. W. Perkins, Norwich, Conn., president, was appointed temporary receiver for the Shore Line Electric Railway on Oct. 1 by Judge Joel H. Reed, of the Supreme Court, on the application of the estate of the late Morton F. Plant.

Ask Cut in Tax.—The Connecticut Valley Street Railway, the Concord, Maynard & Hudson Street Railway and the Northern Massachusetts Street Railway through counsel, have asked the Public Service Commission of Massachusetts to reduce the amount which they pay the cities and towns served by them as an excise tax.

Bondholders Get Ohio Road.—By order of the Common Pleas Court the property of the Miamisburg & Germantown Traction Company, appraised at \$18,000, was sold on Sept. 29 to the bondholders' committee. The line extends from Miamisburg, to Germantown, Ohio a distance of about 5 miles.

New United Railways Director.—At the annual meeting of the United Railways Investment Company, Jersey City, N. J., controlling the United Railroads, San Francisco, Cal., the retiring directors were re-elected, with the exception of Eben Richards and Frederick V. Van Vorst, de-

ceased. Harry B. Lake was elected to take the place of Mr. Richards and L. F. Loree succeeds the late Mr. Van Vorst.

Default on Interest and Sinking Fund.—The Humboldt Transit Company, Eureka, Cal., in its petition to the Railroad Commission for an increase in fare from 6 cents to 10 cents says: "The company by reason of lack of money has been compelled to default on the payment on the interest of its bonds due Oct. 1, 1919, and also in providing for the sinking fund to redeem its bonds."

Protective Committee Purchases Collateral.—Harold B. Thorne purchased on Oct. 1 for the account of the Washington (D. C.) Utilities Company, noteholders' protective committee, the 27,500 shares of common capital stock of Washington Railway & Electric Company, pledged as collateral for the note issue. The amount of the notes outstanding is about \$1,381,000. The amount paid for the 27,500 shares of stock is stated to be about \$5,000.

Municipal Aid for Massachusetts Line.—The town of Sharon having agreed to aid it financially, the Norton, Canton & Sharon Street Railway, Norton, Mass., has been authorized by the Public Service Commission to resume service upon its lines between East Sharon and Sharon Heights. The line, which is approximately 3 miles in length, was abandoned a year ago because the expenses of operating it were much higher than the total of the fares collected.

Small Bond Issue Authorized.—The Public Service Commission for the Second District of New York has authorized William G. Phelps, receiver of the Binghamton (N. Y.) Railway, to issue \$9,000 in receiver's certificates, the proceeds of which are to be used for payment of the cost of extending its Port Dickinson line to the Hire's Condensed Milk factory. The extension has been authorized by the commission.

Receiver for St. Louis Subsidiaries.—Rolla Wells, receiver of the United Railways of St. Louis, Mo., has been appointed receiver of three subsidiary companies by Judge Dyer in the Federal Court. The appointment was made on the request of Thomas Francis, attorney for the United Railways. The three subsidiary companies are the Missouri Electric Railway, and the Florissant Construction, Real Estate & Investment Company and the Merchant's Express Company.

Note Issued to Secure Extension.—The Humboldt Transit Company, Eureka, Cal., has been authorized by the California Railroad Commission to issue a promissory note for \$20,000 to the First National Bank, Eureka. The note is secured by a pledge of \$40,000 of the company's first mortgage 5 per cent bonds. The bank recently advanced money to the railroad to enable the company to purchase rolling stock and to extend its Myrtle Avenue tracks in Eureka.

New Company at Paducah.—Articles of incorporation of the Paducah (Ky.) Electric Company, with \$1,200,000 capital stock, and the Paducah Railway with \$1,000,000 capital stock, were filed on Sept. 23 in the office of the Secretary of State of Kentucky. On Oct. 1 the properties of the Paducah Traction & Light Company were taken over by the Paducah Railway under the terms of the reorganization outlined previously in the *ELECTRIC RAILWAY JOURNAL*.

Seek to Abandon Power Service.—Prior to the entire dismantling of the road of the Cincinnati & Columbus Traction Company, Cincinnati, Ohio, bondhold-

ers of the company have asked the State Utilities Commission through W. S. Little, attorney of the Union Savings Bank and Trust Company, to retain jurisdiction pending litigation. This action was taken to relieve the trust company of maintaining electric lighting and power service east of Owingsville and between that town and Hillsboro.

Municipal Line Piles Up Deficit.—H. Roy Harrison, Commissioner of Public Works of Tacoma, Wash., reports that the tideflats municipal railway is running behind at the rate of \$100,000 a year. The commissioner is confronted with the necessity of either curtailing service on the lines or transferring sufficient funds from the Department of Public Works to pay the deficit. The city's operation of the line has been fraught with heavy financial losses, despite increased fares. The obligations of the municipal railway are said to be more than \$500,000.

St. Louis Assessments \$36,595,397.—The assessment for 1919 of the public service corporations of St. Louis, Mo., fixed by the State Tax Commission and adopted by the State Board of Equalization, has been handed down to St. Louis authorities as \$36,595,397, which will yield a tax of approximately \$900,000. The electric railway valuations were as follows: United Railways, \$20,420,884; St. Louis, Lakewood & Grant Park line, \$52,008; St. Louis & East St. Louis Railway, \$235,370; St. Louis Electric Terminal, \$254,908; Carondelet & Webster Grove Railway, \$9,101; St. Louis Electric Bridge, \$825,000.

Final Cleveland Dividend Hearing.—Final arguments on the request of the Cleveland (Ohio) Railway for an increase in dividends from 6 per cent to 7 per cent were heard by the Board of Arbitration on Oct. 30. Attorneys Harry Crawford and Thomas Sidlo represented the company, while Street Railway Commissioner Fielder Sanders and Assistant Law Director Alfred Clum spoke for the city. Both sides may submit briefs. The arbitrators are Joseph R. Nutt, president of the Citizens Savings & Trust Company; W. E. Davis, commissioner of light, and Attorney A. A. Stearns.

Successor Company Incorporated.—Articles of incorporation were filed on Sept. 22 in California for the San Francisco & Sacramento Railroad as the successor to the Antioch System which embraces the Oakland & Antioch, Oakland, Antioch & Eastern and the San Ramon Valley Railroad. The directors for the organization are: Jesse H. Steinhart, S. J. McAtee, L. L. Levy, San Francisco; S. P. Westington, Alameda; S. T. Maar, H. J. Sutherland, and H. A. Mitchell, Oakland. The sale of the road under mortgage foreclosure was set for Oct. 22, when the reorganization will be complete.

Receiver for Jacksonville Company.—A refusal by the public, through referendum vote, to allow an increase in the 5-cent fare charged by the Jacksonville (Fla.) Traction Company, has resulted in a receivership for the company. The company paid 7 per cent on its common stock before the war. Due partly to war conditions, and partly to decisions of the War Labor Board, the wages of trainmen have been increased approximately 100 per cent since 1914. Fuel costs have increased even more, according to the utility managers. In the last year, they say, the company has operated at a loss, though the lines have carried more passengers than ever before.

Moline Net Inadequate.—The income of the Tri-City Railway, Davenport, Ia., on its Rock Island, Moline & Eastern Traction Company branch, is falling short of the

net earnings permitted under a decision of the Illinois Public Utilities Commission by \$90,000 a year. The report of the company for September shows that the net income for the month before deducting anything for depreciation was \$14,402. In twelve months this would amount to \$172,835. The depreciation is figured at \$60,000, leaving a balance for return on investment of \$112,835. This is equal to an annual return of 3.9 per cent on a valuation of \$2,900,000 fixed by the commission. The commission had held 7 per cent as reasonable. The yearly interest on bonds and notes alone amounts to \$89,090, according to the company.

Atlantic City Road Doing Better.—A complete monopoly in transportation upon Atlantic Avenue, Atlantic City's main business thoroughfare, following the expulsion of jitneys, enabled the Atlantic City & Shore Railroad, Atlantic City, N. J., to show a gain of \$42,512 during the year ended Sept. 30. The Atlantic City division was operated at a loss of \$25,007 in 1918. The Atlantic City-Ocean City division showed a deficit for the year of \$22,677, compared with a loss of \$27,956 for 1918. These figures have been submitted to the United States District Court in support of a petition for the appointment of Stern & Silverman, Inc., Philadelphia, as assistant operating managers to A. J. Purinton, the receiver. Stern & Silverman are financially interested in the railway.

New Preferred Issue Planned.—The stockholders of the Cities Service Company, New York, N. Y., will meet on Nov. 17 to amend the charter to provide for the right of the company to redeem all or any part of the present preferred stock at 112; to make changes in the provisions relating to the reinvestment fund on the present preferred stock in respect to proceeds from junior securities, and to provide an issue of a second preferred stock, of which \$3,000,000 in shares of \$10 par, to be known as Preference B shares, will be offered at \$7.50 a share. The directors believe the Preference B shares will prove as popular as did the Cities Service bankers shares among common stocks, the bankers shares having been issued some eight months ago. The number of holders of record of bankers shares increased from 1061 on March 15, 1919, to 4443 on Oct. 15.

Seek to Foreclose Connecticut Line.—In the Superior Court in Bridgeport, Conn., Bristol & White, New Haven, as attorneys for the holders of the second mortgage bonds of the Danbury & Bethel Street Railway Danbury, Conn., have filed a petition asking the permission of the court to institute proceedings to foreclose the property. The foreclosure proceedings will be directed against Judge J. Moss Ives, as the receiver of the road, and it is understood that they will not be contested by the receiver. The foreclosure action is actually a formality in connection with the proposed re-organization of the road by the holders of the second mortgage bonds, as a measure of self protection. The second mortgage bondholders set up in their application to the court the fact that they have not received interest upon their bonds in two years. The second mortgage bondholders are maintaining the payment of interest on the first mortgage bonds.

Buffalo Southern Reorganization Planned.—The reorganization of the Buffalo (N. Y.) Southern Railway by a new company, the Erie County Traction Company, Inc., is planned under a petition filed with the Public Service Commission for the Second District, by Robert B. Austin, Wil-

liam J. Wheeler and Edward L. Frost, representing the bondholders' committee. The new company plans to have capital stock of \$450,000, to make a mortgage of \$1,000,000 and to issue immediately under it \$100,000 in 6 per cent Series A bonds. Authority by the commission is asked to issue the stock and mortgage bonds as proposed or as the commission may determine before approving the reorganization. The Buffalo Southern Railway extended from the Buffalo city line to East Seneca, to Ebenezer, to Hamburg, and from Orchard Junction to Orchard Park. It entered Buffalo on the International Railway's tracks. The commission will hold a hearing upon the application.

Baltimore-Annapolis Stock Offered.—The stockholders of the Washington, Baltimore & Annapolis Electric Railroad, Baltimore, Md., on Oct. 15 authorized the issuance and sale of 20,885 shares of 6 per cent non-cumulative preferred stock (par \$50) at \$37.50 per share. The stock will carry accrued dividends from Oct. 1, 1919. The holders of both preferred and common stock are entitled to subscribe to the new offering to the extent of 23.43 per cent of their present holdings. Subscriptions were payable on or before Nov. 1, 1919. Poe & Davies, Baltimore, Md.; Otis & Company, Cleveland, Ohio, and Moorhead & Company, Washington, D. C., are offering the stock publicly. In a letter to the bankers the president of the railroad says that on Dec. 31, 1918, the capitalization of the company consisted of \$5,239,000 of bonds, \$1,455,750 of 6 per cent non-cumulative preferred stock and \$3,000,000 of common stock.

More Massachusetts Abandonments.—The trustees of the Eastern Massachusetts Street Railway, Boston, Mass., have consented to continue the operation of the Wakefield Park-Montrose line until Jan. 1, as a result of the efforts of the Wakefield selectmen and a citizens' committee. A special town meeting will be called early in 1920 to consider the appropriation of money to help to meet the expenses of the line. Two of the lines of the company were to discontinue operation on Nov. 1. One is that running through Grove Street, West Roxbury, to the Oakdale section of East Dedham, and the other running from Spring Street, West Roxbury, to Needham. The trustees say that these lines have not been paying expenses, and the citizens of Needham and Dedham have refused to make appropriations in order that the service might be continued. The Needham selectmen have arranged for a jitney service from Needham square to Spring Street, connecting with the Boston Elevated Railway.

Offers Lease to City.—A direct offer has been made by the Reno (Nev.) Traction Company to lease its lines in Reno and Sparks to the city or any company or syndicate on a basis of rental equal to 6 per cent interest on the bonded indebtedness of the company, amounting to \$152,000 altogether, or on a rental basis of 6 per cent on the physical valuation of the property as appraised by three engineers, representing the city, the public service commission and the traction company. This proposal was made by Attorney Goodell of the company at the hearing before the Public Service Commission on the application of the company to abandon certain of its lines. The offer was made following a statement by City Attorney Pike that John T. Read claimed to have a company ready to take over the property and operate it if the Reno Traction Company would lease the lines on a reasonable basis.

Hearing on Abandonment.—A hearing was held recently by Deputy Public Service Commissioner Edward J. Glennon, of the First District, in reference to the cessation of operation by the Brooklyn & North River Railroad, which for the past eight years had operated from West Street, Manhattan, over the Manhattan Bridge to Flatbush Avenue and Fulton Street, Brooklyn. The road stopped running on Oct. 4, according to a statement by its officers, because of the constant losses to which it was subjected, and owing to the fact that there was no prospect in sight of making any money. The line was owned by various street railroads in Manhattan and Brooklyn. Except for the Third Avenue Railway, these lines are all in receivership, and have expressed themselves as unwilling longer to finance the losses of the Brooklyn & North River Company, which have aggregated \$464,269. The company owes the Third Avenue Company \$275,000. The city has announced that it favors mandamus proceedings in an attempt to compel the road to continue operation.

Chautauqua Line Would Abandon Branch.—The Chautauqua Traction Company, Jamestown, N. Y., recently made application to the Public Service Commission for the Second District, for approval of a declaration of abandonment of its Barcelona branch running in Portage Street in Westfield to the New York Central depot and continuing in North Portage Street into the town of Westfield. The company claims the line is no longer necessary for the successful operation of the road or convenience of the public. The branch was originally built with the idea, the company says, of developing Barcelona as a residence section and summer park, and the plan has been abandoned. The company says it has operated the branch for several years at great financial loss. The abandonment, it is claimed, has been contemplated for some time and especially at the present time in view of the company's financial condition. The company says the operation of its entire system is unprofitable. Its annual report for 1917 shows a net corporate loss of \$58,285 and for 1918, \$61,579, and for the first six months in 1919, \$56,138. The Barcelona division for 1917 shows net loss of \$17,019; 1918, \$6,128, and for eight months in 1919 the loss was \$3,613.

California Railway & Power Shows Loss.—The California Railway & Power Company, controlled by United Railways Investment Company, New York, N. Y., and a holding company of the United Railroads, San Francisco, Cal., has reported for the fiscal year ended June 30, 1919, showing net loss for the year of \$28,528, which compares with a net loss of \$10,056 for the previous year and with net income of \$18,544 for 1917 and income of \$166,380 for 1916. The total income for the year was \$134,000, against \$222,000 for the previous year, \$92,425 for 1917 and \$203,327 for 1916. Dividends were paid in 1917 of \$28,000 and in 1916 of \$196,000 on preferred stock, but none has been paid since. The total deficit for the year was \$34,026 against a deficit of \$5,948 in 1918, surplus of \$32,558 in 1917 and surplus of \$14,013 in 1916. Assets of the company, which consist entirely of stock and other securities, are placed at \$49,739,527. The company owns 50,000 shares of first preferred of United Railroads stock, 200,000 shares of preferred and 79,500 shares of common; 199,990 shares of Sierra & San Francisco Power; 20,000 shares of preferred and 29,995 shares of common stock of Coast Valleys Gas & Electric and 99,975 shares of stock of San Francisco Electric Railways.

Traffic and Transportation

Ticket Selling Campaign

Active Campaign by Salesmen Planned by Kansas City Railways to Sell Transportation in That City

The Kansas City (Mo.) Railways is planning to merchandise fare tokens. It will put on a campaign to sell the tokens, and push their sale as vigorously—and with as varied a program of promotion and publicity—as would the distributor of soap or candy. There will be a sales manager in charge of distribution. He and the salesmen will cover the Kansas City district, urging the merchants to carry the tokens, delivering them, and advertising them, educating the public to the advantages of using tokens. Firms will be urged to buy tokens in large quantities for resale to employees.

REASONS FOR CAMPAIGN

The purpose of the campaign is twofold: directly to secure distribution of the tokens, and indirectly to overcome the psychological condition that has temporarily reduced patronage of street cars. The company officials believe that people who patronize jitneys rather than cars because of the increased fare are not doing so from motives of thrift, since they pay 10 cents for a ride in the jitney, against 7 cents on the street car. The public just does not like the idea of paying more fare. The vigorous campaign for the sale and use of tokens, now to be undertaken is designed to break the traditions of the past, and start a current of buying car tickets.

The Kansas City Railways, it will be remembered, was authorized by the Public Service Commission to install an 8-cent fare on Sept. 1, with seven tickets for 50 cents and fifty tickets for \$3.50. The company, pending wide distribution of the tickets at a rate costing 7 cents each, collected a 7-cent fare. The commission's orders were to go into effect on Sept. 21. In the interim, however, city officials had agreed to help work out the company's problem. One of the city's helpful acts was to put into effect an ordinance regulating jitney traffic. When this agreement was reached, the company announced that a flat fare of 7 cents, for one fare or any quantity of tickets, would be established.

This change with reference to fares did not alter the plan of merchandising the tokens. Instead, it made the merchandising task more difficult, since there would be no inducement in lower prices for quantities of tickets. Tokens will be sold, probably, in smaller quantities than formerly planned—it is expected that most purchasers will buy five or ten at a time from stores and stands, and from conductors.

SEVEN-CENT FARE CONTINUED

The Kansas City Railways will continue to charge a flat 7-cent fare until the service-at-cost plan is tested. Theoretically, with an equal volume of patronage, the receipts under 7 cents should be 16 per cent more than the receipts under 6 cents. The actual increase in receipts has been about 10 per cent. Many incidental conditions, however, affect this result—among them

the continuing of the 6-cent fare for passengers boarding cars on the Kansas side of the state line; another, the activity of jitney drivers this late summer.

The recording fare boxes on the company's cars will be discontinued this winter. Seven hundred fare boxes have been ordered from the Woods Fare Box Company, Decatur, Ill., for installation. When the Woods boxes are in service, the company will do away with trip sheets, and will in several other ways simplify the work of the conductors.

Metal Tickets for Washington

Upon the request of the Capital Traction Company and the Washington Railway & Electric Company, the Public Utilities Commission of Washington, D. C., on Oct. 27 modified its recent order granting an increased fare so as to authorize the use of metal tickets or tokens in lieu of the paper tickets provided in the original ruling. This latter ruling will permit the continued use of the fare collection boxes which have proved successful in accounting for fares collected.

The companies stated they would not be able to obtain a sufficient quantity of metal tickets in time to place them on sale on Nov. 1, when the original order became effective, but they expect to have the metal tickets ready for sale by Dec. 1, 1919. In the meantime, paper tickets will be issued at the rate of four tickets for 25 cents, as required by the original order.

The railways have agreed to continue the use of the present form of coupon tickets for the federal and district governments in purchasing inter-company transfers, instead of the metal tickets, in order to provide the most convenient method of issuing transportation to government employees for official use.

The order further provides that settlements between the several companies in the District of Columbia for tickets collected shall be made monthly.

Wants Ten Cents in Eureka

Asserting that it is backed by the labor council of the city of Eureka and by the Eureka Merchants' Association, the Humboldt Transit Company, which operates in Eureka, Cal., has applied to the Railroad Commission for authority to increase fares from 6 cents to 10 cents. The company claims that unless it receives financial relief it will be unable to continue in business. It declares that it is facing an expenditure of \$100,000 for reconstruction work and says that to secure the funds to rehabilitate its system it must obtain additional revenue. The company says:

The only feasible manner in which this can be done is to increase the rates of fare. The company has been informed by the labor council of the city of Eureka and by the Merchants' Association of the same town that these organizations will assist the company to get the increase asked for and the company believes that the citizens of Eureka, by a large majority will favor the increase, realizing that if the system is to be maintained some means must be found to provide additional revenue.

The company points out that for the six months ended June 30, 1919, it expended \$23,905 in excess of the revenue for that period. The company recently increased the wages of the platform men from 36 cents an hour to 50 cents an hour, an in-

crease of \$9,000 in the cost of labor since June 30, 1919. It points out further that it has to pay to the city of Eureka 3½ per cent of its gross earnings as a franchise tax and to the State of California 5¼ per cent of its gross receipts.

3,126,651 Passengers a Day

This Is Record of New York's Rapid Transit Lines—Figures for Nine Months Increase 60,000,000

During the nine months period from January to September, inclusive, the total number of passengers carried on the subway lines of the Interborough Rapid Transit Company, New York, N. Y., was 397,922,538, an increase of 74,122,453 over the traffic of a similar period during 1918.

FIGURES BY MONTHS

The net increase in both the subway and elevated lines was 60,932,365, the elevated lines showing a decrease in the nine months of nearly 14,000,000. The maximum day's traffic was on Oct. 20, when the subway carried 1,955,301 passengers and the elevated lines 1,171,350, making a total for the day of 3,126,651. The following table shows the changes month by month:

	1918		1919	
	Subway	Elevated	Subway	Elevated
Jan.	38,099,384	29,804,233	42,957,191	28,522,788
Feb.	34,577,337	27,318,237	39,748,613	25,537,217
Mar.	38,154,181	31,182,504	45,361,853	29,363,773
Apr.	36,739,288	30,821,249	45,724,974	29,546,361
May	35,708,136	31,518,252	45,299,450	30,166,287
June	32,450,792	29,971,340	41,516,538	28,906,516
July	31,063,192	30,285,706	39,527,523	27,834,065
Aug.	27,128,496	30,030,489	37,394,205	26,594,623
Sept.	31,079,279	28,665,995	42,392,191	29,136,287
Total	305,000,085	269,598,005	379,922,538	255,607,917
Total Subway and elevated, 1918.....	574,598,090			
Total Subway and elevated, 1919.....	635,530,455			

Net increase 60,932,365

Frank Hedley, president of the company, asked whether the growth in traffic would be sufficient eventually to carry the Interborough Company across the danger line of bankruptcy, replied that it would not at a 5-cent fare. He explained this by saying that the increase in costs had so far exceeded the increase in revenues that nothing save a greater fare would ever enable the company to pay its fixed charges and keep the service at its present point of efficiency.

It was because of the loss on the elevated lines that the Interborough Company, lessee of the lines, suffered a net loss of about \$4,000,000 during the year ended June 30 last.

BROOKLYN TRAFFIC ALSO GROWS

Great as the growth of the Interborough traffic has been it is far below the comparative growth of the Broadway subway operated by the Brooklyn Rapid Transit Company. During the eight months, from January to September, the traffic of this line has grown in one year from 27,462,286 to 38,491,127, an increase of more than 11,000,000. The following figures indicate the varying monthly increases:

	BROADWAY SUBWAY	
	1918	1919
January	2,498,761	4,611,720
February	2,805,747	4,439,510
March	3,419,917	5,146,106
April	3,511,698	5,053,599
May	3,659,658	4,909,239
June	3,614,660	4,736,924
July	3,828,107	4,951,436
August	4,123,738	6,645,593
Total	27,462,286	38,491,127

Portland Wants Eight Cents

A Plan Is Advanced for Segregating Railway Properties and Operating Them Under New Franchise

The Portland Railway, Light & Power Company, Portland, Ore., recently presented arguments before the Public Service Commission for an increase in fare from 6 cents to 8 cents. Franklin T. Griffith, president of the company, set forth the plea that the company cannot continue to operate on the present 6-cent fare with increased wages and present operating expenses.

The petition filed by the company asks for the cancellation of the existing fare and substitution of one that will insure a return of 7 per cent upon the investment. Mr. Griffith stated that this return can only be realized by an 8-cent fare, if the unit fare system is to be continued. Zoning of the transportation districts has been discussed, but this was not taken up at the hearing.

The company presented testimony to the effect that the 6-cent fare has barely sufficed to meet the increase in wages and operating expenses when passenger traffic was at its height. It is now declared that a sharp decline in receipts has followed the waning of the intensified industrial period.

It is estimated that the year ending Aug. 31, 1920, will show net earning of only 2.13 per cent on an \$18,568,000 valuation fixed by the Public Service Commission for the railroad property of the company. Operating expenses for the year ending Aug. 31, 1920, are expected to be \$3,430,000, or double the expenses of the year 1916.

About one-sixth of the passengers avail themselves of the 5½-cent fare, procurable by the purchase of reduced price ticket books.

A possible solution of the electric railway problem in Portland was offered at the hearing by the city, through J. P. Newell, who is employed by the city to aid in opposing efforts of public utilities companies of Oregon to increase rates. The plan is the creation of a tripartite profit-sharing enterprise, to include the public, the railway employees and the company as the beneficiaries.

The commission granted a conference on the plan. This was participated in by city legal officials, traction officials, and members of the Public Service Commission. President Griffith expressed willingness to participate in the conference, but said that the company's plea for immediate relief should not be abridged in any way by such discussion. He pointed out that the fruition of such a plan would require considerable time, while the affairs of the railway require the earliest possible relief.

Under Mr. Newell's plan it would be necessary to separate the properties of the railway company from the light and power and other business. He would then determine the amount of interest paid on the indebtedness of the railway properties. The valuation placed on the railway properties by the Public Service Commission in 1916, with the addition of the value of betterments and extensions made and installed since the compilation of the valuation figures, would be used under the proposed new franchise.

Mr. Newell proposes that a minimum return shall consist only of the payment of the actual interest on the indebtedness and a low rate of profit on the investment. If the money rates declined he would increase the minimum rate of profit by an amount equal to the reduction. When the

returns to the company rise above the minimum, one-half of the excess would be paid to the employees as a bonus up to the point where the bonus equalled 10 per cent of the payroll. The remaining half of the excess would be added to the profit of the company, up to the point where the return is 1 per cent above the minimum. Above that point as the net income rises, the excess would be added to the profit in progressively decreasing percentages until the profit reaches a maximum of 8 per cent at the point where the bonus to the employees reaches its maximum. The remainder of the excess over the minimum return would be set aside as a guarantee fund until such fund reached the amount of \$500,000. Whenever the return on the valuation fell below 1 per cent over the minimum, the guarantee fund would be used to maintain the bonus and the return on the investment at the same amount as though the return were at 1 per cent over the minimum.

A committee of five representatives of the public, the corporation and the employees will be appointed to discuss the Newell plan and to consider the other problems facing the railway.

Six-Cent Fare Stands

Voters of Saginaw and Bay City Approve Increase Allowed Temporarily by Municipal Authorities

At a special election held at Saginaw, Mich., recently the voters ratified by a majority of 728 the temporary increase in fares granted by the Common Council to the Saginaw-Bay City Railway so that it might resume service after the strike which tied up its lines, last July. At a similar election held in Bay City, the temporary rates granted there were ratified by a majority of 1825.

The trainmen on the Saginaw local division of the Saginaw-Bay City Railway struck for higher wages on July 25, the strike tying up all local service in Saginaw. The company took the attitude that it could not pay a higher rate of wages on the 5-cent fare, under which six tickets were sold for 25 cents, and eight labor or school tickets for 25 cents.

The company declared wages could be raised only if a higher fare were allowed. The Common Council, in order to secure resumption of service, granted the company a temporary increase of fare, the rate being 6 cents, with labor and school tickets at the rate of five tickets for 25 cents; labor tickets being good between the hours of 5 a. m. to 7 a. m. and 4:30 p. m. to 5:45 p. m. School tickets are good for school children on school days only. This temporary increase was not to become permanent until approved by the electors of the city of Saginaw at a special election to be held on Sept. 9. Service was resumed in Saginaw on July 31. The result of the special election was to ratify the temporary grant by a vote of 3279 for and 2551 against the increase.

The trainmen on the Bay City Division struck on July 31, the tie-up lasting until Aug. 19. The company took the same stand in Bay City as in Saginaw, and the Common Council on Aug. 18 passed a temporary ordinance permitting the railway to charge 6-cent fares with labor tickets at the rate of thirty-six tickets for \$1.50, good only between certain restricted hours. This ordinance, as in Saginaw, was not to become permanent until approved by the electors of Bay City at a special election on Sept. 9. At this election the vote was 3509 for, and 1684 against the increase.

Arbitrators Report

After Inquiry They Report for Continuance of Six-Cent Fare in Kansas City, Kan.

A year ago, in the midst of litigation and various controversies between the city of Kansas City, Kan., and the Kansas City Railways, in the Federal Court on the Kansas side, Judge John C. Pollock, presiding in the court, suggested a board of arbitration. The city and the company assented, the former naming A. L. Berger and the latter naming Frank Hagerman. This board on Sept. 19, 1919, filed its report, covering all the matters which had been under discussion. The findings are not binding. Judge Pollock has final jurisdiction. The board recommended improvement in service; that for sixty days the company file with Judge Pollock a report of the number of cars operated on each line, Judge Pollock to decide as to sufficiency of service. The board made the following recommendations, among others:

That certain extensions, about 2 miles, be completed, one new line and one viaduct built, and an incline built by which a present surface line can use the elevated structure.

That various lines be rerouted.

That the elevated structure be kept in service.

That the company pay car license claims of \$8,000 a year and park maintenance claims of \$5,000 a year.

That the matter of rental of the Intercity viaduct, now owned by the two cities and on which cars now run, be left to agreement between the company and the two cities.

That any fare less than 6 cents is not remunerative, and the minimum of 6 cents should prevail during the remaining life of the Kansas City, Kan., franchise, which is two years.

The recommendation with reference to the rate of fare, leaves that matter practically in Judge Pollock's hands. It is possible that the court may entertain the company's application for introduction of its appeal for 8-cent fares, into the matters to be considered by the Board of arbitration; if such application is not acceded to, the company may, under the recommendations of the board, be free to seek action on fares by the State Utilities Commission. This commission had declined to grant authority for a 6-cent fare. The company is collecting 6 cents on the Kansas side now, under a restraining order issued by Judge Pollock.

The company, through its attorneys, has already filed an application with the commission for an 8-cent fare on the Kansas side of the state line.

Six Cents in Norfolk

The increased electric railway fare in Norfolk and Portsmouth, Va., became effective on Sept. 28 and Sept. 30 in accordance with the terms of an ordinance of the City Councils, and at the same time the new fare—6 cents—became effective on the suburban lines of the Virginia Railway & Power Company in Norfolk County under the terms of an order of the Corporation Commission of Virginia.

The original ordinance and order in Portsmouth provided for a charge of 2 cents for each transfer issued, but in its final passage the City Council took the position that by allowing the 2-cent transfer, the proceeds of which were to go to the city in lieu of compensation for the use of streets, a tax was put on the citizenship. It, therefore, eliminated both the charge for transfers and for the use of the streets. In consequence the fare is 6 cents without a charge for transfer.

The City Council of Portsmouth has taken the position that the 2-cent transfer is not revenue to the company, but that it is a tax on the people and the ordinance would make the company the city's collector of this tax.

Transportation News Notes

Seven Cents Asked in Charleston.—The Charleston Consolidated Railway & Lighting Company, Charleston, S. C., has petitioned the City Council for permission to charge 7-cent fares. The company would sell four tickets for 25 cents.

Seven Cents in Brunswick, Ga.—The Railroad Commission of Georgia has authorized the City & Suburban Railway, Brunswick, Ga., to raise fares from 5 cents to 7 cents. The company some time ago asked the City Council of Brunswick for permission to charge the 7-cent rate.

Wants Seven-Cent Fares.—A. A. Hardage, as receiver for the North Alabama Traction Company, which operates the electric railways in Albany and Decatur, Ala., has filed a petition with the City Councils of both cities asking for permission to increase the fare from 5 cents to 7 cents.

Eight-Cent Fares on Pennsylvania Roads.—The Delaware County & Philadelphia Electric Railway, Clifton Heights, Pa., and the Media, Glen Riddle & Rockdale Electric Street Railway, Media, Pa., announced that on Oct. 26 they would raise the fares on their lines from 6 cents to 8 cents.

Would Sell Commutation Tickets.—The Louisville & Northern Railway & Light Company, New Albany, Ind., has petitioned the State Public Service Commission for permission to put on sale trip commutation tickets to sell at twenty-five times the regular one-way fare. Each ticket will be good for forty single trips.

Fare Reduced to Six Cents.—Fares on the lines of the Paducah (Ky.) Traction Company were reduced from 7 cents to 6 cents on Oct. 1. On that date the properties of the company were taken over by the Paducah Railway, recently given a franchise which stipulates a 6-cent fare for one year.

Higher Fares Asked on Pottsville Road.—The Eastern Pennsylvania Railway, Pottsville, Pa., on Oct. 10 announced increases of fares on its lines to take effect in thirty days. The increase averages 1 cent a zone, and is necessary to meet the 10 per cent increase in wages recently awarded to the conductors and motormen of the company.

Urges Retention of Six-Cent Fare.—The special railway committee of the City Commission having in charge the matter of a permanent increase in fares for the Grand Rapids (Mich.) Railway has recommended that the agreement by which the company was permitted to charge a 6-cent fare with nineteen tickets for \$1 be continued for a further trial period of sixty days.

City's Complaint Dismissed.—The Public Service Commission of Pennsylvania has dismissed complaints filed by the city of Meadville against the 7-cent fare of the Northwestern Pennsylvania Railway. The opinion holds that uncontradicted testimony does not show that the fare will provide revenue much in excess of the operating costs, and that the 7-cent fare is not unjust or unreasonable.

Higher Fares for Asheville.—The Corporation Commission of North Carolina has issued an order allowing the Asheville Power & Light Company to increase fares in Asheville from 5 cents to 6 cents. The order is based on a showing of a 3.92 per cent return on an investment of \$1,063,998.

Asks Seven Cents in Glens Falls.—The Hudson Valley Railway, Glens Falls, N. Y., has applied to the Public Service Commission for the Second District, for a fare rate of 7 cents within its local zones and 14 cents on its through zones. The company on Nov. 19, 1918, was authorized to charge a 6-cent fare.

Fares to Be Raised at McKeesport, Pa.—The Highland Grove Traction Company, operating in the city of McKeesport and North Versailles Township, Allegheny County, Pa., has filed a new tariff of rates, effective Nov. 1, with the State Public Service Commission. Under the new schedule tickets would be sold in strips of six for 30 cents, instead of six for 25 cents.

Orders Eight-Cent Fare Suspended.—The Public Utilities Commission of Illinois has suspended until Feb. 28, 1920, the proposed fare increases of the East St. Louis & Suburban Railway, East St. Louis, Ill., by which the fare in East St. Louis, Brooklyn, Venice and Alton would have become 8 cents on Nov. 1. The fare in the city of Alton now is 7 cents and in the other cities 6 cents.

Fares Raised to Five Cents.—The Railroad Commission of Wisconsin has authorized the Chicago & Milwaukee Electric Railway, Highwood, Ill., to raise its fares within the Milwaukee city limits to 5 cents. The company has been selling tickets at the rate of six for 25 cents and twenty-five for \$1. The city did not oppose the company's petition.

Would Charge Nine-Cent Fares.—The Schuylkill Railway, Girardville, Pa., has filed with the Public Service Commission of Pennsylvania an application for authority to charge a 9-cent fare. The company would sell six tickets for 50 cents. The present fare is 8 cents, with seven tickets for 50 cents. The trainmen recently walked out, demanding a wage increase.

City's Authority Contested.—A number of citizens of London, Ont., have brought suits for injunctions to annul the by-law under which the City Council last April permitted the London Street Railway to increase fares. The company raised wages at the time of the fare advance on the understanding that the higher wages would continue only during the life of the higher fare.

East St. Louis and Alton Want More.—The East St. Louis Railway and the Alton Granite & St. Louis Traction Company, Alton, Ill., have filed petitions with the Public Utilities Commission of Illinois asking for authority to charge 8-cent fares. The East St. Louis Railway has been operating on a 6-cent fare granted by the commission on Aug. 8, 1918, to be in effect until Oct. 31, 1919.

Tokens in Seattle.—The Seattle (Wash.) Municipal Railway is bent on finding improved means of selling transportation. The sale of tickets has been entirely discontinued except children's tickets. There was a demand and a need for something in place of tickets, however, so the city obtained tokens. These take the place of tickets. They are registered by the fare boxes. The school tickets are soon to be replaced by tokens.

Higher Fares in Moose Jaw.—The voters of Moose Jaw, Sask., have ratified a franchise ordinance recently passed by the City Council under which the Moose Jaw Electric Railway is permitted to charge 7-cent fares. Before the higher rate can become effective the ordinance must be submitted to the city authorities for final approval.

Higher Fare Refused at Jacksonville.—The voters of Jacksonville, Fla., at a special election on Oct. 21 defeated a proposition to permit the Jacksonville Traction Company to charge 7-cent fares. The City Council recently passed an ordinance submitting the question of higher fares to a referendum vote. Auditors selected by the city had reported that the company was operating at a loss of \$9,000 a month.

Seven Cents in Buffalo.—The Public Service Commission for the Second District of New York, will authorize the International Railway, Buffalo, N. Y., to charge 7-cent fares beginning Nov. 10. Tickets will be sold at the rate of four for 25 cents. The commission has not yet issued its formal order in the case. Chairman Hill in announcing the commission's decision said that the details of the order remained to be settled.

One-Cent Fare Reduction.—The Public Service Commission of Pennsylvania has authorized the Southern Pennsylvania Traction Company, Chester, Pa., to reduce its fares from 8 cents to 7 cents a zone on one day's notice. The company, which operates lines from Darby to Wilmington, recently installed 8-cent fares on its Pennsylvania lines under authority of the commission. A number of complaints were filed protesting against the increase.

Seven-Cent Fares in Davenport.—The Tri-City Railway, Davenport, Ia., which has been collecting 7-cent fares on its Illinois lines since Aug. 9 under an order of the State Public Utilities Commission, has been authorized to charge 7-cent fares in Davenport. The City Council has passed an ordinance granting the higher rate in accordance with its agreement to allow an increase equal to that authorized by the Illinois Commission.

Increase in Freight Rates Refused.—The Alabama Public Service Commission has denied the petition of Receiver Lee C. Bradley of the Birmingham Railway, Light & Power Company, for an increase in the less-than-carload freight rates charged by that company on its lines in Birmingham. The commission has granted Mr. Bradley's petition for the abandonment of the less-than-carload freight service on the eastern division.

Six Cents in Winnipeg.—The Public Utilities Commission of Manitoba on Oct. 3 issued an order permitting the Winnipeg Electric Railway to collect 6-cent fares. The city authorities immediately went into court and obtained a temporary injunction restraining the company from installing the new rate. The court on Oct. 8 refused the city's application for a permanent injunction and dissolved the temporary stay. The 6-cent fare went into effect the following day.

Jitney Bonds Protested.—The Eastern Massachusetts Street Railway, Boston, Mass., has appealed to the State Public Service Commission from the terms of an ordinance passed by the city of Brockton fixing the amount of bonds for jitney operation. The ordinance requires a bond of \$500 for each five-passenger jitney with \$100 additional for each passenger in excess of five. The railway contends that a bond of \$2,500 should be required for each five-passenger jitney.

Personal Mention

Mr. Ford Resigns

Head of Companies at Portland, Me.,
Went Into Business in New
York on Nov. 1

A. H. Ford has resigned as vice-president and general manager of the Cumberland County Power & Light Company, Portland, Me., to acquire an interest in the firm of Hamilton & Wade, Inc., New York, and from Nov. 1 as vice-president, will actively participate in the work of that firm of insurance brokers, advisers and engineers. Mr. Ford has long been identified with public utility companies as an executive and manager. His insurance experience has been acquired in solving the problems and purchasing insurance for utility companies with which he has been connected and in ten years of service on the insurance committee of the American Electric Railway Association.

Mr. Ford has long been active in the work of the American Electric Railway Association. He also served as president of the New England Street Railway Club. Under his direction, at Portland, where he has been since June, 1914, the Cumberland County Power & Light Company has developed rapidly and has installed the zone system now in effect.

Mr. Ford was born in New York in 1859 and his early education was received at Evansville, Ind. At the age of sixteen he left school and entered the steam railroad field, serving as traveling auditor and treasurer of roads connecting with the Evansville & Louisville Railroad. In 1893 he became secretary and treasurer of the New Orleans (La.) Traction Company, Ltd. This road at the time was being changed from horse power to give electric service. In 1900 Mr. Ford became manager of the New Orleans & Carrollton Railroad, then controlled by the New Orleans banking firm of Isidore Newman & Sons, and for fourteen years Mr. Ford was identified with interests controlled by this establishment. In 1904 he removed to New York to become manager of the operating department of Ford, Bacon & Davis, engineers, but continued as president of the American Cities Company, with headquarters in New York City.

In 1907 he resigned these positions to become president and general manager of the Birmingham Railway, Light & Power Company, Birmingham, Ala., and in June, 1914, was appointed vice-president and general manager of the company at Portland, Me., from which he has now resigned.

Mr. Taurman at New Post

A. Taurman, who has been superintendent of rolling stock of the Virginia Railway & Power Company since 1908, has resigned to become superintendent of equipment of the Birmingham Railway, Light & Power Company, Birmingham, Ala. Previous to his connection at Richmond, Mr. Taurman served the Southern Railway, with which system he began in 1901 as apprentice machinist and left after successive positions as foreman, draftsman and shop engineer. Later he acted for brief periods as assistant locomotive inspector for the American Locomotive

Company, Richmond, and also served as designing engineer for the New York Air Brake Company, Watertown, N. Y. Mr. Taurman is a member of the American Society of Mechanical Engineers. As an electric railway man, Mr. Taurman has given considerable attention to mechanical improvements, not only in rolling stock but in grade crossing protection and track work.

Mr. Porter, General Manager

H. Hobart Porter has been elected general manager of the Brooklyn (N. Y.) City Railroad by the board of directors and has assumed control and management of the property, which has been returned to its owners under an order issued by Judge Mayer of the United States District Court, as noted in a recent issue of the ELECTRIC RAILWAY JOURNAL.

Mr. Porter is a member of the engineering firm of Sanderson & Porter. He was



H. H. PORTER

born in New York in 1865 and was graduated from the School of Mines of Columbia University in 1886. He has since been continuously engaged in connection with engineering projects, having formed the firm of Sanderson & Porter in 1897. He is president of the American Waterworks & Electric Company, Inc., which owns and operates a number of waterworks and electric properties in the United States. Mr. Porter has acted as engineer in an advisory capacity to a number of the largest concerns in the United States.

He is a member of the American Institute of Electrical Engineers, the American Society of Mechanical Engineers, the American Institute of Mining & Metallurgical Engineers and the American Society of Civil Engineers. He is a director of the Engineering Foundation, and of the Engineering Section of the National Research Council.

Patrick Concannon has been made assistant superintendent of transportation of the United Railways, St. Louis, Mo., vice Henry O. Butler, who has succeeded Bruce Cameron as superintendent. Mr. Concannon was superintendent of the third division J. J. Woolan, superintendent of the sixth division, will be superintendent of the third, and Louis His-

serich, superintendent of the St. Charles division, becomes superintendent of the sixth. The St. Charles line will be under the jurisdiction of the general roadmaster of the other county lines.

John M. Bramlette has resigned as vice-president and general manager of the Lincoln (Neb.) Traction Company and will devote his attention, at least for the present, to personal affairs. Mr. Bramlette has been associated with electric railway interests in the Middle West for many years, having entered railroading at St. Joseph, Mo., in 1887. From St. Joseph he went to Denver and later to St. Louis, where he joined the Union Depot line, which was then being electrified. Two years later he was made shop foreman of the East St. Louis Electric Street Railroad. In 1901 he became general manager of the East St. Louis & Belleville Traction Company, Belleville, Ill. He remained with that company for several years, resigning in 1906 to become general superintendent and later general manager of the Michigan United Railways. He was appointed general manager of the Lincoln Traction Company in 1913.

C. F. Crane has joined the Harrisburg (Pa.) Railways as assistant to F. B. Musser, president of the company. The position of assistant to the president is a new one, having been recently created by the board of directors. Mr. Crane entered the employ of the Geneva & Auburn Railway twenty years ago as a clerk and during the next five years was gradually advanced, finally becoming passenger agent. At the end of that time he resigned to become general passenger agent of the Rochester & Eastern Railway, with headquarters at Canandaigua, N. Y. Two years later he became connected with the Rochester (N. Y.) Railway. He was next appointed general traffic agent of the Eastern Pennsylvania Railways, Pottsville, Pa., becoming general superintendent of railways two years later. He remained with the company for several years, and then resigned to take the position of superintendent of transportation of the Wilkes Barre (Pa.) Railways. He resigned on Oct. 1 last to become associated with the Harrisburg Railways in his present capacity.

C. E. Morgan, for a number of years general superintendent of the Michigan Railway, has joined the Brooklyn (N. Y.) City Railroad as assistant general manager. Mr. Morgan will be in active charge of the company's lines, which have been returned to it because of the inability of the Brooklyn Rapid Transit Company to make rental payments. Mr. Morgan began his railroading experience as clerk in the office of a steam road. For the next five and one-half years he acted as assistant to the president, the purchasing agent, and the auditor of the Indianapolis & Greenfield Electric Railway. During this period the line was extended to Richmond, Ind., and the handling of the transportation system of the road, then about 60 miles in length, came under his direction. In 1905 he had charge of the work of rebuilding and operating the Indianapolis line and was also superintendent of the Danville line of the Terre Haute, Indianapolis & Eastern Traction Company. Later, as superintendent, he inaugurated service on the Indianapolis & Terre Haute line of the latter road and operated that division for several years. In 1909 Mr. Morgan accepted the position of general manager of the Indianapolis, Crawfordville & Western Traction Company, known as the "Ben Hur Route." He resigned three years later to become connected with the Michigan Railway.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE MANUFACTURER

SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES

BUSINESS ANNOUNCEMENTS

Pole Market Is Fair With Good Deliveries

Cedar Poles Firm—Chestnut Varieties Show Slight Variation—Business Increasing

Quotations on cedar poles have not advanced since July 1, when they went up 10 to 15 per cent. The Northern and Western varieties were advanced at different times as announced from different localities, but the majority of the lists were effective about that time. It is believed that this new list will continue until the first of the year without any considerable change.

GOOD CEDAR POLE SEASON

Cedar stocks are low, and if the demand should increase to large proportions, some sizes will run out. There probably will not be many more poles of the Northern cedar taken out before winter, although there will be some. With the Western cedar the situation is slightly different, as poles are hauled during the off season of the year, and as a result the pole prices naturally respond more quickly to variations in labor scales. Although stocks are low, deliveries of 500 miles in a week can be made on cedar poles at the present time by several large concerns.

There has been no general increase in the price of chestnut poles, although there have been some variations, according to the grade of pole ordered. The stocks held are fairly large and prompt deliveries are being made. Orders are being handled promptly, and as a rule the poles are en route within two or three days of the time the order is placed.

The season just closed was far better than the previous one as regards the sale of cedar poles. A number of reports show a variance, but the majority indicate that shipments on this variety were better this season than last. However, the comparison with regard to chestnut poles does not show up quite so well but indicates that the sales for the past season are below a pre-war normal year. Generally speaking, there are no large individual orders reported, but the majority of the orders are a fair size or made up of a large number of small orders.

OTHER DEMANDS CURTAILED

In other lines, such as those for creosoted pines, the demand has been curtailed by the plant prices of poles. It has been estimated that the demand is about one-third off the normal pre-war years. Naturally the prices are especially sensitive to a change in the labor market on account of the amount of labor necessary to prepare poles for the creosoting process. In addition to the added labor cost, the price of creosote has advanced in about the same proportion as labor. On account of the war the creosote which usually was imported from Germany, England and Japan was gradually cut off. Of the total of 80,000,000 gal. used annually in this country it is estimated that half came from these three countries. On account

of a large demand and excessive ocean freight rates, the supply is not nearly up to normal.

There is a great deal of restlessness and general inefficiency being shown which has the effect of creating a labor shortage in the pine-producing belt, where most of the work is done by negroes. This has also had its effect upon the prices of the creosoted pine poles, so that unless more favorable circumstances come about a general advance in the market is looked forward to throughout the rest of the year.

Paint and Varnish Market Fair

Linseed Oil and Turpentine Take Drop in Price, But Finished Products Remain Firm

Conditions in the paint, varnish and enamel markets have not been affected by the recent decline in the price of boiled and raw linseed oils and of turpentine. Although the drop in linseed oils has been in the neighborhood of 35 cents during the past thirty days, this is not unusual as an increase of 65 cents in the price of oil in a month has been registered during the past year without causing an immediate effect on prices. The present drop, however, will not affect the market for a number of months, as all high-grade varnishes and enamels are aged from six months to a year and a half. Then again, large manufacturers have contracted months ahead in order to protect themselves and no change of price is looked for in the near future. In fact, in at least one instance quotations on some grades of varnishes and enamels have advanced in price since the drop in oil was registered.

LINSEED OIL UNSTEADY

Weakness in the flaxseed market is given as the cause for the drop in linseed oil. Prices have been extremely high and a sharp decline has been expected for some time. However, most stocks have been short, and it was thought that perhaps the prices would stay up. Imports of flaxseed, however, have been better of late, and this has been one of the contributing factors in driving down the price. Again, many large consumers filled their requirements for a great many months ahead when oil was around \$1.15, and hence are not yet in the market for new supplies.

The amount of paints, enamels, and varnishes held in the distributors' and jobbers' stocks is not large, and enamels especially are in large demand. Deliveries are important these days, as railways generally are ordering for immediate use in painting a specified number of cars. Good deliveries are being made, in fact ten days to two weeks is quoted by two well-known concerns.

Prices remain about the same as usual. Although there is not a great deal of buying just at this time, a considerable amount of business is looked for between now and the time cold weather sets in. Then the volume of orders usually slacks off until about Feb. 1 when the spring painting season commences.

Heavy Demands for Brakeshoes

Business for Past Sixty Days Approximates Normal—Production Resumed After Five-Week Tie-up

The volume of business in the brakeshoe market, which for the past seven months has been very light, has increased to large proportions during the past two months until present orders indicate that the business is about normal. The necessity of putting rolling stock into condition for the winter season is partly responsible for the large amount of business now being placed, the larger portion of which of course is in the steam railroad field.

Since March of the present year there has been very little buying by the steam railroads on account of the policy laid down by the regional directors of the Railroad War Board. The policy followed was to distribute the stock on hand wherever it was most needed regardless of where the stock was held previously. This policy led to a depletion of all stocks with the result that practically all the steam railroads and electric railways are now endeavoring to restock on brakeshoes.

STOCKS ARE ABOUT NORMAL

The manufacturing companies during this period of slackness were forced to close down part of their factories and to run throughout a part of the spring and summer months on a greatly reduced scale. Had it not been that the force employed, which in some instances did not approximate more than 60 per cent, was piling up brakeshoes for future stock, the railways which are now placing orders for large quantities would be unable to fill anything but a very small per cent of their requirements. As it is, stocks are in pretty fair shape, and although the manufacturing companies have just experienced a five-week tie-up, they expect to be in a position to meet all requirements, and if no further serious trouble is forced upon them, they will be able to continue to fill orders. Railways having yearly contracts for brakeshoes have first call on new stock and are being taken care of promptly as they have been in the past.

Cotton Cord Scarce

Bell cord and trolley cord are scarce. Present stocks of the cheaper grades are practically sold out and those of the more expensive cords are fairly well depleted. No deliveries are being quoted on orders which cannot be filled from the broken lines now on hand. New orders are accepted, however, subject to mill conditions. On some grades the mills do not expect to be able to make delivery until February or March.

Labor conditions are unsettled. All efforts to increase production are being made but without success. In a number of places mills are running night and day to get caught up with orders on hand. Prices have again been advanced, this time the increase amounting to approximately 10 per cent.

Rolling Stock

Rutland Railway, Light & Power Company, Rutland, Vt., has placed an order for one safety car.

Birmingham Railway, Light & Power Company, Birmingham, Ala., has ordered twenty-five safety cars from the Cincinnati Car Company. The first of the cars were for Nov. 1 delivery.

Connecticut Company, New Haven, Conn., has specified the following details on the forty safety cars recently ordered from the Osgood Bradley Car Company:

Number	40
Date order was placed.....	September, 1919
Builder	Osgood Bradley
Type	Safety
Seating capacity	32
Weight, car body.....	8,000 lb.
Weight, trucks	4,000 lb.
Weight, equipment	4,000 lb.
Weight, total	16,000 lb.
Length over all.....	27 ft. 10 in.
Truck wheelbase	8 ft. 0 in.
Width over all.....	7 ft. 9 1/2 in.
Height	10 ft. 3 1/2 in.
Body	Semi-steel
Interior trim	Mahogany
Headlining	None
Roof	Arch
Air brake	Westinghouse
Armature bearings	Ball
Axles	A. E. R. A. No. E-2
Bumpers	6-in. channels
Signals	Consolidated buzzer
Car trimmings	Enameled
Control	West. K-63-B
Couplers	Bar and pocket
Fixtures	Curtain Supply No. 89
Curtains	Double-coated Pantasote
Designation signs	Keystone
Door mechanism	Air-operated
Fare boxes	Johnson
Fenders	H. B.
Hand brakes	Osgood Bradley
Heaters	Consolidated truss plank
Headlights	Golden Glow
Journal bearings	Friction
Journal boxes	Symington
Lightning arresters	Westinghouse
Motors	Ten cars—West. 506 Ten cars—G. E. 258
Motors	Outside hung
Varnish	Anglo-American
Sanders	Ohio Brass
Sash fixtures	J. L. Howard & Co.
Seats	Osgood Bradley
Seating material	Slat type
Slack adjuster	Anderson
Springs	Railway steel spring
Step treads	American mason
Trolley catchers	Keystone
Trolley base	U. S. No. 15
Trolley wheels or shoes.....	Wheels
Trucks	Osgood Bradley No. 25-96
Ventilators	Osgood Bradley
Wheels	Griffin 26 in.
Special devices.....	Full equipment of Safety Car Devices Company material

Trade Notes

William F. Hart has resigned as sales manager of the Rubber Insulated Metal Corporation, Plainfield, N. J.

Ajax Metal Company, Philadelphia, Pa., recently opened a branch office in Cleveland, Ohio, in the Schofield Building. L. E. Purnell is district manager. The Pittsburgh office has been discontinued.

Driver-Harris Company, Harrison, N. J., has filed plans for the erection of a new three-story reinforced-concrete building, about 50 ft. by 100 ft., to be located at its plant.

G. E. Anderson, formerly assistant to the vice-president of the American Locomotive Company, has been appointed assistant Eastern sales manager of the Duff Manufacturing Company with headquarters at 50 Church Street, New York City.

H. S. Greene, formerly sales manager Nungesser Carbon & Battery Company, Cleveland, Ohio, is now assistant sales manager of the National Carbon Company, Inc., Cleveland.

Dickey Steel Company, Inc., Woolworth Building, New York City, has been appointed sales representative for the New York and Philadelphia districts of the Worcester Pressed Steel Company, manufacturer of electric sheet steel.

Chicago Mica Company, Valparaiso, Ind., has recently employed L. T. Frederick as consulting engineer and production manager. Mr. Frederick was formerly process engineer of the Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa.

Skee Ball Company, Philadelphia, Pa., has been reorganized from the F. D. Este Company. Edwin V. Dougherty, Jr., is president, J. W. Harper, vice-president and E. H. LeBoutillier, treasurer. The present office and factory is located at 1015 North Bodine Street.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., announces that F. D. Egan, former works manager of the Pittsburgh Iron & Steel Foundries Company, has accepted a position in its general engineering department.

Chicago Pneumatic Tool Company on Oct. 1 will remove its Birmingham office from Brown Marx Building to 1925 Fifth Avenue, North, where a service station with a complete stock of the company's appliances and repair parts will be maintained.

Electric Storage Battery Company, Philadelphia, Pa., has arranged for the erection of a new one-story addition to its plant at Nineteenth and Willard Streets. Contract has been awarded for the structure, which will be about 32 ft. by 97 ft. and is estimated to cost \$14,000.

Bound Brook (N. J.) Oil-Less Bearing Company announces that Harry J. Lindsley, who has been Western sales manager for the past seven years, and William F. Jennings, who has been Eastern sales manager for the past five years, have been made vice-presidents of the company.

Ward Leonard Electric Company, Mount Vernon, N. Y., manufacturer of "Vitrohm," vitreous-enameled resistor units, lamp dimmers, rheostats and electrical controlling devices, announces the removal of the office of its Philadelphia representative, William M. Tompkins, from the Commonwealth Building to the Bourse Building Machinery Exhibit, Philadelphia.

Samuel F. Joor, consulting engineer of Chicago, has joined the American Steam Conveyor Corporation of that city in the capacity of sales engineer. Mr. Joor has had wide experience in the conveyor field, at one time being Western manager and sales engineer of the Jeffrey Manufacturing Company, and previous to that being with the Link Connected Belt Company.

C. H. Norwood, contracting electrical and mechanical engineer, has moved his offices to 116 West Illinois Street, Chicago, and has incorporated his business as the C. H. Norwood Company. James E. Noonan has become a member of the firm. The company will continue to furnish electrical and mechanical equipment for all types of moving bridges.

Western Electric Company has acquired 50 acres of land at Norfolk, Va., on which to provide a plant for the manufacture of submarine cable. It is expected that at a later period other products will be manu-

factured at this place. The new property, having a frontage on the southern branch of the Elizabeth River, opposite the Portsmouth Navy Yard, has fine deep-water facilities.

Worthington Pump & Machinery Corporation has purchased the plant, patterns, accounts, patents and other assets of the Epping-Carpenter Pump Company, located at Pittsburgh, Pa. The plant will be operated as the "Epping-Carpenter Works." Orders and contracts now in hand will be completed by the Worthington Pump & Machinery Corporation, and all further business will be for its account.

Unit Railway Car Company, Boston, Mass., has sold a Unit car to the LaCrosse & Southeastern Railway of LaCrosse, Wis. This line is 42 miles long, and the present equipment consists of three locomotives and thirty-nine cars. The Unit car will enable the company to provide a faster, cleaner, and more frequent service. It was expected that the car would be in operation about Nov. 1.

John T. Rome, specialist in electrical insulation material, has established headquarters at Montreal. He specializes in supplying suitable insulation from specifications and drawings of prospective electrical work and is the Canadian representative of the Imperial Porcelain Works of Trenton, N. J. Mr. Rome represents the Wilmington Fibre Specialty Company and the General Insulate Company.

New Advertising Literature

Ohio Brass Company, Mansfield, Ohio: A folder "How to Make a Good Splice."

Schutte & Koerting Company, New York: A pamphlet "Our Part in the War." A copy will be mailed to those applying for it.

Conduit Electrical Manufacturing Company, South Boston, Mass.: Bulletin 422 describing its Type K-2 air circuit breakers.

Du Pont Chemical Company, Wilmington, Del.: A circular giving a list of new machine tools and other equipment used in its war plants but now no longer required.

Allis-Chalmers Manufacturing Company, Milwaukee, Wis.: Bulletin on steam turbine blading. An illustrated description of the process of manufacturing and installing blading in turbines of this company's manufacture.

American Steam Conveyor Corporation, Chicago, Ill.: A folder "A Pertinent Ash Pile Question," discusses the cost of moving ashes from the boiler plant to the bin or ash pile and shows the savings that can be accomplished.

Esterline Company, Indianapolis, Ind.: A book, "Typical Graphic Records," in which is reproduced a number of interesting curves covering various industries which, for the past eighteen years have been closely studied by this company.

Ingersoll Rand Company, Easton, Pa.: Form No. 8707, a 40-page 6 x 9-in. illustrated bulletin on "Little Davis" pneumatic drills, grinders and saws; Form No. 945, illustrating E. R. and F. R. compressors in small machine shops, power houses, etc.; Form No. 954, descriptive of the "Air Lift Method of Pumping"; Form No. 9029, a pictorial products catalog illustrating and describing practically the entire line of products marketed by this concern.