

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

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Pay-Leave Fare Collection Appeals to Safety Engineer

STILL another advocate of the pay-leave plan of fare collection so successfully used on various electric railways has come to the front. It is none other than the local director of the National Safety Council in Kansas City, Mo., who is at present urging the abandonment of the Beeler plan of handling cars in the downtown districts of that city.

While we are not going to take sides with him in the question of handling traffic, we do feel that this is an opportune time for many electric railway operators to consider strongly that, by the pay-leave plan on outbound trips and the pay-enter plan on inbound trips, they can materially increase the track capacity and they will greatly benefit their patrons in enabling them to reach their destinations and homes more rapidly than when both directions of travel are handled strictly on the pay-enter plan.

Another Debt the Industry May Owe to Franklin

NEXT week is national Thrift Week, which begins on Jan. 17, Benjamin Franklin's birthday. The plan has received the approval of a number of national organizations, and the Governor of New York State has just issued a proclamation asking all citizens to observe the week in honor of Franklin, not by ceasing work, but by following his precepts on thrift; in fact, a movement is on foot to have each year a thrift week beginning on Jan. 17.

A campaign in favor of thrift can well be encouraged in this country, not on the theory that Americans have become greater spenders than formerly, but because a great deal of property was destroyed during the war and, broadly speaking, that amount will have to be replaced by savings before the credit and financial structure of the world will become normal again. The subject also is one closely related to the prosperity of the electric railways and the service which they can render to the public, because of the needs which the utilities have for additional funds each year to take care of their maturing obligations. Moreover, as was shown last week, this money will have to come largely from small investors, because with the present income tax laws, individuals and estates with large incomes are seriously penalized if they hold securities other than those which are tax exempt. The extent of this demand for investment funds by electric railways is indicated by a table of electric railway securities maturing during 1921, published in the *Wall Street Journal* last week. This table was included in the last issue of this paper and gave a total for electric railway bonds and notes maturing during 1921 of \$207,617,530. Even if most of the savings from thrift campaigns do not go directly into utilities they will help their refinancing if they add to the amount of investment capital of the country.

Thrift campaigns should not be considered in any way to be antagonistic to campaigns urging people to relieve unemployment by purchasing articles. Money saved and invested is expended just as truly as if spent for luxuries, and its expenditure keeps employed an equal number of men. But there is this difference: It is spent for something productive and thus tends still further to increase the national wealth. Even purveyors of luxuries benefit from a thrift campaign, because ultimately it results in a larger group of possible buyers of the articles which they provide.

Many people do not realize how rapidly money reproduces itself, but in the thrift campaign for war savings stamps and others which have been conducted many interesting facts have been developed. Thus, it has been declared that if \$7,000 and its proceeds had been kept continuously invested at 6 per cent from the time of the settlement of Jamestown until now the sum would be equal at the present day to the entire national wealth of this country, public and private. It will be remembered that Benjamin Franklin bequeathed a sum of money each to Boston and Philadelphia which was to be put at compound interest and then, with the accumulation, be put to the service of the public at the end of a century. While the actual amounts accumulated fell short of his calculations, the citizens of both cities are today enjoying the benefits of his forehandedness. If the memory and maxims of Benjamin Franklin will encourage efforts of this generation to thrift it may constitute another contribution by him to the electrical industry comparable with that which established the identity of lightning and electricity.

The Scrap Pile an Index of Progress

A REPRESENTATIVE of this paper asked one of the electric railway visitors from abroad last fall what most impressed him in regard to the operating practice of electric railway companies in this country. The visitor, who had made an extensive tour of inspection of different electric railway properties, promptly replied: "The size of their scrap piles." He then explained that he spoke both literally and figuratively and that what he had in mind was the amount of apparatus and equipment discarded as unfit for use by electric railway companies. Some of this was literally thrown on the scrap pile, but all was disposed of as scrap. In view of the more frugal practice observed by electric railway companies on the other side of the Atlantic, such a policy appeared to him to be almost criminal waste.

Much of this scrapping of material, in the opinion of the speaker, was due to lack of proper maintenance. Cars, for instance, would be used up in one-half or one-third of the time they would last abroad, principally because proper attention had not been paid to keeping up the paint and varnish and other protection. Still other cars which were in good condition would be

discarded because "they were out of fashion." Equipment parts would be thrown on the scrap heap because no one seemed to think it worth while to rescue them, and so on down the list.

The fault of waste is one which is often charged against America, but is the practice just mentioned really waste? In fact, are not the enterprise and real efficiency and economy of our railway managements often gaged directly rather than inversely by the size of their "scrap heap"?

It may at first sight, for instance, seem wasteful to neglect the maintenance of a car body, but if there were perfect maintenance, car bodies would last indefinitely except for those destroyed by collisions. Yet car design is a progressive science, and if the physical life of a car body is longer or very much longer than its life as dictated by the existing status of car design, no great good is obtained.

Of course, the same principle applies to equipment parts and apparatus. There are doubtless instances where both have been scrapped too soon, but we believe the number of instances is far larger where they have been scrapped too late. This is especially the case with complete apparatus and equipment. On too many roads obsolete motors have been kept in operation long after they should have been thrown on the scrap pile because of their high maintenance cost and inefficiency. The wise manager is the one who knows the best time to throw away equipment and then acts upon his convictions. Some years ago this paper suggested as a slogan embodying the above principle the phrase, "Don't Build Cars to Last Forever." If cars are not built to last forever, obviously they and their component parts must be discarded some time.

Engineers' Program for 1921 Activities Promises Hard but Effective Work

THE members of the Engineering Association look to the subject committee each year to scan the field so closely as to permit the drawing up of a program which is comprehensive and interesting. The planning of this program is really one of the most important jobs of the association year. When it has been approved by the association and revised by the executive committee it forms a rather rigid guide for the committee work. The presumption that the topics selected are the most important ones for study is a fair one on the part of the committee members. They assume that if they carry out the assignments made to them they are doing their best work for the association. The list of 1921 assignments was printed in the Dec. 25 issue of this paper, page 1296, and its several sections ought to be studied carefully by the specialists in the respective fields.

In examining critically a list like this, one naturally takes the point of view of the committee members, who must do the assigned work and prepare acceptable reports. One asks, in this connection, is the work necessary and will it be inspiring? Most committee work is necessarily tedious; in fact one of its purposes is to relieve the industry as a whole from the task of collecting and digesting data, and similar duties. Hence it is natural to expect that the preparation of a report will be more or less of a "grind." But there should be some inspiration in it, too, if the best results are to be had. From these standpoints the 1921 assignments appear to be satisfactory. The numbers of topics in

the several groups are not large, and in each there is at least one highly attractive topic. For example, the building and structures committee is to work on a shop layout; the equipment committee is to report on the life of wearing parts and related topics; the heavy traction committee is to compare the operation of locomotive and multiple-unit train operation; the power distribution committee will study wear of overhead contact conductors; the power generation committee will bring up to date the subject of the automatic substation, and the committee on way matters will consider substitutes for wood ties. There is also a new committee on apprentice systems which ought to stir up something at the next convention.

As the committees take up their work, it is appropriate that attention should be directed to the principles outlined above. The committees will need the co-operation of the entire industry in their researches. If the commissions which have been given to the committees are faithfully carried out, the 1921 convention of the Engineering Association will set a new high mark for excellence.

Connecticut Starts to Apply Federal Commission Findings

THE special report of the Connecticut Commission on the electric railway situation in Connecticut, of which an extended abstract was presented last week, shows that the commission has spared no effort to bring out the facts of the case and to apply to the local conditions the financial features of the recommendations of the Federal Electric Railways Commission. The commission has struck two ways. In its functions of securing for the public adequate service at reasonable rates, it admonishes the company in no uncertain terms. More strongly perhaps, it speaks to the public, or Legislature, in telling it what it must do in order to assure itself of the service at rates which it desires to pay and also in order adequately to pay for the service, provide for a return on the investment and assure credit upon which extensions and improvements may be based. Above all, it urges a spirit of co-operation, understanding and fair play.

An outstanding suggestion is to the federal court, to the effect that it restore the Connecticut Company to the New Haven road, which had originally created the property in a desire to link together in an economical operating unit the various transportation agencies of southern New England. That the community has not gained by this disintegration seems apparent to the commission.

To the company the commission recommends the sound policy of operation by independent divisions under competent local managers who have the necessary authority. It suggests the use of motor vehicles as substitute transportation on non-paying lines and as auxiliary to existing lines. It recommends increased publicity and suggests certain service improvements, which are probably sincerely desired by the company as well, as soon as its funds can support them.

To the public, the commission urges the abolition of many taxes and imposts, now proving a burden and reflected in poorer service and higher rates to the public. It suggests that legislation be enacted allowing the abandonment of unprofitable lines and permitting the railway company to operate motor vehicles. And most important, in this State of much jitney experience,

it suggests that jitneys be made common carriers, subject to the control of the commission, except for certain safety and license rules of the State's motor vehicle department.

While the company's management may not care for some of the inferences and direct statements in the report and while the public may be slow to recognize the correctness of some of the admonitions directed its way, yet the report gives an impression of sound common sense. One is particularly struck by what might be called the commission's outstanding sanity in the question of valuation. While details of methods employed must be awaited before competent comments may be made, the logic of the commission in arriving at a conclusion at a cost of \$10,000 as compared with a minimum estimated expense of \$100,000 if the usual method has been followed seems unassailable, provided, of course, that an essentially correct result has been obtained.

Connecticut's new engineer-lawyer Governor, E. J. Lake, in an independent message, has closely paralleled the suggestions of the commission, in principle if not in detail.

It is, of course, too early to predict the form of any actual legislation which will result, but these recommendations in Connecticut, where electric railway and jitney troubles are serious, indicate both that there is action pointing toward constructive utility legislation, as has been anticipated in these columns, and that the report of the Federal Electric Railways Commission is taking effect in concrete form.

Educating the Man on the Job

TO GET the maximum efficiency from the men directly responsible for electric car maintenance requires that these men have a general knowledge of the functions which the various parts of the equipment are expected to perform and of the methods used in calculating and checking dimensions and adjustments. Most brake repair men will immediately concede the advantage of having the same shoe pressure on each pair of wheels during the braking period. In practice they find unequal shoe wear occurring continually, but if asked to check up their equipment and determine the pressure they are actually getting, few could do it. Such questions as the relation which unequal shoe clearance, excessive piston travel and high leverage bear to the frequency with which inspection and adjustment must be made will be better appreciated if the men can follow out some of the fundamental calculations of brake-rigging design on their own equipment. At first thought this problem may appear rather difficult, but a little consideration shows that in reality it is very simple and can be readily understood without the use of complicated mathematical formulas.

An article in this issue, which is the first of a series by H. M. P. Murphy, takes up some of the elemental

considerations of brake-rigging calculations. Articles which are to follow will apply these to the most common types of brake rigging found on electric cars. These calculations are presented in a manner that can be readily understood by the average car repairman and should prove of educational value to the men most closely connected with the work if this information is made available to them. On account of the differences in car construction and weight there can be no fixed standard as to levers, but foremen and their assistants should be interested in informing themselves as to methods of making easy calculations. A little study and analysis will show many minor details in maintaining foundation brake rigging which would, if neglected, lead to serious accidents, or at least to a decrease in the efficiency of the braking equipment.

Customers' Notions Sometimes Make Supplies Cost More

THE contention of the standardization "fans" is that non-standard equipment will in the end cost more. If a reasonable number of companies adopt association standards this will prove true. There is a real drift or movement now in this direction. An element in the situation is the willingness of purchasers to suppress their desire for individuality for the good of the treasury.

Time was when every designer of electric railway apparatus wanted his designs to be different, thus stamping his individuality and personality upon his work. Not being quite satisfied with what he found ready to his hand, he got up something which he thought a little better. This of course was a special product for which his employer had to pay extra. This condition prevailed from a trolley hanger to a power plant.

This craving for individuality was opposed to manufacturing economy, often because the offender was not familiar with manufacturing processes. The present committee make-up of the Engineering Association, with railway and supply engineers on the same footing, is having an excellent effect, among others, in educating operating men as to these processes.

In last week's issue of this paper an article was printed which emphasized the above-mentioned point, but with regard to steel poles. It gave the manufacturer's point of view as to this important product. The careful reader was undoubtedly impressed by the

fact that many considerations enter into the selection of details of design of steel poles, and other things, which are apt to be overlooked altogether. Presumably the salesman points these out when specifications are handed to him, but the salesman is hardly in a position to dictate or even urge a change in specifications when he is competing for an order. It is really up to the purchaser to know what he wants, and he ought to want what can be had most economically. In other words, the less notional he is the better.

Quotation from the Federal Electric Railways Commission Report

No. 3

ELECTRIC railways were not conservatively financed in their early years, and have not since made good their overcapitalization, except to a limited extent, otherwise than through the process of bankruptcy and reorganization. In the early days the promoters of electric railway properties believed that the long-term franchises with a 5-cent fare would be permanently profitable. Large sums of money were required to develop the business. In many cases the promoters issued bonus stock to represent money, service or property and added nothing to the value of the plant. As a result of this practice, there are many cases where the existing capitalization exceeds the investment in the plant or the value thereof, and there has been neglect to amortize this excess capitalization.

The Force Action of Brake Riggings

Most Common Forms of Levers Used in the Brake Rigging of Electric Cars Are Described and the Fundamental Laws of Leverage Are Worked Out and Applied to Practical Installations—By Solving Several Problems Involving the Forces Acting at the Various Points of Levers Those Interested Can Become More Familiar with the Subject

By H. M. P. MURPHY

IN ALL brake systems economy and other practical considerations require that the force exerted by the brake-cylinder piston, or other source of power, be multiplied many times before being delivered to the brake shoes. Consequently the most important parts of any brake rigging are the devices which do the multiplying work and which are ordinarily simple levers or their equivalents. In dealing with this subject one of the fundamental requirements that must always be fulfilled in any satisfactory design is that each lever shall have only three independent parallel forces acting on it at the same time. If an attempt be made to cause four or more independent forces to act on a lever at the same time perfect equalization is no longer possible in practice and can only be obtained in part by the use of springs. On this account, and because the use of such devices offers no advantage whatever, the three-point lever has become the universal standard and is the only one that will be discussed here, although the same fundamental principles are applicable to all types of levers.

DEFINITION OF A LEVER

Whenever the generally accepted term "lever" is used it refers to a rigid bar, either straight or curved, which is so designed that it may be acted upon by three parallel forces in such a way as to produce a balance between them and to cause them to bear any desired relation to each other.

There are two kinds of three-point levers, namely, "straight line" and "eccentric." These will be taken up and described. The most common form of lever is a flat steel or iron bar, with three holes drilled in it in the same straight line, as shown in Fig. 1, the forces being transmitted by pins run through the holes and fastened in the jaws of rods or brackets. This type of lever is called the "straight-line" lever. At times a slight modification of the straight-line type of lever is employed, as illustrated in Fig. 2, one of the end holes being replaced by a semicircular notch or a curved bearing surface, as indicated. With this type a hooked jaw or a slotted head transmits the force to the end thus designed, instead of through a pin, as in the case shown in Fig. 1. Occasionally levers of the straight-line form are bent into various shapes in order to clear some obstruction. Such a lever is shown in Fig. 3.

ELABORATE and costly experiments have been made to secure braking efficiency, braking power has been calculated to a nicety and everything possible has been done to insure proper installation of brake equipment, yet the results obtained ultimately depend on the thoroughness with which adjustments are made and the mechanical relations maintained. The most careful designing may be upset by such small items as the position of a brake lever, wrongly applied or missing cotter pins, holes worn oblong in brake levers, excessively worn brake lever pins or wrongly applied levers. Proper maintenance requires that careful attention be given to checking brake leverage, and foremen and their assistants should be posted on easy methods of making calculations. With this object in mind the editors of this paper have arranged for a series of articles on brake rigging design and calculation, the first of which is published herewith. The studies presented will be given in as simple and fundamental a manner as possible so that the whole subject may be more fully understood by the men actually doing the work. H. M. P. Murphy, the author, has had a long and varied experience in the calculation, installation and operation of braking systems with the pioneer company on brakes, the Westinghouse Air Brake Company, and the information which he presents should be of value to the mechanical departments of electric railways.

The eccentric form of lever differs from the straight-line type only in that the three pin holes or bearing points are not in the same line, as illustrated in Fig. 4. This type of lever is not generally desirable from a practical point of view and should never be used when it is at all possible to avoid it. The object of bending a lever in this way is to provide clearance where necessary.

The simple principles or physical laws which govern the action of all levers, and similar force-multiplying devices, are in reality self-evident facts and therefore require no elaborate proof. Before stating these laws in a broad sense it will, however, be well to illustrate

them by aid of a few elementary examples: Thus in Fig. 5 let a straight-line lever be suspended at the middle point by a cord passing over a pulley and suppose that the weight of the lever itself is neglected; then if a 100-lb. weight be hung at one end, 20 in. from the central point, the lever will be balanced if another 100-lb. weight be hung on the opposite end at the same distance from the center end if two 100-lb. weights be attached to the cord.

Again, suppose that a 100-lb. weight is suspended on a lever, as in the previous case, at 20 in. from the central point. Now the lever may be perfectly balanced, as shown in Fig. 6, by hanging two 100-lb. weights on the opposite end at 10 in. from the central point (*i.e.*, at one-half of the single weight distance from the central point) and by attaching three 100-lb. weights to the cord.

As another example, suppose that a 100-lb. weight is suspended on a lever, as in the preceding cases, at 20 in. from the central point. Now the lever may be perfectly balanced, as shown in Fig. 7, by hanging four 100-lb. weights on the opposite end at 5 in. from the central point (*i.e.*, at one-fourth of the single weight distance from the central point) and by attaching five 100-lb. weights to the cord.

In any of these examples it is equally true that the same weights or forces will remain in balance if the lever be swung about the central point at any angle; thus, the same relations between the weights indicated in Fig. 6 will be maintained if the lever be swung at the angle shown in Fig. 8, the weights all acting vertically; that is, in parallel lines.

By an inspection of Figs. 5 to 8 it is seen that the two

end forces acting on a lever are always exerted in the same direction, which is opposite to that of the central force. The examples illustrated also show that the middle force is always equal to the sum of the two end forces. Thus in Fig. 6 the middle force is 300 lb., which is equal to the sum of the two end forces of 200 and 100 lb. respectively, and either end force is equal to the middle force minus the other end force. Thus in Fig. 7 the force acting on the short arm is 400 lb., which is equal to the middle force of 500 lb. minus the other end force of 100 lb., or, the force acting on the long arm is 100 lb., which is equal to the central force of 500 lb. minus the opposite end force of 400 lb.

A FULCRUM IS DEFINED

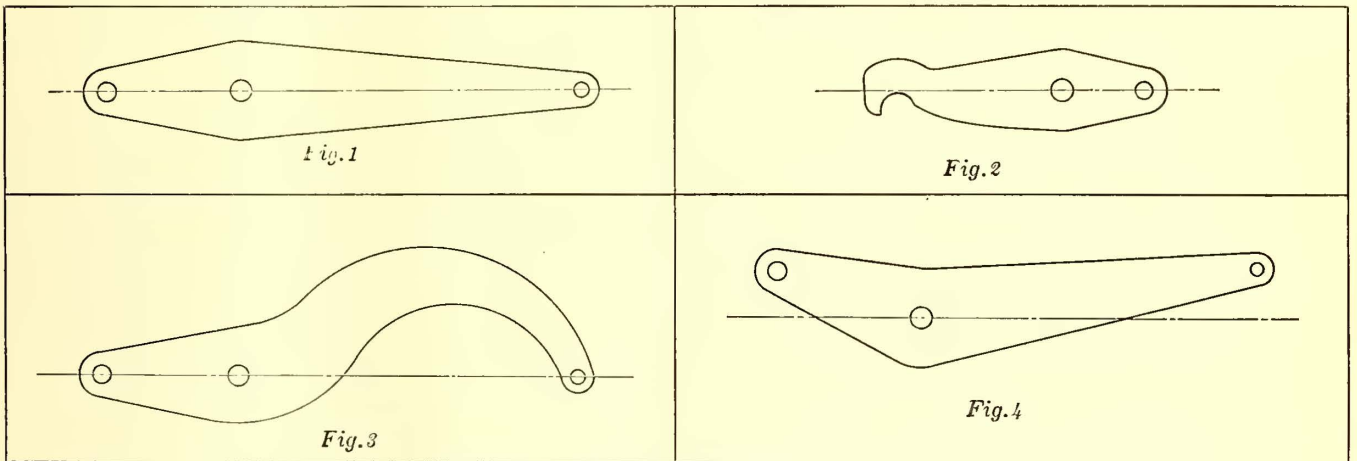
In dealing with levers of any type or with other force-multiplying devices, such as locomotive bell cranks, it is customary to consider one of the three points or pin centers as the center about which the lever turns. A point thus considered is called the fulcrum. It is often thought that the fulcrum should be a fixed point, but this idea is entirely wrong. On the contrary, it should be emphasized that no matter what may be the duty of

also seen that the given law applies, for $200 \times 10 = 2,000$, which is equal to $100 \times 20 = 2,000$; also, by considering the right-hand point of the lever as the fulcrum it is seen that the same law again applies, for $200 \times 30 = 6,000$, which is equal to $300 \times 20 = 6,000$.

FORCES DEVELOPED BY STRAIGHT-LINE LEVERS

In order to obtain a direct method for determining the forces developed by any straight-line lever it is apparent that the law may be given as follows: If any one of the three points of a lever be considered as the fulcrum and if either one of the forces acting at the two other points be multiplied by its own lever arm and this product be divided by the lever arm of the second force the result obtained will be equal to the second force.

This method may be illustrated by Figs. 5, 6, 7 and 8. For example, consider the lever shown in Fig. 7 and suppose that the right-hand point is assumed to be the fulcrum. Then by multiplying the left-hand force, 400 lb., by its lever arm, 25 in., and dividing the product, 10,000, by the lever arm, 20 in., of the middle force the result is seen to be equal to 500 lb., the middle force. Similarly, if the middle force of 500 lb. be multiplied by its



COMMON TYPES OF THREE-POINT LEVERS

Fig. 1—Straight-line type of lever. Fig. 2—Straight-line type with hooked jaw. Fig. 3—Straight-line type bent to provide clearance. Fig. 4—Eccentric type of lever.

a lever or whether it has a fixed center or not any one of the three points (or pin centers) may be considered as the fulcrum. By remembering this important fact the problems of figuring leverage is reduced to one of extreme simplicity, and, as will be shown later, one single rule may be used for finding the forces acting on any lever.

In the case of any straight-line lever the distance between the point of application of a force and the point considered as the fulcrum is called the lever arm of the force in question. When any one of the three points of a lever is considered as a fulcrum the forces acting at the two other points are so related to each other and to their lever arms that the product obtained by multiplying either force by its own lever arm is always equal to the other force multiplied by its lever arm. Figs. 5, 6, 7 and 8 illustrate this. For example, in Fig. 6 or Fig. 8 consider the left-hand point of the lever as the fulcrum. Then by applying the law in question it is seen that the product obtained by multiplying the middle force, 300 lb., by its lever arm, 10 in., is 3,000, which is equal to the product of the right-hand end force, 100 lb., by its lever arm, 30 in.; or, in the same figures, consider the middle point of the lever as the fulcrum, then it is

lever arm, 20 in., and if this product, 10,000, be divided by the lever arm, 25 in., of the left-hand force the result is seen to be equal to 400 lb.; that is, the left-hand force. Again, suppose that the middle point be considered as the fulcrum. Then if the right-hand force of 100 lb. be multiplied by its lever arm, 20 in., and if this product, 2,000, be divided by the lever arm, 5 in., of the left-hand force the result is seen to be equal to 400 lb.; that is, the left-hand force. Consequently it is clear that the truth of the law, or principle, under consideration holds for any case whatever, and, therefore, that in order to compute the forces acting on any three-point lever it is merely necessary to remember this law, which, for convenience, will be called the "leverage rule" and which may be restated in the following concise form: When the force applied at one point of a lever is known and it is desired to find the force developed at (*i.e.*, acting at) either one of the two other points consider the third (*i.e.*, remaining) point as the fulcrum. Then the desired force may be found by multiplying the known force by its own lever arm and by dividing this product by the lever arm of the desired force.

The lever point (or pin center), which is to be considered as the fulcrum in any specified case, is, of course,

the point at which neither the known nor the desired forces act; that is, in order properly to select the "fulcrum" note the points of application of the known and desired forces. Then the third or remaining point should be considered as the fulcrum.

EXAMPLES OF THE LEVERAGE RULE

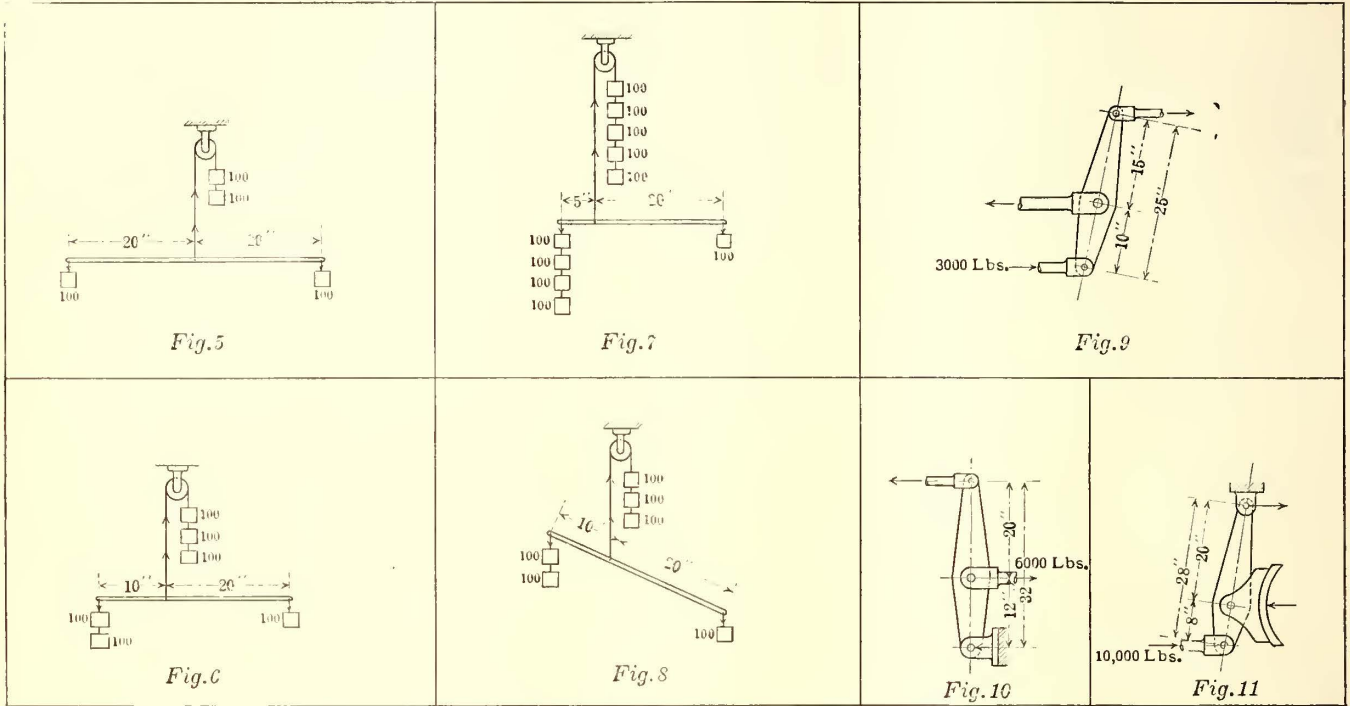
To illustrate the use of the leverage rule consider a lever of the type and size shown in Fig. 9. Suppose that a force of 3,000 lb. is applied at the lower end point as indicated and let it be required to find the force developed at the middle point. Consider the upper end point as the fulcrum. Then by the rule, which for sim-

As a further example of this method of calculation consider a lever of the type and size shown in Fig. 10. Suppose that a force of 6,000 lb. is applied at the middle point, as indicated, and let it be required to find the force developed at the upper end point. To solve this problem consider the lower end point as the fulcrum and then, by the mathematical expression previously given:

The desired force =

$$\frac{(\text{the known force}) \times (\text{the lever arm of the known force})}{\text{the lever arm of the desired force}}$$

$$\text{The upper end force} = \frac{6,000 \times 12}{32} = 2,250 \text{ lb.}$$



DIAGRAMS ILLUSTRATING LAWS OF LEVERAGE

COMMON FORMS OF BRAKE LEVERS

Fig. 5—Lever suspended at middle point.
Fig. 6—Lever suspended at point with weight distances of ends in ratio of 1 to 2.

Fig. 7—Lever suspended at point with weight distances of ends in ratio of 1 to 4.
Fig. 8—Lever swung through an angle.

Fig. 9—Live cylinder lever.
Fig. 10—Dead cylinder lever.
Fig. 11—Brake hanger lever.

licity may be expressed in the following mathematical form:

The desired force =

$$\frac{(\text{the known force}) \times (\text{the lever arm of the known force})}{\text{the lever arm of the desired force}}$$

As in this case the middle force is the desired force and the lower end force is the known force, and also as the lower end force = 3,000 lb., the lever arm of the lower end force = 25 in. and the lever arm of the middle force = 15 in., the mathematical calculation is obtained from:

$$\text{The middle force} = \frac{3,000 \times 25}{15} = 5,000 \text{ lb.}$$

In the same manner the force developed at the upper end point may be found by considering the middle point as the fulcrum, thus:

$$\text{The upper end force} = \frac{3,000 \times 10}{15} = 2,000 \text{ lb.}$$

Now as a check on these computations the two end forces added together must be exactly equal to the middle force. This is seen to be the case, for 3,000 + 2,000 = 5,000.

Also to find the force developed at the lower end point consider the upper end point as the fulcrum. Then by applying the rule,

$$\text{The lower end force} = \frac{6,000 \times 20}{32} = 3,750 \text{ lb.}$$

Now as a check on these computations the two end forces added together must be exactly equal to the middle force. This is seen to be the case, for 2,250 + 3,750 = 6,000.

A still different but similar application of this may be had by considering a lever of the type and size shown in Fig. 11. Suppose that a force of 10,000 lb. is applied at the lower end point, as indicated, and let it be required to find the force developed at the upper end point.

Consider the middle point as the fulcrum. Then by applying the mathematical rule previously given:

$$\text{The upper end force} = \frac{10,000 \times 8}{20} = 4,000 \text{ lb.}$$

Also to find the force developed at the middle point consider the upper end point as the fulcrum. Then:

$$\text{The middle force} = \frac{10,000 \times 28}{20} = 14,000 \text{ lb.}$$

Now as a check on these computations the two end

forces added together must be exactly equal to the middle force. This is seen to be the case, for $10,000 + 4,000 = 14,000$.

IMPORTANT FACTS CONNECTED WITH THE USE OF THE LEVERAGE RULE

The important facts which have been illustrated by the preceding examples may be summarized as follows: First, any one of the three points or pin centers of a lever may be considered as the fulcrum whether there is a fixed point or not; second, in the computation of one of the two unknown forces acting on a lever the point at which the other unknown force acts must be considered as the fulcrum, and, third, each of the unknown forces acting on a lever may be found by aid of the "leverage rule," providing that the point considered

as the fulcrum is properly selected in each case and that the lever arms of the desired and known forces are correctly measured in accordance with the fact that for straight-line levers the lever arm of any force is the distance between the point of application of the force and the point considered as the fulcrum.

It is now evident that by remembering the simple but general "leverage rule" and the true significance of the terms "lever arm" and "fulcrum" the forces developed in any standard form of brake rigging may be easily computed, for all of such systems are composed of a series of simple levers connected by suitable means, such as tie rods, etc., for transmitting the forces concerned. The usual method of procedure employed in the solution of brake rigging leverage problems will be fully explained in the following articles.

The Inspection of Rail Bonding

Inspectors Must Make Certain that All Joints Are Bonded, that Proper Types of Bonds Are Used, that Rails Are in Proper Condition for Bonding and that the Work Is Done Satisfactorily
—Analysis of the Methods to Be Employed to Achieve the Desired Results

BY G. H. MCKELWAY

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NO MATTER how good a rail bond may be immediately after installation, there is no type that can be relied upon to remain in good condition indefinitely. It is therefore important that they be inspected and tested periodically in order that those that deteriorate may be removed and be replaced with good ones. Some railway companies, particularly those whose tracks are laid and bonded by contractors, have inspectors on the work during the time of installation to see that the bonds are applied properly and also have tests of the bonds made as soon as they are installed. Where concealed bonds are being installed by contract such inspectors are often needed to make certain that the bonds are installed at all. Even if the contractors in charge of the work are entirely honest and furnish enough bonds for all joints, yet the men whose duty it is actually to install the bonds may not put all of them in, either through carelessness, laziness or dishonesty.

The first duty, and the most obvious one, of such an inspector therefore is to see that all of the joints are bonded. The next is to see that the proper type and length of bond is used, and then to make sure that all bonds are applied in such a manner as to make good contact with the rail and to insure that they will remain in good condition as long as possible.

First the rail should be properly prepared to receive the bond terminal. If expanded terminal bonds are to be employed holes of the proper size should be drilled in the rail at the proper height and the right distance apart. The height of the hole may seem unimportant, but if it is not in just the right place the bonds may be pinched between the splice plate and the web of the rail where the bonds are installed under the plates. At best there is very little room for the bonds under many of the plates, and a slight variation in the location of the bond may easily place it where the joint plate will squeeze it when the bolts are drawn up tight. The

holes themselves should be drilled with well-sharpened bits so that the metal will be cut out cleanly and not torn out raggedly so as to leave burrs in the hole.

The question as to whether or not any lubricant should be used when making the holes is still an open one, although it has been debated for many years. The consensus of opinion seems to be that it is safe to use a lubricant if proper precautions are taken to insure its removal after the drilling has been finished. But the supporters of the use of a lubricant are divided as to whether plain water, soda water or oil should be used.

MOISTURE WILL CAUSE RUST

The objection to the use of water is that any moisture left in the hole will cause rust, which is an insulator. The contact between the terminal and the sides of the hole is imperfect and the resistance is increased not only at the point where the original rusting occurred but ultimately at other points to which the corrosion may extend. Oil is also an insulator, but it is claimed that all but a very thin film of it will be pushed out of the hole when the bond terminal is inserted and expanded. The excess oil, however, when driven out of the hole will gather around the edges and will stay between the head and button of the terminal and the web of the rail, thus reducing the conductance between those parts. To make a really good job all of the water or oil should be wiped off before the bonds are installed and this is too much to expect from the ordinary class of bonding labor in the field, so that the safest way is to drill the holes dry.

Not only must the inspector be on guard against any moisture that might be introduced into the hole during the act of drilling, but precautions should be taken to make certain that no dampness from the atmosphere or from any other source may enter later. To this end no bonding should be done during rainy weather, and even on clear days the bonds should be installed in the holes

as soon as possible after the latter have been drilled. When holes are drilled on one day and the bonds are not installed until the next it is sometimes the practice to plug the holes with paper to exclude the dampness. This is better than nothing, but the best plan is to run a reamer through the holes the next morning, taking off only enough metal from the sides of the holes to be sure of removing any corrosion that may be present.

After the terminals have been placed in the holes the inspector should satisfy himself that they have been sufficiently expanded. With tubular terminals there is little to watch except to see that the taper punch is used in accordance with the instructions and that the drift pins are driven home. In the installation of compressed terminal bonds the compressors must be in good condition, well greased, and with screw threads, pins or cups unbroken and well centered in the bond terminals, and sufficient force must be exerted by the bonders to make sure that the bonds are well compressed. Where hydraulic compressors are used it is much easier to obtain satisfactory compression than with the screw type, as the former do not require the bonders to exert as much strength in their operation as do the latter.

The screw compressors are generally used on all but large jobs because of their low first cost and lighter weight. If the screw compressors are well made and operated they can turn out as satisfactory work as the hydraulic type and will compress just as much. That this is true will surprise many persons, but it was proved by a competitive test made by a large railway company a few years ago. The saying of Archimedes, that given a lever long enough he could move the world, can be adapted to the screw type of compressor. By using a long enough wrench and particularly if a ratchet wrench is used, so that it can be made to take hold of the screw at the angle best suited for the application of power by the men operating it, sufficient power can be supplied to give any compression needed. In fact, that can be furnished by two husky men on the end of the ordinary wrench if they are only willing to work hard.

POLISHING INSURES GOOD CONTACT

Another point that is always recommended but which is seldom carried out in practice is the polishing of the bond terminals with emery cloth before they are installed in the holes. This polishing is to make sure of good contact between a clean, bright terminal and the clean sides of the hole. Mercury amalgam is occasionally used to make a still better contact, but, although there is a very slight improvement in the contact resistance at the beginning, this is only temporary and the contact cannot be relied on permanently to improve the bonding.

Where soldered bonds are installed the inspector should see that the portion of the rail to be covered by the terminal has been carefully polished, that the terminals are placed on the polished portions of the rail and not partly on the smooth and partly on the rough metal and that the rail and the terminal are sufficiently heated before the solder is applied to them. The rail should be tinned before the bond is clamped in place, and this cannot be done well unless the blow torch has been playing on it for some time. It is easy to heat the terminal thoroughly after it has been put in place, but owing to the much greater amount of metal in the rail and the ease with which the heat is conducted away from the point where it is applied there is always danger

that the solder will adhere closely to the terminal but not to the rail and that a poor job will result.

With the various types of welded bonds the same precautions must be taken as with soldered bonds except that there is no necessity for preheating the rail. When a welding car is used, after the welding has been begun it is only necessary to see that the proper pressure is applied to the bond and that the current is kept on for the right length of time. When the bonds are applied by the arc-weld process the operation is not so mechanical and the type and length of the arc, as well as the method of depositing the molten metal, must be watched.

When special work is to be bonded with cable jumpers not only the connections between the terminals and the rail should be inspected but also the connections between the various wires and between the bonding wires and the sections of bonds running to individual pieces of the special track work as well. The inspector should make sure that the splices in these wires are not only well wrapped but also carefully soldered, for unless the work is carefully supervised there will be attempts to make some if not all of these connections with "dry splices," using no solder at all.

TESTING FOLLOWS INSPECTION

After the installation of the bonds has been completed tests should be made to insure that they have been put on properly and are fulfilling the requirements specified. With the welded and soldered bonds these tests are often made by purely mechanical means, the terminals of the bonds are kicked or struck a light blow with a hammer to see that they cannot be easily knocked off. A variation of this method is to slip a bar through the loop of the bond and to use that as a lever in an attempt to pry the bond from the rail. In order that enough but not too much strain may be thrown on the bond it is well to specify the length of the bar to be used and to have the pull exerted at the specified height through a spring balance to measure the amount of the force applied. It is also customary with some companies to pull off a certain percentage of the bonds and examine the terminals to see the extent of the contact made between them and the rails. These few bonds are taken at random and therefore are supposed to represent the average conditions of the whole lot of bonds that are installed.

Mechanical testing will serve no good purpose with the expanded terminal bonds, and although visual inspection will show a few things, such as whether or not the compressor was properly centered on the bond, whether the button was formed properly, and whether any splitting of the terminal took place, yet that is about all, and there is no way, except by testing electrically, to make certain as to the quality of the contact made. As was mentioned by the writer in a previous article, it is extremely doubtful whether electrical tests of recently completed bonding are of any value except to show up bonds that have been very poorly installed or to locate joints where no bonds at all have been placed. The contact resistance between the joint plates and the webs of the rails is so low when the tracks have just been laid and until a film of rust has had time to form between them that a much greater proportion of the current is at first carried by the plates than is the case later, and therefore the bonds appear to be in better condition than they really are. Later tests, however, will produce the desired results.

Arc Welding on Railway Properties*

The Convenience and Economy Resulting from Electric Welding Are Now Recognized Quite Universally by All Railways—New Uses and Practices Are Coming to Light Continually—Some Important Details of the Science of Electric Welding and the Results Obtained Are Related—New Applications for Arc Welding Are Also Pointed Out

By A. M. CANDY

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THREE views of three different truck frames which are entirely welded, no rivets being used in their construction, are shown in Fig. 1. This is a practice now being used to a certain extent by the Government Electric Railways of Sydney, Australia. The journal boxes used with these trucks are also made up completely by welding. Another interesting use of arc welding on this property is in making gear cases, as pictured in Fig. 2. It will be observed that not only is the shell of the gear case welded but also the reinforcing strips on the sides. The latter are welded by what is known as the plug welding method, wherein metal is deposited in small holes drilled through the outer plate. These places can be

shows how uniformly a good operator can put down the deposited metal. Incidentally, this entire case was welded by an operator who had been using the oxy-acetylene welding process for years, but who had only two weeks' training previous to building this particular arc-welded tank.

Fig. 4 shows the method used by one of the pressed steel car builders for attaching the felt lining for the inside of a car body. The positive side of the welding circuit is attached to the car body and the operator, using a pair of pliers connected to the negative side of the circuit, grips finishing nails in the pliers so that he can touch the head of each nail against the side of the car sheeting, drawing an

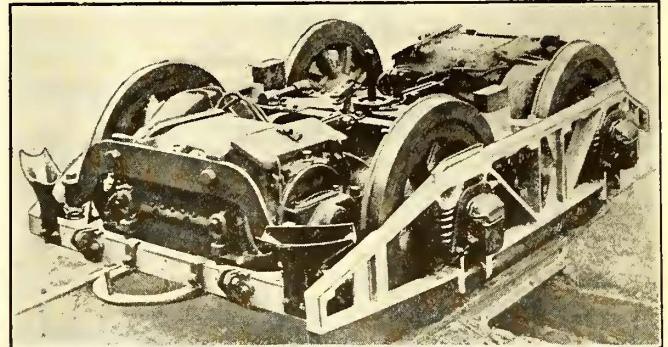
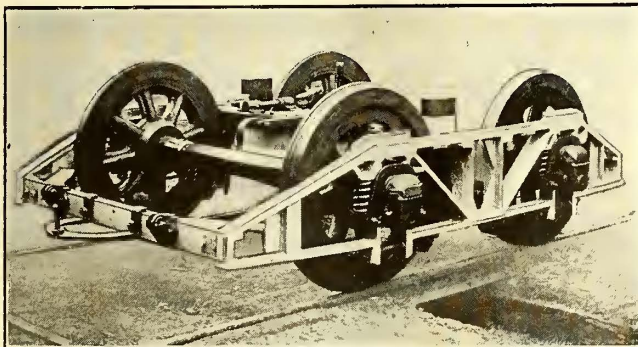
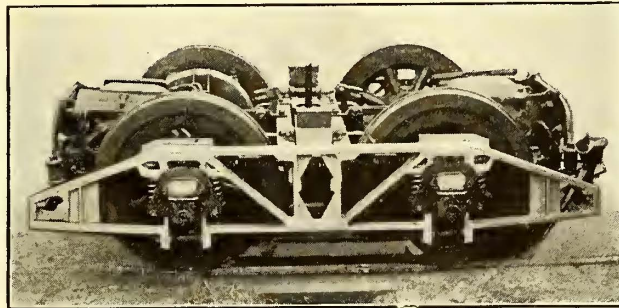


FIG. 1—ALL-WELDED STREET RAILWAY TRUCK USED BY THE GOVERNMENT RAILWAYS, SYDNEY, AUSTRALIA

identified by the rough approximately circular spots at various locations over these reinforcing plates. A somewhat similar method of welding gear cases is used by some of the large manufacturers here.

Fig. 3 shows the bottom of a welded steel transformer tank, which is a good illustration of a welding job that can be done more satisfactorily by the arc process than by the gas process for the following reason: If the gas flame is played against the center of the Z-bars in order to bring them to a welding temperature for welding the bracing strips the bars will become so badly heated that they will buckle up in the center, making it practically impossible to do a satisfactory job. In the case of the arc process the arc heat is so concentrated and the weld can be made so rapidly that the entire joints between the Z-bars and the bracing strips can be made without throwing the Z-bars out of alignment appreciably. This close-up view of the bottom seam

arc. He then pushes the nail into the molten metal thus formed and releases the pliers, leaving the nail attached to the plate as indicated. The felt lining is then pressed down over these nails, after which small circular disks of tin, such as are used for fastening tar paper roofing, are pressed down over the nails. After this has been done the nails are clinched over to hold the lining in position.

In Fig. 5 is illustrated a very neat and satisfactory way of building up the worn surfaces of a standard coupler knuckle. A number of steam railroads are following this practice.

EXPERIENCE IN WELDING UNDERSIZE MOTOR SHAFTS

If undersize motor shafts are reclaimed by welding and turning down to proper size it would appear from superficial observations that this practice is satisfactory. However, if the shaft is cut through the deposited section, as illustrated by Fig. 6, and the section is ground, polished and etched it will be found that the deposited

*Abstract of address made before Association of Railway Men, Mansfield, Ohio, Dec. 7, 1920.

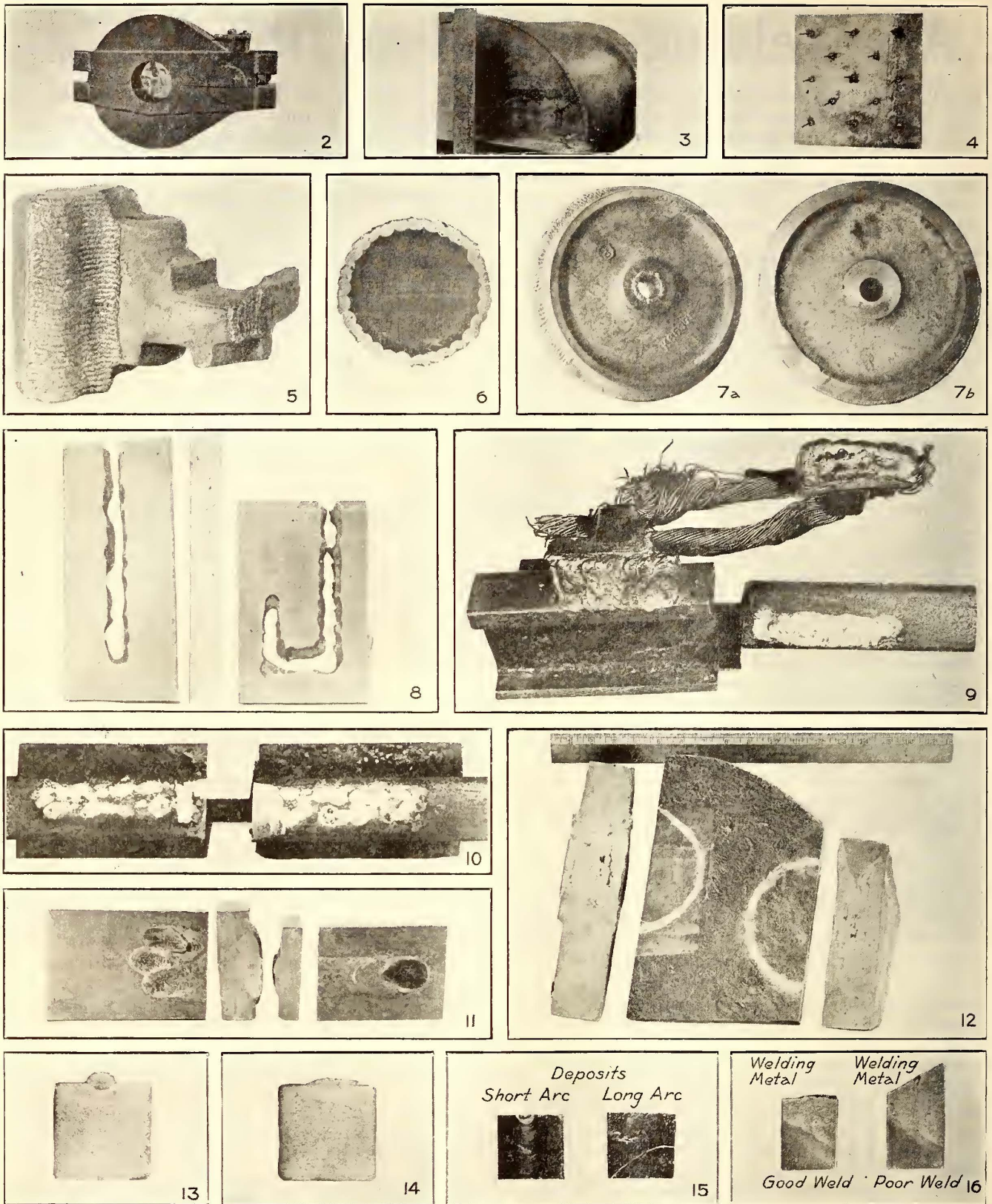


Fig. 2—Method of welding gear cases used by Sydney, Australia, electric railways.

Fig. 3—Bottom welding on a steel transformer tank, where arc welding surpasses gas welding.

Fig. 4—Welding finishing nails head-on to car sizing for attaching felt lining.

Fig. 5—Manner of reclaiming worn coupler head by arc welding.

Fig. 6—Section through built-up armature shaft, showing blow-holes and change in crystalline structure.

Fig. 7—Two views of car wheel on which the flange has been built in thirds by welding.

Fig. 8—Cutting cast iron (left) and steel plate (right) by means of the electric arc, using the graphite electrode process.

Fig. 9—Arc welded bond tested for strength. Right-hand terminal indicates thorough weld resulting from weld made with rail positive and electrode negative.

Fig. 10—Appearance of rail surface from which arc-welded pond has been sheared. Weld was made with rail negative and electrode positive.

Fig. 11—The depth of crater and the overlap of deposited metal form an index of the depth of penetration of the weld.

Fig. 12—Two welds on cast steel; left-hand weld was made with metallic electrode, whereas right-hand weld was made with graphite electrode process.

Fig. 13—Polished and etched section through metal deposited by using a short arc.

Fig. 14—Polished and etched section through metal deposited by using a long arc.

Fig. 15—Surface appearance of welds made with short arc (left) and with long arc (right).

Fig. 16—Section through two welds, showing effect of current value. Too low current was used in right-hand piece.

metal, which is practically pure iron in cast form, contains a certain amount of blowholes. Furthermore, the heat of the arc and of the deposited metal has raised the temperature of the shaft metal adjacent thereto to a sufficiently high value so that when it is cooled rapidly the crystalline structure is changed. This metal is chilled rapidly both by heat which is conducted into the central portion of the steel shafting, which is at a relative low temperature, and by radiation through the deposited metal to the air. The result is a chilled section of steel shafting which is relatively brittle. A subsequent heat treatment will bring back all of the shaft material to its original crystalline structure, but no amount of heat treatment will change the characteristics of the deposited metal by any very appreciable degree, due to the fact that it is cast material and contains practically no carbon.

TAPERED FITS ARE BUILT UP ECONOMICALLY

For these reasons we do not ordinarily recommend building up of heat-treated steel shafting at points where severe strains take place. There are cases, however, where this is entirely permissible; for example, in building up the tapered fit for a gear pinion or the threaded end of a shaft for re-turning to accommodate a nut for securing the pinion. We have also used this process for extending some shafts used on cranes in our own shops with very good results. However, there are cases where the severe vibration and alternating stresses set up in the shaft will make it absolutely inadvisable to apply the welding process.

Fig. 7 illustrates a built-up flange and bore of a car wheel. Approximately one-third of the flange was left in its original state, another third at the right was welded and then turned down, after which the left-hand third was built up and left as finished from the welding operation. The reverse side of this same wheel is also shown in Fig. 7. By the discoloration seen in the lower right hand one-third portion of the wheel it is obvious that the heat of the welding arc and the deposited metal have changed the structure of the wheel materials. The use of this practice is therefore of very questionable value, especially where high speed service is encountered. For city service, however, I believe this practice would prove satisfactory and if properly handled would be often found more economical than the use of a new wheel or turning the wheels down to re-establish the proper contour.

The welding of small cast-iron sections presents special problems. The deposited metal is soft, as is also the cast iron, but the metal at the zone of union between the cast iron and the deposit, representing a skin of approximately $\frac{3}{16}$ to $\frac{1}{8}$ in. in thickness, will be very hard. This is because the pure iron deposited by the metallic electrode absorbs some of the free carbon, known as graphitic carbon, from the cast iron and is chilled due to the heat flow into the cast iron and also radiation to the air. This therefore forms a shell of high carbon cast steel which is very hard and can only be eliminated by either preheating the cast iron before the welding work is done or else annealing the casting after the welding is finished. Where the material can be finished by grinding it is unnecessary to get rid of the hard zone. But if machine work must be done in the region of the zone of fusion it is necessary to have this hard shell eliminated.

The electric arc can be used effectively for cutting purposes. Fig. 8 shows two samples of cutting by the

graphite electrode process. The sample at the left is a piece of cast iron $1\frac{1}{2}$ in. thick, which was cut for a length of approximately 10 in. in three minutes, using a current of 400 amp. This is at the rate of $16\frac{1}{2}$ ft. per hour. The sample at the right is a piece of steel plate 1 in. thick which was cut using a 400 amp current, the length of the cut being approximately 13 in. It was made in three minutes, or at the rate of $21\frac{1}{2}$ ft. per hour.

Fig. 9 shows a test sample of electrically welded rail bond, the weld having been made with the bond connected as the negative electrode and the rail as positive. The sections of rails which were available were not sufficiently large to permit welding the bond in its proper position on the side of the head, and therefore it was welded on the face of the head. This bond was tested for strength in an Olsen testing machine by gripping the two pieces of rail in the jaws of the machine. The test results are as follows:

One of the twin cables pulled out of each terminal at 1,350 lb. The left-hand copper terminal was then given a shearing stress by compressing it, the compressing pressure being 11,200 lb., when it commenced to shear from the deposited metal. The deposited material of the right-hand terminal was sheared from the rail by a pressure of 34,000 lb. By observing the light portion shown on the head of the rail it is evident that a very good job of welding was secured, giving a very thorough fusion.

Fig. 10 shows the results obtained using the welding polarity obtained by making the rail negative and the electrode positive, as in ordinary service where welding current is obtained from the overhead trolley wire working through a resistance to the electrode. These samples were also pulled in the Olsen machine and given a shearing test with the following results:

The cables pulled out of the terminals at 5,520 lb. The weld metal sheared from the left-hand rail section at a pressure of 29,580 lb., and from the right-hand rail section at 17,400 lb. The "spotty" appearance of the weld surface from which the bond has been sheared indicates that the fusion of the metals was not complete. This appearance in Fig. 10 is compared with that in Fig. 9.

HOW TO INSPECT A WELD

Fig. 11 shows the results obtained when making a deposit upon a strip of steel plate by using a $\frac{3}{8}$ -in. diameter electrode and a current of 350 amp. This also shows how the depth of the penetration of the deposited metal, indicated by the section of the two center pieces, can be judged from the depth of the crater appearing both in the right-hand piece and at the three places on the left-hand piece. By observing these characteristics, together with the overlap of the deposited metal at its edges, the operator can very readily judge the satisfactoriness of the deposit relative to a weld of desirable strength.

Fig. 12 illustrates polished and etched sections through welds made in a steel casting, that at the left having been made using a $\frac{3}{8}$ -in. diameter metallic electrode and 400 amp., whereas the right-hand weld was made using the graphite electrode process. The same metallic electrode material was used as filler metal and the same current in both cases. When using large metallic electrodes or the graphite electrode process the operator is very likely to have a considerable amount of slag inclusion, as indicated by the sections. Therefore we do not ordinarily recommend these processes

except where the speed of doing the work is of more importance than strength of the weld. In the case of the left-hand metallic electrode weld the metal was deposited at the rate of approximately $3\frac{1}{2}$ lb. per hour, whereas in the right-hand weld made by the graphite electrode process the metal was deposited at the rate of approximately 3.43 lb. per hour. The size of the parts

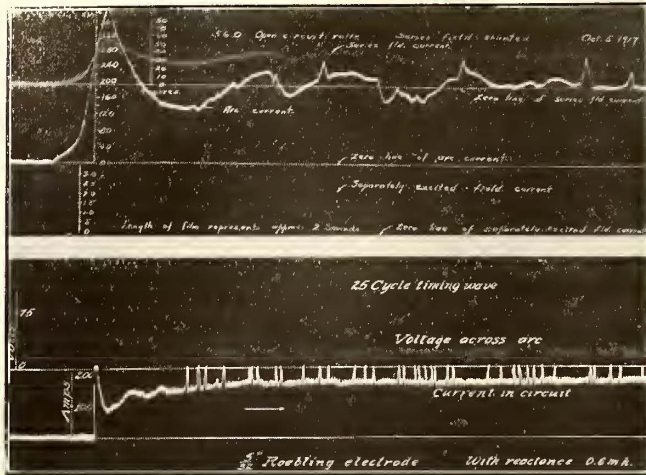


FIG. 17—GRAPHS COMPARING RESULTS WITH AND WITHOUT REACTOR. AT TOP, NO REACTOR IN CIRCUIT AT BOTTOM, REACTOR USED

can be judged from the rule, which is shown immediately above the pieces.

For test purposes a 14-lb. deposit approximately 4 in. wide, 2 in. thick and 12 in. long made on a piece of $\frac{3}{8}$ -in. steel by using $\frac{3}{8}$ -in. diameter electrode and 160 amp. of current was made. This was ground, polished and etched and it could then be seen that very little slag or oxide inclusions were present. Therefore where a weld of maximum strength is desired we usually recommend the use of smaller size electrodes, namely, $\frac{1}{8}$ to $\frac{1}{4}$ in. in diameter maximum, and a current of from 160 amp. for the smaller to 225 amp. for the larger electrode.

Test samples in the shape of a small shaft with a threaded head at each end were then turned up from the metal in the 14-lb. deposit. The tests on these pieces of solid deposited metal showed the following characteristics:

Ultimate tensile strength, 58,225 lb. for one piece and 56,075 lb. for another, the yield point being 35,875 lb.; elastic limit 29,000 lb., per cent elongation in 2 in., 16 for one and 18 for the other; per cent reduction of area, 23.4 for one and 27.8 for the other.

LENGTH OF ARC AND PROPER CURRENT VALUE

Fig. 13 shows a polished and etched section through a deposit made with $\frac{1}{8}$ in., 22-volt arc on a piece of 1-in. x 1-in. steel. The depth of penetration of the deposited metal and the concentration of this material are evident. Fig. 14 shows a similarly prepared section through a deposit made with a long arc. In the case of the long arc the air drafts which are always present cause the arc to play about over the surface of the work, scattering the metal around and causing a great deal of porosity. It will be observed in Fig. 14 that the deposited metal has not penetrated into the steel piece to any extent and that it is scattered over a considerable area. Fig. 15 shows the plan view of these same two pieces, showing the metal deposited by the short arc at the left to be very smooth and relatively free from porosity and oxidation, whereas the metal deposited by

the long arc at the right is very porous, poor material and is scattered over a considerable area.

Fig. 16 illustrates the importance of using a sufficiently high current to obtain good fusion between the deposited metal and the part being welded. The sample at the right was made with too low a current value, so that the deposited metal pulled away from the surface very readily, as indicated at the top edge. The left-hand sample was made with a sufficiently high current. When tested it broke through the center of the weld, where it would be expected to break, owing to the fact that the entire section was machined down to a uniform thickness. The deposited metal is cast material and hence would break before the parts welded, which were mild rolled steel.

The use of a reactor or inductance coil in each metallic electrode circuit is recommended. The advantages of the reactor are that it makes it easier for the operator to strike his arc and also gives the arc additional stability. This is of especial value if the steel upon which the operator must do his welding work contains foreign matter, such as grease, absorbed gas, rust or other foreign substances, which under the heat of the arc will form gas, tending to blowholes in the molten metal. The electromagnetic energy stored in this reactor gives the arc additional stability. When the operator strikes his arc the reactor keeps the current from building up to such a high value as to cause the electrode to stick or freeze to the work.

In Fig. 17 is shown in curve form the result of using a reactor. The upper curve was taken with a welding circuit having no reactor connected therein. Below is illustrated the effect of the reactance in the same welding circuit, without changing any other conditions except connecting in the reactor in series with the welding resistance.

Moving Platforms for Crosstown Lines

Consulting Engineers Outline a Solution of the Crosstown Traffic Problem by Using Moving Platforms Propelled by the Electric Carrier System—Details of the Proposed Platforms Are Given

AT THE meeting on Nov. 17 of the New York section of the American Society of Civil Engineers L. B. Stillwell of the firm of Stillwell & Putnam, consulting engineers, presented a paper briefly describing a moving platform to handle crosstown traffic on Fourteenth, Forty-second and Fifty-seventh streets. Since the publication of the abstract of this paper in the ELECTRIC RAILWAY JOURNAL of Nov. 27, 1920, on page 1102, more detailed information has become available about the design and the means of propulsion of the moving platform.

As early as May 15, 1902, moving platforms were proposed to the former Rapid Transit Commission by the then Commissioner of Bridges, Gustav Lindenthal, who wished to install such equipment on the Brooklyn Bridge. The Public Service Commission, however, having succeeded the Rapid Transit Commission, declined to approve Gustav Lindenthal's plan. Several times since propositions to install moving platform subways on the more important crosstown routes have been laid before the traction companies and the Public Service Commission, only to meet with an unyielding opposition. Now further public efforts have been induced by the inadequacy of the shuttle train service in the Forty-second

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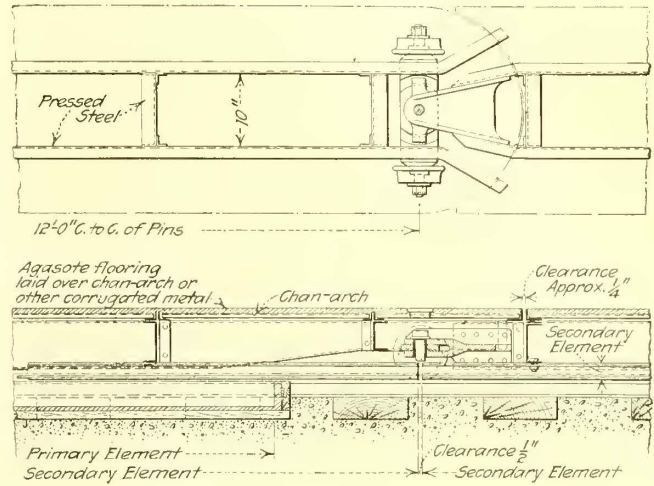
Street subway, and certain legislative changes in the Public Service Commission afford an opportunity which will permit serious consideration of a method offering a solution for the relief of congested crosstown traffic.

In the report on this subject by the engineers recommending the new plan the success of previously proposed methods where the platform is carried on rollers, mounted on shafts which are driven by stationary motors, is doubted because of inherent mechanical difficulties. The electric carrier system of propulsion will permit the use of platforms mounted on car trucks, which will effect a material reduction in the cost of construction, operation and maintenance, and also of the space required. The distinguishing characteristic of this system is the method of propulsion. Instead of a complete motor being mounted upon the car and transmitting mechanical power therefrom through gears to the wheel, or driving carrier wheels on which the platform moves, the three-phase induction motor of the squirrel-cage type is used. These parts are separated, that corresponding to the stationary or primary element of the motor being straightened out into sections about 5 ft. long and placed midway between the rails in the roadbed, while that corresponding to the revolving element, also straightened out, forms a continuous short-circuited secondary mounted on the bottom of the car. The primary elements, when energized with three-phase current by induction, magnetize the short-circuited secondary which extends continuously along the bottom of the car. The result is that the force created between the induced secondary current and the shifting field of the primary propels the car.

The scheme proposed is to use three platforms of 27 in., 27 in. and 57 in. width, respectively, moving at 3, 6 and 9 m.p.h. The high-speed platform carries seats for two persons spaced at 3-ft. intervals. It is proposed to use identical construction for the electrical elements on the three platforms, the different speeds being secured by operating the intermediate platform at double the frequency of the low-speed platform, and the high-speed platform at three times the frequency of the low-speed platform. All conductors and windings carrying power will be imbedded in the roadbed and

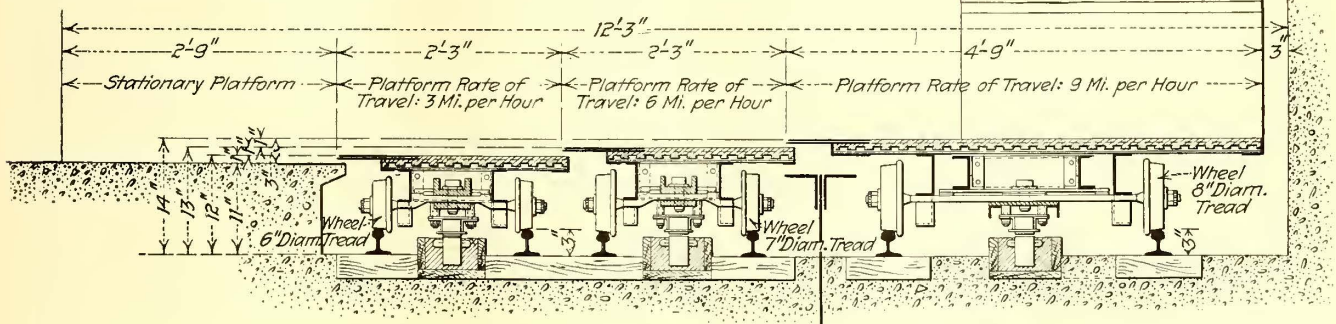
apart. Each primary element will produce a pull equivalent to a 1½ to 2-hp. motor. The secondary, consisting of copper punchings imbedded in the lamination, is continuous except for a ½ in. break between cars.

The power supply will be produced by a motor generator set, in which a single motor will drive three generators mounted on a single shaft. The generators will



PLAN AND LONGITUDINAL SECTION SHOWING MOVING PLATFORM DESIGN

produce three-phase alternating current at 10, 20 and 30 cycles respectively or some multiple of these frequencies. As the speed of the different platforms depends on the frequency of the three-phase current applied to the primary, it is clear that any platform may be operated at a lower speed by changing the frequency supplied to it, in case it should be desired to shut down one platform and operate the other two, or in case one platform only is to be operated. During periods of light traffic some such method of modified operation may be desirable. The cars proposed for the system for the 3 m.p.h. and



CROSS SECTION OF SUBWAY SHOWING ASSEMBLY OF PLATFORMS

thoroughly protected and insulated against damage by water in a manner to make accidental contact and danger very remote. The current will be carried at relatively high potential to transformers located at points along the system and thence by cables in ducts to the primary element between the rails. The primary element, as explained, is not continuous, but will be installed at intervals in sections about 5 ft. long. In the case of the 3 m.p.h. platform the primaries will be approximately 400 ft. apart, in the case of 6 m.p.h. platforms 200 ft. and in the case of the 9 m.p.h. platform 60 ft.

6 m.p.h. elements will be about 12 ft. long and 28 in. wide, constructed from channels which support a pressed-steel platform covered with 1½-in. agasote, giving a light and non-slippery surface. Each car is supported by a pair of wheels and coupled at the rear by a kingpin to a similar pair of wheels on the car immediately following. The two slower-speed elements run on a track of 18-in. gage, while the gage of the track for its 9 m.p.h. platform is 32 in. Axle friction on curves will be minimized by the use of roller bearings for the wheels. Friction and wear can still further

be reduced by keeping the track well greased on curves and on tangents, since magnetic pull and not the adhesion of the wheels to the track is used for propulsion. The resulting low rail and wheel wear will reduce the extent of the adjustments required to maintain the standard air gap, but such adjustments can easily be made when necessary.

The high-speed platform overlaps the medium-speed platform, which, in turn, overlaps the low-speed platform. This difference in elevation is secured by the use of 8-in., 7-in. and 6-in. wheels on the high, medium and low-speed platforms respectively. The overhanging edge of each platform is covered with a non-slip tread to prevent accidents to passengers while passing from one platform to another. Posts on the low-speed and intermediate platforms are provided as supports to assist the less alert passengers in progressing from one platform to another. The third platform has a passage-way 21 in. wide besides the seats, which occupy 36 in. of the width.

The application of the electric carrier system to the Forty-second Street loop would require three platforms, each approximately 10,100 ft. long. The seating capacity of the 9-mile platform would be 31,680 passengers per hour in each direction. The weight per seat for all three elements would be roughly 375 lb., while that of a loaded subway train is approximately 1,800 lb. per passenger. About 350 kw. would be necessary for its operation and about 3,000,000 kw-hr. per year. Although, electrically, the air gap of $\frac{3}{8}$ in. used is far from ideal, the increased losses due to a low power factor are inconsiderable compared with the small amount of power required for its operation. The estimated initial cost of this project for equipment and its installation, exclusive of excavation, is about \$750,000.

An electric carrier system installed as a demonstration plant near Paterson was in successful operation for several years and its use is now being contemplated for postal service in several large cities.

Preserve the Pole Line

Analysis of Pole Preservative Methods in Indiana Shows Ample Justification for Their Use—Data Upon Which This Analysis Is Based Were Secured from 100 Utilities

PRESERVATIVES for wooden poles, preservative treatments and all that pertains thereto are subjects of prime importance to electric railway distribution engineers and administrative officials. While very few pole lines constructed of treated poles have reached the replacement stage, any information that sheds light upon the subject is worth investigating. In a recent publication of the Engineering Experiment Station of Purdue University Prof. R. V. Achatz has set forth the results of a study which he made with particular reference to the needs of executives responsible for the construction policies of public utilities. Data for this study were obtained from about 100 electric railway, steam railroad, telephone, telegraph and electric power companies operating in the State of Indiana. The estimated annual requirements of these companies are about 40,000 poles. From 60 to 70 per cent of those now being set are given some kind of preservative treatment. Practically all of the well-known forms of pole treatment are being used.

Some timbers decay rapidly when exposed to the

weather, while others are affected to an almost negligible extent. Most pole decay occurs at the ground line and the rapidity with which decay progresses depends greatly on the character of the soil and the climate. It is obvious, therefore, that no one preservative or method of treatment is best for all purposes. The choice of preservative should depend upon the conditions of service, as well as upon the method of application and the price.

To provide effective protection from decay the wood preservative must have strong germicidal properties; it must have penetrative ability; it must not evaporate, and it must not be soluble in water. Preservatives obtained by the distillation of coal tar possess these qualities and have come into wide use. Dead oil of coal tar or creosote oil and the higher boiling oils, known as carbolineums, are the most satisfactory preservatives. Coal tar itself should not be used, as it has little value as a preservative, and "mixed creosote oils"—that is, those preservatives containing undistilled products—are not recommended.

In Indiana the commonly used treatments are the brush and the open-tank. Poles of less durable woods treated by the pressure tank process are as yet expensive for this reason and have not come up to the present time into general use.

An analysis of the economic side of pole preservation shows that under average conditions an increase of life of about two years will justify brush treatment, three and one-half years open-tank dipping treatment in hot creosote, and seven and one-half years hot and cold-bath open-tank treatment. The results of the inspections made in various parts of Indiana indicate that an increase in life greater than that necessary to justify treatment will be secured if the treatment be properly given. In most cases where treatment has failed to protect the poles from decay the failure can be traced to improper treatment or to causes which the treatment itself could not control.

By far the greater number of poles in service at the present time have been set without preservative treatment. As the poles on the older lines are now nearing the end of their life much interest has arisen in the problem of deferring replacement. It is possible to do this to a certain extent by reinforcement and by treatment in place. The most common form of reinforcement is that of setting a creosoted stub alongside the weakened pole and binding the two together by wire. Another method used where decay has not progressed too far is to excavate the earth from around the pole, clear away the diseased wood and apply a brush treatment. Concrete reinforcement has been applied to some extent, but on account of cost can be recommended only where the cost of replacement is very large.

Report on Lubricants

A REPORT of the inquiry committee on lubricants and lubrication, made under the direction of the Department of Scientific and Industrial Research in England, has just been published. This report contains the results of a research made to determine the relation between viscosity of lubricants and the load on a bearing and the action of lubricants at high temperatures as applied to commercial methods of oil testing. Copies of this report may be obtained directly by addressing H. M. Stationery Office at Imperial House, Kingsway, London.

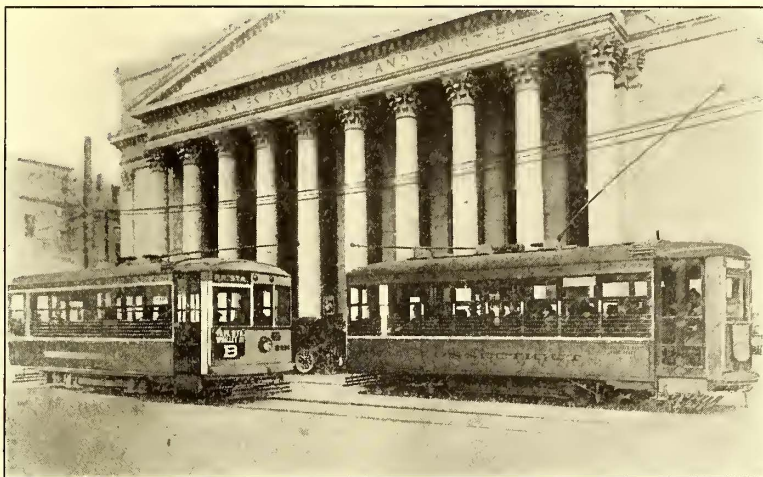
Trend of Safety Car Construction

A Review of Some of the More Recent Changes in Safety Car Design Points Toward the Development of a Type with Increased Capacity, Greater Comfort and Convenience and Additional Safety
—Changes During the Past Year Have Been Directed Principally Toward Increasing the Strength of Various Structural Parts

ONE-MAN car operation has proved both satisfactory and economical for light and average service requirements. For lines where traffic is very dense a larger unit is needed. There is still a very commendable desire on the part of both operators and manufacturers to improve safety car construction and to enlarge the field of its usefulness. In the report of the committee

on safety car operation, presented to the American Electric Railway Transportation & Traffic Association at its convention held in Atlantic City last October, conclusions were given as to the limitations of the safety car based on answers from member companies received to a questionnaire. This report states that half the companies that sent in information and are operating safety cars report changes and departures from specifications of the standard Birney safety car. The principal changes consist of:

1. Use of heavier and better riding trucks.
2. 24-in. cast steel wheels replaced by 26-in. steel wheels.
3. Specially designed rubber cushions installed in the truck suspension bolts to reduce noise.
4. Larger motors used for propelling the car.
5. Larger compressors used.
6. Air piping located inside of car to prevent freezing.
7. Brake levers and chains provided with safety jaws.
8. Additional heaters installed in place of the eight used as standard, one of these being a cab heater.
9. Seating arrangement changed.
10. Wider seats and wider aisle used.
11. Wooden-slat seats replaced by full rattan covered or upholstered seats.
12. Fenders used in place of life guards.
13. Voltage push buttons without exposed metal parts used instead of buttons with exposed parts.
14. Platform arrangement revised to facilitate loading and passenger movement.
15. Maximum step height reduced by using ramp platform.
16. Double floor used.
17. Structural strength of underframe increased.
18. Platform strengthened.
19. Heavier bumpers and stronger dash used.
20. Heavier materials used for roof and sides.
21. Headlining added for interior ceiling to improve appearance and add warmth in winter.



SAFETY CARS ARE A FAMILIAR SIGHT IN NEW HAVEN

22. Lining added between the floor and window sill along sides and dash.

23. Storm sashes added.

It will be noted from this list of changes that the more important ones have to do with increasing the strength of various structural parts, increasing the facility for boarding and alighting passengers, providing a seating arrangement to meet local conditions and

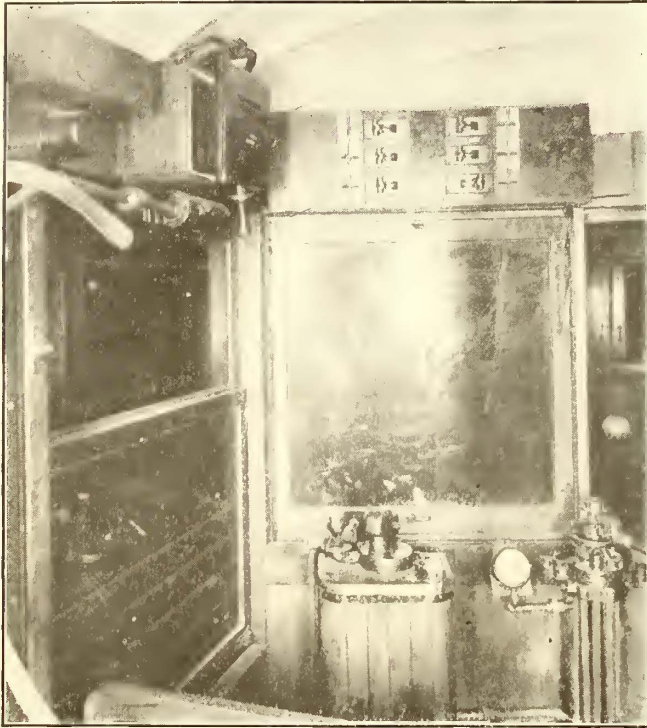
providing more heating capacity and a more heat-resisting body construction in places where severe winter weather is encountered, the standard safety car having been developed for climatic conditions prevailing in the south. The changes have increased the weight of the car somewhat, but have undoubtedly resulted in a stronger construction and one which will withstand severe operating conditions more satisfactorily.

CHANGES IN CAR CONSTRUCTION

The present trend of safety car design can best be studied by considering some of the changes from the standard type of construction that have been made by various railways in an endeavor to meet operating conditions as they exist on their individual properties. In this analysis the changes which have been made and those which are being advocated by railway engineers as desirable can be grouped under five headings: (1) Changes necessary for strengthening construction; (2) changes for providing greater comfort and convenience to passengers as the use of wider and more comfortable seats, easier riding trucks and the reduction of step height; (3) changes found desirable for winter operation in cold climates, such as the use of lining, double floors, storm sash, an increased number of heaters and larger diameter steel wheels; (4) changes to provide greater safety to passengers, such as rearrangement of platform lights to illuminate steps, use of safety panels for switches and fuses, improvements in brake rigging, removal of circuit breakers from car vestibule, removal of foot valve from motorman's control; (5) changes which appear desirable in order to provide increased capacity and facilities for handling crowds on heavy traffic routes, such as the use of larger cars with longer platforms, double doors, platform railing, longitudinal seats at ends and a wider aisle.

From the standpoint of construction there appears to be rather a general feeling among the officials of railway operating companies that the first safety cars were

built of too light construction, that to date the idea of maintaining the standard type of construction first advanced has received too great consideration by the builders and that there are essential a number of changes and refinements. The use of a stronger construction which seems advisable may necessitate the



INCREASED SAFETY IS PROVIDED BY INSTALLING ALL SWITCHES AND FUSES IN A SAFETY PANEL

addition of slightly more weight, but perhaps the additional strength can be obtained through the use of better materials.

In this connection the remarks made by P. J. Kealy at the meeting of the Transportation & Traffic Association in Atlantic City Oct. 7, 1919, are of interest. In speaking of the changes made in the Kansas City safety cars, he said that he considered that the radical innovation with respect to the reduction of weight in safety car construction as carried out had produced a rather flimsy type of construction for severe operating conditions. As a result of this feeling many of the cars furnished during the past two years have had substantial changes made in the type of construction. This is probably best evidenced by the increase in weight of cars now being furnished, which is in the neighborhood of 16,000 lb., while the first safety cars weighed but 12,000 lb. In Kansas City the last order for safety cars required the strengthening of some of the structural members by the use of buffet plates and additional cross bracings. In the 200 cars furnished for the Brooklyn Rapid Transit Company a new type of truck of stronger construction with friction bearings was furnished. The vestibule construction was stiffened and a heavier bumper construction used. Other roads have required similar changes from the first type of standard construction.

PROVIDING GREATER COMFORT AND CONVENIENCE FOR PASSENGERS

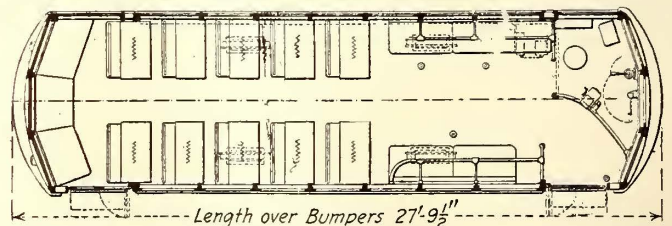
The merchandising consideration of providing greater comfort and convenience for passengers is one which apparently warrants a deviation from standard construc-

tion. Changes which have been made and others which are advocated consist in the use of wider seats and a change from the standard wooden-slat-seat construction to a cushioned type; the use of easier riding trucks, and a reduction of step height to encourage more riding and to prove an added attraction apparently equal to that of frequent and fast service. In the Kansas City cars the distance of the first step above the rail is reduced from 16 in. to 14 in. by placing the wheel housings under the seats and by using a very slight ramp in the floor of the front platform. The inside seating arrangement was altered by the use of longitudinal seats at the entrance in an endeavor to help eliminate congestion, and stanchions for the use of standing passengers were placed in front of the longitudinal seats. Cushioned seats were also used, as Kansas City officials felt that the traveling public in that city had been educated to the use of this type of seat and it was easier to fit the car to the public than to expect the public to accommodate itself to certain changes in car design. Their experience was that the public would not walk back through a long narrow aisle and they considered the idea of the original seating arrangement of the safety car as directly counter to the latest development in seating design of the last ten years, which provided a loading well.

CHANGES FOUND NECESSARY TO MEET SEVERE WINTER CONDITIONS

The standard safety car as originally designed was for service on the Stone & Webster lines in Texas and other Southern railway properties. For service in cold climates and locations subject to severe winter conditions experience has already demonstrated the necessity of equipping certain cars with both side and head lining. The use of storm sash and double floors also has appeared essential, as well as an increase in the number of heaters, and perhaps the employment of cross-seat heaters to give a better distribution of heat, as was first used in Brooklyn for these cars. On this latter road ten cross-seat heaters and two truss-plank heaters were used per car. The truss-plank heaters were installed under the motorman's seat to act as cab heaters for the operator. There is no doubt that the cross-seat type of heater is the most popular with the traveling public and Brooklyn officials felt that by specifying this type for their cars they would help to make safety cars more popular with passengers.

Some of the changes found necessary in the safety cars used at Levis, Que., in order to provide for severe



SEATING ARRANGEMENT FOR SINGLE-END SAFETY CAR AS USED IN KANSAS CITY

winter conditions as they exist there, are of interest as indicating what may be necessary in cars operating in northern climates. The principal differences from the usual standard features of car construction are: (1) Double lining throughout; (2) double floor; (3) storm windows or sashes on all windows; (4) ventilators capable of being closed as required; (5) all vestibule windows permanently fixed except center

window, being drop sash; (6) air equipment especially installed with proper amount of radiating pipe to prevent freezing of air and moisture accumulation from the cold; (7) operating motors with covers for closing up of the ventilating ducts in winter to prevent snow accumulation; (8) the use of 26-in. wheels to give a maximum clearance on account of high centers caused by snow and ice, and (9) the use of twelve heaters per car instead of the standard number. An article describing these cars published in the April 3, 1920, issue of the *ELECTRIC RAILWAY JOURNAL*, page 699, gives other interesting information regarding changes which were incorporated in these cars and results from their operation during the severe winter of 1919-20.

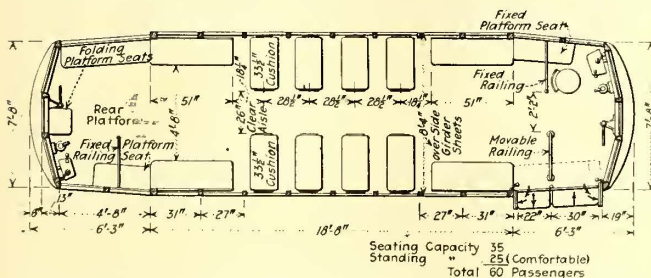
PROVIDING GREATER SAFETY FOR THE TRAVELING PUBLIC

The name "safety car" is now generally accepted as designating this type of one-man car and a determined effort should be made to increase its safety features wherever possible in order that the traveling public may be more thoroughly convinced that this type of car is in reality safer than the ordinary two-man car.

In reviewing the answers to the questionnaire sent out by the committee on safety car operation of the American Electric Railway Association it appears that the majority of accidents which have happened are due to the operator devoting his attention to passengers while making change or issuing transfers while the car is in motion. The use of the foot valve in connection with the car operating equipment, while a great convenience to the operator, is looked upon with suspicion by some managements as encouraging the operator toward other duties which detract from the proper operation of his equipment.

With the present standard location of equipment, the circuit breaker is located inside the front vestibule. Whenever overload conditions occur the blowing of this circuit breaker alarms the passengers, and in cases of crowded conditions injury is liable to result. On other types of equipment it has long been considered essential to place all circuit breaking mechanism underneath the car and remove all danger from serious results of this character to a location remote from passengers. The changing of the present location of the circuit breaker has been considered in several instances as offering a field for improvement.

To prevent the lights in the body of the car from interfering with the view of the motorman during hours



A PROPOSED SEATING ARRANGEMENT FOR DOUBLE-END SAFETY CAR WITH DOUBLE DOORS

of darkness a curtain is provided which is drawn around the back and right side of him. The lights to the right of the operator are also equipped with shades for this purpose. It has been suggested that a better arrangement of lights could be provided, so as to provide not only for less interference with the view of the motorman but also to provide illumination of the step when the door is opened.

The use of a safety panel for all switches and fuses in the light, buzzer, compressor, register and heater circuits as first used on the cars of the Brooklyn Rapid Transit Company is also an additional feature of safety worthy of consideration, as is also the use of push buttons without exposed metal parts, as was suggested in the first part of this article.

Improvements in brake rigging connections by the use of box-type jaws have been furnished for cars of operating companies controlled by the Second District Public Service Commission of the State of New York. In his report to the commission regarding this feature,



FREQUENT SERVICE WITH SAFETY CARS HAS INCREASED TRAVEL AND MADE THEM A SUCCESS

Charles R. Barnes, then chief of the division of electric railways for the commission, reported that there were at least thirteen points in the braking system where if a bolt broke or became loose and dropped out it would disable the entire braking system for both air and hand operation. His recommendation was that the braking system should be improved by the use of box-type jaws at all points where members were connected with clevis and bolts, and this, it is understood, is being required by all cars controlled by the Second District Public Service Commission.

A LARGER CAR IS BEING ADVOCATED FOR SOME LOCALITIES

Where safety cars have been used in large cities, such as Brooklyn, Philadelphia, Baltimore, Boston, etc., their use has been confined in most instances to routes having light traffic characteristics. Where existing headways are three minutes or less and where traffic is so heavy at times even during off-peak periods that car-carrying capacity is a controlling factor, the usefulness of the standard safety car is restricted, because of its smaller carrying capacity and the fact that no improvement in earnings may be expected from improved headway. The use of the safety car has produced such marked economies in communities with less severe service characteristics that these economies have led to a desire to try to adapt the safety car if possible to crowded conditions. This has already led in a small way to the tentative use of larger double-track cars with one-man safety features.

There is without doubt a growing tendency toward increasing the capacity and facilities for handling crowds and heavier traffic with one-man operated cars. The question as to whether one man can satisfactorily handle this increased traffic is still debatable and there is strong opposition from certain quarters regarding its feasibility. This problem of whether such a car can be

handled satisfactorily by one man will have to be worked out by actual trials in service. In addition to providing a car with increased seating capacity, designs for such a car will include longer platforms, the use of double doors for entrance and exit of passengers, the employment of platform railings to separate incoming from outgoing passengers, the use of longitudinal seats at the ends of the car body to provide ample space for passenger movement and for standing passengers and the use of a wider aisle so that passengers can move in and out of their seats with greater freedom. Double doors for cars with provisions for separating incoming and outgoing passengers have been built and are in operation in several cities in this country. The desirability of using double doors has come largely from the endeavor to make the safety car serve for rush hour conditions and lines with heavy traffic characteristics.

Where large groups of people board and alight at one point there is undoubtedly an annoyance to the passengers boarding in their having to wait until the leaving passengers are all discharged before they can get on. Some of the principal arguments used against the adoption of double doors for a one-man operated car are that one man cannot satisfactorily handle the two streams of traffic and that as soon as passengers cease getting off those waiting to board will use the exit door in order to gain access. With the two openings, there is also danger that passengers may slip in without paying their fare. Such radical changes in design as this are also considered as a setback to the standardization. The cost of such a car would be increased and its weight per passenger seated would unquestionably be more.

As an example of a one-man car of somewhat greater proportions and seating capacity than that of the standard Birney car, the Three Rivers Traction Company of Three Rivers, Que., has recently added four cars to its equipment with general dimensions as follows:

Length of body	21 ft.
Length of front vestibule	6 ft. 2 in.
Length of rear vestibule	4 ft.
Length over bumpers	32 ft. 2 in.
Width of car bumper	8 ft. 6 in.
Seating capacity	36 persons

The front vestibule of this car is made extra long and the step opening is extra wide to facilitate entrance and exit. Separate openings are also provided for entrance and exit and each opening has an individual folding door and step operated by a National Pneumatic Company door-engine. These are so arranged that the motorman can operate them singly if desired.

A proposed type of car having these characteristics was described in the *ELECTRIC RAILWAY JOURNAL* for Sept. 18, 1920, page 549. The principal idea of this design was to make available the great economic advantages of the safety car to properties operating in large cities and having extremely heavy traffic conditions. Other operating engineers are also making studies for a type of car built along these general lines.

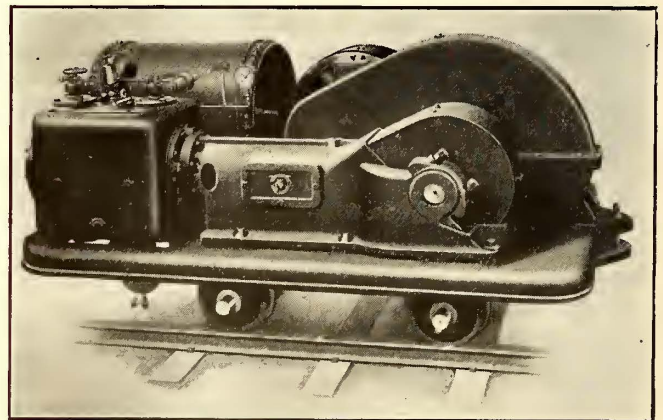
The desirability of a separate entrance and exit is not confined to the idea of developing a larger car for congested traffic conditions as is evidenced by their use at the present time in small-sized cities. In Mason City, Iowa, and Madison, Wis., the introduction of the double door came about through a desire to reduce length of stops and to avoid annoyance to boarding passengers by compelling them to wait until all have alighted. Nevertheless, it is noteworthy that safety car operators in

much larger cities have expressed themselves as content with the standard platform and doorway arrangements.

The safety car, embodying as it does the most decided step ever taken toward standardization, has caused some rather sharp conflicts between the users and manufacturers. The advantages of standardization cannot be doubted. However, in insisting on rigid adherence to standards, there should be no stifling of sound development in the improvement of the safety car or any of its equipment. Many worthy changes have already been introduced since this type of car was brought out, and it would be unreasonable to expect that other still important changes should not be incorporated. The most general feeling in regard to standardization on this particular car seems to be that the present general dimensions of length, width, height and general capacity are satisfactory. With the improvement in strengthening construction that is advocated the standardization of the body construction would be pretty generally adopted for local service. The finishings and the car-seating arrangement, etc., should be left to individual operating companies.

Portable Air Compressor

A FLEXIBLE and economical compressor outfit which can be moved to the point of distribution has recently been placed on the market by the Chicago Pneumatic Tool Company. The feature of portability results in the elimination of line losses and expensive piping systems. Where air is used at a great distance from the compressor and where temporary piping is laid which is subject to much abuse, the line losses are very high. The economy effected by the elimination of



PORTABLE ELECTRIC-DRIVEN AIR-COMPRESSOR UNIT

these losses far more than offsets the difference in efficiency between one large unit and several smaller ones, not to mention the saving in time, trouble and expense of laying pipe lines.

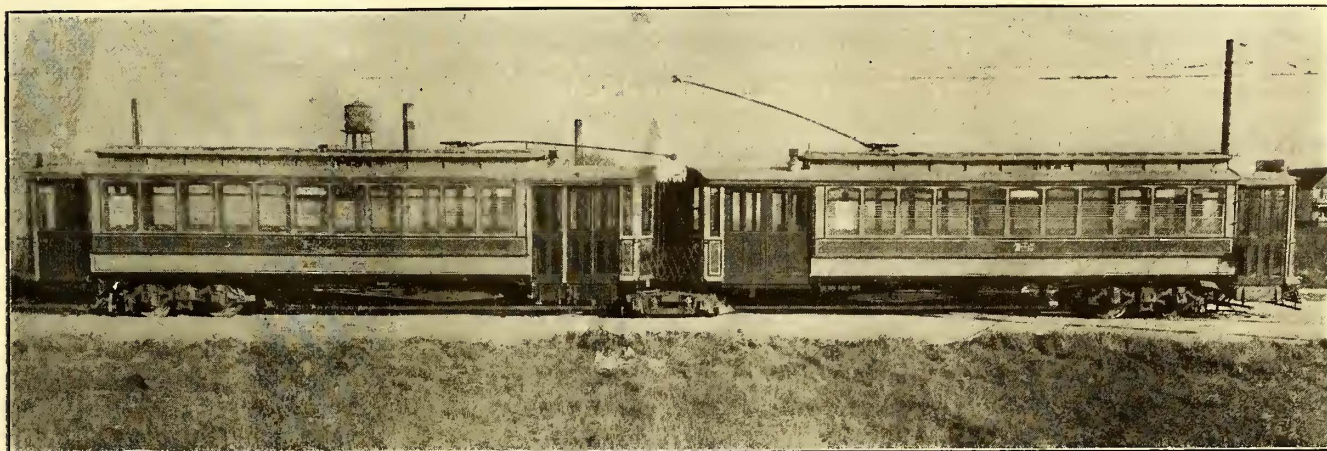
This rugged and simple compressor of the horizontal single-stage type is totally inclosed. It is hopper water-cooled and driven by an electric motor through herringbone gears. The complete outfit, consisting of compressor, air reservoir, motor and starter, is mounted on a substantial car readily adjustable to suit any track gage commonly found. Although this outfit is primarily designed for the mining industry, its usefulness is not confined to that field. It is possible to make it portable on almost any system so that a supply of air would be available for pneumatic tools. It is made in capacities of 147, 218 and 314 cu.ft. of free air per minute.

Milwaukee's Three-Truck, Two-Man Train Declared Successful*

General Plan of Construction of This Unique Equipment, Operated on Combined Urban and Interurban Property, Is Described and Other Experiences in Various Train Operation Related—Some of the Advantages Are Economy in Platform Labor and Increased Flexibility Over Single-End Trains Both in Service and at Carhouses

By S. B. WAY

Vice-President and General Manager Milwaukee (Wis.) Electric Railway & Light Company



MILWAUKEE'S THREE-TRUCK, TWO-MAN TRAIN BUILT FROM TWO OLD DOUBLE-TRUCK CARS

FOR a number of years electric railways have found it very difficult to obtain capital for new construction. Managements faced with the necessity of effecting every operating economy possible without a reduction in the quantity of service, and unable to spend money for new equipment, even though operating economies would certainly result, have found this necessity truly the mother of invention. The problems to be solved were: (1) To run more service through sections already congested to apparent capacity; (2) to do this with fewer trainmen; (3) to do this with smaller expenditures for power and for maintenance of tracks and cars; that is, to reduce the car weight per unit of capacity; (4) and finally, and this is controlling, to do the job without spending any money.

This problem had to be faced in 1917 to 1920, when equipment prices were advancing from twice to three times the values obtaining at any time in forty years. The problem, of course, has not been completely solved. Various attempts have been made with varying results. Perhaps a brief review of the experiments made over the course of several years in Milwaukee will be of interest.

The Milwaukee system is a combined urban and interurban property. In the operation of its interurban system the company has for many years operated interurban cars in trains, always, however, concentrating the power in one unit and employing two, three and even four plain trailers for the remaining units in each train.

In 1912, incident to a general plan of revamping and modernizing its old urban equipment, advantage was taken of the opportunity to regroup the motors on cer-

tain cars, making such cars capable of pulling trailers and at the same time avoiding the necessity for purchasing as much motor equipment as would have been necessary had all cars been re-equipped with motors. The experience on the interurban system naturally suggested that, in constructing trains, the second car should be a plain trailer and be pulled behind a suitable motor. During the years 1912 and 1913 all but seventy-two of the company's older types of cars were thoroughly overhauled and re-equipped, and fifty-four of these cars were stripped of motors, controllers, trolleys, etc., and arranged with detachable couplers and suitable light wiring and air connection, to permit them to be operated as trailers. As the system and all of the single-car units were arranged for double-end operation, it was necessary to make certain special track arrangements for the operation of these single-end trains around loops. These loops were generally placed some distance short of the ends of the lines upon which the trains were scheduled, resulting in short-route operation of the two-car trains.

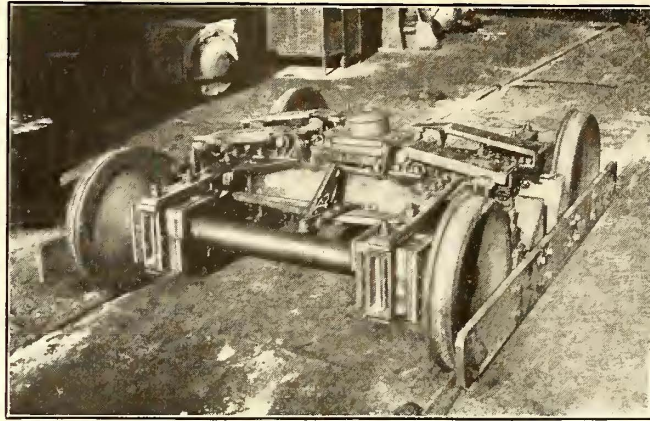
Experience with these fifty-four trains developed, of course, some economy in platform labor, but cost of loops and the lack of flexibility of the single-end trains, both on the system and in the car stations, deterred the management from extending train operation for some time thereafter. In the light of more recent experience it is difficult to understand why the cars were entirely stripped of motors and power wiring, controllers and trolleys and a less convenient and more expensive method of operation chosen. It would have been somewhat cheaper to arrange these same cars for double-end operation in two-car trains, thus making them available for use anywhere on the system with equal flexibility with the single-car units.

*Abstract of paper read before joint meeting of A. I. E. E. and W. S. E., Chicago, Dec. 17, 1920.

No further progress was made in the development of train operation in Milwaukee until about 1916, when the company undertook to build in its own shops fifty new cars of the center-entrance and exit and front-end exit type. These cars were equipped with two motors, maximum-traction trucks and multiple-unit control, with a view of operating in two- or three-car trains. In choosing these cars the advantage of double-end operation of the trains was recognized, although considerable additional expense was incurred in arranging the cars for both single-unit operation and train operation, which might have been saved by arranging them for train operation only. These cars operated in trains afforded further economy in the use of labor. The last of these cars were placed in service at the beginning of the year 1918.

The demonstrated advantages of double-end train operation, of course, suggested the idea of coupling up existing equipment where possible to achieve further economy in the use of platform labor. The company had a certain number of old cars more or less modernized which were equipped with two motors each. The controllers, standard on the property, are readily capable of handling four motors. The next development involved merely putting pairs of these cars together with permanent coupling, rearranging the wiring and carrying it through on the permanent coupling bar, stripping each car of one trolley and one set of air and electric controls and removing one air compressor. Cars so put together operated perfectly as double-end two-car trains.

While this development was going on, war conditions were rapidly advancing the cost of labor and material and platform labor was becoming extremely scarce, even though wages were rapidly advanced. Seventy-two of the oldest cars owned by the company and which had been excluded from the original program of reconstruction and modernizing had by this time become sorely in need of general overhauling if they were to be kept longer in service. Under ordinary circumstances it is probable that these cars, on account of



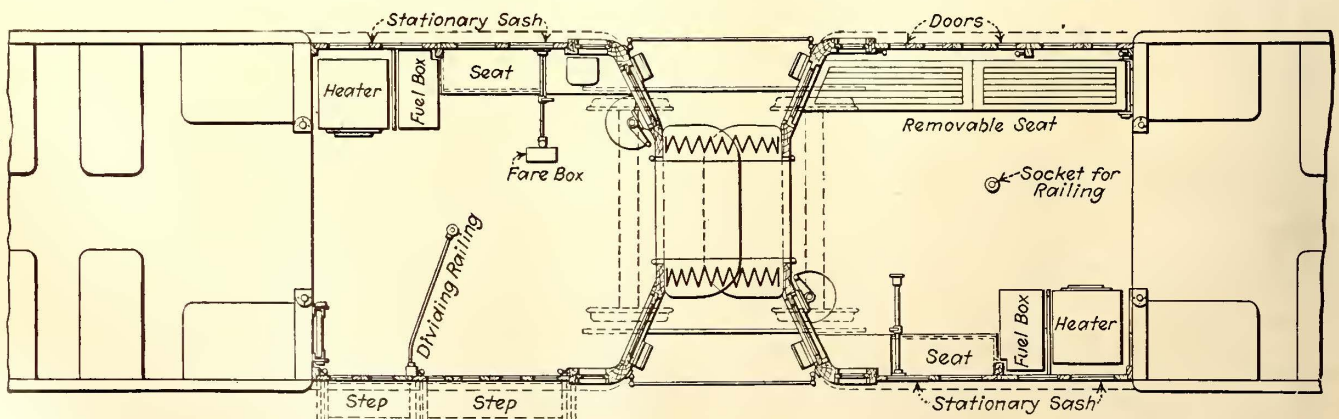
SPECIALLY CONSTRUCTED CENTER TRUCK HAVING INSIDE JOURNALS FOR USE ON THREE-TRUCK TRAIN

their extreme age, would have been scheduled for retirement from service. Under war conditions this treatment was of course out of the question. The problem presented was how to treat these cars, incident to the necessary repair and reconstruction, so as to derive the maximum benefit from the expenditure. It was reasoned that if double-end, two-car trains operated by three men were advantageous, as compared with single-unit operation with two men per car, a two-car train arranged to be handled by one conductor would be even more advantageous. This point was emphasized by two considerations, namely: (1) Scarcity and high cost of platform labor; (2) difficulty of making tripper runs attractive to men without payment of excessive bonus time.

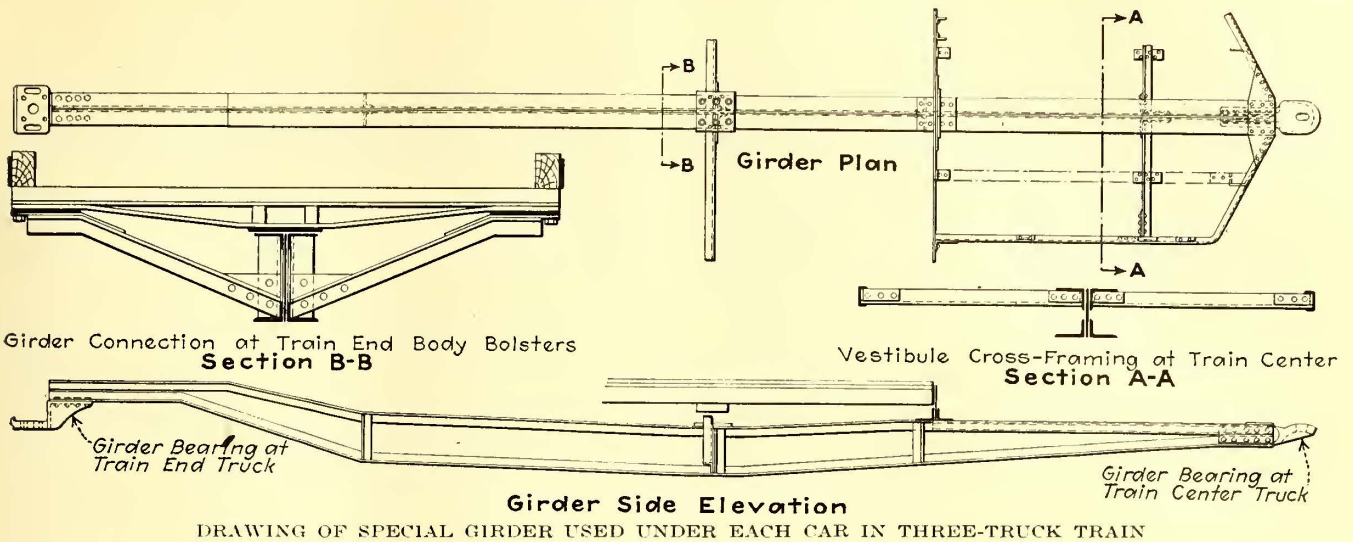
CONSTRUCTION OF THE THREE-TRUCK TRAIN

To handle a two-car train with one conductor in city service requires, of course, that the passengers be allowed to pass freely from one car to the other while the cars are in motion and rounding curves, etc. This requires the careful articulation of the cars and the elimination of all possible motion and displacement of the two car bodies at the point of connection. It also requires the location of the conductor at a point to control the admission of all passengers and the exit of all passengers from the rear car. This became virtually the same problem as that of the location of the conductor in a large center-entrance car. All of these requirements pointed to the connection of the two cars with minimum amount of space at the adjacent platforms and the support at that point of a single truck.

In adapting these old cars to these conditions it was necessary to support the old car bodies in substantially the same manner as they had been previously carried upon individual trucks, namely, at the car body bolsters. This was accomplished by placing under each car an auxiliary steel underframe beginning at the outer truck bolster and continuing through to the point of joining the two car bodies together. By suitable design, this steel underframe carries the weight of the car at the



FLOOR PLAN OF CENTER PLATFORMS



old car body bolster, provides adequate support for a greatly enlarged platform and transmits the load to the center truck, where a kind of ball and socket joint arrangement on the ends of the two main auxiliary girders permits both to rest and pivot on the center-truck kingpin and bolster.

The enlarged platforms were desired in order to provide space for the larger number of passengers to be handled and to accommodate the heating equipment. The platforms were connected by overlapping steel plates attached to the platforms, and arranged to permit the necessary joint movement on curves. The vestibules were connected by diaphragm. The motors of the cars were regrouped on the outer trucks, giving the train the same motor power as cars possessed when individually operated, and, accordingly, the same speed and power when arranged as a train.

In the actual reconstruction of these old cars into three-truck trains it was found possible to increase the combined seating capacity from 84 to 106 in summer and from 80 to 102 in winter, and the standing capacity an even greater percentage. The old car bodies were greatly strengthened by the use of the steel underframes. There were recovered from each pair of cars two trolleys, two sets of air and electric control, one air compressor, two standard trucks, besides various minor

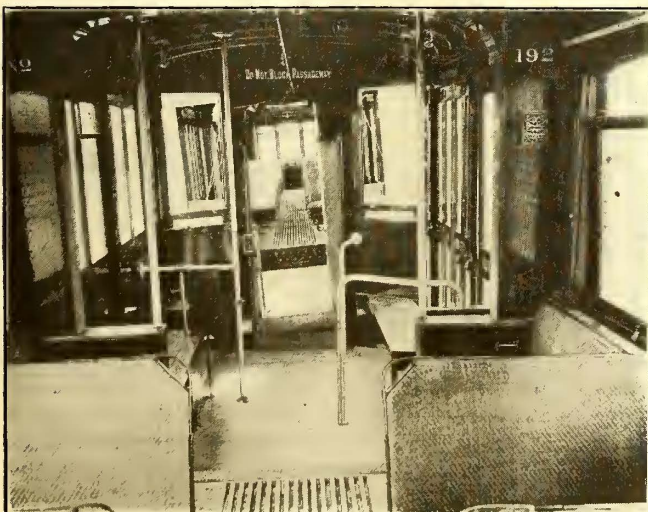
equipment, such as destination signs and headlights. And notwithstanding the addition of the third truck, new steel underframes and enlarged platforms, the total weight of the finished train is only slightly more than the combined weight of the individual cars.

On account of the exposure of the center truck, particularly on curves, it was found desirable to reduce the lateral dimensions of the truck and necessary clearance to a minimum. This was accomplished by building a special truck having inside journal boxes. A picture of this truck is reproduced herewith.

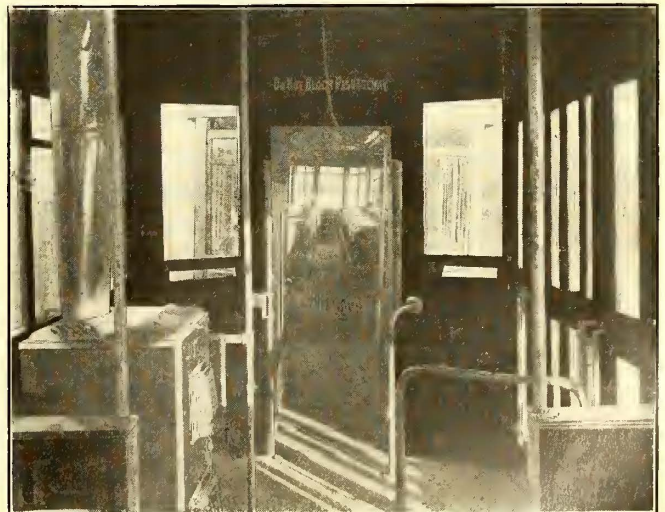
ADVANTAGES AND DISADVANTAGES OF THE THREE-TRUCK TRAIN

Experience has shown that these three-truck units have the following advantages:

1. Utilization of old obsolete equipment in a manner making it entirely acceptable for rush-hour service and for other special service, as well as for regular service on very heavy lines where the traffic justifies the operation of units of this size.
2. Economy in platform labor.
3. Adaptability for operation as either straight pay-as-you-enter or as a combination pay-enter and pay-leave system.
4. Better control of distribution of passenger load.



CENTER PLATFORMS, LOOKING FORWARD, SHOWING PLATFORM SEATS AND PASSAGEWAY BETWEEN CARS



CENTER PLATFORMS, LOOKING BACKWARD, SHOWING ARRANGEMENT OF STANCHIONS AND LOCATION OF HEATER

The disadvantages of the these units are:

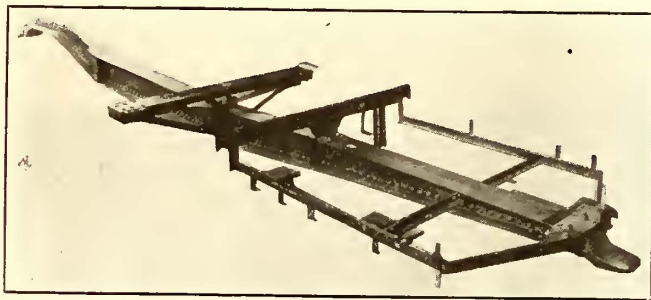
1. Difficulty of locating the trolley stand so as to be accessible to the conductor and yet avoid frequent leaving the wire on curves. Where electric switches are not operated, the preferable location of the trolley is over the rear truck. On a system operating single-car units and electric switches it is necessary to employ a special swiveling trolley which in practice follows the wire substantially as well as the standard trolley mounted over the car truck. It requires, however, to be equipped with two ropes in order to handle it around the diaphragm connection between the cars.

2. Slowness in loading, as compared with single-car units. The same objection, however, would apply to increasing the size of single cars. In Milwaukee operation this disadvantage is of no moment, as street fare collectors are employed at all congested corners to facilitate operation of all types of trains and single-car units during the rush hour.

In the particular case of reconstructed old cars into three-car trains these general results were achieved:

1. The winter seating capacity was increased from 40 per car to 102 per train, or 27.5 per cent.
2. The weight per seated passenger was reduced from 913 lb. to 735 lb., or 19.4 per cent.
3. Rush-hour capacity (as determined by standards of the Wisconsin Railroad Commission) per trainman increased from 30 passengers before reconstruction to 76 passengers, or 153 per cent.
4. Rush-hour capacity per trainman increased 31 per cent, as compared with largest two-car, three-man trains operating at same service standard with fifty-eight passengers per man.
5. Power consumption per passenger under rush-hour capacity reduced 26.6 per cent as compared with the same cars operated singly before reconstruction.
6. The net cost of providing the increased rush-hour capacity did not exceed \$72 per passenger, or less than one-half the cost per passenger of purchasing the cheapest character of new equipment.

In general the train has proved satisfactory in operating characteristics. Thirty-three of these trains are



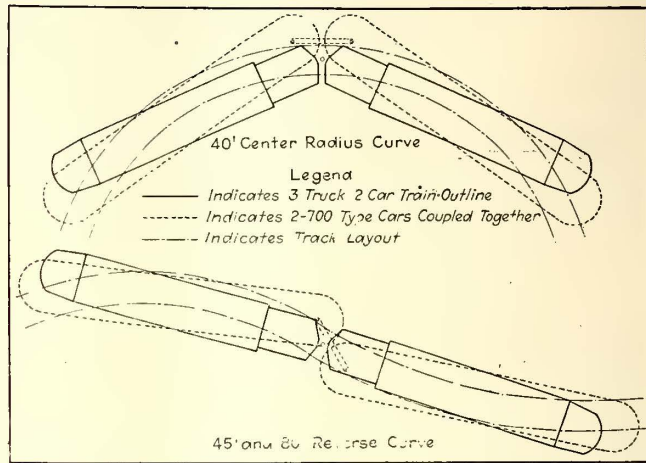
SPECIAL STEEL GIRDER UNDERFRAME CONSTRUCTED UNDER EACH CAR TO PROVIDE MAIN SUPPORT FROM CENTER TRUCK TO EITHER END TRUCK

now in service, the first one having been operated fourteen months. The passengers accepted the trains without comment or notice. They have attracted no special attention from the local public or the press. The trains keep their place on the road and do not get behind schedule to as great an extent as three-man trains.

With three-man trains the passengers show a preference for the first car in the ratio of about eight to five. With the three-truck train there appears to be no preference shown, but this may in part be accounted for by

the fact that the conductor has an opportunity to control the distribution of the load.

The gross cost of converting the old cars into three-truck trains, including thorough overhauling and repair of old bodies and trucks and enclosing the old semi-open platforms, averaged about \$3,000 per pair. The conservative value of the equipment recovered is more than \$900. The net cost of converting these very old



COMPARATIVE CLEARANCE DIAGRAMS OF THREE-TRUCK TRAIN AND ORDINARY TWO-CAR TRAIN ON CURVES

and obsolete and rather small cars into attractive trains which are economical and satisfactory for operation for many years to come is returned through direct saving in platform labor alone in less than one year.

No careful study has been made to disclose the further economies which might be achieved in constructing three-truck trains entirely from new materials. It is certain, however, that substantial gains would be possible in respect to weight, power consumption and first cost as compared with providing the same capacity in single cars or in two-car trains of the multiple-unit type. The cost of a three-truck train should not exceed the cost of a motor car and trailer of equivalent carrying capacity but requiring three men to operate.

GENERAL CONCLUSIONS

Experience in train operation on surface lines leads to the following general conclusions:

1. A comparatively large number of trains may be operated advantageously on any fairly large urban system. The maximum number that may be so operated depends on local conditions, but in general may be

Total cars owned.....	600
Total cars scheduled maximum rush hour.....	566
Total cars scheduled maximum non-rush hour.....	254
Total single cars.....	336
Total cars in trains.....	264
Single cars for shop.....	24
Total cars for regular inspection and washing.....	58
Single cars available for rush hour.....	312
Cars in trains for shop.....	10
Cars in trains available for rush hour.....	254
Ratio cars in trains to total cars.....	44 per cent
Ratio cars in trains to single cars.....	78.6 per cent
Ratio cars in trains to rush-hour trippers.....	81.4 per cent

taken as being equal to at least 80 per cent of the rush-hour trippers. From a traffic standpoint it would be possible to operate 100 per cent of the trippers in trains. Extra single cars for scheduled inspections and washing, but available for rush-hour service, accounts for the lower percentage of trippers in trains which can be operated in practice. Figures from the Milwaukee system, given above, will illustrate the point.

2. Trains load somewhat slower than single cars, but this disadvantage is largely overcome by using street fare collectors. Whatever disadvantages exist are small in comparison with the advantages derived from economy in platform labor and track space.

3. Cars in trains are economical and satisfactory for many classes of special service such as baseball, theater crowds, picnics and the like. In such cases loading and unloading time is relatively unimportant, particularly where cars are standing between going and returning loads.

4. In rush-hour and special service the distortion in headway is not important as cars run close together in any event.

5. The use of a substantial percentage of the total equipment in trains assists greatly in working out good runs for the men, also in reducing the number of extra men and payroll time not worked. The more rigid the agreement or rules under which the men work respecting percentage of straight runs, limits on spread of duty and extra time for overtime the more advantageous train operation becomes from the labor standpoint.

6. It is practicable to operate an unpowered unit of

a train either ahead or behind the motor car. The control is easily carried through and the train operates as well in one direction as the other. This is of importance mainly on systems which operate double-end. Double-end trains are, of course, easier to handle in car stations and admit of short routing without loops.

7. It is not desirable or necessary to couple and uncouple trains daily or even frequently. Automatic air and electric couplers are expensive and any other kind involve serious hazards in operation. Couplers must swing through a long arc and even if automatic, as far as making connections is concerned, they must be handled with extreme care if frequent injuries to hostlers and other employees are to be avoided. About the only excuse for the use of readily detachable couplers is to enable one car of a train to continue in service if the other is disabled. A non-detachable coupling greatly simplifies and cheapens the making of trains from single units.

8. It is important to use folding steps and platform-inclosing doors in train operation in the interest of avoiding accidents to passengers who attempt to board or leave the leading car while in motion.

Duties of Bridge and Building Inspectors

A Standard Form for Instructions Is Given for the Guidance and Information of Inspectors, with the Salient Features of Their Duties—Importance of Properly Trained Men Recognized

By HOWARD H. GEORGE

Engineer Maintenance of Way Public Service Railway of New Jersey

THE Public Service Railway of New Jersey long ago recognized the importance of properly trained men for performing inspection work and standard instructions were compiled which were the result of very careful study of the requirements for the particular class of work under consideration. Sometimes new men are employed whose experience has been rather limited in the particular field in which they are placed and such men must be trained for the requirements of their new positions. Some men are more apt than others and absorb and retain information more readily. Individual instruction is desirable in many cases where special considerations are involved, but this frequently results in a duplication of work on the part of whomever may be in charge, and verbal instructions are frequently forgotten by the inspector. More often, the engineer in charge will unintentionally neglect to give the proper instructions on points to which it is essential that special attention be given, and there is very frequently a decided lack of uniformity in the instructions issued to different men on the same class of work. This practice, in many cases, leaves entirely too many

questions to the individual judgment of the inspector, and where the experience of the latter has not been very broad this is liable to lead to difficulties.

In this article is reproduced a standard set of instructions which have been in use a number of years for the guidance and information of inspectors on building and bridge construction. The advantage of having such standard instructions to turn over to such men is that during the few spare minutes that may present themselves the inspector has an opportunity to refresh his memory as to what is required and expected of him. The salient features of his duties are more apt to be impressed on his mind, and it relieves him of uncertainty and avoids many delays to the work which would otherwise occur while he is awaiting definite instructions. When arranged in convenient pamphlet form they can be readily carried and referred to from time to time. In addition, the engineer or architect in charge of the work is relieved of some of his worries because he is assured that his inspectors have at least been properly instructed. The following instructions will be of service in such cases.

Information for Building and Bridge Inspectors

Carefully study all plans, elevations or other drawings, and also all specifications, and see that the drawings are in conformity with each other and with the specifications.

Check all figures and dimensions on plans and details; check shop details as they are received to see that they do not conflict with scale drawings; also check all erection drawings in

order to recommend some other procedure in an emergency should the necessity occur; also see that the specifications or special intentions agree.

Keep on the work in an accessible location special copies of all drawings, details and specifications, and carefully note on same any changes from the original plans, so as to keep a complete record of the work constructed.

Familiarize yourself with all local conditions or ordinances affecting the work and see that the same are rigidly adhered to.

Make the acquaintance of and keep in touch with the general contractor and all sub-contractors or other principals engaged on the work.

Establish diplomatic relations with adjoining property owners or residents,

and see that all their rights are respected by the contractors.

Acquaint yourself with all traffic arrangements, whether regular or special, that may interfere in any way with the progress of the work.

Secure full information concerning the conditions of steel work being fabricated in the mills or shops; also of any other materials that may be under the course of construction, and ascertain the names of all contractors for same, date of orders and the probable date of shipment, and if necessary closely follow up same in order to secure proper delivery.

Should any incomplete work be fabricated that will need attention and correction at the site carefully look out for and see that all corrections are made before same is incorporated in the structure.

MATERIAL SHORTAGE CAN BE PREVENTED BY CAREFUL CHECKING

Keep a record of the arrival of all materials. The contractor's record should be sufficient, if suitable, but should be carefully checked. Strive to anticipate any shortage of material and use all available facilities to hasten delivery; also arrange for the proper storage of same on the site.

Try to anticipate the need of detail drawings and notify the engineer or architect regarding same.

Study the progress of the work and try to determine whether it will be completed in the specified time, and, if in your opinion it will not be finished as specified, endeavor to secure such additions to the force and equipment as will secure completion within the allotted time.

See that the company's photographer is kept informed as to the progress of the work and that "progress photographs" are taken at least every ten days.

Keep a daily record of the force employed and the distribution of labor in such a manner as will clearly show the progress of the work, and also of all equipment in use at all times.

When "unit prices" are called for make a careful report of the cost of all material and labor which are included in same, separating the two items.

NEVER INTERRUPT SERVICE WITHOUT NOTIFYING TRANSPORTATION DEPARTMENT

Where necessary to interrupt regular car service see that sufficient notice is given the transportation department. Have full preparations made beforehand, so that such interruption shall be as short as possible and will occur at such a time as will least interfere with normal operation. Make a record of all delays to operation caused by such work; also see that proper signals are displayed for the protection of cars.

Keep in close touch with the office and designing engineer or architect and consult with them frequently as to the interpretation of all drawings or specifications.

Exercise a constant supervision of any sheath piling, underpinning, forms for concrete, or any other false work or temporary structure, and see that same are properly maintained and not removed until all masonry is set.

Keep careful account of any extra work in order to be able satisfactorily to explain and check all extras. Keep a daily record of the progress of the work in a separate field book for each job. Note the same, and, if any disputes arise, their settlement; also note variations, if any, from the plans or specifications. At the completion of the work see that all plans and specifications are corrected to agree with the work as constructed and make a final report showing costs where required.

Make careful preparations so that erection may proceed rapidly and that the period of any disturbance or delay may be reduced to a minimum.

See that all piping or sleeves for same are built through walls and that all other piping, conduits, drains or ducts called for in the plans are placed in the proper position and before any floors are laid or masonry constructed; also see that all chases or recesses are left in walls to receive piping, etc.

See that the substructures are placed and constructed in a manner that will conform to the steel plans.

Where piles are used in the foundation, the inspector shall see that they are properly driven and that they are cut off at the correct elevation.

PROPER SHORING WILL PREVENT TROUBLE FROM SHIFTING EARTH

Carefully observe all surface and subsurface conditions and see that all excavations are shored or sheet-piled where necessary. If surface drains are necessary see that same are installed in advance of masonry. Be sure that all waterproofing is thoroughly jointed and lapped. Do not allow back filling against green walls unless same are braced; also see that all back-fill is well puddled.

See that the grades of pipes are uniform and properly supported, and that all plumbing work conforms with the requirements of the local authorities. See that all joints are carefully made and watertight.

Where concrete is required, see that the proper proportions are used and that the materials are up to the specifications. See that all reinforcement is placed in its proper location and held in such a manner that the placing of the concrete will not disturb it.

Where blasting is necessary see that the proper protection and warning is given to the public and to the cars operating in the danger zone, and that it is done at such a time as to cause the least interference with operation. The charges are to be so regulated and covered that no damage will result.

See that all machinery and boiler foundations are built true to detail. See that all stone or terra-cotta work is perfect before same is placed in the work, and also see that all brick or

other mason work is laid and anchored as specified. Be careful to see that all concrete work, whether reinforced or otherwise, is constructed as specified in all particulars.

See that all furring is in place and firmly secured before plaster work is started, and that sufficient time is given between coats, and that a proper backing is prepared for all tile and marble work.

See that all work is carefully aligned and accurately fitted. Closely watch the painting of all work.

Carefully examine all work before same is installed. See that all framing is accurately made and anchored and that all roughing and furring is built in. All finished work should be carefully inspected as to design, finish, etc. If necessary have a "mill inspection" made. Trim must not be applied until plastering is dry. See that all hardware is properly attached, including that to metal-covered work.

See that all flashings are carefully built in.

Be constantly on hand when work is in progress and note any damage to the metal, failure to conform to the specifications, or any special difficulty in assembling.

Make sure that each member of the structure is placed in its proper position. If match marks are used examine them with care. Endeavor to have the several members assembled in such order that no unsatisfactory makeshifts need be resorted to in getting some minor member in place.

Watch carefully the use of fillers, washers and threaded members to see that they are neither omitted nor misused.

Make certain that all parts of the structure are properly aligned and that the required camber exists before riveting. It is possible for a structure to be badly distorted although the rivet holes are well filled with bolts.

Watch the heating of rivets to insure against overheating and to make sure that scale is removed.

Examine and test carefully all field-driven rivets and have any that are loose or imperfect replaced.

Have cut out and replaced all rivets whether shop-driven or field-driven that may be loosened during erection and riveting.

Prevent injury to metal while removing rivets.

A careful and complete record in detail must be kept of the cost of all alteration or repair work wherever work of this nature occurs in any part of the construction; also a detail of the estimated cost to reproduce any and all structures that may be torn down, removed, or otherwise destroyed shall be kept, and a report in full sent to the engineer or architect immediately.

A careful check should be kept at all times of the amount of money being expended, and if there is any indication of a likelihood of the amount authorized being exceeded, notice thereof shall be given the engineer or architect immediately.

Financing Public Service

President Gadsden Shows Relation of Credit Restoration to Rate Adjustment, Delayed Due to Lack of Knowledge by Public—Says Utilities Should Give Full Explanation in Understandable Terms

URGING a complete, simply worded program of public information, with all facts disclosed as a means of restoring credit, President P. H. Gadsden of the American Association addressed the Indiana Public Utilities Association, at Indianapolis on Jan. 13, on the subject of "Public Service Financing." After reciting the war troubles which led to the appreciation of the necessity of public utilities and of the mutual dependence of all industries and emphasizing the financial straits of utilities in spite of this, he pointed out the layman's difficulty of understanding this when he sees other industries prosperous. He then proceeded to outline the situation as follows:

"It is only natural when a business is in difficulties that one should look first to the management to discover if therein lies the chief trouble. To such an investigation the public utilities of the United States can freely submit themselves without fear of the result. While there may be, and doubtless are, isolated cases of bad management in the business throughout the country, for, indeed, no industry's management is 100 per cent perfect, it is safe to say that on the whole the public utility properties are managed with as high a degree of efficiency as any other lines of business in the world. Hence they must be discharged on that count.

"From considering the management it is a very natural step to the cost of supplies, and turning to them we find that the coal, oil, rails and other supplies of public utilities are purchased in the same market as are those of other industries and at the same price. It follows then that here is no unusual situation.

"Again it is not a lack of business that is to blame for the public utility situation because the demands on their facilities never have been greater. Electric railways have all the traffic that they can carry. The demands on gas, electric light and power companies are unprecedented, and from every section of the country comes the declaration that the capacities of telephone and telegraph companies are severely taxed and that obtaining a sufficient quantity of new supplies to handle new business is one of their greatest problems.

REGULATION INTERFERES WITH LAW OF SUPPLY AND DEMAND

"In the face of this situation, then, it is obvious that there is some one thing which differentiates the public utilities from other classes of business. Somewhere there is a difference in operation which has created the broad and gradually widening chasm between prosperity and ruin. To the practical public utility operator the cause is plain.

"It is the regulation of public utility rates that is the basic cause of their troubles.

"The laws of supply and demand which normally should regulate public utilities are artificially interfered with. The natural operation of these laws are so checked and diverted that they operate only on the expenses of public utilities and not on their receipts.

"It is unfortunate, but it is true, that the fact that public utility rates have been fixed by commissions and

not by the law of supply and demand has gradually impressed the public with the idea that the whole field of public utilities is removed from the operation of economic laws."

Tracing the rise in prices of all supplies and the necessary rise in labor prices, Mr. Gadsden said that proportionate advances in rates should have been made simultaneously, and then proceeded to say:

"The results of this inequitable advance in payment for services rendered has been that public utility companies throughout the United States today are in financial difficulties and many street railway companies are in bankruptcy. Credit of gas companies is greatly impaired and it is with the utmost difficulty that new money can be obtained to make the necessary and required extensions which every gas company must make continuously if it proposes to give good service to growing communities."

As a cause for what he termed "this chaotic situation," Mr. Gadsden pointed to the rigidity of the present system of regulation. This, he said, is a defect. The system is devoid of easy flexibility which would enable it to meet emergencies such as those created by the war.

COMMISSIONS HAVE RESPONDED ABLY

"The trouble lies very largely in the system itself and is not the fault of the commissions that regulate public utilities. The Public Utilities Commissions of this country are filled with honest, capable, conscientious men who are striving diligently to do their utmost to relieve public utilities of their great and sometimes seemingly insurmountable problems. Generally speaking, these commissions have responded to the very best of their ability to the demands of the situation. But the fault in the regulatory system lies beyond their power to remedy.

"The great need in the public utility field today is credit and this need links up directly with rate adjustment.

"It is absolutely necessary if public utilities are to continue to function that they must establish new credit and create a flow of new capital into their securities. The answer to this whole problem is the granting of rates to public utility companies which will insure a return to the security holders that will induce them to invest. Nothing less than this sort of an arrangement will save the public from ruin.

"Adjustment of public utility rates to a basis that will attract new money into the field will be hastened by a thorough public understanding of the public utility problems.

"The best way to bring about that understanding is to be frank and advertise.

"Frankness must go hand in hand with advertising else advertising fails. Therefore, be prepared, when you begin presenting your story to the public, to tell the whole truth about your business to every one. As the only customer of the public utilities, the public is entitled to know all about their business, and any public utility which cannot stand the searchlight of honest public inquiry cannot hope to obtain help through favorable public sentiment. Put your house in such order that you will fear the questions of no man.

"Advertise by every possible channel and hit the line hard. Tell your story in electric railway car cards, in the display advertising columns of the daily newspapers,

through your employees—tell it everywhere that there is blank space which you can fill.

“Present your facts simply, frankly and honestly. Make it plain that the public utility problem is the problem of every man, woman and child who uses your service. Strive by frank statement to convince consumers that you are trying to do the best thing for their general good and that in their own selfish interest, if nothing else, they should interest themselves in your efforts. The way to accomplish this result is not to make the flat statement that this is your intention, or to submit to the public a large indigestible volume of statistics, and then sit down and wait for the millennium. The thing to do is to explain your situation in understandable terms to just as many folks as possible. If you have a good case, as most public utilities nowadays have, and you will tell the whole truth about your situation in a simple and convincing manner and give it deserving circulation through the best available advertising medium, you are certain to rally the public to your support.”

Fighting Snow on the Milwaukee

Division Master Mechanic in Charge of Equipment on the Rocky Mountain Electrification Tells How the Track Is Kept Open—Snowslides Are the Greatest Enemy of the Snowplow

ONE advantage of the electric over the steam locomotive in cold and snowy climates is the greater ease of keeping the tracks clear of snow. This, among other points, is explained in the current issue of the *Electric Journal* by E. Sears, division master mechanic Chicago, Milwaukee & St. Paul Railroad. He states that a moderate depth of snow, 4 to 5 ft., unless it is heavily packed, and even greater depths extending for only a short distance, can be removed most easily by means of the wedge type snowplow. The railroad has a number of double mold board Barr plows of this type, which are placed ahead of loaded ballast cars and driven at high speed through the snow by two or three locomotives. These are usually able to take care of the snow situation in the Rocky Mountains, as the snow does not usually attain as great depth in this territory as in the coastal ranges. When fighting snow in this manner the members of the crew are continually wet from the snow which is melted by the heat of the locomotives. Snow is necessarily shoveled into the firebox with the coal, making steaming difficult. A considerable gang of laborers with snow shovels is usually carried for use in emergencies.

For deeper snows the railroad employs six rotary plows, mostly in the Bitter Root and Cascade Mountains. The plow is pushed ahead of the locomotive, boring its way through the snowbanks. The rotary wheel is about 12 ft. in diameter. It is faced with knives, which cut into the snow; this is thrown by centrifugal force out of the chute at the upper part of the housing. The snowslides are the greatest enemy of the snowplow in the mountain district, as they cover the tracks to considerable depths; at times they catch a plow and bury it completely. In one case one of the electric locomotives without a rotary plow attached ran into a large drift and several visiting electrical engineers who were on the locomotive were entirely buried in the snow, which forced itself through the broken windows and filled the cab.

Prior to the electrification, as many as three or four steam freight locomotives were placed behind the rotary plow. Now the rotaries are handled by one electric locomotive and, inasmuch as each half of the present freight locomotives, when not coupled to the other, can be run as a separate unit, only one unit of the engine is sometimes employed, although in heavier drifts both units can be cut in, giving full power to push the snowplow.

The heavy snowfalls do not interfere with the electrical operation over the mountain territory as much as they did with steam, since an electric engine will plow through snow where a steam engine will not go. The heavy snows have no bad effect on the overhead wiring. At times heavy frost collects on the two No. 0000 copper trolley wires. With a pantograph of the double-shoe type, sliding on two trolleys whose hangers are spaced alternately, excellent current collection is obtained at all times and sleet and frost have not so far caused trouble to any extent. Sometimes during heavy frosts both pantographs are raised, the front one serving principally to clear the wires.

Experience indicates that snow fighting can be done better with electrical equipment than with steam. The electrical equipment gives better speed control, as there is no difficulty in securing all the power desired and there is no opportunity for the freezing up of injector pipes, etc., on the locomotive, or necessity of having to go back for water or fuel, except to meet the fuel and water demands of the rotary plow itself.

The only change necessary to adapt the rotary snowplow to use in the electrified territory was the attaching of a deflector on the upper part of the rotary hood, so that the snow and other material, when thrown out, would not come in contact with the power limiting and other wires. These are at such a height that a rotary, in its original condition, would throw the snow onto the wires, and trouble was experienced from this cause when the rotaries were first operated in the electrified section.

Mr. Sears concludes with the statement that, no doubt, in the near future rotary snowplows will be built with electric motors instead of steam engines for electrified territory, and the old ones will be changed over for electric operation. The only drawback to operating the plow itself with motors is that quite often the rotary wheel will freeze, in which case it is necessary to have steam available to thaw it out. This difficulty could be overcome by using a small boiler similar to the ones which are now being used for heating the passenger trains.

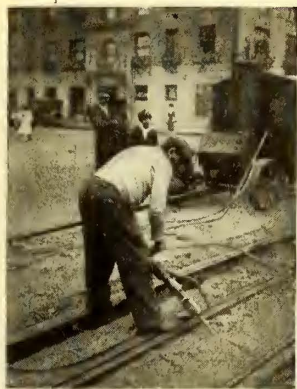
New England Club Meets

TWO meetings were held at the American House in Boston by the New England Street Railway Club on Thursday, Jan. 6.

In the afternoon Col. Thomas F. Sullivan, former roadmaster of the Boston Elevated Railway and now Commissioner of Public Works, city of Boston, gave a short talk on “Snow Fighting.” There followed a discussion of some length on this subject by various railway managers of New England roads, after which dinner was served. The evening meeting was in the nature of a reunion. Many of the past-presidents of the club were present and gave short talks on the growth and accomplishments of the club during its twenty years of existence.

Shop, Track, Power and Line

These Articles and Ideas Are from Men on the Job Who Find Special Applications and New Methods an Incentive for Greater Effort — If You Have Something Good Pass It Along



Broken Switch Casting Reclaimed by Electric Arc Welding

An Ingenious Method of Repair Used by the New York Railways on a Broken Switch Casting Which Made It Practically as Good as New and Accomplished It at a Substantial Saving

By A. MCGREGOR

Chief Engineer Arc Welding Machine Company, New York

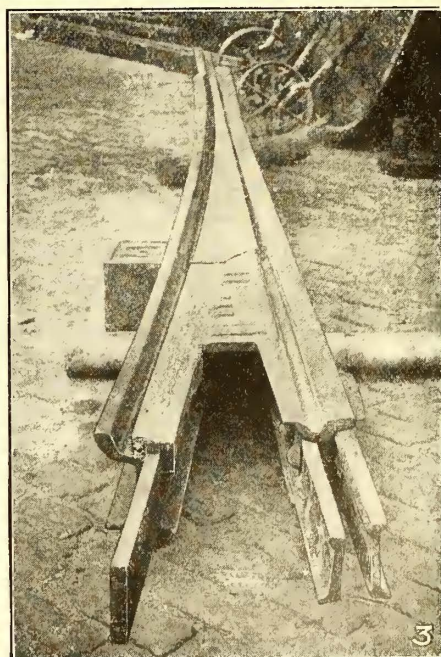
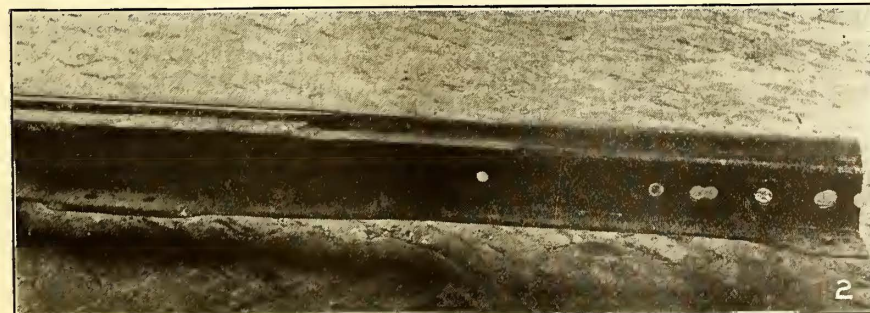
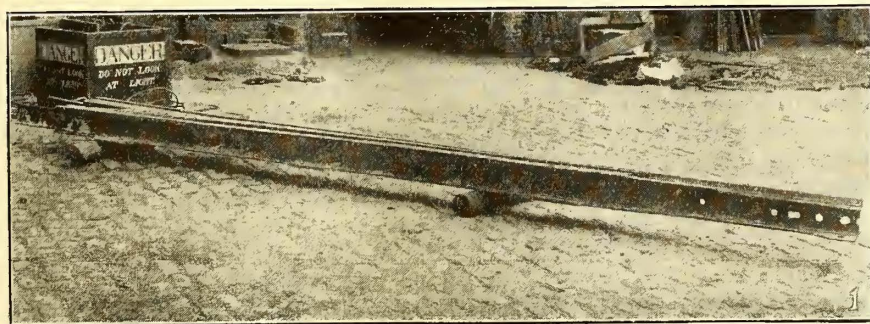
A RIGHT hand standard switch casting which had seen service on the New York Railways system as a one way switch at Fifty-ninth Street and Sixth Avenue for a number of years finally became so badly worn and broken that it had to be removed. It was found that at a place about half the length of the switch tongue, where the car wheel started to bridge the switch tongue and the running rail, to the end of the casting the running rail was worn to a maximum depth of approximately $\frac{1}{8}$ in. At the end of the casting the splice plates were broken, and the rail had been so weakened by wear that the head of the running rail was broken off for a distance of 27 in. from the end. A somewhat similar condition was found at the heel end of the casting. Not only was the head of the running rail

worn and a section 20 in. long broken off but the gage line of the running rail was also worn away for approximately $\frac{1}{4}$ in.

A short time ago this casting would have been scrapped. In fact, some of the less progressive roads still scrap such sections, but the maintenance of way department of the New York Railways was equal to the occasion. It removed the section to the yard and by using an electric arc-welding machine built for it by the company with which the writer is connected, it not only reclaimed the casting, making it practically as good as new, but also accomplished it at a saving of approximately \$350.

METHOD USED FOR REPAIRS

It was interesting to see the ingenious manner in which the repair was made. At both ends where the running rail was broken a steel plate 1 x 5 in. was arc welded solid to the web and another piece of steel 1 x 2 in. was arc welded to the top edge of the plate to form the head of the rail. The plates were prepared long enough so that they extended approximately 16 in. beyond the end of the rail, thereby forming a splice plate on one side of the web at each end.



No. 1. Switch casting reclaimed by electric arc welding.
No. 2. Toe end of casting, showing section of running rail, 27 in. long broken off. Also showing worn section of running rail built up by the electric arc (partly finished).

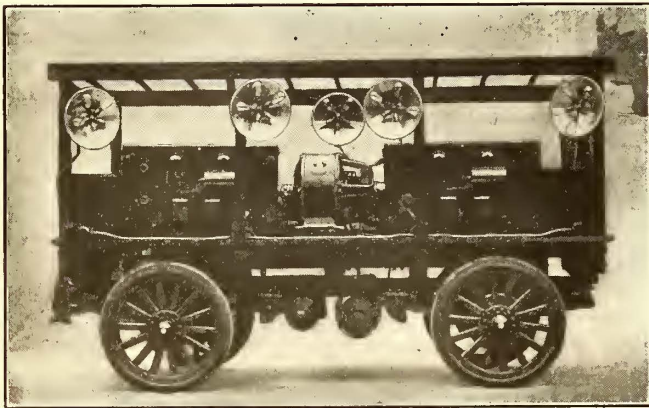
No. 3. Heel end of casting, showing how worn and broken section was repaired. Note the steel plate which forms the head of the running rail and also the splice plate. Observe how the gage line of the running rail was brought back to normal.

COST OF RECLAIMING BROKEN SWITCH CASTING

Cost of new casting complete	\$500.00
Cost of repairing old casting.	
51 hours welding}	\$42.78
18 hours grinding}	
35 lb. $\frac{1}{16}$ in. electrodes (hard steel)	14.35
40 lb. $\frac{1}{16}$ in. electrodes (mild steel)	7.40
200 lb. 1 in. x 7 in. rolled steel plates	20.00
30 cu.ft. acetylene } for cutting90
100 cu.ft. oxygen }	1.30
New switch tongue	78.00

Actual saving by electric welding..... \$335.27 \$164.73

The top and inside edges of the plates were built up with steel by means of the electric arc, until the head of the rail was brought back to normal. For a depth of approximately $\frac{3}{8}$ in. from the top a layer of special hard grade steel was used. Where the rail was worn but not broken the surface was built up with mild and hard steel, until, after grinding, all sections were brought back to their original dimensions. No attempt was made to weld the switch tongue. It was simply replaced with a new one. The switch casting was made



PORTABLE TWO ARC ELECTRIC WELDING MACHINE
USED BY THE NEW YORK RAILWAYS

by the Lorain Steel Company. The center section of the rail is of manganese steel and is keyed into the steel casting.

The writer was informed that this is only one of a number of cases where the use of electric arc welding has saved the company considerable money and lengthened the life of equipment. At some crossings the company has replaced worn and broken manganese hard centers with special forged tool steel plates, arc welding the plates in place. At another location where a long section of the rail had been broken out, and where the expense of removing the pavement to replace the rail would make its replacement costly, it was found that with the aid of the arc it was able to graft a new section of rail in place without disturbing the pavement to any great extent, consequently adding another achievement to its credit.

High-Speed Tool Steel

MODERN high-speed tool steel is a high alloy, the essential contents of which are within the following limits: Carbon, 0.5-1.0 per cent; tungsten, 12-20 per cent; chromium, 1.5-6.0 per cent, and vanadium, 0.5-2.0 per cent. Tool steel has several unusual characteristics peculiar to itself which are intimately connected with its treatment and utility. To obtain its best properties by hardening, it must be heated to an excessively high temperature such as would ruin simple steels. After this treatment tool steel will not

lose its hardness on tempering until heated above a dull red heat. This valuable property explains its great superiority over carbon steels, which begin to lose hardness appreciably on tempering at 200 deg. C., while for high speed steel this loss does not occur until about 700 deg. C. is reached.

Construction of Dry Kilns

BASED on the experience of the United States Forest Products Laboratory the following notes have been prepared for the benefit of all users of wood. The notes regarding dry-kiln construction will be particularly suggestive to electric railway master mechanics.

Where insurance rates permit, a well-built wood kiln is very satisfactory, wood being a very good insulator, easily repaired and cheaper than the other materials. The chief objection to the use of wood, aside from fire risk, is its tendency to swell and shrink with alternate moist and dry conditions, causing more or less working of the frame and loosening of nails. All lumber should be thoroughly seasoned. Fir, Douglas fir, yellow pine, redwood, cypress and similar woods with low shrinkage rates should be used for sheathing and sills. For frame timbers any good straight-grained material is suitable. The sheathing should be shiplap laid horizontally and nailed twice at each stud, in the middle and at the bottom of the board. Outside walls should be sheathed on both sides or sheathed inside and plastered outside. They should also be insulated with a good moisture-proof, heat-resistant insulator. The ordinary quilt insulations sewed between so-called waterproof paper have not proved satisfactory in dry kiln construction. Walls should be painted on the inside with asphaltic paint. Where lumber is plentiful, crib or laminated construction may be used, the walls being built up of 2 by 6-in. planks laid flat, and the roof of similar material laid tight together. If the planks are well seasoned and well manufactured this form of construction permits very little heat loss, but if the lumber is low grade and knotty a tight, weather-resistant construction is extremely difficult to obtain. The shrinkage of the walls is excessive and causes considerable trouble at door jambs and where pipes pass through the walls.

Brick or hollow tile is procurable almost everywhere, and where permanency is desired is usually more satisfactory than wood. The brick or tile should be hard burned. The walls should be laid up in tempered or cement mortar. Unequal expansion in the exterior walls, caused by the difference in temperature of the outer and inner faces, is almost certain to create numerous small cracks, which should be painted up with an elastic cement rather than mortar. A kind of tile should be chosen that has openings running horizontally rather than vertically in the wall. The tile should be scored for plastering. Both sides of tile walls should be plastered with cement mortar. When brick, tile or concrete kilns are more than 50 ft. long it is advisable to build both the exterior and interior walls 12 in. thick, particularly if fireproof roofs are used.

Walls of monolithic concrete or of concrete blocks are highly absorbent of moisture unless thoroughly water-proofed. It is very difficult to hold a high humidity within a kiln whose walls absorb moisture readily. The heat loss through such walls is also very great.

In comparing the above types of kilns the choice will depend upon the relative importance of the first cost, maintenance and fire hazard.

Interurban Freight Terminal Opened

Modern Facilities Result in Improved Service and More Efficient Handling and Delivery of Freight in New Terminal of the Northwestern Pennsylvania Railway in Erie

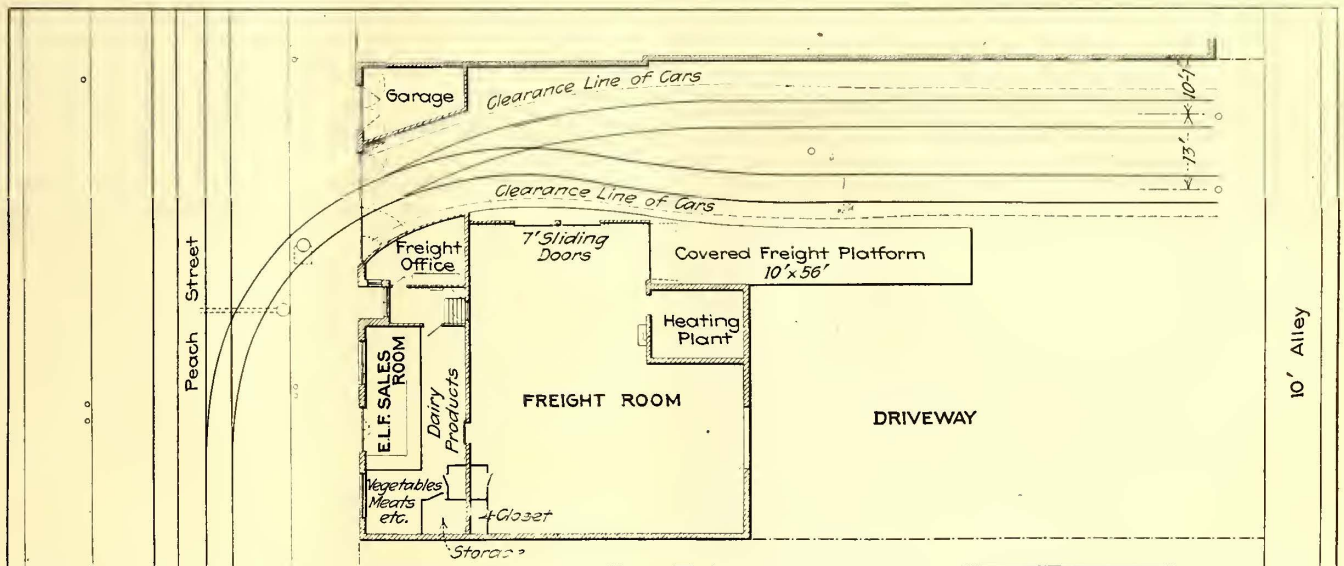
FOR several years prior to 1916 the interurban freight business of the Northwestern Pennsylvania Railway and of the Cleveland & Erie Railway in Erie, Pa., had been conducted in cramped quarters in a small storeroom on Peach Street. Both inbound and outbound freight was handled in this outgrown and obsolete terminal building. Freight cars were stopped on a passing siding near the center of the street and all freight was hand-trucked across the sidewalk between the car and the building. This arrangement was a nuisance to both pedestrians and drivers of vehicles and the cost was all out of proportion to the work done. The volume of business demanded facilities for handling freight more economically and plans were adopted with that end in view. A formal request was made of the City Council for a permit to install and operate a switch from the main track in the street across the sidewalk into the proposed freight terminal and a lease of adjoining property necessary for the

Street, approximately 69 ft. x 56 ft., with a covered platform 10 ft. x 56 ft. extending from one corner parallel to the track extension which serves the terminal. In the opposite corner from the covered platform and facing the spur track is the freight office, while behind it and extending along the street is a room in which vegetables, meats, dairy products, etc., are handled. Cars can be loaded and unloaded through a door directly from the freight room or freight can be trucked onto the platform and then into the cars. In back is a spacious driveway for the receiving and distribution of freight from the covered platform.

Working Capital in Valuations

IN A supplement to the November issue of its publication, the *Annals*, the American Academy of Political and Social Science, Philadelphia, Pa., prints a paper by Dr. Delos F. Wilcox entitled "Working Capital in Street Railway Valuation."

Dr. Wilcox in this paper cites numerous cases of valuations of electric railway properties in which the subject of working capital has been considered and argued upon and in each case points out the fallacy of the arguments brought forward to sustain a working capital fund as a part of capital value when the working



PLAN OF FREIGHT STATION IN ERIE, PA.

execution of the plans was obtained. The plan provided for a double-track layout of five cars capacity and a freight house of ample floor space with all freight handled through entrance and exit in the rear, where wide driveways afforded opportunity to load and unload at the rear freight house door, or along a covered platform, or directly from the car, as circumstances might make most convenient. However, this plan was not carried out at that time due to the refusal of the City Council to issue the necessary permit because of protests from adjacent property owners affected. After much controversy and through the aid of many business organizations that found themselves deprived of necessary service, the Council finally passed the ordinance, which in due time was approved by the Public Service Commission, and on Oct. 21, 1920, the new freight terminal of the Northwestern Pennsylvania Railway was placed in operation.

This new freight terminal is a building on Peach

capital is figured or based upon the record of the company showing cash on hand from time to time. What Dr. Wilcox supports as the correct position with respect to working capital in street railway valuation is that the entire amount of money required in advance for the purchase of materials and supplies and for other prepayment is much more than offset under normal operating conditions by the accumulation of cash from the daily revenue collections in anticipation of the payment of deferred expenses, and that therefore a street railway company with a fully developed business and receiving from its patrons a revenue sufficient to cover the full cost of service is not entitled to any allowance whatever for permanent working capital as a part of the capital value to be taken as the basis for rate fixing.

Among the cases cited for analysis with reference to working capital are the valuation of the Pittsburgh Railways, the Cleveland Railway service-at-cost contract and operating record, the reserve fund in the

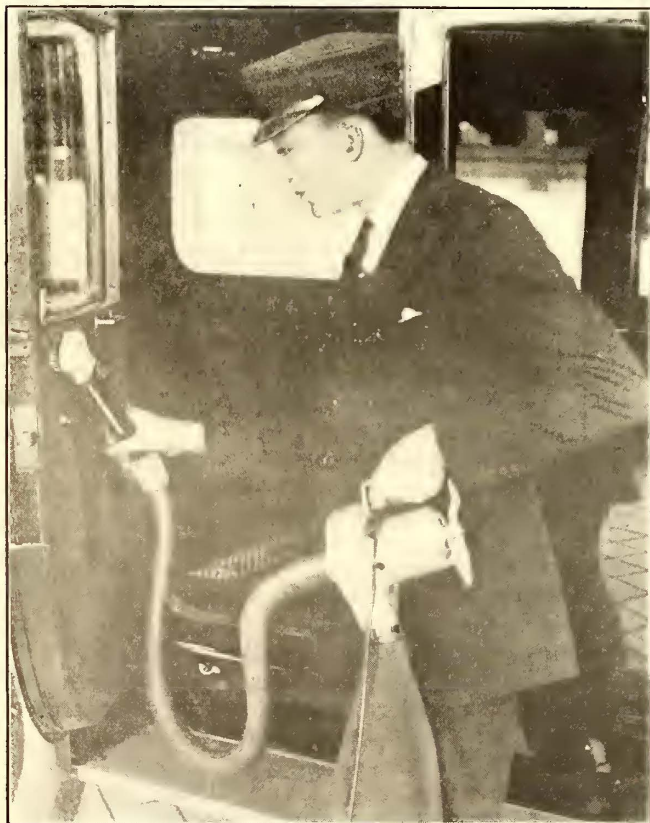
Boston service-at-cost act, working capital in the Bay State case, the Cincinnati reserve fund, various decisions of the Wisconsin, Illinois, Utah, District of Columbia and other commissions, and finally a detailed analysis of the Public Service Railway (New Jersey) valuation.

Swiss Railway Electrification Plans

AFTER the St. Gotthard line in Switzerland has been electrified, the State Railways will direct attention to the Vallorbe-Lausanne-Brigue line, assuring connection with France (via Dijon and Pontarlier) and Italy (via Brigue, the Simplon and Milan). *Le Génie Civil*, Dec. 18, states that the first step will consist of the introduction of single phase between Brigue and Lausanne, partly by changing over the present three phase between Brigue and Sion, and by electrifying the Sion-Lausanne section (57 miles). Power will be furnished by the Barberine hydro-electric station, located near Martigny, which will be completed in 1923.

Light Portable Suction Cleaner

A HANDY portable suction cleaner for removing dust from places hard to clean has been placed on the market by the Air-Way Electric Appliance Corporation, Toledo, Ohio, under the name of "Air-Way Junior." It has a handle for convenient lifting by the left hand, a flexible cleaning hose, which is held in the right hand;

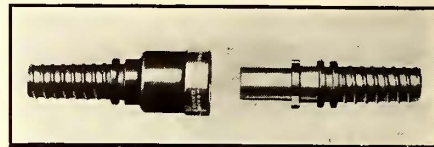


OPERATING THE PORTABLE SUCTION CLEANER

a rubber cleaning attachment and brush holder, a brush, a fiber extension for cleaning corners, and an attachment for connecting the hose to the blower. While this was designed particularly for cleaning the interiors of automobiles and automobile establishments, the device can also be used for cleaning the interiors of electric cars.

New Type Hose Couplings

A HOSE coupling with several new features has recently been placed on the market by the Ingersoll-Rand Company, New York, N. Y. It is called the "Little David" Hose Coupling and will be distributed as an accessory to the line of "Little David" Pneumatic Tools manufactured by this company. Hose couplings which become leaky after short use are the cause of serious air losses, and another trouble commonly experienced with many couplings is jamming or sticking through some slight injury, making them difficult or almost impossible



NEW TYPE HOSE COUPLING

to connect or disconnect. The design of the "Little David" coupling has been with the view to overcoming these troubles. Its main features are sturdiness, simplicity and an all-around ability to stand all sorts of abuse.

The coupling consists of two parts, male and female. The female end is fitted with a V-shaped rubber gasket providing an airtight joint. The gasket is prevented from blowing out by a protective shoulder inside the coupling should the coupling become accidentally disconnected under pressure. The locking shoulders are heavy with large bearing surfaces. The locking spring is strong and can be replaced if necessary. The parts are made of a metal not subject to ordinary rusting or corrosion.

The male end has a very liberal bearing in the female end and another feature is the absence of any outer sleeve exposed to injury. The air ports are straight and of uniform diameter.

The coupling may be connected or disconnected by a quarter turn. A groove in the hose end of each part allows using a hose clamp to attach securely to the hose. "Little David" Hose Couplings are manufactured in $\frac{1}{2}$ in. and $\frac{3}{4}$ in. sizes, which are interchangeable; that is, a $\frac{1}{2}$ in. male piece may be used with a $\frac{3}{4}$ in. female end or vice versa. Gaskets are also interchangeable between the different sizes.

Recorder for Both CO₂ and Combustible Present in Flue Gas

RECENTLY an instrument has been perfected and placed on the market by the Mono Corporation of America which not only analyzes and records the percentages of CO₂ present at all times in flue gases but also detects and clearly records on the same chart the presence and approximate proportion of combustible gases whenever they appear. It is claimed that a continuous indication of the percentage of CO₂ alone does not always give a true basis for determining combustion conditions, but that a continuous and simultaneous record of combustible gases present is also necessary. One of the prime purposes of this instrument, the Duplex Mono, is to detect the presence of combustible gases in the flue immediately upon their appearance and to record accurately the percentage of CO₂ present at that particular time. Very slight proportions of combustible gases are clearly recorded on the chart, giving warning of improper conditions and inefficient boiler operation.

Porcelain Tokens Used in Germany

ALL kinds of small emergency coins are now used in Germany. These are made out of sheet aluminum, zinc, iron or brass, but the most modern coin is made out of royal saxonian porcelain. Even this hard cash is rare and is substituted for by emergency paper money printed with more or less artistic taste by the large and small cities. This paper money is good only in its native city, so conductors must be extremely careful in accepting small paper money, and in order to facilitate payment of fares the Statt Cottbus Street Railway has issued some brass money of about $\frac{5}{8}$ in. diameter and with a $\frac{1}{8}$ in. center hole. This token can be purchased at the trunkline deposits, from a number of stores in the city and from the conductor. This token is good for one ride and saves trouble and time on the part of the motorman.

Comparison of Five Types of Glue

THE United States Forest Products Laboratory has furnished the accompanying table containing information regarding glue, which will be of interest to the master mechanics of electric railways.

Particular Compared	Animal Glue	Casein Glue	Vegetable Glue	Blood Glue	Liquid Glue
Source	Hides, bones horns, etc.	Casein from milk	Cassava starch	Dried blood	Animal glue or fish parts
Cost per Lb. 1920	25-42 cent	16-20 cents	10-12 cents	20 cents	\$1-\$5 per gal.
Spread in Sq.Ft. per Lb.	25-35	35-55	35-50	30-100	No data
How Mixed	Soaked in water and melted	Mixed cold with rapid stirring	Mixed with alkali and cold or hot water	Mixed cold	No preparation
How Applied	Warm with brush or mechanical spreader	Cold with brush or mechanical spreader	Cold with mechanical spreader, not by hand	Cold with brush or mechanical spreader	Cold or warm usually applied by hand
Temperature of press	Cold, or with hot cauls	Cold	Cold	Hot	Cold
Strength (in shear test)	High grades stronger than strongest woods	Equal to medium grade animal glue	Equal to medium grade animal glue	High strength in plywood. Not used for joint work	Best grades equal to medium grade animal glue
Water resistance	Low	High	Low	High	Low
Chief uses in wood-working	For strong joint work	For water resistance plywood or joint work	For veneer work because of cheapness	For water resistant veneers	For repair work and small articles

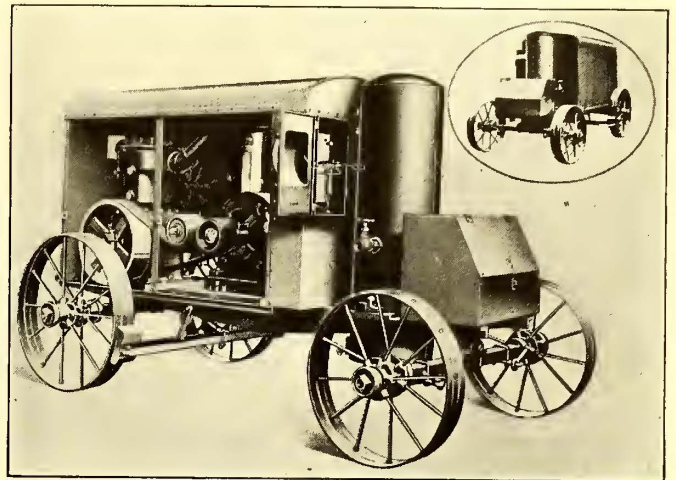
Characteristics of Hardened Copper

TO CLEAR up much of the misunderstanding about hardening copper, the Bureau of Standards has issued a circular letter explaining the characteristics of and the methods for the hardening of copper. There are two well-known methods of hardening copper: One is mechanically to work it by hammering, cold rolling, drawing, etc., and the other is to alloy it with a small amount of another metal, usually zinc, tin, aluminum or iron. The alloyed metal is no longer copper, but should be referred to according to the chief alloying constituent. The misconception about the loss of the so-called art of tempering bronze is made clear by the statement that any hardness of the cutting edges on knives or swords

made of copper and bronze was obtained by hammering and not by any method of tempering. Any bronze today can be made as hard if not harder than that of prehistoric times by hammering alone.

New Portable Compressor Outfit

THE Ingersoll-Rand Company has recently added an electric motor-driven portable compressor outfit to its line of "Imperial" compressors. This unit is of 118 cu.ft. capacity and weighs approximately 4,450 lb. It is of all-steel construction, and steel doors at the sides

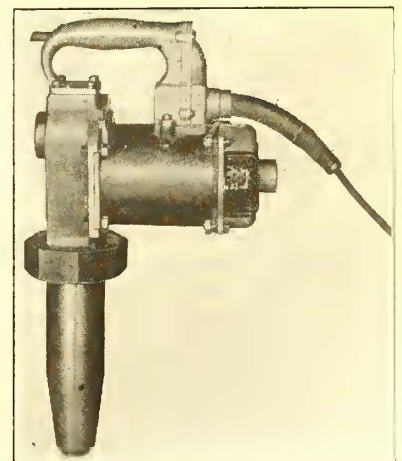


PORTABLE ELECTRIC DRIVEN COMPRESSOR OUTFIT

provide easy access to the operating equipment and afford protection from the weather. A suitable intake unloader is provided for regulation. Either alternating or direct current motors can be supplied as desired.

Electric Hammer Drill

A NEW type of drill, called the Little Giant Electric Hammer Drill, is now being manufactured by the Chicago Pneumatic Tool Company. It is most suitable for drilling concrete and soft stone and for light chipping of metals. A motor designed for either direct or alternating current runs the drill. The hammer blow which is delivered by a piston on the drill steel or chisel is produced by a pneumatic impact. At the instant the blow is struck the piston is running free of all mechanical parts, and therefore no shock or vibration is transmitted to the electrical parts of the tool. This means that there is no tendency for the electrical wire or connections to become crystallized due to incessant jarring. The switch is conveniently located in the handle for control of the electric circuit. All bearings are of the ball type, provision



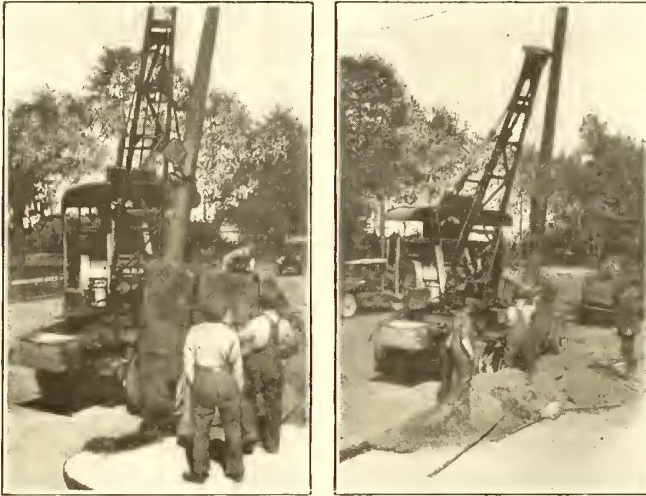
ELECTRIC HAMMER DRILL FOR LIGHT DRILLING AND CHIPPING

made of copper and bronze was obtained by hammering and not by any method of tempering. Any bronze today can be made as hard if not harder than that of prehistoric times by hammering alone.

being made for the lubrication of all revolving and reciprocating parts. The gear and those portions of the moving parts subject to wear are all hardened. A special feature of this drill is the live air device for clearing the hole of the cuttings.

Moving Trolley Pole with Concrete Setting

IN THE issue of the ELECTRIC RAILWAY JOURNAL for Sept. 25, 1920, page 584, mention was made of the use of the "International" truck crane, made by the International Crane Company, in moving trolley poles and in other heavy lifting and carrying work. A job stated to have been witnessed by the writer of the article was one in which a steel trolley pole was lifted



UTILIZING A TRUCK CRANE FOR MOVING A TROLLEY POLE IN CLEVELAND

with a mass of concrete around its butt and dropped into a hole some yards distant, the whole operation requiring but a few minutes after the machine reached the work. The load lifted in this case weighed about 1 ton, and only a foreman and two other men were required on the ground with the derrick man and the chauffeur on the truck. The accompanying photographs of this job have been taken to give a more concrete idea of the operation. The International crane consists of a rotatable derrick, mounted on a 7½-ton Mack truck. The derrick has a lifting capacity of 6,000 lb. at 12 ft. radius, with corresponding capacities of other radii. The derrick is operated by a Stearns engine.

Fundamentals of Cold-Weather Concrete Practice

THE methods used by contractors for continuing concrete work in spite of low temperatures by applying proper protective measures is discussed in the current issue of *Concrete in Architecture and Engineering*. An ever-increasing amount of concrete work is being done without interruption twelve months in the year, instead of seven or eight as formerly. Thus steady employment can be offered to employees and overhead costs can be reduced. The fundamentals of cold-weather concrete practice are storing the aggregates in advance under shelter to prevent their freezing into a solid mass, heating materials enough to give required warmth to the mixture, speedily transferring the mixture to the forms, and protecting the concrete from loss of heat while hardening by a temporary canvas shelter and by fires.

Steam Railroad Statistics

THE statistical report of the railways under the jurisdiction of the Interstate Commerce Commission for the year ended Dec. 31, 1918, has just been published. It shows a total of 1,849 roads, with 253,528 miles of line owned and 264,233 miles of road operated. There are 8.53 miles of track for each 100 square miles of territory and 24.02 miles of track for each 10,000 inhabitants. At the close of 1918 seventy-four roads with 16,805 miles owned were in the hands of receivers.

All of the companies in the country had 67,563 steam and 373 electric locomotives, 2,427,460 freight cars, 56,611 passenger cars and 105,192 service cars. The employees numbered 1,837,663. The capital outstanding, not including securities of inactive or of switching and terminal companies and excluding also securities held by other railway corporations, amounted to \$16,454,339,035, of which the stock represented \$6,732,728,684 and the unmatured funded debt \$9,722,060,351.

Gasoline-Propelled Trains in India

THE whole service of the Nasik tramways in India is furnished with four gasoline-driven cars, each equipped with a 45-hp. four-cylinder motor. The change-speed gear box is arranged so that it is fool-proof even to the most unskilled driver. There are two speeds in both directions and two operating levers, one for speed changing and the other for reversing. The planetary system of gear changing does not involve the disengaging of any of the toothed wheels, which are always in mesh, as it is effected by engaging a clutch plate with either of the two driven members. Reversal is effected by engaging one of two bevel gears, driven by one pinion, with a dog clutch on the shaft.

Tree Grows Around Wire

THE accompanying illustration shows a 110-volt distribution wire passing through the center of a limb of a tree. The wire was not deliberately placed in that position, but is the result of the wire rubbing against the limb and of the limb eventually growing around the wire. The limb appears to have a growth of approximately nine years.

This unusual condition was found by the trouble gang of the British Columbia Electric Railway, Ltd., Vancouver, B. C., when inspecting the distribution lines recently. A property owner had pruned the trees on the boulevard in front of his house on Nichola Street and finding the above condition to exist had simply cut the



UNUSUAL CONDITION FOUND ON DISTRIBUTION SYSTEM

limb above and below the wire and left that portion of the limb shown in the illustration suspended in the air. When the trouble gang found it, it cut the wire on each side of the limb and turned the specimen in to the office to confirm the necessity of its application for an appropriation to cover the cost of pruning trees that were damaging or interfering with the company's distribution system.

American Association News

AS DATE OF MID-YEAR CONFERENCE DRAWS NIGH, ELECTRIC RAILWAY INTEREST IS FOCUSED ON FINANCE, THE TOPIC SELECTED FOR SPECIAL TREATMENT

—PRESIDENT GADSDEN ALSO URGES SPECIAL ACTION REGARDING F. E. R. C. REPORT

Mid-Year Conference and Dinner

at Chicago, Ill., Feb. 10, 1921

SUBJECT:

Electric Railway Financing

Papers at the Mid-Year Conference

THE committee on subjects, of which J. D. Mortimer is chairman, has made public the following details of the subject matter to be treated in the papers at the Chicago convention:

"Previous Methods of Electric Railway Finance," by James F. Fogarty, secretary the North American Company, New York. This paper will give a summary of the changing methods of financing capital improvements from the days of early electrification down to the present, with reasons therefor; influence of low rates of return on such methods, as disclosed by the large proportion of capital securities represented by interest-bearing debt; influence of the holding company and probable future; war-time financing; post-war financial methods.

"Present Requirements for Mortgage Securities," by F. K. Shrader, Halsey, Stuart & Company, Chicago. In this paper Mr. Shrader will give an analysis of what competition requires in the way of relation of cash invested to amount of loan; influence of previous history on electric railway investments; margin of earnings over interest charges; flexibility of mortgage provisions; necessity of ample stable earnings as a condition precedent to re-establishment of credit to be derived from automatic regulation or cost-of-service franchises; characteristics of interest bearing securities which the general market is likely to absorb during the next year or two.

"Home Town Financing—Partial Mutual Ownership," by S. B. Way, vice-president and general manager the Milwaukee Electric Railway & Light Company. This paper will describe the desirability of large local interest being held by car riders; influence on local regulatory ordinances, etc.; cost of capital procurable by this means; methods of distribution.

"Necessity of Financing by Sale of Capital Shares," by Chester Corey, vice-president Harris Trust & Savings Bank, Chicago. Mr. Corey in this paper will point out the importance of providing for return on new capital that will invite the investment of new money through the purchase of issues of capital stock; requirements in the way of franchises or methods of regulation which will support such plans of financing.

"Municipal Aid in Electric Railway Financing," by Melvin A. Traylor, president First Trust & Savings Bank, Chicago. This paper will give the conditions under which municipal co-operation is required; moral support and abandonment of the street railway as a political issue; pledge of municipal credit through guarantees; municipal aid for rapid transit in construction of subways and elevated lines.

Ladies to Dine and Dance

ARRANGEMENTS have been made with the Hotel Drake for serving a special table d'hôte dinner to the feminine guests at the mid-year conference in Chicago, Feb. 10. This will be served in one of the private dining-rooms on the mezzanine floor adjoining the main dining-room in which the banquet of the railway men will be held. It has a little balcony and doorway opening out over the main dining-room so that the banquet music will also entertain the ladies.

After dinner the ladies will proceed to the Aisle of Palms, which extends along the main dining room about

3 ft. above it, and is separated from it only by a low balustrade. From this position they will be able to hear and see the speakers and entertainers to good advantage.

After the banquet and addresses have been completed, there will be dancing in the Aisle of Palms, with music furnished by another orchestra. The sub-committee on ladies' entertainment, of which John Benham is chairman, has thought it unwise to make any definite arrangements to entertain the ladies during the one-day convention. The Drake is so readily accessible to the great shopping center of Chicago by taxicab and by the buses of the Chicago Motor Bus Company, which pass the door frequently, that the committee thought the ladies would more than likely prefer to entertain themselves in the shopping district during the day.

However, these same buses run north along Lake Shore Drive for a distance of eight miles and pass the Edgewater Beach Hotel, which is one of Chicago's unique attractions. If the weather favors, it may be that some special arrangements will later be made for a drive up the lake shore through Lincoln Park and to the Edgewater Beach Hotel.

New York Delegation Going to Chicago Meeting via Broadway Limited

THE mid-year conference committee on transportation for New York and vicinity, of which Carl H. Beck, Westinghouse Electric & Manufacturing Company, is head, has completed transportation arrangements for those who plan to attend the Chicago meeting. The party will leave New York at 2:45 p.m., Feb. 8, via the "Broadway Limited" of the Pennsylvania Railroad and arrive in Chicago on the following morning. Special cars will be attached to this train unless the delegation is sufficiently large to warrant the operation of a special train.

The following letter, which is being sent by the committee to all members of the Association, gives full details:

The mid-year meeting and dinner of the American Electric Railway Association, to be held in Chicago, Feb. 10, is to be one of the most important meetings in the history of the Association.

Circumstances brought about through the rapidly changing conditions incident to post-war readjustments are such that railway men and manufacturers should give more than ordinary attention and support to this occasion. Now is the time to put an optimistic punch into the affairs of the industry. The subjects to be covered at the meeting, as well as the speakers and subjects at the dinner, are being announced through other channels, from which it can be observed a most complete program is arranged.

Your committee on transportation, charged with the duty of securing transportation accommodations from New York and vicinity, has selected the Broadway Limited, via the Pennsylvania Railroad, on Tuesday, Feb. 8, as the train and date accommodating the greatest number desiring to make this trip to Chicago. This train leaves New York at 2:45 p.m., arriving at Chicago at 9:40 o'clock the following morning, and it is now hoped to join with delegates from Philadelphia, Baltimore, Washington, Harrisburg, etc., in making this trip.

Accommodations can be secured by application to E. B. Burritt, secretary American Electric Railway Association,

8 West Fortieth Street, New York City, accompanied by New York check to his order, or similar funds, in accordance with the following schedule:

Lower berth, including all transportation charges, one way, \$55.37.

Upper berth, including all transportation charges, \$53.43. Compartment, two tickets required, including all transportation charges, \$118.84.

Drawing room, minimum two tickets required, including all transportation charges, \$125.32.

Extra for third person in drawing room, \$45.65.

Reservations for the return trip can be secured by expressing a desire for them at this time. A representative of the railroad company will be on hand at Chicago to take care of the details, but it is recommended that advance reservation be made to insure adequate accommodations for all those desiring to return from Chicago.

An endeavor is being made to arrange through the Central Passenger Association for reduced fare for the return trip. The results of this endeavor will be announced shortly.

Replies to this communication making reservations, must be in the hands of the committee by Saturday, Jan. 22, in order that suitable Pullman accommodations may be secured.

Be on hand. Bring all the enthusiasm you can collect; if you haven't any, somebody else will have it. Travel with the bunch.

Very truly yours,

C. H. BECK, C. B. KEYES,
ROSS HAYES, THOS. L. LANGAN,
C. R. ELLICOTT, Chairman,

Sub-Committee on Transportation, New York and Vicinity.

Executive Committee Holds Busy Meeting

A MEETING of the executive committee of the American Association was held at New York headquarters on Friday, Jan. 7, with most of the members of the committee in attendance. The committee had an extensive program before it for consideration and accomplished a great deal of work.

Approval was given to the amendment to enlarge the executive committee from fourteen to twenty, as proposed by President Pardee at the Atlantic City convention. It will thus be voted on at the mid-year conference in Chicago on Feb. 10.

The committee approved the support of an appropriation by Congress of \$50,000 for the Bureau of Standards to pursue electrolysis investigation. It was brought out that the bureau and the association are working in close co-operation on this subject.

Secretary Burritt presented the financial statement for the year ended Oct. 31, 1920, together with a statement of expenses of the 1920 convention, and also his budget for the fiscal year ending Oct. 31, 1921, all of which were approved by the committee and ordered published in the Transactions.

Fifteen companies were ordered reinstated on payment of last year's dues, making the total now 344 railway companies, 246 manufacturing companies, 890 individual members, and 1,250 company section members.

Charles L. Henry was given a vote of appreciation as chairman of the national relations committee for the work that he and his committee have done in connection with the Railroad Labor Board decision on interurbans recently rendered at Chicago.

Reports of several committees were received and also the report of the Bureau of Information and Service outlining its activities for the last three months and listing the bulletins issued.

President Gadsden announced the personnel of the committee to bring in a report to the mid-year conference on the Federal Electric Railways Commission report and the report of the Special Commission on Public

Utilities of the United States Chamber of Commerce, as follows: Walter A. Draper, Henry G. Bradlee, Thomas S. Wheelwright, Arthur W. Brady, John J. Stanley, Lucius S. Storrs, James P. Barnes, J. H. Hanna, J. D. Mortimer, J. K. Newman and Britton I. Budd.

He also appointed the following as the locations committee for the next convention: John G. Barry, chairman; Charles L. Henry, H. D. Shute, B. A. Hegeman, J. J. Stanley, J. N. Shannahan, W. H. Sawyer, D. B. Dean, and the following members of last year's exhibits committee: F. H. Gale, H. Fort Flowers, F. J. Dell and J. B. Kilburn.

The committee adjourned to meet at the Drake Hotel in Chicago on Feb. 9, the day preceding the mid-year conference.

Consideration of Federal Report Urgent

PRESIDENT P. H. GADSDEN looks upon action by the association on the report of the Federal Electric Railways Commission and the report of the special committee of the Chamber of Commerce of the United States as one of the most important matters scheduled for consideration at the Chicago conference. Nothing that the Association can do, in his opinion, will be more helpful than to place itself squarely upon record before the public in this matter. This statement is contained in a letter sent by him under date of Jan. 12 to the executives of member companies and accords with opinions expressed by him in the interview with him which appeared on page 6 of the issue of this paper for Jan. 1, 1921.

The letter of Mr. Gadsden to the executives of member companies follows:

AMERICAN ELECTRIC RAILWAY ASSOCIATION

Jan. 12, 1921.

To Executives of Member Companies:

DEAR SIR: I want to urge you personally, as strongly as I can, to have your company represented at the Mid-Year Conference of the Association at Chicago, February 10, when a special committee will present a report on the recommendations made in the report of the Federal Electric Railways Commission and the report of the special committee of the Chamber of Commerce of the United States.

No other utility has had the advantage of two such thorough investigations by impartial bodies, and the reports undoubtedly represent the opinion of the American public.

Up to this time, however, there has been no official expression of the Association's attitude with respect to the conclusions and recommendations contained in the reports, and it is believed that nothing the Association could do would be more helpful than to place itself squarely upon record before the public.

The special committee will present its report at the conference for discussion and appropriate action, which will make known to the public the attitude of the electric railway industry.

It is believed that nothing more striking or more helpful toward bringing about a better understanding on the part of the public could be done by the Association at this time.

For this reason every company member should be represented when the report is discussed and a resolution setting forth the Association's attitude voted upon.

This is so important that I want to urge you personally to be present at the conference and have as many of the officers of your company in attendance as possible.

While the general subject of electric railway financing, to be discussed at the conference, is of interest mainly to executives, it undoubtedly will prove of such a highly educational nature as to be extremely beneficial to subordinate officials as well.

I would appreciate word from you that you will make a special effort to attend the conference and participate in the discussions and whatever action the Association may take.

Very truly yours,

P. H. GADSDEN,
President.

Personnel of Engineering Association Committees

IN THE issue of this paper for Dec. 25, page 1296, the full list of assignments to Engineering Association committees was given, together with the names of the chairmen of the several committees. At that date the personnel of the committees was not complete. It is now possible to give this as follows:

Committee on Apprenticeship Systems—F. R. Phillips, Pittsburgh (Pa.) Railways, chairman; L. C. Datz, American Cities Company, Birmingham, Ala.; H. A. Johnson, Metropolitan West Side Elevated Railway, Chicago, Ill.

Committee on Buildings and Structures—D. E. Crouse, Rochester & Syracuse Railroad, Syracuse, N. Y., chairman; E. H. Berry, Cincinnati (Ohio) Traction Company; B. R. Brown, Dallas (Tex.) Railway; N. E. Drexler, Newport News & Hampton Railway, Gas & Electric Company, Hampton, Va.; H. V. Haulard, New Orleans Railway & Light Company, New Orleans, La.; B. P. Legare, United Railroads of San Francisco, Cal.; James Link, Knoxville Railway & Light Company, Knoxville, Tenn.; J. R. McKay, Indiana Service Corporation, Fort Wayne, Ind.; S. J. Steiner, Aurora, Elgin & Chicago Railroad, Aurora, Ill.

Committee on Equipment—Daniel Durie, West Penn Railways, Connellsville, Pa., chairman; W. S. Adams, J. G. Brill Company, Philadelphia, Pa.; H. A. Benedict, Public Service Railway, Newark, N. J.; J. C. C. Holding, Midvale Steel & Ordnance Company, Philadelphia, Pa.; H. A. Johnson, Metropolitan West Side Elevated Railway, Chicago, Ill.; T. R. Langan, Westinghouse Electric & Manufacturing Company, New York City; F. H. Miller, Louisville (Ky.) Railway; C. N. Pittenger, Steubenville, East Liverpool & Beaver Valley Traction Company, East Liverpool, Ohio; E. D. Priest, General Electric Company, Schenectady, N. Y.; C. F. W. Rys, Carnegie Steel Company, Pittsburgh, Pa.; F. W. Sargent, American Brake Shoe & Foundry Company, New York City; Charles F. Scott, General Electric Company, New York, N. Y.; Karl A. Simmon, Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.; C. W. Squier, ELECTRIC RAILWAY JOURNAL, New York City; J. M. Yount, United Railroads of San Francisco (Cal.); R. H. Dagleish, Capital Traction Company, Washington, D. C.

Committee on Power Distribution—Charles R. Harte, The Connecticut Company, New Haven, Conn., chairman; Azel Ames, Kerite Insulated Wire & Cable Company, New York City; C. C. Beck, Ohio Brass Company, Mansfield, Ohio; Ralph W. Eaton, Public Service Engineer, Providence, R. I.; H. H. Febrey, American Steel & Wire Company, New York, N. Y.; C. J. Hixson, General Electric Company, Schenectady, N. Y.; Charles H. Jones, Metropolitan West Side Elevated Railway, Chicago, Ill.; F. McVittie, New York State Railways, Rochester, N. Y.; M. B. Rosevear, Public Service Railway, Newark, N. J.; W. Schaake, Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.; A. Schlesinger, Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind.; F. J. White, The Okonite Company, Passaic, N. J.

Committee on Power Generation—A. B. Stitzer, Republic Engineers, Inc., New York, N. Y., chairman; L. D. Bale, Cleveland (Ohio) Railway; H. P. Bell, San Francisco-Oakland Terminal Railways, Oakland, Cal.; Walter E. Bryan, United Railways of St. Louis (Mo.); N. A. Carle, Public Service Electric Company, Newark, N. J.; F. C. Chambers, Des Moines (Iowa) City Railway; H. E. Davis, New York State Railways, Utica, N. Y.; C. A. Greenidge, J. G. White Management Corporation, New York, N. Y.; H. A. Kidder, Interborough Rapid Transit Company, New York, N. Y.; Charles F. Lloyd, Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.; G. W. Saathoff, Henry L. Doherty & Company, New York, N. Y.; E. H. Scofield, Minneapolis (Minn.) Street Railway; L. R. Shattuck, Sanderson & Porter, New York, N. Y.; E. P. Waller, General Electric Company, Schenectady, N. Y.

Committee on Way Matters—R. C. Cram, Brooklyn Rapid Transit Company, Brooklyn, N. Y., chairman; H. A. Abell, New York State Railways, Rochester, N. Y.; Charles A. Alden, Bethlehem Steel Company, Steelton, Pa.; Victor Angerer, William Wharton, Jr., & Company, Easton, Pa.; S. Clay Baker, East St. Louis & Suburban Railway, East St. Louis, Ill.; W. R. Dunham, Jr., The Connecticut Company, New Haven, Conn.; E. B. Entwisle, The Lorain Steel Company, Johnstown, Pa.; H. Fort Flowers, Differential Car Company, New York, N. Y.; Howard H. George, Public Service Railway, Newark, N. J.; W. F. Graves, Montreal

(Que.) Tramways; E. M. T. Ryder, Third Avenue Railway, New York, N. Y.; T. B. Skelton, Metal & Thermit Corporation, New York, N. Y.

Equipment Committee Gets to Work

THE equipment committee of the Engineering Association held its first meeting of the year at association headquarters in New York City on Jan. 12. Those present were Daniel Durie, West Penn Railways, chairman; W. S. Adams, J. G. Brill Company; T. R. Langan, Westinghouse Electric & Manufacturing Company; F. H. Miller, Louisville Railway; C. N. Pittenger, Steubenville, East Liverpool & Beaver Valley Traction Company; C. F. W. Rys, Carnegie Steel Company; F. W. Sargent, American Brake Shoe & Foundry Company; C. F. Scott, General Electric Company; K. A. Simmon, Westinghouse Electric & Manufacturing Company, and C. W. Squier, ELECTRIC RAILWAY JOURNAL.

The twelve subjects given to this year's committee for consideration and report, printed in the issue of this paper for Dec. 25, 1920, were taken up and discussed. In order to minimize the number of sub-committees necessary for carrying on this work, several subjects were combined and assigned to one committee. In the list as previously given, subjects 2, 3, and 11; 4 and 10, and 7 and 8, respectively, were combined, thus reducing the number of sub-committees to eight. The work to be taken up is divided as follows, the name given first in each instance being that of the chairman of the sub-committee: (1) Brake shoes, heads and keys—Messrs. Sargent, Benedict, Holding and Pittenger; (2, 3 and 11) Tread and flange contour of wheels—Messrs. Dagleish, Benedict, Durie, Holding, Rys and Sargent; (4 and 10) Specifications and standards—Messrs. Johnson, Dagleish, Holding and Rys; (5) Helical gears—Messrs. Durie, Priest, Johnson and Simmon; (6) Car arrangement and design—Messrs. Benedict, Adams, Langan and Scott; (7 and 8) Life of wearing parts—Messrs. Pittenger, Langan, Priest, Scott, Simmon, Squier and Yount; (9) Direct-current lightning arresters—Messrs. Miller, Langan, Pittenger and Scott; (12) Layout of shop building—Messrs. Squier, Adams, Johnson, Miller, Priest, Simmon and Yount.

In connection with the study to be made of the life of wearing parts, the committee decided that this year's work should be confined to obtaining information on cast-iron and steel wheels, brake shoes, axle and armature bearings and trolley wheels. The next meeting of the committee will be held at association headquarters on March 16 and 17.

New Section at Camden

A COMPANY section of the American Association was formed at Camden, N. J., on Jan. 13, by employees of the Southern Division, Public Service Railway. Several representatives of the association from out of town were present and assisted in the launching of the new enterprise. While an active section has been maintained by Public Service for several years, it has been difficult for geographical reasons for the employees in the Southern Division to take an active part in the section activities. The inauguration of section work at this point is part of the program of Manager Martin Schreiber, outlined in his Atlantic City convention paper, for the development of a co-operative spirit in his organization.

Letters to the Editors

The Selling Idea in Zone Fares

MOUNT VERNON, N. Y., Jan. 10, 1921.

To the Editors:

Your publication of the article by L. S. Storrs on "Our National Fare Experiment" in the issue of Jan. 1 is a characteristic bit of enterprise in keeping a step or two ahead of the mass mind of the industry. The diagrams or maps must prove especially helpful in showing how far our pioneers have gone in these zone fare beginnings.

Somewhat loosely, I think, Mr. Storrs states that "It appears that there is no known method of assessing fares upon the riding public that has not been tried in this national experiment." Then he adds with delicious humor: "Some methods never heard of before have also been tried, as is evident."

However, it is far less important to list types of graduated and other special fares that have not been tried in the United States than it is to point out that the spirit in which such changes are made is far more important than the outer resemblance to fare schemes elsewhere. Our operators and regulators are still largely steeped in the unit-fare tradition which gave so little scope to the selling of transportation. In a real business, special inducements are always made to secure the patronage of those who can stay away, on the basis that overhead as well as operation enters into the cost of the article sold. In our industry—for it is not yet a business—those who can stay away are the walkers, the automobilists, the motor-truck riders and that more than half of the population not engaged in earning a living. When examined through this lens of traffic creation it is evident that few indeed of our roads have adjusted their fares in the true spirit of transportation salesmanship which underlies the graduated fare.

WALTER JACKSON.

Points of Difference Between American and German Railway Practices

BERLIN, GERMANY, Nov. 22, 1920.

To the Editors:

There are two main points in which American and German electric railway equipment practices seem to differ. To these I think attention might well be directed in the United States, with a view to possible saving in maintenance and operating costs.

The first is the use of bow collectors rather than trolley wheels. The former would be of particular value with one-man safety cars, as their use would eliminate traffic interruptions due to the trolley wheel leaving the wire.

The second point is the use of the electric brake in place of the air brake. The modern motor is rugged enough to be used as a generator without undue heating and it would appear to be useless to introduce compressed air as a further means of braking. Moreover, air-brake equipment is expensive in first-cost, in power consumption and in maintenance. The Berlin street railways are planning to abandon air-brake equipment

entirely because investigation has shown that they would thus have saved in 1913 the equivalent of 1 per cent in dividends. If this is true with pre-war costs of labor and materials, the saving would be much more under present conditions.

The prevalent idea in this country is that the air brake was introduced ten or twelve years ago only because the electric motor was not sufficiently well developed, having no commutating poles and being less well insulated.

I realize, of course, that compressed air is well liked in America, not only for braking but also for the operation of other safety appliances. However, I think the electric brake merits at least reconsideration.

"ENGINEER."

More About Foreign Rail Sections

EDGAR ALLEN & COMPANY, LTD.

SHEFFIELD, ENGLAND, Dec. 31, 1920.

To the Editors:

I have read with interest the articles on rail sections in the Nov. 27 and Dec. 4 issues of the *ELECTRIC RAILWAY JOURNAL*. The decision of the French tramways to adopt a flat tread with cylindrical wheels is very important and one which would not have been reached without very careful consideration. At the instance of Monsieur Bacqueyrise, engineer General Omnibus Company, Paris, numerous inquiries were sent out before the war to French and German tramway companies. It was upon the results of this investigation that the decision was arrived at.

At the meeting of the Tramways & Light Railways Association, in July, 1920, to which you evidently refer in your article, I brought up this question and there was a very interesting discussion. Several engineers favored the flat rail and cylindrical tread wheels, provided that the track was new, but they preferred continuing the existing track with a radius rail. The radius now in general use is 12 in.; the London County Council, however, prefers the 6-in. radius. The result is that many companies now have both types. The engineering standards committee is at present considering this question and also that of increasing the depth of the groove.

On the subject of compromise joints, the article by R. C. Cram in your issue of Nov. 27 is very interesting and the illustrations are excellent. The method of determining the "hand" shown in Fig. 18 is the same as that adopted here, and cast joints are chiefly used.

I note that the American Electric Railway Association has adopted the term "special trackwork," which is the same as the term used here except that in America you spell "trackwork" as one word, whereas here we separate it into two. I think that "trackwork" is an improvement over "track work." FRED BLAND,

Tramway Department.

"Get that Guy's Number"

A RECENT striking poster issued by the Ontario Safety League, as electric railway bulletin No. 140, has the above caption. The story told in the bulletin is this: "The conductor was helping an old lady off a car. An automobile shot by. 'Get that guy's number,' shouted the conductor to the motorman. They got it and it was reported to the police department." "That is safety education," states the poster.

News of the Electric Railways

FINANCIAL AND CORPORATE • TRAFFIC AND TRANSPORTATION
PERSONAL MENTION

Carhouse Burned

Additional Facts About Fire that Destroyed De Baliviere Structure in St. Louis

For the second time in less than three years the De Baliviere carhouse of the United Railways, St. Louis, Mo., has been partly destroyed by fire. The conflagration, which started on the evening of Jan. 3, burned the southeast section of the sheds to the ground. Sixteen motor cars were destroyed and seven motor cars and four trailers were badly damaged. Ten other cars were scorched and had windows melted or broken. Many cars in use on the Oliver line

however, confined to the section of the sheds where the fire had started.

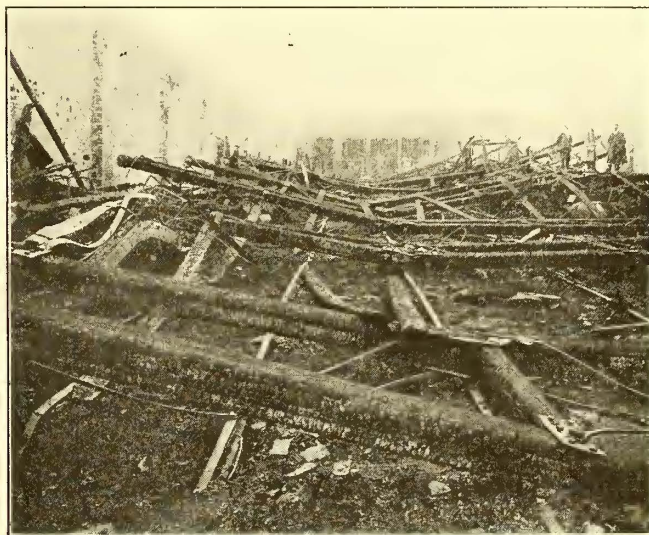
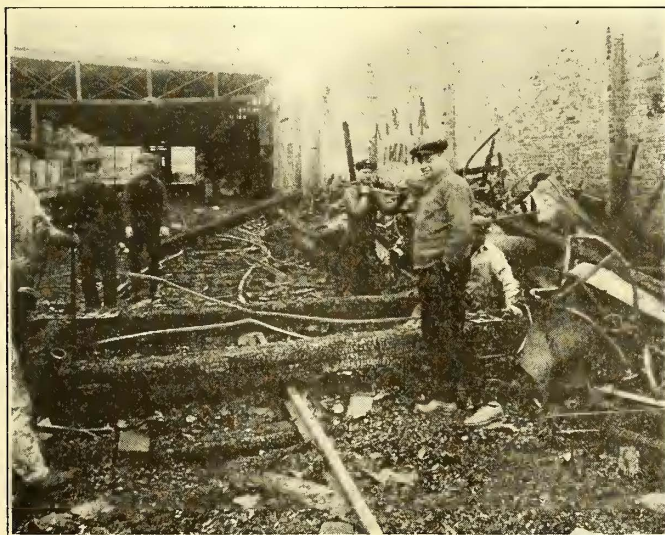
An investigation has been started by company officials to determine the origin of the fire. Car 365, near the center of the building and almost entirely consumed, had been put in the sheds only about five minutes before the fire was discovered. One theory advanced is that someone had dropped a lighted cigar or cigarette in the car or down a window slot.

Repair work on the building has been started and will be rushed to completion. Some alterations will be made at the same time. Cars which were damaged in the fire are being repaired and will

Wage Cut Rejected

Proposed Revision of Trainmen's Pay Downward at Detroit Will Go to Arbitration

The proposed wage cut of approximately 20 per cent which was suggested by the Detroit (Mich.) United Railway for all employees, effective Jan. 1, has been again rejected by the trainmen by an almost unanimous vote. The ballot was taken to determine the attitude of the men on the question, as it was contended by the Detroit United Railway that the men had not been properly informed as to conditions and that the men who attended the first



RUINS OF THE DE BALIVIERE CARHOUSE

were put out of service permanently or temporarily, but traffic officials of the company saw to it that schedules on the days following were not disarranged. In consequence the public has not been inconvenienced by the fire.

FORMER MISHAPS

The first fire at the sheds occurred on June 14, 1918, the eastern portion of the building being destroyed. Twenty-eight cars and a snow sweeper were lost in that fire. Another fire affecting the railway was the one at the plant of the carbuilders in October, when fifty cars in the course of construction for the United Railways were burned.

The De Baliviere carhouse extends from De Baliviere Avenue west to Laurel Street. Waiting rooms, offices and a power house are grouped about the sheds, but none of these was harmed. On the south the sheds are flanked by a number of apartment houses and these were thought to be in danger for a while, as the wind blew in that direction. The flames were,

be back in service in a very short time. The accompanying illustrations were made from photographs taken by F. C. Krug, official photographer of the railway company.

Fight Expected Over Abolition of Commission

A fight is expected in the State of Arkansas over the public utilities commission. The incoming administration, which will be headed by Governor-elect McRea, was elected on a platform one of the planks of which called for the abolition of four state commissions, including the Public Service Commission. Such action, however, cannot be taken except by legislation. The matter came to a head a few days ago when Governor Brough was called on to appoint a member of the commission to fill a vacancy. He asked Governor-elect McRea to assist him, but the latter declined on the ground that the people by their vote had indorsed the commission abolition plank.

meeting at which the subject was considered did not constitute a majority of the employees. At the first meeting a resolution was passed unanimously refusing the cut. At meetings held during the week ended Jan. 8 the employees voted 1663 to 4 against accepting the proposed cut.

It is believed that as soon as the company is officially notified of the decision of the union, steps will be taken leading to the appointing of a board of arbitration.

Since employees of some of the Interurban lines involved have not yet voted on the question, it is not anticipated that formal notification will be sent to the Detroit United Railway officials until after further meetings of the men have been held.

At the meeting of the Detroit employees, W. B. Fitzgerald, vice-president of the Amalgamated Association, criticised the company for its proposal to reduce wages at the present time, and urged the men to reject the proposal.

People's Ownership Plan Declared Feasible

Chicago Mayor's Traction Commission Reports for Five-Cent Fares— Proposed Transportation District Law Drafted

Mayor Thompson's long heralded plan for a restoration of a 5-cent fare in Chicago under a municipal-owned traction system was submitted to the City Council on Jan. 7 in the form of a report of his Commission on Local Transportation. With this was submitted a report by the commission's engineer, George W. Jackson, in which it was stated that he believed the Mayor's plan for a 5-cent fare was feasible "without adding any permanent burdens to the taxpayers of Chicago." There was also the draft of a proposed enabling act, which is to be sent to the State Legislature for passage, giving the voters of Chicago the power to establish the transportation district.

IN the early part of its report the commission points out that it has accumulated a mass of information, including maps of possible routes of subways, plans for structures and construction, data showing population and travel on lines of local transportation, etc., but it has acted on the theory that the commissioners were charged with the duty of working out a practical method of local transportation for the people, rather than to accumulate "ponderous reports and documents that would be filed away and result in nothing tangible."

It is also noted that it is not the function of the commission to formulate fixed plans and methods of local transportation, as it would appear unwise to select any one or any combination of plans, because it is desired to leave it to the trustees of the proposed Transportation District, to determine what is best at that time in the way of a proper traction system. Farther along in the report appears the statement that "we have omitted from our report the non-essential mass of detail, to the end that our conclusions and recommendations might not be obscured in the public mind through over-emphasis of some unimportant details by the opponents of people's ownership."

1907 TRACTION ORDINANCES QUOTED

In answering the question as to whether people's ownership is feasible and desirable, the commission points briefly to the provision of the 1907 ordinances wherein the city is authorized to purchase the traction lines, and to the Mueller law which purported to authorize the city to issue certificates on which to raise money to pay for the lines. The Supreme Court, however, held that such certificates constitute indebtedness of the city issuing them and that if the city of Chicago issued such certificates it would exceed the limit of its bonded indebtedness, and that, therefore, the city could not issue such certificates. The report then points out that this leaves the city without adequate means of raising sufficient money to purchase the lines and hence the provisions of the ordinances along this line are meaningless. It is furthermore pointed out that it is equally certain the city will never be able to find a licensee who will purchase the properties under the 1907 ordinances. The report states that according to the

terms of the 1907 ordinance the companies can continue to operate their lines in the streets of the city until the city or its licensee pays to them the purchase price built up under the ordinances. This price, it is contended, includes from \$85,000,000 to \$90,000,000 of "water."

FIVE-CENT FARE ENTIRELY POSSIBLE

So the city is helpless and the present companies can remain on the streets forever if these ordinances shall hold. Even if the courts should finally hold that the provision above is illegal, fraudulent and void the city would be in no position financially to acquire and operate a street railway system, because of the constitutional limitation of municipal indebtedness.

So, unless the present companies are to be left in undisputed control, and permitted to continue their operations as they have in the past, it is obvious that the new Transportation District advocated by you (Mayor Thompson) is an absolute necessity.

The question then recurs whether under this plan the people could be given 5-cent fares. Our investigation leads us to the conclusion that there is no doubt that it can be done.

Apparently to prove this statement the report shows that the "earnings of the Chicago Surface Lines under the 5-cent fare from Feb. 1, 1907, to Aug. 1, 1919," were \$140,559,475, made up of the following items: 10 per cent of all items added to capital account for contractors' profit retained by the companies and not paid to any contractor but added to capital account; 5 per cent of all items added to capital account for brokerage but retained by the companies and not paid to any broker; 5 per cent of the capital account drawn out each year by the companies; 45 per cent of the net divisible receipts drawn out each year by the companies; 55 per cent of the net divisible receipts paid to the city; and the accumulation in the renewal fund over all expenditures for renewals. After presenting these figures the report draws no conclusions as to how the previous statement is substantiated that 5-cent fares can be had.

In concluding its direct statement the commission says:

The plan proposed by your Honor, commonly known as the "Thompson Plan for People's Ownership and Operation of Street Cars at a 5c. Fare," if adopted, would obviate all the difficulties which have been heretofore experienced by the people of Chicago, and place it within their power to own and operate their lines of local transportation, if they so desire.

A communication from the engineering department of the commission is submitted as a part of this report. This is signed by George W. Jackson, engineer for the commission. In this

Mayor Thompson is again assured that his plan is feasible and that under it the people can own and operate street cars in Chicago successfully at a permanent 5-cent fare. Mr. Jackson says:

I am further able to say that such plan could be put into execution without adding any permanent burdens to the taxpayers of Chicago, and in my opinion the Transportation District contemplated in such plan would give the people of Chicago better local transportation than they have ever heretofore enjoyed.

The present conditions in local transportation are mainly due to overcapitalization upon the part of the companies and their efforts to maintain unwarranted values on their properties and to make their lines earn dividends on inflated valuations by taking out of the pockets of the people the largest possible amount of money for the least possible amount of service.

The total report on the engineering work done for the commission is given in the following paragraph:

The engineering features to be considered, of course, involve subway construction, at least to the initial extent of serving congested areas, with the possibilities of sufficient extensions to meet the needs of the future. Subway construction, however, is not vitally essential to the success of the Mayor's plan, but can be combined with it harmoniously and practically at any time. The re-routing of surface traction lines in the downtown business section under plans whereby 200,000 passengers an hour could be brought into or taken out of the loop, as compared with 100,000 passengers an hour under the present service, should be done. An increase in the average speed of surface cars accomplished through economies of routing and operation will bring perceptible relief, and the use of double-deck street cars and loading platforms for collecting fares, thus increasing capacity and eliminating the delay occasioned by payment of fares on the cars, will bring still greater relief.

DRAFT OF PROPOSED ENROLLING ACT

Mr. Jackson concludes his portion of the report with the following statements and explanation of how substantial savings in operating expenses may be made:

The daily saving in expense referred to will total, conservatively estimated, \$40,000 a day. This saving computed on the basis of 300 days yearly will equal an annual saving of \$12,000,000. Included in this estimate are the following items:

Elimination of the present Board of Supervising Engineers and the cost of service and rate investigations to the companies and the city by the Public Utilities Commission.

Discontinuance of the employment of detectives and spotters through the sale of tickets to passengers before entering cars.

Gain in revenue which will accrue through the sale of tickets instead of the payment of cash fares.

Saving on payrolls of employees replacing switches and making repairs and renewals of trackage, which are now exorbitant.

Saving in expense of operation by maintaining an average speed of 12 m.p.h. instead of 10 m.p.h., which is the present average.

Saving by operating cars by the loop system in the downtown district and at a number of terminals.

Saving of unnecessary overhead expense, costs of administration, lawyers' fees, legal expenses, and lobbying.

Generation of their own power by people's lines, instead of purchase of same from private generators and distributors.

Saving in purchases of equipment and supplies in open competition, instead of from concerns in which owners of traction capital are interested.

The printed report also contains the proposed enabling legislation which would create the Transportation District controlled by six trustees elected by the people of the district to provide a system of local transportation. The full control of such system would be vested in the board of trustees. The only restriction imposed is that in no case shall the rate of fare exceed 5 cents per person for a continuous trip in the same gen-

eral direction wholly within the limits of any incorporated city within the Transportation District. This fare is not to be subject to the control of or review by any governmental agency of the State.

"Mayor Thompson's Traction Commission" was appointed on Sept. 9, 1919. The sum of \$250,000 was appropriated for the expenses of its investigation. Of this amount \$180,000 was spent. It was charged with two principal considerations; namely, is people's ownership and operation of the traction lines feasible, practicable and desirable; and will a permanent 5-cent fare be guaranteed thereunder?

The commission began its work by adopting a resolution wherein it was

agreed that, inasmuch as the Illinois Public Utilities Commission was shown by its rulings in favor of the public utility corporations and against the interest of the people, it is vain to look for relief to that commission, and that, since the Supreme Court of Illinois had held that the State Public Utilities Commission had no jurisdiction over public utilities owned and operated by municipalities in the State of Illinois, arrangement should be made to appeal to the General Assembly for legislation authorizing the people to create a Transportation District or new municipal corporation, if they so elected, for the ownership and operation of the railway, at a 5-cent fare in accord with the so-called "Thompson plan."

for the Detroit United Railway, asked that the city be compelled to restore the company's tracks.

Following the disposal of the first case, suit will be filed for E. J. Burdick for personal damages as a result of his alleged false arrest and his retention until morning by the police in an effort to prevent his serving the temporary injunction on city officials.

Voluntary Ten-Hour Day

Public Service Railway Employees Go on This Basis in Spirit of Mutual Helpfulness

A voluntary concession has been made by 4,000 trainmen employed by the Public Service Railway, Newark, N. J., to work ten hours a day for a six-month period instead of the nine hours now put in. This will bring about a rearrangement of runs. William Wepner, state chairman of the union, made the announcement on Jan. 13. He said that only about twenty out of a total membership of more than 4,000 men in the union voted against the proposition. Mr. Wepner said:

The company has treated us better than we expected since our agreement made after the last strike. When we learned a month or so ago that a policy of retrenchment was to be adopted by the company we decided to do what we could to show our appreciation.

The War Labor Board said a nine-hour day at the pay we were receiving for ten hours was fair. We have been paid at that rate since making an agreement with the company. It meant, though, that some of the men longest in the business would receive about \$60 a week. I refer to about five per cent of our membership. This exceptional wage was a combination of the regular wage earned and overtime paid for several hours each day, which was not earned, in a sense, because the men were not compelled to remain at the carhouses.

There are some of these men whose runs end at about 2 o'clock in the afternoon. The company needs them during the rush hour. Under the agreement, the company had to pay these men at a rate of time and a half for the three hours they loafed. They could be at their homes or anywhere, so long as they report to take out cars at 5 o'clock. This averaged \$2.50 or more for each of about 500 men for almost every day in the year.

We decided that, as the first step to help the company in its emergency, we would do away with this system. We planned a ten-hour day and a rearrangement of runs, so that these men would not have that loafing period. It was put before the union at fully attended meetings and agreed upon. I went into conference with President McCarter of the company and told him my plan. He assured me that he had intended no wage reduction for the men because of the financial difficulties he was facing and accepted the plan I offered. It will take about two weeks to put it into effect.

John L. O'Toole speaking for the company said:

It is true that conferences have been held between the operating officers and representatives of the motormen and conductors looking to a readjustment of schedules that will be helpful in keeping down expenses. In fact, the relations between the company and its employees have been growing increasingly cordial for more than a year, and when the fact became evident that the company was not meeting its operating expenses the representatives of the men showed a commendable co-operative spirit and evinced a willingness to lend aid. As a result of many conferences the employees are accepting readjusted schedules of work which help to keep the costs from going higher.

In some instances these schedules extend the day's run a little, but the contract hourly rate of pay is not altered. Some changes have already been made and, while it is not possible to measure results in dollars, even approximately, the real promise of value is the anticipated outcome of closer co-operation between employees and company in the operation of the cars and the supplying of better service.

Coup d'État by Municipal Line

Detroit United Official, About to Serve Injunction, Arrested and Marooned on Island Over Night

The Street Railway Commission of Detroit, Mich., succeeded on Sunday, Jan. 9, in crossing the Mack Avenue tracks of the Detroit United Railway at St. Jean Avenue with the Charlevoix-St. Jean line, the first municipal ownership route that it is proposed to start in operation, after E. J. Burdick, assistant general manager of the Detroit United Railway, had been taken to Belle Isle by Detroit policemen and detained there by the opening of the draw span in the bridge that connects the island with the mainland.

A TEMPORARY restraining order had been issued by Judge Harry Dingman to prevent the Street Railway Commission from crossing the tracks of the Detroit United Railway and it was while serving this order that Mr. Burdick was arrested by the police and hurried away from the scene in a patrol wagon.

About 200 policemen were in the vicinity of the crossing, having been assembled there at the order of Police Commissioner Inches. In a statement to John C. Lodge, acting Mayor at the time of forced crossing, Police Commissioner Inches said in explanation of the treatment accorded Mr. Burdick that Commissioner Martin of the Department of Public Works, Mr. Goodwin, manager of the Municipal Railway, and Ross Schram, secretary of the Street Railway Commission, all had informed him Saturday night that they were going to do some work at the corner of St. Jean and Mack Avenues, and asked protection as they feared trouble. Mr. Inches instructed Superintendent Rutledge to provide a force which would be able to take care of any trouble which might develop and it was decided to throw a cordon of officers around the men who were at work and thus prevent a crowd from gathering.

The number of men assigned to the job was increased when it became apparent soon after the work was started that the Detroit United Railway was massing some heavy equipment on its tracks and on the adjacent streets a short time before the work was begun. Not far from the contemplated work a heavy wrecking train of the Detroit United Railway was idle on that company's track and in the other direction

a snow plow was stationed and motor trucks were awaiting on adjacent streets.

According to the statement by Mr. Inches, trouble began as soon as work was started. A large motor truck belonging to the railway was driven right through the gang of men who were starting the work and was abandoned at a point where it would entirely obstruct traffic on the street. Shortly after Mr. Burdick was observed among the men. The natural inference, according to the Police Commissioner, was that he was getting word to the wrecking trains and snow plow and other equipment to get into the fight, and he was removed from the scene of work and taken to the station for investigation.

According to Mr. Burdick the police attempted to prevent him from serving the temporary injunction. It is held, however, that service was made, inasmuch as it is only necessary that the one on whom the injunction is served be informed of the nature of the paper.

Ross Schram, secretary of the commission and also secretary to the Mayor, is credited with having supervised preparations for crossing the Mack Avenue line with the municipal rails. The Commissioner of Public Works, Mr. Inches and Mr. Goodwin are believed to have received their instructions from Mr. Schram.

As a result of the forced crossing, action was started in the Circuit Court, where the Detroit United Railway brought suit to force the city to abandon the crossing. The company also seeks permanently to enjoin the street railway commission for crossing its lines. Elliott G. Stevenson, attorney

Municipal Road May Start Service Feb. 1

According to Joseph S. Goodwin, general manager of the Detroit (Mich.) Municipal Railway, service will be instituted on the first of the municipal lines on Feb. 1. The first cars will be operated over the St. Jean lines to Charlevoix Avenue and thence east to Alter Road, a distance of about 4 miles.

Work is being carried on with a view to progressing as rapidly as possible with other municipal lines. With the advent of cold weather and the necessary slackening up of construction all equipment which has been procured for and used on the municipal lines is being overhauled and put in good condition in order that no delays will be experienced when the construction season again opens.

Chicago City Administration Attacked

In a call for the annual meeting on Feb. 8 of the Chicago City & Connecting Railways Collateral Trust, which holds the stock of the Chicago City Railway, an attack is made on the attitude of the Mayor of Chicago and the city administration toward the traction companies. The statement points out how seriously the activities of the company in providing additional facilities have been handicapped by the continual litigation with the city. In short, the city officials have continued to make political capital of the requirements of the traction companies despite the fact that this very attitude has made it virtually impossible for the companies to give adequate service.

Receivers Explain Accident

As a result of the fatal accident on a line of the Pittsburgh Railways, Pittsburgh, Pa., referred to in the *ELECTRIC RAILWAY JOURNAL*, issue of Jan. 8, the receivers of the company, Charles A. Fagan, W. D. George and S. L. Tone, at the conclusion of an all-day session of inquiry, issued the following statement:

Investigations are being made regarding the accident which occurred last Monday evening during the rush hours, but it has not been possible to determine the direct cause of the same.

For the purpose of impressing upon the employees of the railways company the necessity for following out rules of a similar nature previously made the receivers directed the posting of the following rule as to the operation of cars on the system:

Motormen and conductors are hereby directed and ordered, that hereafter while operating cars in their charge, if brakes, or any portion of the equipment connected to the brakes do not operate properly they shall hold the car in its then position on the street until a following car can be coupled to it, and then proceed with such car to either the nearest car barn or to a switch where that car can be removed from the main track.

City Councilman John F. Dailey introduced a resolution compelling the railway to install safety chains on every car hauled by another car in which passengers are carried. Three separate investigations are now being conducted into the causes of the accidents.

News Notes

Cleveland Interest Fund Low.—The falling off of the number of car riders on the lines of the Cleveland (Ohio) Railway has been so great since the maximum rate of fare went into effect that the interest fund, which is the fare barometer, has continued to drop instead of showing the expected increase. On Dec. 1 the interest fund had dropped to less than \$60,000.

Wages of Way Men Reduced.—The New Jersey & Pennsylvania Traction Company, Trenton, N. J., has announced a reduction of 20 per cent in the wages of the employees of the maintenance of way department. Gaylord Thompson, general manager of the company, declares that the readjustment of the wage scale is in keeping with present conditions and that the new wages correspond with the scale recommended by the War Labor Board some time ago.

Wants Street Intersections Improved.—Commissioner Barbur has announced that unless street intersections traversed by the railway lines of the Portland Railway, Light & Power Company, Portland, Ore., are repaired immediately and put in proper condition he will appeal to the Public Service Commission for relief. The commissioner states that he has repeatedly urged executives of the railway to make repairs at street intersections but that nothing more than temporary repairs have been made.

Information Committee for Wisconsin.—The Wisconsin committee organized for the purpose of distributing information about the public utilities to the public has begun to function. This committee is conducted under the name of the Wisconsin Public Utilities Bureau, by the Wisconsin electrical, gas and telephone associations. Headquarters of the bureau are at 445 Milwaukee Street, Milwaukee, Wis. Frantz Herwig is director. Publication of a bi-weekly news bulletin for the use of newspapers has been started.

"All Together" at Camden.—The Public Service Railway at Camden, N. J., is issuing periodically under the direction of George A. Rothery a leaflet, entitled "All Together." By means of this pamphlet Mr. Schreiber, chief engineer of the Public Service Railway and manager of the Southern Division, is able to keep in close touch with his employees. In this paper such subjects as accidents, jitneys, etc., are discussed. In a recent number of Vol. 1 an urgent appeal is made to the men to try to co-operate with the company officials in securing the good will of the public. The paper states: "Please tell

our patrons that the company welcomes any communication by word or by letter of any complaint, criticism or commendation about the railway and any such communication will be acknowledged and receive sincere, careful and intelligent consideration."

Programs of Meetings

Canadian Electric Railway Association

The members of the Canadian Electric Railway Association will meet at the Chateau Laurier, Ottawa, Ont., on Jan. 31 and Feb. 1.

C. E. R. A. Meeting Postponed

The annual meeting of the Central Electric Railway Association, which was announced for Jan. 27 and 28, has been postponed until Feb. 24 and 25.

National Civic Federation

Outstanding industrial problems, with which the American people are confronted today, from both the national and the international viewpoints, will be discussed at the twenty-first annual meeting of the National Civic Federation, to be held at Hotel Astor, New York City, Feb. 14, 15 and 16.

It will be the purpose at the Civic Federation's meeting to make so clear the difference between the sane, patriotic American labor movement and the labor movements of Europe that the so-called Liberal groups in the United States cannot longer becloud the situation.

The program for the federation's annual meeting will include, in addition to topics indicated by the problems presented in the foregoing, reports from its workmen's compensation department, social insurance department and the new department on study of revolutionary movements.

During the past year through fifteen sub-committees the last-named department made an extensive study of the extent to which the revolutionary forces in this country have penetrated the various groups making up our citizenry: Labor, agriculture, the church, the college, the public school, philanthropic agencies, negro and foreign groups, and women's organizations.

This investigation, says Ralph M. Easley, chairman of the executive council of the federation, has resulted in some amazing revelations which call for most serious consideration by those who believe that the institutions of our country should be safeguarded against the "boring from within" policies of the Socialists, I. W. W.'ites and bolsheviks.

The sessions of the woman's department, to be held on the third day, will include consideration of the questions it has been studying during the past year, such as public health education, immigration and naturalization, the educational system and its needs and the dangerous radical tendencies of the times as they affect American citizenship.

Financial and Corporate

Reading Property Evaluated

Cost of Reproducing and Developing the Property Included Based on Present Prices, Average Five-Year Prices and Historical

At the hearing of the Public Service Commission of Pennsylvania held on Jan. 5, 1921, in Harrisburg, A. L. Drum & Company, consulting engineers of Chicago and Philadelphia, presented on behalf of the Reading Transit & Light Company, a final report on the cost of reproducing and developing the electric railway properties of the Reading company. In accordance with the public service law of Pennsylvania the engineer's report comprises: (a) An estimate of the present-day cost of reproducing and developing the property. (b) An estimate of the cost at various fair average prices of reproducing and developing the property. (c) A statement of the historical cost including the developmental cost of the property.

A COMPARISON of the costs of reproducing the property on the several bases is contained in the accompanying table, which shows that the cost of reproduction on the basis of 1919 prices is 53.77 per cent in excess of the cost of reproduction based on average prices for the five years ending Dec. 31, 1917. The historical cost of the company's property is found to have been \$6,150,687. This corresponds very closely with the cost to reproduce the physical property new on average pre-war prices.

The developmental costs as shown on the accompanying table are reported as specified in the Pennsylvania law and represent a measure of the developmental and going concern value of the property and indicate the costs that have been or would be encountered in creating and developing the property to its present state of efficiency and unification. The developmental costs are segregated under two heads, one consisting of the cost of unifying the system, representing an estimate of the cost incident to the creation and consolidation of the various companies now comprising the Reading Transit & Light Company into one operating company with the resulting benefits accruing to the public through the efficiencies and economies of operation and the reduction in fare due to free transfers established by reason of the unification of the system.

UNIFIED SYSTEM CONSISTS OF THIRTEEN COMPANIES

The unified system of the Reading Transit & Light Company, Reading Division, consists of some thirteen companies, six of which were merged into the Reading Transit & Light Company on Sept. 12, 1917, six are operated under lease and one is operated through stock ownership. During the historical development of the company twenty-six companies were chartered, with a final reduction to thirteen companies through mergers and sales. The other developmental cost consists of the loss of

interest during operation and represents the deficit of return on the investment during the early period of operation up to the time the business had

amounted to \$709,983; on the basis of average prices 1914 to 1919 it amounted to \$884,476; and on the basis of average prices during 1919 it amounted to \$1,197,737.

READING DIVISION OPERATES RAILWAY

The Reading Division of the Reading Transit & Light Company owns or leases and operates the railway system in the city of Reading with suburban lines radiating from Reading through intermediate boroughs and to the villages of Womelsdorf, Adamstown, Birdsboro, Temple, Boyertown and Stony Creek. The property principally consists of 101.97 miles of track (gauge 5 ft. 2½ in.), of which 36.48 miles are located in Reading and the remaining 65.49 miles in the Suburban Division; 141 passenger cars, thirty service cars; two main carhouses and shops; two office buildings, used jointly by the railway and the Metropolitan Edison Company, and miscellaneous buildings, waiting-stations, bridges, land, etc. Power is purchased from the Metropolitan Edison Company at Reading.

The appraisal was prepared from an inventory made by the railway company as of Dec. 31, 1917, and the repro-

	Basis No. 1 Average Prices 1913 to 1917, Inclusive	Basis No. 2 Average Prices 1914 to 1919, Inclusive	Basis No. 3 Average Prices 1919
Physical property:			
Cost to reproduce new.....	\$6,440,112	\$7,642,424	\$9,903,165
Developmental cost:			
Cost to unify system.....	487,000	487,000	487,000
Loss of interest during operation.....	450,808	534,970	693,221
Total developmental cost.....	\$937,808	\$1,021,970	\$1,180,221
Total cost of reproducing and developing the property.....	\$7,377,920	\$8,664,394	\$11,083,386

become established on a paying basis.

A summary of the cost of reproducing and developing the property under the various methods is as above.

The accrued depreciation as reported in the appraisal represents the amount of existing depreciation due to wear and use, as ascertained and determined by inspection and measurement in the field and is not based on theoretical depreciation due to age or obsolescence. The amount of accrued depreciation ascertained under the basis where average prices 1913 to 1917 were applied

duction cost as reported is arrived at by applying to the inventory units the actual existing prices for labor and material which prevailed in the community during the periods specified under the three different bases and represent the amounts it would actually cost the company to install the work in place. To the amounts as reported in the inventory and appraisal should be added the capital expenditures from Jan. 1, 1918, to Oct. 31, 1920, amounting to \$158,823 to arrive at the reproduction cost as of October 31, 1920.

READING TRANSIT & LIGHT COMPANY

READING DIVISION

Estimated Cost to Reproduce New as of December 31, 1917, Based on Average Unit Prices Prevailing During the Periods Specified

	Basis No. 1 Applying Average Prices, 1913-1917 Inclusive	Basis No. 2 Applying Average Prices 1914-1919 Inclusive	Basis No. 3 Applying Average Prices 1919	Per Cent Increase		
				1914- 1919 Over 1913- 1917	1919 Over 1913- 1917	1919 Over 1917
Track.....	\$2,035,646	\$2,581,478	\$3,491,418	26.81	71.51	
Bridges.....	183,750	225,388	295,322	22.63	60.72	
Paving.....	540,587	664,329	1,010,144	22.89	86.86	
Electrical distribution system.....	444,596	499,008	537,494	12.24	20.89	
Rolling stock.....	869,346	1,075,147	1,396,013	23.67	60.58	
Shop machinery, shop tools and supplies.....	26,299	27,966	38,608	6.34	46.78	
Buildings.....	268,339	317,388	458,092	18.28	70.71	
Furniture and fixtures.....	6,883	8,259	12,388	20.00	80.00	
Stores, tools and miscellaneous equipment.....	106,331	107,916	118,028	1.49	11.00	
Land.....	602,039	602,039	602,039			
Expenditures not apparent in inventory.....	14,859	14,859	14,859			
Engineering and superintendence.....	218,313	264,394	347,604	21.11	59.22	
Administration, organ and legal expenses.....	258,872	258,871	258,871			
Taxes during construction period.....	23,858	22,822	20,825	*4.34	*21.71	
Interest during construction.....	391,980	466,891	688,137	19.11	75.55	
Working capital.....	141,742	141,742	141,742			
Cost of financing.....	306,672	363,924	471,579	18.67	53.77	
Physical property, total value.....	\$6,440,112	\$7,642,423	\$9,903,164	18.67	53.77	

* Decrease.

Interborough's Deficit Still Decreasing

The Interborough Rapid Transit Company has been steadily decreasing the deficit in its net income from August, 1920. That month the Interborough showed a deficit of \$658,000, and in its

While a complete reorganization plan has been prepared, the committee considers it inadvisable to submit it under the present financial conditions. The committee in consequence recommends that the deposit agreement of Jan. 15, 1919, be amended so that the time for the submission of a plan thereunder be

Edwin P. Maynard, Henry F. Noyes, H. Hobart Porter, Dick S. Ramsay, Hiram R. Steele, James Timpson and Harold T. White.

Frank Lyman, the president of the company, presided at the meeting. H. Hobart Porter, vice-president and general manager, in response to questions by stockholders, stated that the gross earnings of the road now aggregated about \$200,000 weekly. Mr. Porter told of the difficulties encountered by the management since the Brooklyn lines resumed independent operation on Oct. 19, 1919, stressing particularly the expense incurred through the recent strike and the heavy snow fall of last year. Necessary improvements in equipment and other operating detail he mentioned as additional large sources of expenditure.

Mr. Porter reiterated to the stockholders the statement addressed to them in his recent letter, emphasizing the necessity of a higher fare if the road were to gain a sound financial position.

Mr. Lyman was re-elected president of the Brooklyn City Railroad at the meeting of the directors on Jan. 11 and Mr. Porter was re-elected vice-president and general manager. Mr. Porter has had charge of the Brooklyn City system since independent operation was resumed. Mr. Lyman has been president of the company since 1911. Henry F. Noyes was elected vice-president; S. B. Olney, secretary; and George W. Jones, treasurer. Other officials chosen were: Clinton E. Morgan, assistant general manager; E. H. Reed, auditor; L. E. Sharpe, assistant secretary and treasurer; William Siebert, superintendent of transportation; and James T. Grady, publicity director. Mr. Morgan has been identified with the Brooklyn City Railroad since the lines were taken over by their owners.

INCOME STATEMENT OF THE INTERBOROUGH RAPID TRANSIT COMPANY

Month Ended Nov. 30:	1920	1919	Percentage Change Over 1919
Gross operating revenue.....	\$4,813,587	\$4,286,850	12.3
Operating expenses.....	3,124,459	2,619,757	19.3
Net operating revenue.....	\$1,689,128	\$1,667,093	1.3
Total taxes.....	217,218	211,949	2.5
Income from operation.....	\$1,471,910	\$1,455,144	1.2
Non-operating income.....	52,230	42,864	21.9
Gross income.....	\$1,524,140	\$1,498,008	1.7
Interest rentals, etc., including Manhattan Guarantee.....	1,785,570	1,653,235	8.0
Net Corporate Income (exclusive of accruals under the provisions of Contract No. 3 and related Certificates which under these agreements with the City are payable from future earnings).....	*\$261,430	*\$155,227	-68.5
* Deficit			
Five months ended Nov. 30:			
Gross operating revenue.....	\$21,989,323	\$19,531,958	12.6
Operating expenses.....	14,798,444	12,319,269	20.0
Net operating revenue.....	\$7,190,879	\$7,212,689	- 0.3
Total taxes.....	1,090,437	1,068,960	2.0
Income from operation.....	\$6,100,442	\$6,143,729	- 0.7
Non-operating income.....	260,159	217,941	19.4
Gross income.....	\$6,360,601	\$6,361,670	- 0.02
Interest, rentals, etc., including Manhattan Guarantee.....	8,741,958	8,259,866	5.8
Net Corporate Income (exclusive of accruals under the provisions of Contract No. 3 and related Certificates which under these agreements with the City are payable from future earnings).....	*\$2,381,357	*\$1,898,196	-25.5
* Deficit.			

latest report for November the figure is down to \$261,000, against a \$155,227 deficit for November, 1919. In its five months' statement ended Nov. 30, after subtracting interest, rentals, etc., the company lost \$2,381,357 against \$1,898,196 for the corresponding period of last year. In November, 1920, the Interborough carried 86,466,512 revenue passengers, an increase of 8,028,271 over 1919.

Improvement in American Cities Company's Affairs

The committee headed by J. K. Newman representing the deposited 5-6 per cent collateral trust bonds of the American Cities Company reports favorable progress in the development of the subsidiary properties of the American Cities Company. As soon as operating figures for 1920 have been completed a report will be made covering the operation and financial position of each of the subsidiary properties.

Recent statements of earnings of the subsidiary companies indicate that those companies are on a basis where their combined net earnings are more than sufficient to pay interest on the American Cities Company 5-6 per cent collateral trust bonds after setting aside ample renewal and replacement funds in addition to adequate maintenance expenditures. However, the subsidiary companies have declared no dividends, as the surplus earnings have been used to better the physical properties.

extended to Dec. 31, 1921, and that the deposit agreement as so amended be extended and renewed.

Interborough Meets Interest Payment

Arrangements completed on Dec. 30 give the Interborough Rapid Transit Company, New York, N. Y., a six months' extension on its 7 per cent notes, which fell due on Jan. 1. The company planned to pay the interest due the first of the year on the 5 per cent bonds amounting to \$3,800,000 with cash accumulated through operation of its lines.

The following statement was issued by Frank Hedley, president and general manager of the Interborough:

My attention has been called to a statement on the news ticker that the Interborough Rapid Transit Company will be saved from receivership on Jan. 1, 1921.

The Interborough Company has been successful in securing an extension of its notes of \$2,900,000 for six months, and as a result of this, and by adopting the policy of paying some of its obligations as it may be possessed with cash after Jan. 1, the company will be able from the cash on hand and which it expects shortly to receive, to meet its obligations, but the company has not been able to negotiate any loan for new cash.

Brooklyn City Officers Re-elected

At the annual meeting of the stockholders of the Brooklyn (N. Y.) City Railroad the following directors were elected: Frederick L. Allen, William N. Dykman, Richard L. Edwards, Crowell Hadden, Alfred R. Horr, Frank Lyman,

Equipment Trust Certificates Offered

In its January circular the bond department of the Chicago Trust Company describes the equipment trust 8 per cent gold certificates of the J. G. Brill Company, issued for subscription at 100 and accrued interest. The certificates mature serially. They are in coupon form in denominations of \$1,000 and \$500. These certificates are issued by the Chicago Trust Company, trustee, under the "Philadelphia Plan," and are secured by Birney one-man safety cars, built by the J. G. Brill Company, and equipped by the General Electric Company and the Westinghouse Airbrake Company. Purchase contracts and notes covering the sale of the equipment are pledged as additional security with the trustee, and title remains in the trustee until all outstanding certificates have been retired. The cars securing these certificates are operated by well-known, successful companies, including the Iowa Railway & Light Company, the Houston Electric Company, the Puget Sound Power & Light Company, the Tampa Electric Company and others. The cer-

tificates represent approximately 63 per cent of the purchase price of the cars, the balance having been paid in cash and junior securities.

Valuation Has Small Effect on Rate of Fare

A recent issue of the *N. O. T. & L. News*, which is distributed to the patrons of the railway lines of the Northern Ohio Traction & Light Company in Akron, Ohio, brings out an interesting point as to the effect of the valuation figures on the rate of fare. The new service-at-cost franchise being negotiated at Akron contains a provision that the property shall be valued by a commission after the franchise is put in effect. As usual, some opponents to the plan are making much capital of the fact that the property has not been valued, and that this will have a very material effect upon the rate of fare should a high valuation be placed after the contract is entered into. The comment follows:

Suppose the Akron city system was valued at \$5,000,000, the interest charge (7 per cent) would be \$350,000 annually.

Suppose the balance of the expense was \$2,650,000 annually.

Suppose the company carries 60,000,000 passengers annually, as it probably will within the next year.

The fare would be just 5 cents.

Now suppose the system was valued at \$6,000,000, what difference would it make in the fare?

A little more than one mill.

If the system were valued at \$7,000,000 the difference would make a little more than 2 mills; if \$8,000,000, a little more than 3 mills, and so on.

It would require an increase of more than \$4,000,000 to make a difference of 1 cent in the fare.

Why talk about the valuation regulating the fare?

It's the price of labor, cost of upkeep of track and expense for equipment, coal, etc., that regulate fares.

Statistics of Express Companies

Statistics of the mileage covered by the national express companies in the United States have just been published by the Interstate Commerce Commission. They follow:

Kind of mileage:	1919	1918
Steam road.....	238,354.22	239,282.12
Electric line.....	3,523.75	6,951.25
Steamboat line.....	31,060.87	40,410.12
Stage line.....	906.42	1,175.42
Total mileage.....	273,845.26	287,818.91

The figures during 1919 are those of the American Railway Express Company and in 1918 of that company and some smaller companies absorbed by it during 1918.

Prospects Good for Financial Rehabilitation

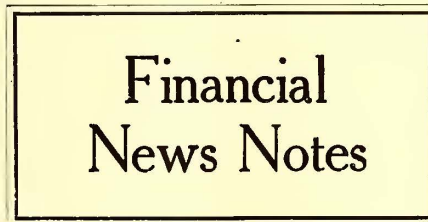
J. R. Baggett, of Lillington, N. C., who was recently appointed by the North Carolina courts as a temporary receiver of the Cumberland Railway & Power Company, which owns and operates a number of public utilities in the State of North Carolina, is reported to have stated that in examining in Norfolk the inventories, books, etc., he regards the physical properties of the company to be worth approximately

\$500,000. This, he states, is based on a very thorough appraisal made by the Appraisal Company of the South as of March 15, 1920, and upon his inspection and examination of the company's properties.

He further states that there are somewhat less than \$500,000 of bonds apparently outstanding. His information is that the Corporation Commission of North Carolina values the properties of the company for tax purposes at more than \$400,000. Mr. Baggett is said to feel that giving publicity to unfounded rumors and to information manifestly unreliable would tend to prejudice very seriously the rights of the company's security holders.

He is quoted by the *Virginian-Pilot* of Norfolk as follows:

Mr. Baggett is of the opinion that if his plans in regard to the company's management can be carried out the security holders of the company will be amply protected and that no loss will be sustained by either the bondholders or the creditors. Mr. Baggett assigns the reason for the company's embarrassment and the receivership petition more to the financial stringency which prevented the obtaining of ready funds for development than to an insolvent condition. He says that he has the unqualified co-operation of the officers and directors of the company, with a view to putting the company on its feet and feels that if the bondholders and others interested will show the proper spirit of co-operation the company will ultimately prove a very profitable venture.



Abandonment at White Plains Approved.—The Public Service Commission for the Second District of New York has approved abandonment by the Westchester Street Railroad of its Westchester Avenue line in White Plains but has declined to approve a declaration of abandonment by the company of its Mamaroneck line.

Short Stretch Is Abandoned. — The Southeastern Ohio Railway, Zanesville, Ohio, was authorized by the Public Service Commission to abandon its Mill Run line on Dec. 31. The line extends for 1 mile from North Sixth Street, out Sixth, on Howard, North Seventh, Price, Fernanda and Hall Avenues to the Mill Run depot of the Ohio River & Western Railroad.

Maumee Lines Operate Leased Equipment.—The Maumee Valley Lines, being operated by Raleigh D. Mills, receiver, are using cars rented from the Toledo Railways & Light Company at \$5 a day each. What the railroad will do when the cost-of-service franchise goes into effect and the cars are turned over to the Community Traction Company is problematical.

Abandonment Application Withdrawn.—The Public Service Commission for the Second District of New York has authorized the Geneva, Seneca Falls & Auburn Railroad to withdraw its appli-

cation for authority to cease operating that part of its line between Garden Street in Seneca Falls and Cayuga Lake Park. This action follows a hearing before Commissioner J. A. Barhite, who recommended a closing of the company's application to cease operations.

Restoration Suit to Equity Court.—Judge Thomas H. Darby, of the Common Pleas Court of Hamilton County, Ohio, has refused to appoint a Master Commissioner to hear the suit for \$350,000 and accounting filed by the city of Cincinnati against the Cincinnati Traction Company. In his official capacity as Presiding Judge of Common Pleas Court, Judge Darby said he would send the case for trial to one of the equity courtrooms as soon as the parties of the suit are ready for trial.

Greenville Road Purchased.—In the matter of the purchase of the railway system at Greenville, Tex., by the city, referred to in the *ELECTRIC RAILWAY JOURNAL* on Jan. 1, 1921, the property included was that of the Greenville Railway & Light Company, which connects Greenville and Peniel. There were originally two systems in Greenville; namely, the Greenville Railway & Light Company and the Mineral Heights Street Railway. The latter company abandoned service some time ago, although the tracks of the railway still remain in the streets.

Dividend Reduced.—The directors of the American Light & Traction Company, New York, N. Y., have declared a quarterly dividend on its common stock of 1 per cent in cash and 1 per cent in stock. In the preceding quarter 1 per cent in cash was distributed in addition to 1½ per cent in stock. From 1910 to July, 1920, the company has maintained an annual rate of 10 per cent cash and 10 per cent stock. In July, however, a quarterly dividend of 1½ per cent cash and a like amount in stock was declared. Three months later the cash payment was made 1 per cent. The regular dividend of 1½ per cent on its preferred was declared, all dividends being payable on Feb. 1 to stock of record on Jan. 14.

Thrift Campaign in Blue Grass District.—The Lexington (Ky.) Utilities Company is conducting a bond-selling campaign in the interests of Kentucky utilities. The offering consists of first lien and refunding 6 per cent gold bonds in \$50, \$100, \$500 and \$1,000 denominations to yield more than 7 per cent. Bonds may be purchased for cash or on a time plan. In an effort to interest the people of Lexington and its surrounding vicinity in home industries instructive and attractive circulars have been issued by the company. These circulars contain pictures of electric shops and power houses and depict what the lighting company in the Blue Grass district has done and is doing in the way of service. "Invest in home industries and help make your community a bigger and better one" is the direct appeal of the Lexington Utilities Company to the residents of Lexington and vicinity.

Traffic and Transportation

Service Order for Chicago

Illinois Commission Orders Safety Cars, Trailers, Loop Rerouting and Skip Stop Continuance

The Public Utilities Commission of the State of Illinois on Jan. 3 issued an order to the Chicago Surface Lines to continue skip-stop operation, to install safety cars on certain lines, to proceed to use trailers and to work on a rerouting plan for the down-town loop district. This new service order was issued after a series of hearings, looking toward improvement in the service rendered by the surface railways.

The skip-stop plan ordered is that which is now in force and which was installed by City Council ordinance during the war, as a coal conservation step. There has been a good deal of agitation that the skip-stop should be abolished, but the commission points out that this plan has resulted in greater efficiency and decreased running time, enabling the railways to carry more passengers with the equipment available. In view of this saving in operating expenses and better service to the public, the commission orders that the companies continue to carry out the skip-stop plan of operation now in effect until further notice from the commission.

ONE-MAN CARS APPROVED

With regard to one-man safety cars, the commission states that the railways are authorized and ordered to procure and install these cars at the earliest date possible, on such lines and at such times as the traffic is light and their use would make possible a more frequent or better service, or would release heavier equipment for use on other lines. The commission's order places a definite limitation on where such cars may be used by stating that they shall be operated in day service only on those lines outside the loop where the headway between cars during morning rush hours is not less than 7 minutes; and in night service on those lines where the headway between cars is not less than 15 minutes.

In its order on the operation of trailers, the commission referred back to a service order dated Sept. 29, 1915, in which it pointed out that the use of trailers would increase the capacity of the tracks and that their use is practicable and feasible, but stated that there was doubt whether the use of trailers was justified at any other time than during the rush-hour period. In the new order the commission rescinds this earlier finding and orders the use of trailers on such lines and at such times (all day or in rush hour only) as the density of traffic is great and the use of trailers would result in greater accommodation and better service.

The commission further orders the companies to prepare and submit to it within sixty days preliminary plans for such rerouting and switchback and turnback service as the company may deem practicable and effective in facilitating the movement of cars and reducing the congestion of traffic in the loop.

It will be recalled that the Chicago Surface Lines has already purchased and received ten standard one-man safety cars which to date have not been placed in operation. It also has under construction in its West Side Shops, fifty trailer cars. There has been some opposition on the part of trainmen to operating safety cars.

Eight Cents in East St. Louis

The Public Utilities Commission of Illinois, after more than two years' deliberation on the application of the East St. Louis (Ill.) Railway, a part of the East St. Louis & Suburban Railway, for permission to charge increased fares, has made a ruling as one of its final acts granting the company's request.

The ruling is that the permanent fares on cars in East St. Louis shall be 8 cents for an adult single fare, two adult tickets for 15 cents, and 3 cents for children, cash or ticket fare. The present fare is 8 cents for adults and 4 cents for children. The new order is effective at once.

The award was made on an application filed in 1918 for increased rates. At the time the appeal was made fares were 5 cents for adults and 2½ cents for children. The company asked for a 6-cent rate for adults and 3 cents for children. A temporary order to that effect was made and the City Council adopted a resolution giving approval of the increase. While the temporary rates were in effect the commission started an investigation to ascertain the value of the company's property as a basis to figure the rate of income the company should receive in order to meet its obligations.

While the commission was engaged in conducting hearings and using experts to determine the valuation of the property the company filed two amendments to its petition, one for a 7-cent fare and the other for an 8-cent fare. No action was taken on the 7-cent fare application, but the commission granted permission to the company to charge 8 cents for adults and 4 cents for children as a temporary measure. This order was issued about six months ago to permit the company to take care of an increase in wages.

When the 6-cent fare was granted an appraiser appointed by the commission fixed the company's valuation at \$1,560,000. The company contended the valuation was too low.

Ticket Rate Advanced

Railway at Santa Cruz Authorized to Sell Six Rides for Fifty Cents
—Cash Fare 10 Cents

The Union Traction Company has been authorized to increase its fares in Santa Cruz, Cal., and vicinity by the sale of six rides for 50 cents instead of eight. The Railroad Commission in an order issued on Jan. 4 says, in reference to the fact that the company has not asked for a rate sufficient to yield a return on its investment:

We have given careful consideration to the return secured in the past and to the extent to which the earnings may be increased as a result of the increased fares sought, and while the moderate advance to be made in the fares may solve the problem and retain to the community the transportation service which it needs in order to continue to grow and prosper, it is difficult to escape the conclusion, in the face of the competition by automobiles, mostly vehicles operated for private family use, that the limited number of riders now patronizing a street car system of this kind cannot be expected to pay rates sufficiently high to carry the entire burden.

YEAR'S DEFICIT \$35,846

In 1920 the actual loss of the company, as brought out at the hearing of the application to increase rates, totaled \$35,846. The commission says that the company is efficiently and honestly managed and that operating expenses have been reduced to a minimum by the use of one-man cars wherever possible. "Further reductions in operating expenses," says the commission, "appear impossible without seriously impairing the standard of the service now being rendered."

The commission points out that prices of materials and labor have greatly advanced during recent years and cites the fact that platform men who, in 1917, were receiving 26, 27, 28 cents an hour, depending upon the length of service, are now receiving 46, 48 and 50 cents an hour. The commission also points out that while the company's gross revenue increased \$22,530 from 1916 to 1920 the expenses, in the same period increased \$27,066.

The following is also from the commission's opinion:

At the hearing some objections were entered by certain citizens against the increases in fares, another group of patrons had no objections to urge, the majority frankly declaring that it would be a calamity to the city of Santa Cruz and the outlying districts if the company were forced to discontinue or curtail its service by reason of lack of adequate revenue. The City Attorney, while calling attention to some unsatisfactory service at points along the line, had no objection to the increase in fares and stated that in his judgment the application should be granted.

The commission's order allows the company to continue charging 10 cents for single fares.

New Mexico Road Wants More

The Las Vegas (N. M.) Transit Company has filed an application with the State Corporation Commission for permission to increase its fares from 6 to 8 cents. The company explains that the cost of operating is far in excess of receipts and that its patronage has seriously decreased during the past few months.

Fares Up in Florida

Jacksonville and Pensacola Companies Awarded Advances After Court Insists Commission Shall Act

Awards have been made of a 7-cent fare for the Jacksonville (Fla.) Traction Company and an 8-cent cash fare with 7½-cent tickets for the Pensacola (Fla.) Electric Company. The two companies appealed for 10-cent fares. The rates allowed will not suffice, in the opinion of Peter O. Knight, general counsel for the Stone & Webster subsidiaries in Florida, who argued the case before the Railroad Commission and then before the State Supreme Court, where he won a decision to the effect that a street railway is a railroad. The Railroad Commission assumed jurisdiction after it was ordered by the Supreme Court to hear the appeals.

COMMISSION ASSUMES JURISDICTION

After assuming jurisdiction, the commission, handling both cases jointly, held hearings in Jacksonville and Pensacola, had its experts audit the books of both companies for years back and ordered an appraisal of the companies' properties.

Though the counsel for the Stone & Webster corporation argued that a 10-cent fare would yield only 5 per cent on the commission's own valuation of the properties on the Jacksonville lines and only 3 per cent on the Pensacola property, the orders were prepared with the 7-cent basis in Jacksonville and the 8-cent basis in Pensacola.

In addition the companies in both cities were directed to issue tickets for school children at the rate of ten for 40 cents, to continue to provide transfers and to file special charter rates for review.

The financial difficulties of the Jacksonville corporation go back of November, 1919, when a receiver was appointed by Federal Judge R. M. Call in the District Court. Receivership for the Pensacola company followed in February of 1920. E. J. Triay was appointed in Jacksonville and J. J. Holdzclaw in Pensacola.

COAL PRICE BIG FACTOR

The rapidly increasing price of coal, several increases in wages, arbitrary rulings in Jacksonville that extensions be made, when such were costly and unprofitable, and general conditions in Pensacola, contributed to make conditions worse and worse. The Jacksonville company paid as high as \$17 per ton for coal, according to Mr. Knight, and at Pensacola prices ranged almost as high. Old prices had been \$3.50.

Conditions were very bad when the first application was made to the Railroad Commission. The commission ruled that it had no jurisdiction over street railways. It held that such roads were public utilities, but not railroads.

Mr. Knight, petitioning for the receivers, asked the Supreme Court for a writ of mandamus directing the Railroad Commission to assume jurisdiction

and grant reasonable and just rates. Jacksonville and Pensacola attorneys opposed the action. The State Attorney General and the commission's attorney led the fight against the writ, but Mr. Knight and J. L. Doggett succeeded in securing a ruling that "a street railway is a railway or railroad."

When the commission assumed jurisdiction it disposed of the appeal by granting a part of what was asked.

Valuation Case Argued

Presentation of evidence and examination of witnesses in the case of the city of Knoxville, Tenn., vs. the Knoxville Railway & Light Company, in which the traction concern is seeking a 7-cent fare, was completed before the Public Utilities Commission of Tennessee at Nashville on Jan. 7. The hearing had been in progress four days.

Counsel for the city was given until Jan. 18 in which to file protests. A decision is not expected until a thorough examination is made of the briefs on the part of the commission.

The point at issue before the commission is the value of the traction company's property along with its commercial lighting department. The appraisers for the company and the State made a joint report to the commission. The appraiser for the city of Knoxville refused, however, to sign this report. He made a separate finding in which he placed the value of the company's holdings at a figure about \$2,000,000 less than that made by the engineers representing the State and the city.

The report of the engineers with respect to the valuation findings at Knoxville was reviewed in the *ELECTRIC RAILWAY JOURNAL* for Dec. 25, page 1302. The historical cost was reported as \$6,234,141.

More Two-Fare Lines

New rate schedules have been filed with the Public Service Commission for the First District by the Brooklyn City Railroad and by several subsidiaries of the Brooklyn Rapid Transit Company increasing the fare for long rides on fourteen Brooklyn surface lines. It is proposed to charge a 10-cent fare by restricting the single-fare zone and, in some cases, by eliminating free transfers.

Filing of the schedules is based on the decision of the Appellate Division of the State Supreme Court that the Flatbush Avenue line has the right to charge a double fare. The decision followed the disorder which attended the effort of the Brooklyn City Company to charge two fares for a through trip. The Public Service Commission restrained the company from making the double charge and the company, appealing to the courts, won the fight. Since then two fares have been charged on this line and the Brooklyn City Railroad and the B. R. T. The commission has suspended the new schedules until March 12, pending an inquiry into the situation.

Railway Must Pay Overtime of Customs Agent at Port of Entry

United States District Judge R. Hazel at Buffalo, N. Y., has denied the application of the International Railway for a permanent injunction restraining the federal collector of customs at Buffalo from closing the International Railway's upper steel arch bridge and the Lewiston bridge at Niagara Falls on Sundays. The bridge crosses the lower gorge of the Niagara River and connects the Dominion of Canada with the United States. The collector of customs notified the railway he would close both bridges to Sunday traffic unless the International paid overtime to the customs agents on duty from midnight Saturday until 7 a.m. Monday.

A temporary injunction was issued, but after hearing the arguments of the government, Federal Judge Hazel ruled that unless the International Railway pays overtime to the customs agents on duty at the bridges, all passengers will be required to deposit all personal baggage, including pocket books, umbrellas, etc., with a customs agent at the bridge until the customs office is opened at 7 a.m. Monday morning. The court ruled the government is not obliged to keep customs agents on duty Sundays and has the authority to close the port of entry unless the expenses are borne by the bridge company, which is owned by the railway.

Nine and One-Half Cent Fare in Prospect

Following the receipt of the annual report of the Cincinnati (Ohio) Traction Company for the year of 1920, W. C. Culkins has forecasted a further increase in fare on March 1. The fare in Cincinnati now is 9 cents cash, with two tickets for 17 cents.

Although figures submitted by the company show that there were over 1,000,000 more passengers during the past year than in 1919, Mr. Culkins said that an increase in the rate of fare to 9 cents on March 1 may be looked for. Figures were 118,618,860 passengers for 1920 and 117,495,936 for 1919.

Mr. Culkins bases his conclusion on the assumption that there will be no reduction in the cost of materials of labor. Another contributing factor which may mean higher fares, he said, was a possible falling off in the number of passengers.

According to the franchise under which the company is operating an increase of only one-half cent can be made at any time, and this can only be done when receipts for the first two months of the preceding quarter have shown a deficit.

Receipts for December and January will not be submitted by the company until the beginning of February. If Mr. Culkins' prediction proves true that expenses of the company will not be reduced, the receipts for these months will show a deficit and another increase of one-half cent will go into effect, making the fare 9½ cents.

Transportation News Notes

Ten Cents in Atchison.—The City Council of Atchison, Kan., has authorized the Atchison Railway, Light & Power Company to charge a 10-cent fare on its city lines. The new rate is to stand until July 1, 1921, unless further extension is granted by the Council. The 7-cent fare went into effect a year ago.

Car Tickets as Gifts in San Diego.—Many residents of San Diego, Cal., were helped to solve the gift problem during the holidays by the San Diego Electric Railway. The 7½-cent fare tickets, good for ride through inner and outer zones and all transfer privileges, were put up for sale in neat little booklets containing forty tickets, with space on the cover for the name of the recipient and the donor. A large number of these practical gifts were reported sold.

Fare Schedule Continued in Milwaukee.—The rates of fare for the single fare and suburban areas at Milwaukee, Wis., as fixed by the Wisconsin Railroad Commission in its order of June 24, 1920, were to have expired on Dec. 31, 1920, but have been continued by the commission until further order. Before such an order is issued, it is said, another hearing will be held. The single-fare area schedule is 7 cents cash and eight tickets for 50 cents. The continuing order was issued on Dec. 29, 1920.

Higher Rates in Kingston.—The Public Service Commission, Second District, has authorized the Kingston (N. Y.) Consolidated Railway to put into effect on five days' notice a 7-cent cash fare with four tickets for 25 cents. This new rate will be effective for one year or until further orders of the commission. A 6-cent fare was put into effect on the Kingston lines in April, 1919. Several months ago the company petitioned the commission for authority to fix such a rate as it would find just and reasonable.

Commission Claims Power Over Rates.—The Arkansas Corporation Commission has announced that it has jurisdiction to pass upon the reasonableness of rates. It takes this stand notwithstanding the existence of a contract between the utility and the town in which it is operating, and the fact that the Supreme Court of the state has held that a contract between a town and a public utility company is valid as between the parties does not deprive the commission of its jurisdiction to pass upon the reasonableness of the rates fixed in the contract.

Seven-Cent Fare Continues in Lima.—A 7-cent fare will continue for six months after Feb. 1 on the Lima, Ohio,

lines of the Ohio Electric Railway. A 7-cent cash fare went into effect on Sept. 3 and the expiration date was set for Feb. 1. The company recently applied for an extension on the ground that it had not profited sufficiently by the increased fare. The Council granted the extension. Mayor F. A. Burkhardt has announced that unless the railway takes steps to improve its service the city will consider a plan for municipal operation.

Eight Cents in Each Zone.—Zone fares on the interurban lines of the Houghton County Traction Company, Houghton, Mich., have been raised from 7 cents to 8 cents by authority of the State Public Utilities Commission. Tickets, each good for a ride in one zone, are being sold at the rate of five for 35 cents. Children between the ages of five and twelve years will be carried for 5 cents in each zone. They formerly paid the same rate as adults. The fare within the city limits of Houghton, Hancock and the other towns served by the railway remains at 5 cents.

Mr. Beeler's Plan Opposed.—The Safety Council at Kansas City, Mo., will launch, as one of its new year activities, a campaign for abandonment of the Beeler plan of loading and unloading street cars in the down town district. L. J. Smyth, director of the council, is reported to have said: "The Beeler plan of loading street cars midway between intersections is fundamentally wrong, so wrong it should be abandoned at once. First it requires pedestrians to cross the streets in the middle of blocks. Intersections are the only safe places to cross. Second, it permits motormen to smash across crowded intersections."

Restrictions on Camden Buses.—An ordinance has been passed by the City Council of Camden, N. J., regulating the operation of jitney buses through the streets of that city. Jitney operators in securing licenses in the future must designate the proposed route, which must be operated every trip. Each car must be equipped with a cash register and reports of receipts are to be turned over to the City Treasurer. Licenses will be granted only to those who have had at least six months' experience. License fees will cost from \$100 to \$250 according to passenger capacity. The question of jitney regulation in Camden has been pending now for several months.

Bulletin for Nashville Riders.—"Read As You Ride" is the title of a little folder issued by the Public Relations Department of the Nashville Railway & Light Company, Nashville, Tenn., for the use of its patrons while riding on the cars. This interesting little folder is issued every Friday by the railway and contains suggestions by the patrons of the cars for betterment of the service as well as complaints. The company asks the cooperation of its patrons in this manner and gives suggestions by which they themselves may help to increase the ef-

iciency of the service in speed and convenience. A portion of the pamphlet is devoted to anecdotes under the title of "Smiles as You Ride" for the amusement of the passengers.

"Pay-Leave" Cars on Interurban.—The cars of the Union Traction Company of Indiana operating on the line between Indianapolis and Broad Ripple were converted into pay-as-you-leave cars on Jan. 1, when the through fare was raised to 10 cents. Passengers on both inbound and outbound trips are now required to enter by the front door, and to leave by the rear door, paying the conductor as they leave. The company received permission to charge 10 cents for rides between any point in Indianapolis and in Broad Ripple, and 5 cents for a ride within Indianapolis or Broad Ripple. Fifty-third Street is the dividing line from which the fare is computed. The Indianapolis city limit is ninety-four feet south of the center of Fifty-fourth Street, and the Broad Ripple corporation line is in the center of Fifty-fourth Street.

Wants More on Interurban.—A petition has been filed with the Indiana Public Service Commission by the Indiana Service Corporation, Fort Wayne, asking an increase in the present passenger rate of ¼ cent a mile on its line between Fort Wayne, Lafayette and Bluffton, making the rate 3 cents a mile. The petition states that increased operating expenses have reduced the company's revenue to such an extent that an increase is absolutely necessary. Several interurban lines operating within the state, now have a 3-cent rate, while the Chicago, South Bend & Northern Indiana and the Winona Interurban Railway have also filed petitions for increased rates. The increase, if granted, would put the interurban lines on an equality with the steam roads, which have had a 3-cent rate for some time.

Reprisal Threatened in Fare Case.—Following the report of the committee of fifteen, which recommended to the City Commissioners of Covington, Ky., that the South Covington & Cincinnati Street Railway should be allowed to increase the rate of fare, citizens took a rising vote and decided that in the event that the increase is allowed they would walk. The fare on the Green Line is still 5 cents. The company has endeavored to show the citizens of the towns in northern Kentucky, through which the company operates, that it is now impossible to give the same service for 5 cents as it has done in the past. Refusal to allow the increase will necessitate the curtailment of service, Polk Laffoon, secretary of the company, said. The bone of contention on the part of the citizens of the northern Kentucky towns is that the railway itself has incurred no deficit, but that the deficit has been caused by subsidiaries of the corporation. The railway's financial troubles began several months ago. Last fall its trainmen demanded an increase in wages. The board of arbitration awarded the men a 60-cent scale.

Personal Mention

Mr. Riftenberick Resigns

Consulting Engineer Retires from Detroit United Railway to Enter Business for Himself

Robert B. Riftenberick has resigned as consulting engineer for the Detroit (Mich.) United Railway. Mr. Riftenberick was born in Cincinnati. In June, 1885, he was graduated from Miami University Scientific Training School. The following year, 1885-86, was spent in the university proper specializing in engineering. Mr. Riftenberick was taken into his father's office as a draftsman, but made it a point to change from one job to another with a view to getting a wide and varied experience.

During part of 1886-87, he was draftsman, levelman, transitman and finally in charge of a party on the railroad projected from Middletown, Ohio, to Louisville, Ky. The fall of 1887 to the spring of 1889 he spent as instrument man on the Duluth, South Shore & Atlantic Railroad construction in northern Michigan. After five years or more spent in engineering work on steam railroads, Mr. Riftenberick engaged for five years as engineer with the New Orleans Traction Company, constructing street railways in New Orleans. He also constructed by contract one of the smaller lines and parts of others. In 1898-1900 he was engaged first in charge of ballasting and relaying steel on the New Orleans & Northeastern Railroad, then as engineer in charge of construction, Cleveland & Eastern Electric Railway, Cleveland to Burton, and later as traction engineer for the city of Cleveland.

From the middle of 1902 to April 28, 1908, he was consulting engineer of the Cleveland Electric Railway. This was during the régime of Tom L. Johnson, Mayor of Cleveland. During this time he played an active part in sixty-one injunction suits in the Cleveland controversy, fifty-nine of which were won by his company.

After spending one year in private consulting practice with offices in Cleveland, Mr. Riftenberick accepted on Feb. 15, 1909, the position as consulting engineer with the Detroit United Railway, from which he has just resigned.

No definite plans for the future have as yet been formulated by Mr. Riftenberick. It is his intention, however, eventually to enter private practice on electric railway construction, operation and appraisal work.

P. F. McCall Promoted

Peter F. McCall, general storekeeper of the Chicago Elevated Railroads, has been appointed superintendent of materials and supplies of the Chicago, North Shore & Milwaukee Railroad. While

retaining his position on the elevated system, Mr. McCall's duties have been expanded to include charge of certain work on the Chicago-Milwaukee interurban system. The department of materials and supplies is newly created and it will include the present purchasing department, which handles the purchase of all railway materials, supplies and foodstuffs; the storehouses for railway materials and commissary and supervision of all restaurants.

The purpose of this department will be to consolidate, co-ordinate and bring about the greatest economy and efficiency in the purchase, receipt, and distribution of all supplies, and properly to merchandise the sale of all foodstuffs and supplies sold to the public through the medium of restaurants, concessions and dining cars. The purchasing agent, storekeeper, and superintendent of dining car service of the North Shore Line will report to Mr. McCall. Mr. McCall has been with the elevated system for about ten years.

Van Horn Ely Heads Columbia Graphophone Company

Van Horn Ely, president of the American Railways, Philadelphia, Pa., has been elected president of the Columbia Graphophone Manufacturing Company, New York City, to succeed F. S. Whitten, who has been made chairman of the board of directors. Mr. Ely's connection with the phonograph company as active head will in no way affect his status with the American Railways or the other traction properties in which he is interested.

Mr. Ely was born in Lockport, N. Y., on July 28, 1866. He was graduated from the Lockport Academy in 1884 and from the Buffalo High School in 1885. Three years later he entered the real estate business as a member of the firm of Bell & Ely. He was appointed in 1899 assistant to the president of the International Railway, Buffalo, where he remained for six years. He then resigned to become head of the electric railway and lighting properties serving communities for seventy-five miles along the Ohio River between Pittsburgh and Beaver, Pa., and Wheeling, W. Va. Two years later he incorporated the National Properties Company, a holding company which has acquired public utilities in many cities of the East and Central West. In 1916 the National Properties Company acquired the American Railways, which owns and operates electric light and railway properties in a number of cities, including Wilmington, Del.; Chester, Scranton and Altoona, Pa.; Springfield and Dayton, Ohio; Joliet, Ill.; Huntington, W. Va., and Lynchburg and Roanoke, Va.

Henry Surguy Edits "Aera"

Henry Surguy, editor of *Aera* since the resignation of Harlow C. Clark some months ago, has been connected with activities of the American Electric Railway Association for more than a year, first in charge of publicity for the Committee of One Hundred and later as special contributor to *Aera*. He is particularly well informed on public relations matters and his articles along these lines in *Aera* have attracted unusual attention. Mr. Surguy has not had any direct training along engineering or electric railway managerial lines, but has a background of schooling in journalism and law that bespeaks for him ability quickly to grasp the essentials of electric railway economics, finance and operation.

Mr. Surguy was born in Columbus, Ohio, in 1886. He was educated in the public schools and high schools at Washington, D. C., and was graduated in 1910 from the National University Law School with the degree of LL.B. He practiced law in Fairfax, Va., and in Washington, D. C., in 1911 and 1912. Like Alfred Henry Lewis and other noted editors and writers, however, he foresook law in 1913 to enter journalism. His experience in newspaper work covers practically every position from reporter to editorial writer and staff correspondent. He has been with the *Washington Herald*, the *Frederick (Md.) Post*, *New York Herald*, *Hot Springs Telegraph*, the *Richmond Times-Dispatch*, and more recently has been city editor of the *Washington Herald*, news editor of that paper, and staff correspondent of the Washington Bureau of the United Press Association. Finally after service in 1917 with the United States Marine Corps in the Champagne Sector in France, he returned to New York to become staff correspondent of the *New York American*.

Chester M. Rowell, Commissioner

Governor Stephens of California recently announced that Harvey D. Loveland would be appointed to succeed himself as a member of the State Railroad Commission on Jan. 1 last and that Chester M. Rowell, Fresno, would be appointed to succeed E. O. Edgerton. Mr. Rowell will return at once to Washington to conclude his work as member of the United States Shipping Board, returning to California on Feb. 1 to assume his duty as Railroad Commissioner.

Mr. Rowell has been prominently identified with politics for a good many years in the State of California, and has for some years been the owner and publisher of one of the State's best known newspapers at Fresno.

Recently Mr. Rowell retired from the newspaper field by disposing of his newspaper holdings at Fresno, and it was reported that he was to affiliate himself with one of the San Francisco papers in the capacity as editor. His appointment to the commission disposes of this report.

Henry W. Blake Honored

Thirtieth "Milestone" Dinner Tendered to Senior Editor of the "Electric Railway Journal" by His Associates in the McGraw-Hill Company

Thirty years ago this month H. W. Blake, now senior editor of the *ELECTRIC RAILWAY JOURNAL*, joined the editorial staff of what was then the *Street Railway Journal*, a connection which he has held continuously and devotedly for thirty consecutive years. In appreciation of this unique editorial record, and as a milestone in his relations with the McGraw-Hill Company, his associates tendered him a dinner on Thursday evening, Jan. 6, at which many reminiscences of the *Street Railway Journal* and the *ELECTRIC RAILWAY JOURNAL* and Mr. Blake's editorial activities in connection therewith were reviewed.

AFTER graduation in 1886 from Yale as a civil engineer Mr. Blake took a course in electrical engineering in the Massachusetts Institute of Technology and then became connected with the Sprague Electric Railway & Motor Company, handling advertising and publicity work for the company. When Mr. Blake came to the *JOURNAL* in 1891 the argument between cable and elec-

NAL, which stands as a monument to his thirty years' endeavor."

As an editor Henry W. Blake stands out pre-eminent for his sense of fairness, for his well-nigh universal knowledge of the field and for what editors among themselves call "balance"—the just apportionment and interpretation of news values.

As an employer Henry W. Blake has always been noted for the quality best

with a de luxe edition of Gibbon's "Decline and Fall of the Roman Empire." His associates, however, felt that for once in his career Henry W. Blake should step into the limelight, so contrary to his modest nature. Hence the present remarks from those who have and will continue to work with and for him to keep the *ELECTRIC RAILWAY JOURNAL* in the front rank of technical journalism.

Trainmen Honor Colonel Kealy

One hundred and twenty-five officers and members of committees of the employees' organization of the Kansas City (Mo.) Railways gave a luncheon on Jan. 5 in honor of Col. P. J. Kealy, upon his retirement from the active supervisory management of the property. The luncheon was planned and arranged by committees of the employees, as a result of suggestions emanating from employees. Several officials of the company attended as invited guests. The event was notable as a tribute of personal regard and respect of all employees for Colonel Kealy, and as an expression, through these representatives, of the recognition by the body of employees, of the cordial spirit that has developed between company and men in the past few years, and of the efficient program of co-operation between company and employees for rendering public service.

R. L. Kimbrough, chairman of the Employees' Central Committee, presided. F. G. Buffe, continued as general manager under the receivership and joint author with Colonel Kealy of the employees' participation plan; D. L. Fennell, superintendent of transportation, who had a large part in the institution and operation of this plan; Warren Fisher, president of the Employees' Brotherhood, and other officers and employees spoke.

James Holt, committeeman from the shops at Ninth Street and Brighton Avenue, on the part of employees, presented a watch to Colonel Kealy, as evidence of their appreciation of his part in the building of the co-operative plan for service to the public by men and company and as a symbol of the personal popularity of Colonel Kealy.

Colonel Kealy, responding, said that the good judgment of the men in adopting the co-operative plan had been vindicated, for under it there had been great improvement of service to the public and material benefit to the employees. Colonel Kealy said:

Participation of the employees in ownership of stock of the company will come eventually, as the virtues of the plan get results in improved conditions for the men, in better service, and larger earnings.

While returns on the investment of the owners are a paramount consideration in the operation of a utility, such returns are not possible nor to be expected unless service to the public is efficient and the wages and conditions for employees are such as will enable them to live like good citizens. A company that cannot pay proper wages has no business to exist. It should quit as soon as possible. The scheme of co-operation under which we have been working together, employees and management, for two years, provides for the two important factors, proper wages and efficient service, upon which adequate revenue depends.



HENRY W. BLAKE HAS GIVEN THIRTY YEARS OF SERVICE TO THE "ELECTRIC RAILWAY JOURNAL"

tric advocates was at its height, not to mention such minor antagonists as the compressed air car, storage battery car, combustion engines, etc. Heavy electrification of any sort, such as the Baltimore tunnel work, was still four years away. In short, the young editor came to the *Street Railway Journal* during a period of unparalleled activity of invention, promotion, financing and construction.

With a technical knowledge rare in those days, a flair for seeking nothing but the facts in all the welter of contradictory claims and with a memory of marvelous tenacity, Henry W. Blake soon proved to be the one man for the job. In 1894 he became editor-in-chief, with results to the paper that speak for themselves. For as one of his long-time associates put it: "Mr. Blake has written his very life into the columns of the *ELECTRIC RAILWAY JOUR-*

described by that fine English word "gentleman." To imagine any harshness toward a subordinate as coming from Mr. Blake is inconceivable.

As a man and a figure in the industry Henry W. Blake has made and held thousands of friends partly through the charm of his personality, partly through his willingness always to give to the inquirer of his truly amazing knowledge of mass transportation from the days of the horse-bus to the last word on its rubber-tired gas and electric successors and all that has been developed in between. The influence of such a man in such a position cannot be measured, but it can be and has been felt in every department and on almost every electric railway throughout the world.

As a tangible remembrance of the occasion, Mr. Blake's friends in the McGraw-Hill Company presented him

"Fred" Handshy Climbs Another Notch

Veteran Operator Made General Manager of Interurban Lines of the Illinois Traction System—Other Promotions

New Year's Day had in store a pleasant surprise for C. F. Handshy of Springfield, Ill. Mr. Handshy received a number of greetings on Jan. 1, but the one which gave him the most pleasure and which, incidentally, called forth many of the others, came from H. E. Chubbuck, vice-president executive of the Illinois Traction System. Mr. Chubbuck's "best wishes" took the form of a notice to Mr. Handshy that he had been promoted to general manager of interurban lines of the system. Mr. Handshy was not the only executive to receive this sort of message from Vice-President Chubbuck. A number of superintendents of city lines included in the McKinley group of properties learned that they too had been promoted, their titles in each case being changed to general manager.

THE general superintendents of city lines who have been made general managers are: J. E. Johnson, Danville Street Railway & Light Company; M. L. Harry, Decatur Railway & Light Company; D. W. Snyder, Bloomington & Normal Railway & Light Company; R. F. Carley, Galesburg Railway, Lighting & Power Company; E. A. Roehry, Cairo Railway & Light Company; F. E. Bell, St. Louis Electric Bridge Company, and Missouri properties; L. W. Hess, Northern Illinois Light & Traction Company; F. E. Fisher, Chicago, Ottawa & Peoria Railway, and E. H. Gray, Jacksonville Railway & Light Company.

"Fred" Handshy is one of those traction executives who have come into the electric railway field via the steam railroad route. He entered the employ of the Wabash Railroad in 1884 as a telegraph operator. Six years thereafter he became a train dispatcher for the same road, and in 1902 was promoted to the position of assistant chief dispatcher, with headquarters at Decatur, Ill. Two years later he succeeded to the position of chief dispatcher and later to that of trainmaster.

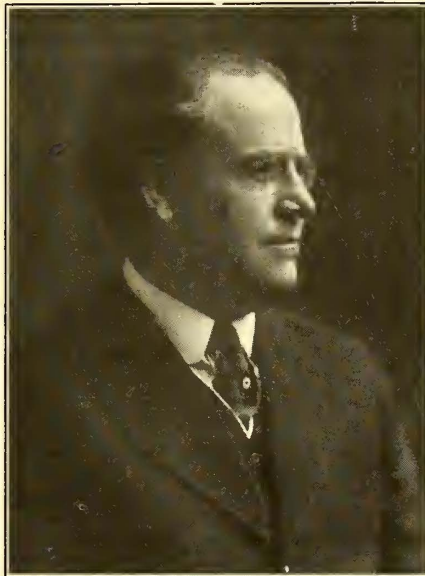
Mr. Handshy entered electric railway work in 1907 as general superintendent of transportation of interurban lines of the Illinois Traction System. Three years later he was promoted to general superintendent of interurban lines, and on June 1, 1913, he became assistant general manager. He served as president of the Illinois Electric Railway Association in 1917.

Mr. Handshy brought to the traction field a knowledge of operating methods which has undoubtedly been a great influence in the development of the electric lines of the country, particularly those of the Middle West. His initial engagement with the McKinley System came during its construction and formulative period.

During his connection with the system the idea of using trains made up of a motor car and trailer coaches was inaugurated. This idea was later developed into the successful use of motor cars to pull parlor cars, sleeping cars and express cars. The use of heavy locomotive-type express cars to pull trains made up of coaches, sleepers and express cars has proved to be very successful and the practice is still followed on the lines of the Illinois Traction System.

This was also among the first prop-

erties to develop the idea of trains operating over long distances. It has also been during Mr. Handshy's connection with the system that block signals have been installed. Another important development has been the hauling of freight on a scale comparable with steam road practice and the use of belt



C. F. HANDSHY

lines to shunt such traffic around cities through which the lines passed. In these respects also the Illinois Traction System was among the first to adopt the practice.

Obituary

J. B. MacAfee, Railway Builder

John Blair MacAfee, organizer and formerly manager of many electric railway properties in the East and Central West, died in England on Jan. 11 following an operation. Mr. MacAfee had resided for a number of years in London, where he was active in banking and financial circles, being chairman of MacAfee & Company and of the British-American Continental Bank. He was also chairman of the finance committee of the American Chamber of Commerce in London and treasurer of the Royal Institute of Public Health.

Mr. MacAfee was born in St. John, New Brunswick, in 1861. Removing to Philadelphia at an early age, he attended the University of Pennsylvania and was admitted to the Philadelphia bar. He practiced law until 1892, when he took up engineering work. He subsequently organized the Raritan Construction Company and built several electric lines in New Jersey, including those of the New York & Philadelphia Traction Company and the Central New Jersey Traction Company, now a part of the system of the Public Service Railway, controlled by the Public Service Corporation of New Jersey.

Still later Mr. MacAfee became president of the American Engineering Company, which built the Newton Electric Railway and the Elmira & Seneca Lake Railway and the line between Kalamazoo and Battle Creek, Mich. He then served as vice-president and general manager of the Railways Company General. In 1899 he built the system of the Ohio River Electric Railway & Power Company and was identified with the building of the New Orleans & Pontchartrain Railway. Then followed the building of the Augusta-Aiken Railway, of which he later became president. He also served at one time or another as president of the Norfolk & Portsmouth Traction, the Pomeroy & Middleport, the Central & Kentucky Traction and the Blue Grass Traction Companies, and of the Lexington Railway. He retired from his active connection with these properties about ten years ago to go to England. At the time of his death he was a director of the Kentucky Traction & Terminal Company and of other public utility properties in the United States.

William Robinson, Ph. D., inventor of the Robinson radial truck which was used at one time extensively for electric cars, especially in New England, died in Brooklyn, N. Y., on Jan. 2. Dr. Robinson was an inventor and patentee in other fields than the electric railway, specializing on block signals. A number of his patents, covering the use of rail circuits, were acquired later by the Westinghouse interests. Dr. Robinson was eighty years old at the time of his death. During the time when Dr. Robinson's truck was on the market it was built by the Robinson Radial Truck Company of Boston.

Alva E. Moore, well known to many electric railway men in Indiana, died on Dec. 24 last in a hospital at Aberdeen, S. D., following an automobile accident. Mr. Moore was a traveling auditor for the Chicago, Milwaukee & St. Paul Railroad. He was formerly connected with the general offices of the Union Traction Company of Indiana, serving as an auditor and later as assistant division passenger and freight agent. He went to Chicago four years ago and became a traveling auditor for the Illinois Central Railroad, later taking employment with the Chicago, Milwaukee & St. Paul.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE MANUFACTURER,

SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES

BUSINESS ANNOUNCEMENTS

Stock Deliveries of Cartridge Fuses

Buying for Heater and Lighting Circuit Use Is Considerable, Though Only for Current Needs

Current buying of cartridge fuses by electric railways is not large judged by what manufacturers consider a strong demand. Nevertheless, the absolute needs of traction companies for fuses used with heaters, lighting circuits, etc., are sufficient to account for no inconsiderable volume of business, and orders of this "necessity" type are being placed right along. The fact that railways are not trying to accumulate considerable stocks of cartridge fuses for their future needs is no doubt influenced by the rapidity with which orders can be filled at present.

During much of 1920 fuse manufacturers were hampered by unfavorable production conditions and many of them fell far behind on orders. Until quite recently one of the large producers was running both day and night shifts. With the general falling off of demand and the improvement in production, however, these conditions have become gradually reversed. Some factories are now laying off numbers of workmen; back orders, while still existent in a few cases, are pretty well brought up to date, and in general shipments can be made from stock.

Prices have remained stationary for some time, and though no immediate reductions are seen the general price tendency, in view of the copper and insulation trend, would appear to be downward.

Business Is Fundamentally Sound

Ten reasons were given by Roger W. Babson when he appeared before the Chicago Association of Commerce on Jan. 7, as to why conditions in the business field are fundamentally sound. These are that the Federal Reserve System is successfully functioning; that 80 per cent of Liberty Bonds are still in the hands of the original purchasers; the effect of prohibition in releasing large sums of money for savings and investment, resulting in better living conditions; the development of national advertising and better resulting national distribution; the development of standardization in all lines of manufacture; the improvement in the elimination of seasonal fluctuations in business; the economic education of the public; the wonderful crops of the past year, which despite very much lower unit prices, have brought to the farmers almost as large a sum of money as they

received for their crops the year before; our great merchant marine, and the lesson of the last election that radicalism cannot sway the country.

In discussing the troubles of the business world, Mr. Babson gave it as his opinion that the beginning of the end of a period of prosperity was marked when 51 per cent of the people turned from purposes of service, thrift and honest dealing, to selfishness and extravagance. Likewise, when 51 per cent turned from selfish interests to service, this marks the beginning of better times. It was his view that the bottom of business depression would be reached in a few months, and that while complete recovery might take two or three years, there would be a gradual process of improvement.

Quiet Market for Fenders and Wheel Guards

Buying of Repair Parts Is Normal—Good Deliveries—Safety Car Equipments Shipped from Stock

Buying of repair parts for car fenders and wheel guards by electric railways is proceeding in about normal volume, through orders come spasmodically and do not bulk very large. The market for complete equipments is rather quiet just now following the good sales that were made in the past year. Orders for car fenders and wheel guards are for the most part dependent upon the buying of new cars and right now the demand is not very heavy. Manufacturers report that during the last year or so they have experienced a fair demand for equipments on behalf of old cars that were being fitted with up-to-date safety appliances.

Conditions of supply in this market are excellent as labor and raw material are now favorable factors. Fenders and guards for safety cars, being practically a standard article, can be shipped from stock and a good reserve supply of repair parts sufficient to care for all needs promptly is also carried. Equipments for other cars, however, can not be shipped from stock as their manufacture is according to specification and the quickness of delivery varies. In general it can be said, however, that shipments are good. No price change has come about yet.

Manufacturers are optimistic over the volume of business which they think should develop during the present year, for with improving financial conditions the necessary rehabilitation of rolling stock, it is hoped, will result in good buying of fenders and wheel guards by car builders.

Several Months Required to Get Insulators

Demand for High-Tension Porcelain Material Keeps Factories Busy Although Present Buying Is Slow

Deliveries of porcelain high-tension insulators, though improving, are still long, despite the fact that comparatively few new orders are coming in just now. Manufacturers have enough old business on the books, however, to carry them well along through the first half of the year. It is this circumstance, coupled with production difficulties, that has caused new orders to stand scant chance of being filled promptly. One of the difficulties mentioned has been the short supply of natural gas upon which some manufacturers depend for firing their insulators. Another has been raw material, though recently the latter has almost ceased to be a factor affecting production adversely. Production, as a matter of fact, in several cases is increasing and the capacity of some plants is also being enlarged.

FOREIGN MARKET PROMISING

Although manufacturers are warning their customers to enter the market now if they expect to make new power extensions during 1921, the prospect of long insulator deliveries does not seem to have hastened buying. In fact, demand from home and abroad has been dropping off and is light at present. Good prospects for insulator buying are said to exist in Italy, Switzerland, Japan and Scandinavia. Just when the large need for insulators that is known to exist in this country and abroad will result in orders being placed, however, is a question. Prevailing exchange rates, on the one hand, and tightness of money, on the other, have a deterrent effect on buying. Expectations of lower prices may also be a consideration, though producers offer little hope of prices changing for some time. Wages remain unchanged at insulator plants, it is stated, and no employees have been laid off, so far as can be learned. The raw material, being mostly a complete product of nature, is not subject to great fluctuation, and costs are no lower there.

Deliveries, generally speaking, probably average three to four months, though extremes of two to six months, and even seven occasionally, are quoted, depending upon the size and type of insulator and the manufacturer. In some cases suspension insulators are worse off than pin types as regards supply, and in others better. Surplus stocks, of course, do not exist anywhere.

Pole Material Prices Lower

Crossarms, Pins and Hardware Reduced
—Stocks Ample to Care for
Light Demand

Buying of wood poles, crossarms, pins and pole hardware is in general light, but with the comparatively open winter to date it is hoped that central stations and railways will consider their line needs earlier this year. The exception to light buying is found in the Atlanta district where there is a good movement of this material.

Stocks in distributors' yards are good, for the most part, but there is reported only enough line hardware to care for the present demands. There seems to be no excess of it. Wood materials can be had in the East on deliveries of about two weeks. Last year stocks were good at the mills and cutting yards but very poor in distributors' yards. In the San Francisco territory stocks of crossarms are better than for several years, while decreasing business by local lumber companies has resulted in a crop of vigorous competitors for crossarm business.

Six-pin, 6 ft. x 3½ in. x 4½ in., Rainier fir crossarms in New York sections in 3,000 to 5,000 linear-foot quantities are quoted \$114.68 per 100 arms, price reductions of about 10 per cent having been made early in December. Yellow pine arms, same conditions, are \$95.98 per 100 arms. In the southeast, standard fir arms, two-pin, 4-ft., lots of 1,000 linear feet and over, are 62 cents each; four-pin, 4-ft., 83 cents. N. E. L. A. fir arms, two-pin, 3-ft., 93 cents; 4-pin, 5-ft. 7-in., \$1.41 each.

Locust pins, 1½ in. x 9-in. in lots of 5,000 are quoted in New York at \$38.75 per 1,000, and in Atlanta \$42. The 1¼-in. x 8-in. pins are \$27.15 in New York, \$25 in Atlanta and \$30 in St. Louis.

Hot galvanized crossarm braces, 1½ in. x ½ in. x 24-in. are quoted in New York at \$120 per 1,000 in 500 lots; in Chicago they are quoted \$155.03 in 500 lots and \$137.80 in larger lots. Crossarm bolts, ⅝-in. x 10-in., in New York bring \$10.92 per 100 for 500 bolts and in Chicago \$13.71 per 100 for 500 bolts and \$12.19 for larger quantities.

As far as has been learned there has been no price decrease applied to wood poles.

Window Glass Prices Firm

Were it not for the slump in the building industry the window glass market during 1920 would have presented a famine aspect. As it was, it was not until recently that manufacturers were anywhere near caught up on back orders. One reason for the scarcity was the shutdown of European factories during the war and the curtailment of domestic production during the same period. Following the dangerously low point to which window glass stocks became reduced came shortages of labor, raw material and transportation tie-ups. As a result

several producing interests practically were out of the market for a long time. Double-strength glass which is used in car windows was particularly scarce.

Recently demand has lessened and reasonable shipments can be made from stock up to three weeks' time. No likelihood of lower prices very soon is held out, however, especially in view of current demands for higher wages by independent workers and low gas fuel supply.

Senator Calder Seeks to Regulate Coal Industry

Production, Ownership, Sale and Distribution of Coal Charged with Public Interest and Use

Senator Calder of New York, chairman of the United States Senate's committee on reconstruction, which has just concluded an investigation into the bituminous-coal situation, on Wednesday of this week introduced a bill which seeks to regulate the coal industry of the United States and declares the ownership, production, sale and distribution of coal throughout the country to be "charged with public interest and use."

By the provisions of this bill coal operators and others engaged in the coal business must give to the government at stated intervals complete reports as to their business activities. It gives to the President of the United States in any period of emergency the right to fix maximum prices, to direct production and distribution and, if need be, to engage in the sale of coal to the people.

In commenting upon his bill Senator Calder accused the coal operators of engaging in biased and self-serving methods of publicity and of concealing the facts of the coal situation from the public. Profiteering, he asserted, had been proved and admitted, but a controversy exists as to its extent and its promoters and beneficiaries. The bill aims to make such practices impossible. It does not set up any new governmental machinery, but utilizes the experienced agencies in existence, chiefly the Federal Trade Commission, the Interstate Commerce Commission and the Geological Survey.

Rolling Stock

Alabama Power Company, Birmingham, Ala., has on order two safety cars for its Gadsden division and is also in the market for two closed, double-truck trailers.

San Diego (Cal.) Electric Railway Company received 25 new Birney safety cars on Dec. 19 for operation on its lines where travel is light. The new cars are 28 ft. in length, weigh about 8 tons and seat thirty-two passengers. The company will continue to operate the large two-man cars on the lines where traffic is heavy.

Recent Incorporations

Shore Line Electric Railway, Norwich, Conn.—A petition requesting the Legislature to grant a new charter to new owners of the former property of the Shore Line Electric Railway has been filed with the Secretary of State. It is stated that Mr. Levinson bought the New Haven-Chester line and property of the Shore Line and will start operations with a capital stock of \$600,000.

Woodbridge Street Railway, Woodbridge, Conn.—The Woodbridge Street Railway will apply to the Connecticut Legislature some time in January for a charter to build a railway which will connect with the Connecticut Company's Whalley Avenue line at Pond Lily near New Haven and will run out into Woodbridge. The new line will be about 1½ miles in length. The incorporators are: Adam Ziegler, Michael J. Quinn and William B. Turley, all of whom are interested in the Woodbridge Trap Rock Company. Judge Burpee of the Superior Court has notified all people interested in the petition to appear before the General Assembly and give their opinions.

Track and Roadway

Alabama Power Company, Gadsden, Ala.—The Alabama Power Company has authorized the expenditure of \$100,000 in improvements in its Gadsden division. This includes the replacing of several miles of small rail with larger relay rail and the rebuilding of certain parts of the overhead system where replacement is needed.

St. Petersburg-Tampa Railway, St. Petersburg, Fla.—R. E. Ludwig, director of public utilities for the city, has asked the City Commission to issue short-term bonds for \$65,000 for two extensions of the municipal street railway system—the First Avenue loop and the Ninth Street extension from Central to Seventh Avenue, the total to be approximately 1 mile of track. The commission has instructed the city attorney to call an election for the bonds. Several citizens have come forward with pledges of from \$1,000 to \$5,000 and indications are the entire issue will be subscribed before it is offered.

Evansville, Ind.—There is agitation for a union traction station at Evansville, Ind. At the present time there are two traction stations in that city, one on Fifth Street and the other at the corner of Locust and Second Streets. The stations are about two blocks apart. The Fifth Street station is used by the Evansville & Boonville line and the Evansville, Suburban & Newburg road, while the station at the corner of Locust and Second Streets is used by the Ohio Valley Railway, the Rockport and Grandview line, the Mt. Vernon line and the Evansville & Henderson line.

Power Houses, Shops and Buildings

Cincinnati (Ohio) Traction Company.—The Cincinnati Traction Company plans to purchase part of the power it requires for operation of its lines from the Union Gas & Electric Company. Automatic substations are now being planned by the company. W. C. Culkins, director of Cincinnati's street railways, favors the purchase plan and believes it will mean a considerable saving to the railway.

Hagerstown & Frederick Railway, Frederick, Md.—Electricity generated by water power was switched in over the high tension wires of the Hagerstown & Frederick Railway on Dec. 18 from the plant of the Northern Virginia Power Company at Millville, part of the Hagerstown and Frederick Railway's power system. Fully \$250,000 has been expended on the recently acquired Northern Virginia Power Company by the interests backing the Hagerstown & Frederick Railway.

Trade Notes

Léon Chapuis, 36 Boulevard Magenta, Paris, France, distributor of electric railway supplies, would like to secure catalogs of American manufacturers of supplies of all sorts in this field.

The Pawling & Harnischfeger Company, Milwaukee, Wis., has increased its authorized capital stock from \$1,000,000 to \$3,000,000. This new issue is to cover an extensive plant development. The company manufactures electrically driven traveling cranes.

E. W. Charland, Tilton, N. H., manufacturer of mica insulating materials, is enlarging his plant and installing new machinery to cut and to grind mica. When improvements are completed 1,000 lb. of mica washers will be cut per day.

The Whiting Foundry Equipment Company, Harvey, Ill., announces that it has changed its name to Whiting Corporation and increased its authorized capital stock from \$700,000 to \$3,000,000. The company remains under the same management and will manufacture cranes, foundry equipment and railway specialties, as heretofore.

The American Chamber of Commerce in London, 8 Waterloo Place, Pall Mall, London, S. W. 1, England, has issued a year book of this chamber for 1920, in which are listed the names, addresses and business classification of more than 1,000 Americans and British firms, including electrical manufacturers, interested in developing business between the two countries.

The Conveyors' Corporation of America, Chicago, announces the appointment of the Hallidie Machinery Company, L. C. Smith Building, Seattle, Wash., as its representative in Washington and Oregon. The Hallidie com-

pany is twenty years old. Philip Rowe is president, W. S. Dyson vice-president, Archie McLean secretary, and George Henderson treasurer.

J. A. Robinson has been appointed Western sales agent of the Consolidated Car-Heating Company with headquarters at 1814 Fisher Building, Chicago. Mr. Robinson, who succeeds C. A. Eggert, recently resigned, was previously with General Electric Company and for the past several years has been in the mechanical department of Consolidated Car Heating Company.

Falls Rivet Company, Kent, Ohio, has just purchased from the Ohio Wire Goods Manufacturing Company, Akron, Ohio, all the machinery, patents and patterns relating to the manufacturing of cotter pins and flat spring keys. The machinery has been moved from Akron to Kent and is now in operation. The Ohio Wire Goods Company will discontinue the manufacturing of these articles and the Falls Rivet Company will add to its product of rivets, bolts and nuts for the railway trade.

Manistee Iron Works Company, Manistee, Mich., manufacturers of Roturbo centrifugal pumps, vacuum pumps, rotary jet condensers, etc., has established a Pacific Coast office in the Rialto Building, San Francisco, Cal., in charge of L. M. Page, formerly sales-manager of the company for the past five years. The company expects to open branches also at Los Angeles, Portland, Ore., and Seattle, Wash., which will be under the supervision of Mr. Page.

The Transit Equipment Company, New York City, dealer in used railway equipment, through its president, R. W. Marshall, has taken over three acres of ground from the Batavia Car Works, Inc., Batavia, N. Y., of which company Mr. Marshall is vice-president and general manager. The company will erect a two-story brick building on the ground, 100 ft. x 150 ft., which will be used for rebuilding used motors, controllers, etc.

Fowle & Cravath, electrical and mechanical engineers, Monadnock Bldg., Chicago, Ill., has discontinued business owing to the withdrawal of James R. Cravath from the firm. Mr. Cravath moves to California because of the ill health of one of his family, but Frank F. Fowle announces that the new firm of Frank F. Fowle & Company will continue business at the above address, covering the same field as heretofore. The services of Mr. Cravath will still be retained in an advisory capacity.

The Star Brass Works, 3114 Carroll Avenue, Chicago, manufacturer of cooling systems, painting and spraying machinery, announces that on and after Jan. 1, 1921, the company name will be changed to Binks Spray Equipment Company to conform more nearly with the nature of the products manufactured. Announcement is also made of the completion of a new plant and office extension on the west wing of the old plant, in which provision is made for new salesrooms, testing lab-

oratories and increased manufacturing facilities on the first floor, with new offices and drafting rooms on the second floor. The new addition was necessary by reason of the rapid expansion of the business.

The Standard Underground Cable Company, Pittsburgh, Pa., announces that Richard G. Harris succeeds John P. Bell as Pacific Coast manager. Mr. Bell will hereafter devote his time to the growing demands of his export and import business. Mr. Harris has been connected with the organization since 1909 and for the past eight years has been manager of the Montreal office territory of the Standard Underground Cable Company of Canada, Ltd. Vinton Smith, who has been with the San Francisco office staff for several years, has been appointed assistant Pacific Coast manager. W. G. Stearns, also for many years with the company on the Pacific Coast, has been appointed special sales agent.

New Advertising Literature

Recorders.—The Foxboro Company, Inc., Foxboro, Mass., is distributing Bulletin No. 114, covering its Foxboro-Heath CO₂ recorder.

Safety Disconnecting Hangers.—The Thompson Electric Company, 226 St. Clair Avenue, N. E., Cleveland, Ohio, has issued catalog B-19, describing the new underslung feature of its safety disconnecting hanger.

Electric Arc Welding.—The U. S. Light & Heat Corporation, Niagara Falls, N. Y., has issued bulletin 700, entitled "Electric Arc Welding," in which it describes "USL" arc-welding machinery.

Coal Combustion.—"Automatic Combustion Control," descriptive of the Gray system of automatic control, is being issued by the Automatic Fuel Saving Company, 549 West Washington Boulevard, Chicago.

Testing Equipment.—The Delta-Star Electric Company, 2433-2453 Fulton Street, Chicago, is distributing a leaflet describing its 40,000-lb. testing equipment for mechanically testing insulators, bus supports and switches which will be subject to heavy mechanical stress.

Headlight Projectors and Reflectors.—Crouse-Hinds Company, Syracuse, N. Y., has issued bulletin No. 304-A, effective Dec. 15, 1920, a sixteen-page, illustrated booklet, which lists Imperial Floodlight Projectors and Imperial Reflectors developed since the publication of bulletin No. 304, which is still in effect.

General Electric Company: Bulletin on "Automatic Station Control Equipment," No. 47,730. This is an illustrated discussion on the whole subject of automatic control. It contains a partial list of automatic stations installed by the company and also a bibliography of this subject from 1913 to date.