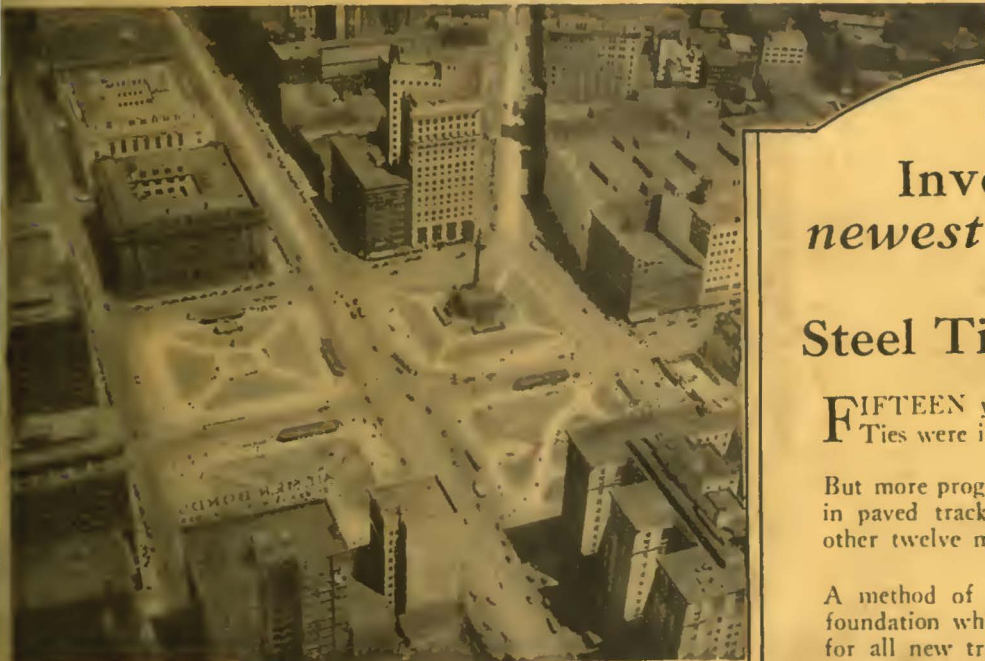


ELECTRIC RAILWAY JOURNAL



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The Public Square, Cleveland

In 1924 five miles of rail was renewed on the street branching off to the right at the top of the photograph. The original Steel Tie foundation was found intact and was not disturbed.

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Investigate the newest developments in Steel Tie Construction

FIFTEEN years ago the first Steel Twin Ties were installed.

But more progress has been made in their use in paved track in the last year than in any other twelve months, in all that went ahead.

A method of renewing rail on a Steel Tie foundation which saves 75 per cent; provides for all new track as well as new alignment, new surface and new paving was developed in all details on over seven miles of track in 1924.

A new method of tamping, which locks the tie into the track foundation, reduces deflection and eliminates shrinkage, has been thoroughly tested and approved by users.

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Ask for the book "Steel Tie Track Construction" covering all details of initial and renewal construction and delivered prices for estimating.

The International Steel Tie Co.
Cleveland

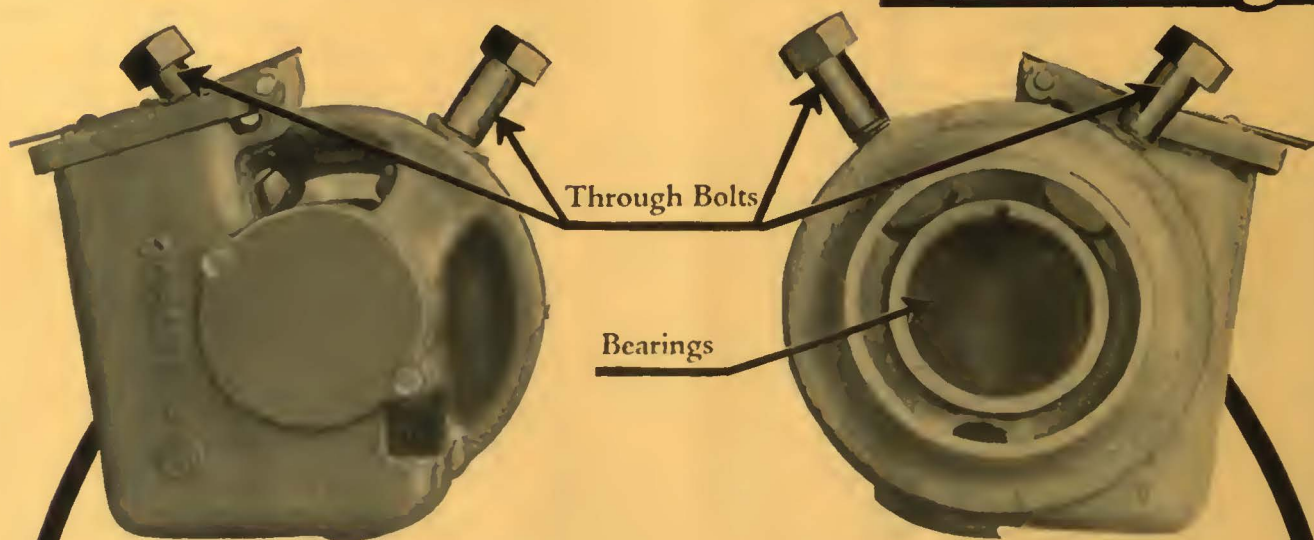
Steel Twin Tie Track

Renewable Track . . . Permanent Foundation

Railway

Renewal

Housings



Westinghouse Renewal Housings, which embody most of the characteristics found in the housings of modern Westinghouse Railway Motors, have been developed for many of the older types of Motors.

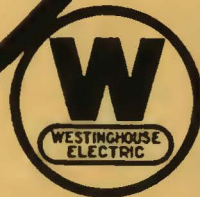
Be sure that the Renewal Housings you buy embody the following points:

**Through Bolts—Proper Bearing Fit—
Material which may be easily repaired.**

Cast-Steel Housings are the best. Malleable Iron has very good wearing qualities.

Both standard and over-size housings can be furnished. Standard size for unworn frame fits. Over-size for worn frame fits which must be bored out.

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East Pittsburgh Pennsylvania
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ELECTRIC RAILWAY JOURNAL

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It Gives Him Ideas

"WHAT I like most about the JOURNAL," said the general manager of a small electric railway when talking to one of the editors of this paper a few days ago, "is the real usefulness of the articles. They give me ideas about things I might be able to do on this property. Of course, I read the news too and the personal items, but the articles that appeal to me most are those that describe improved methods I can use on my own property."

We are glad to know which parts of the paper appeal most to our various readers. We like to have them tell us these things, and we like to have them tell us if they find things they do not like in the paper.

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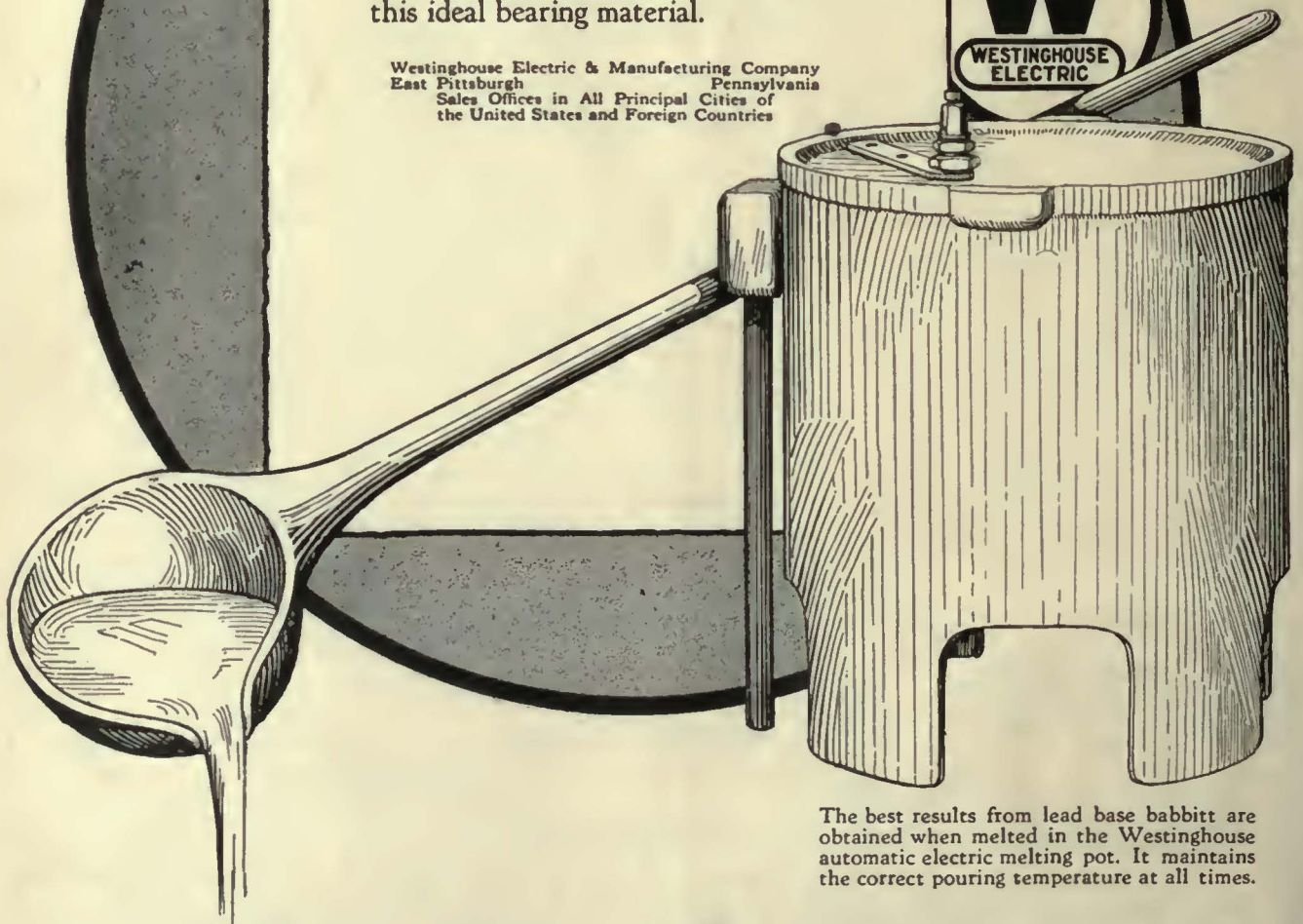
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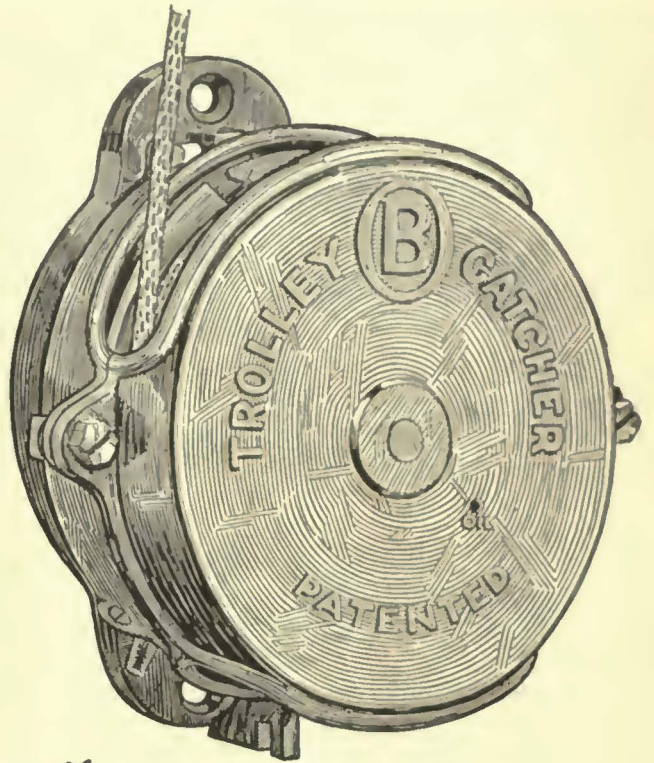
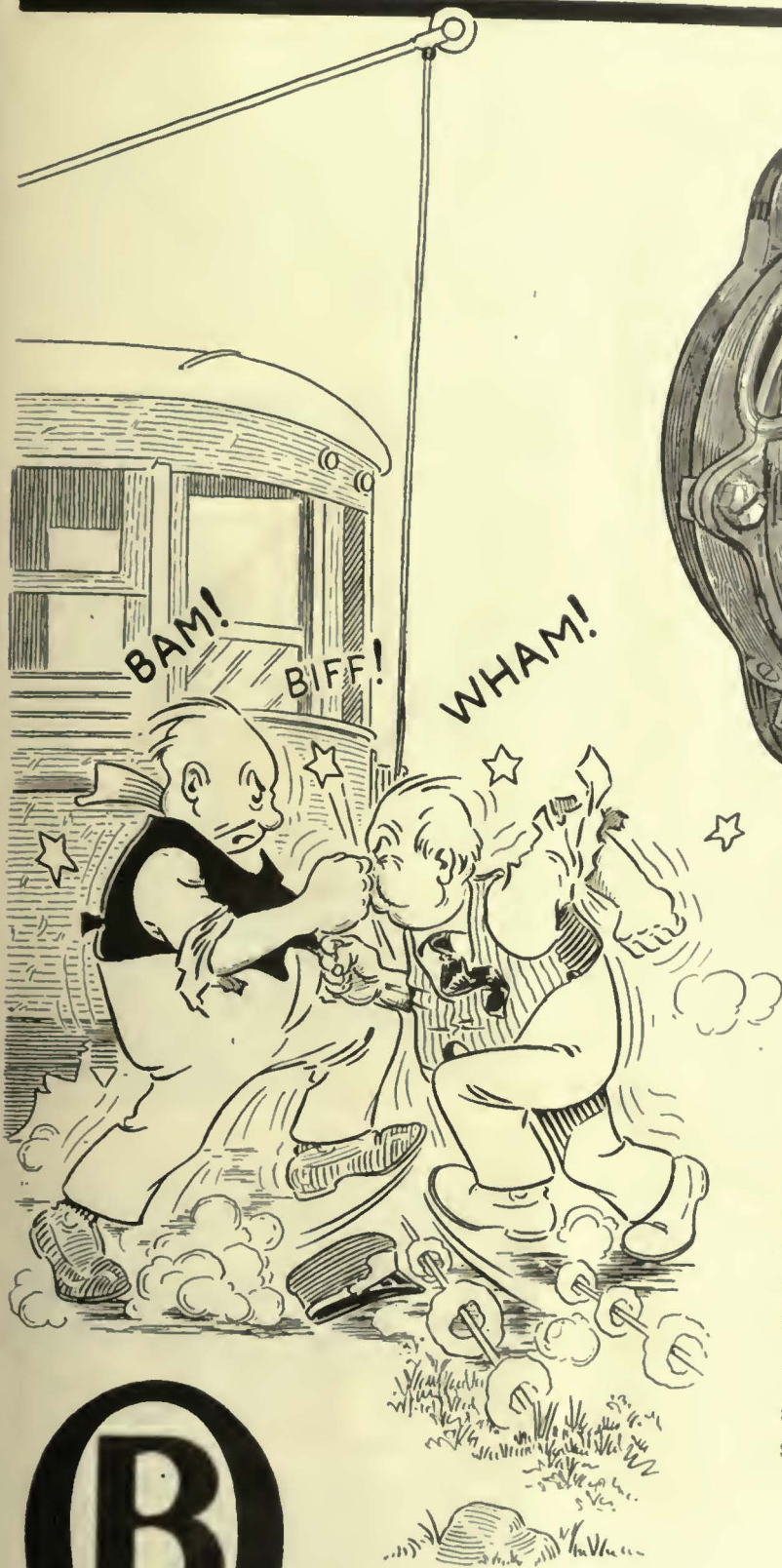
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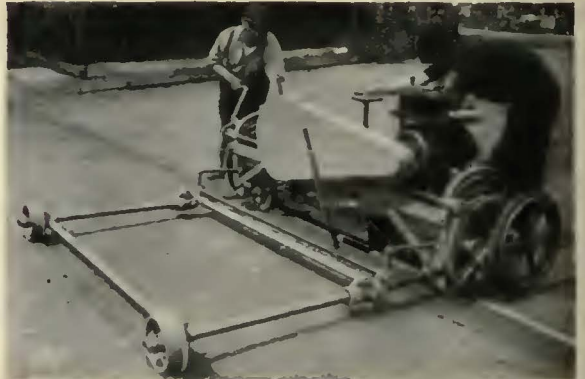
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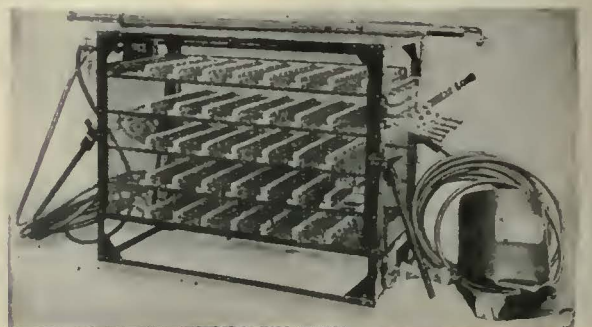
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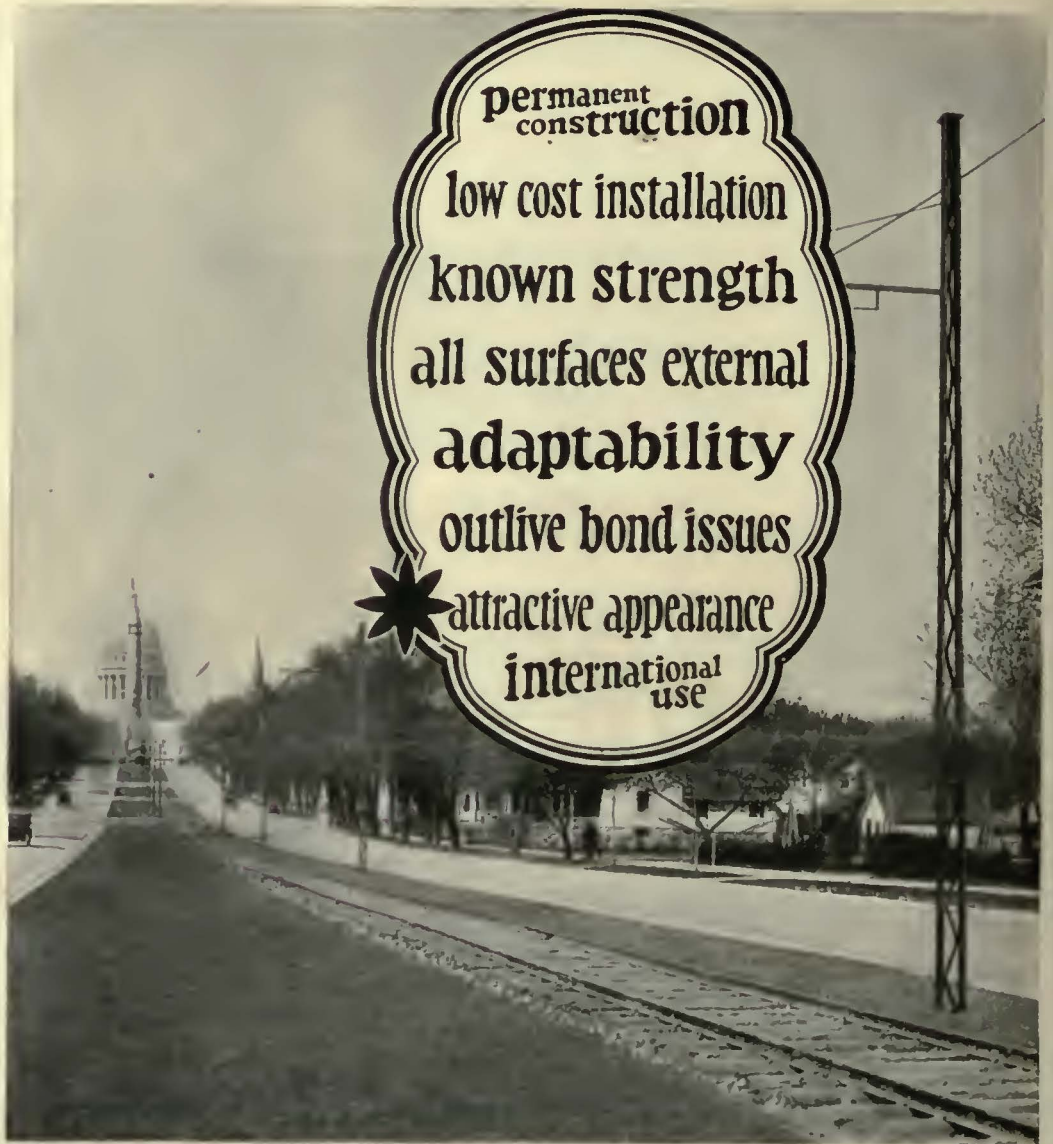
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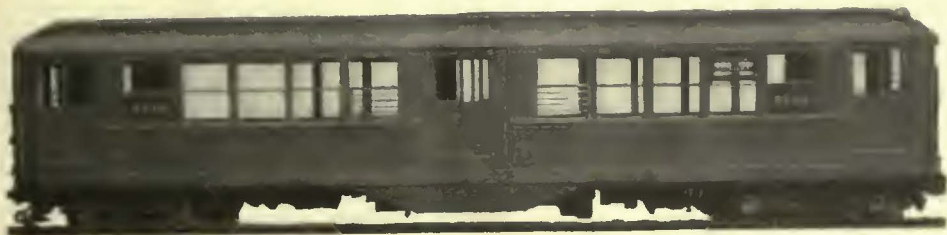
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Illinois Merchants Bank Bldg.

Chicago, Ill., U. S. A.

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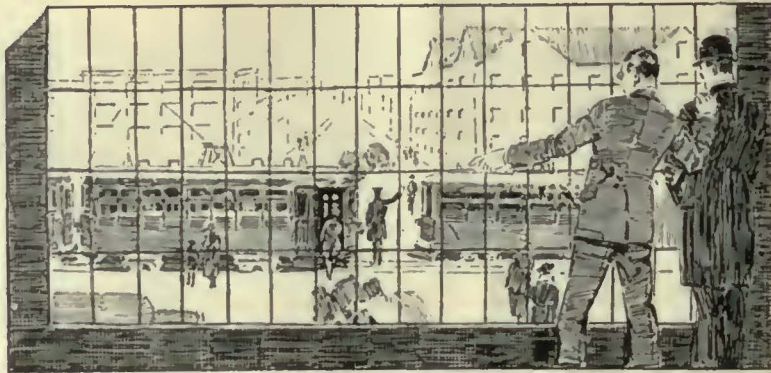
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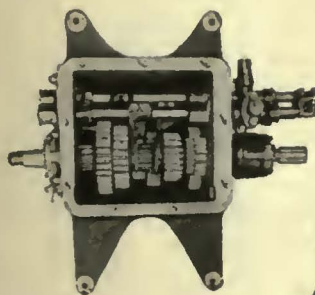
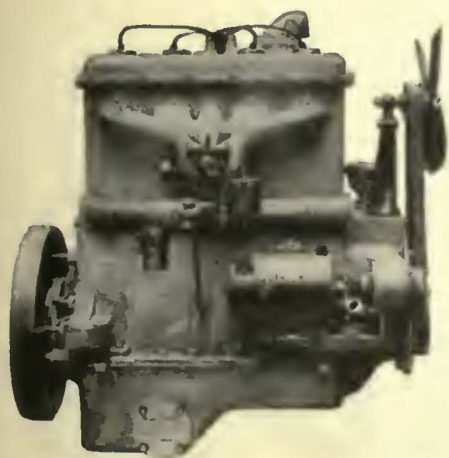
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From radiator to rear end—

a unitary assembly of standardized parts



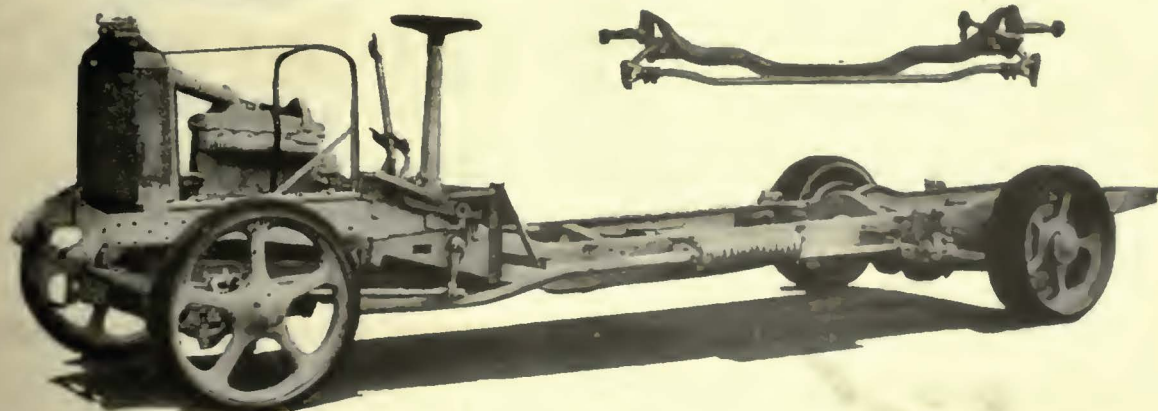
FIFTH AVENUE BUSES fit railway requirements

*D*EMONSTRATED operating success in New York, and a dozen other prominent cities, is backed up by *demonstrated* maintenance economy and the long, useful life of Fifth Avenue Double-Deckers.

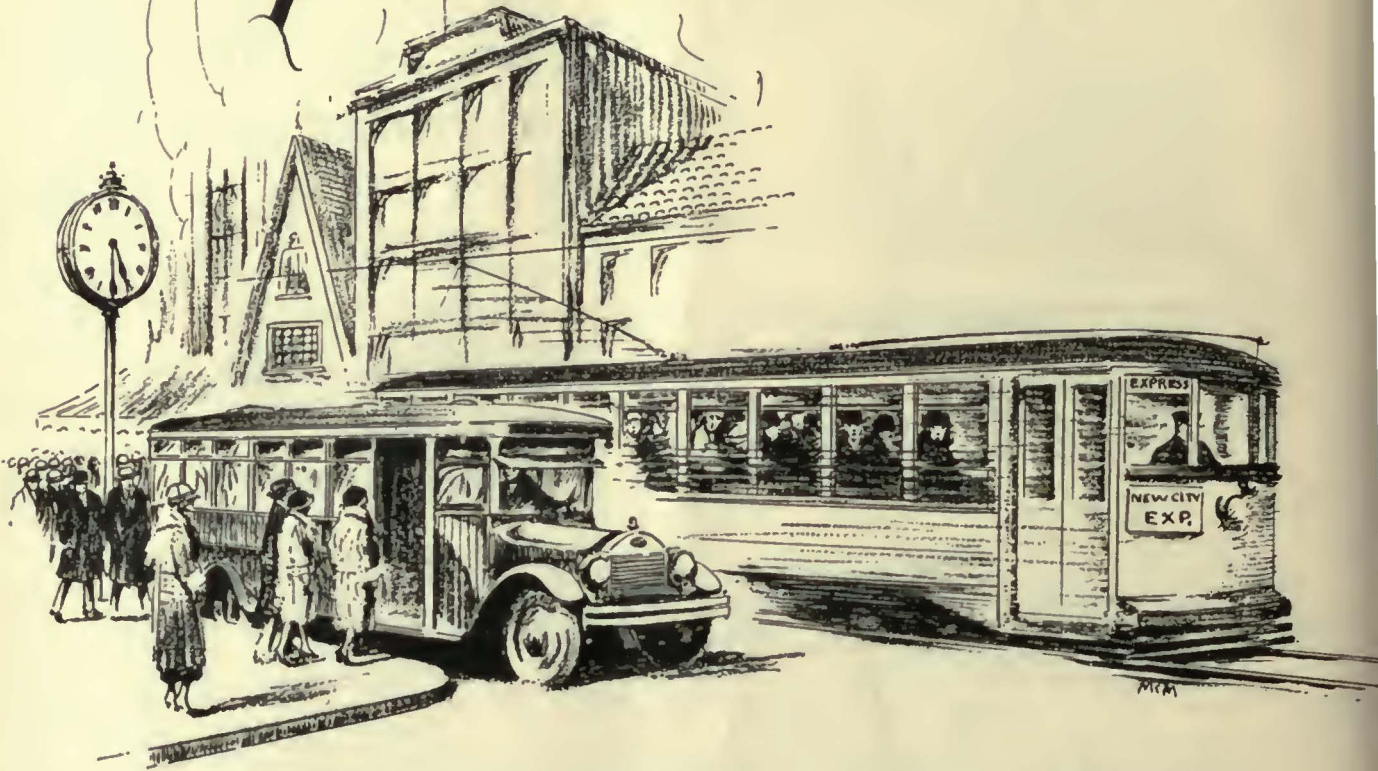
Unitary assembly means interchangeable unit parts! This simplifies maintenance, reduces costs, and keeps the equipment on the road in revenue-producing service virtually all the time.

Large seating capacity, low operating cost, simplified maintenance, standardized parts, long life— these are the high points for railway managements' consideration.

NEW YORK TRANSPORTATION CO.
New York, N.Y.



For parallel express




1900 1925
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on the
manufacture of
transport vehicles

and local service — *on the same street!*

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INTERNATIONAL MOTOR COMPANY

25 BROADWAY

NEW YORK CITY

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The Mack Bus



Sedan Type Bus

Performance counts!



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This makes a total of 535 Variable Load Brakes used by the Brooklyn City Railroad Company.



Westinghouse Traction Brake Co.
General Office and Works: Wilmerding, Pa.

WESTINGHOUSE TRACTION BRAKES



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Over 27,000 ELRECO Poles are in use in this city

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The Electric Railway Equipment Co.

Cincinnati, Ohio

New York Office: 30 Church Street

ELRECO

POLES





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The House of Quality and Service



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Staten Island Electrification



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with car inspection dials....



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Let us quote you prices and answer detailed questions.

Economy Electric Devices Company

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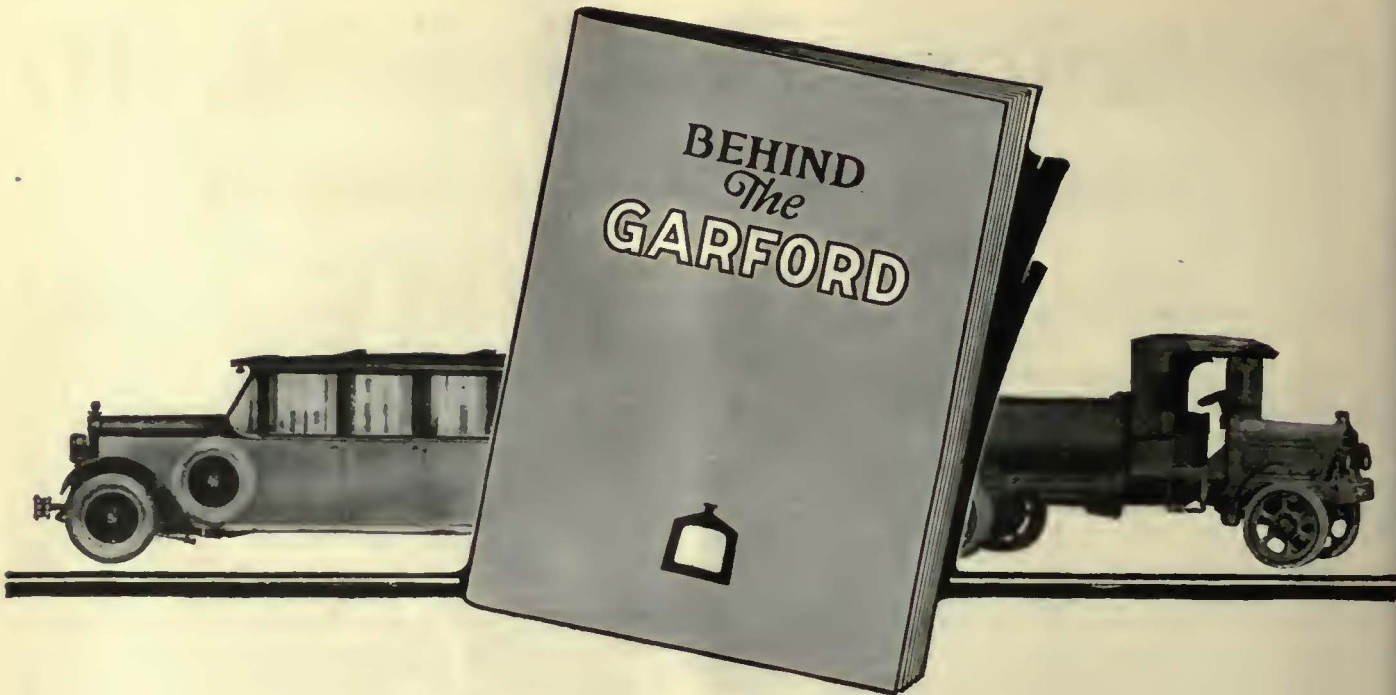
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This advertisement is printed as a cordial invitation for you to ask us—on your business stationery, please—for our book, "Behind the Garford." You'll find it well worth while.

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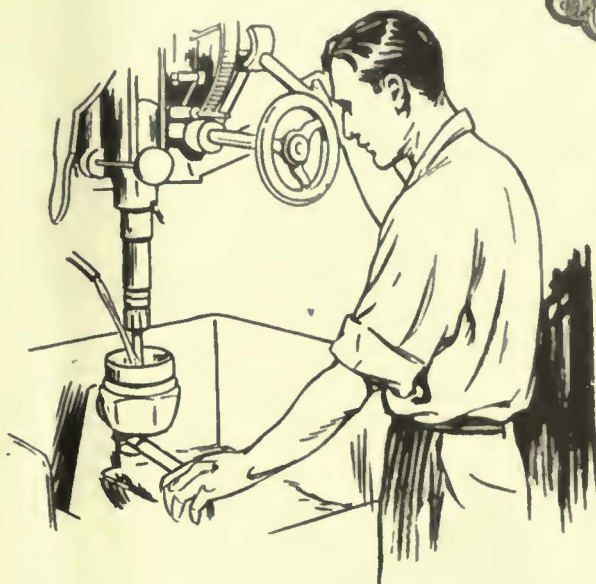
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Trucks
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Tons

Beginning in 1902, Garford is now among the eight companies manufacturing 75% of the bona-fide trucks

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MANY a tap or reamer cuts slowly or poorly for lack of proper lubrication.

Following its practice of fitting the lubricant to the work, Galena has developed a special Tapping and Reaming Compound.

Its effectiveness is shown by the following quotation:

"A test of Galena Tapping and

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So you may convince yourself of the aid of this Galena product in speeding tapping and reaming work, we will gladly ship a free sample upon request.



Galena-Signal Oil Company

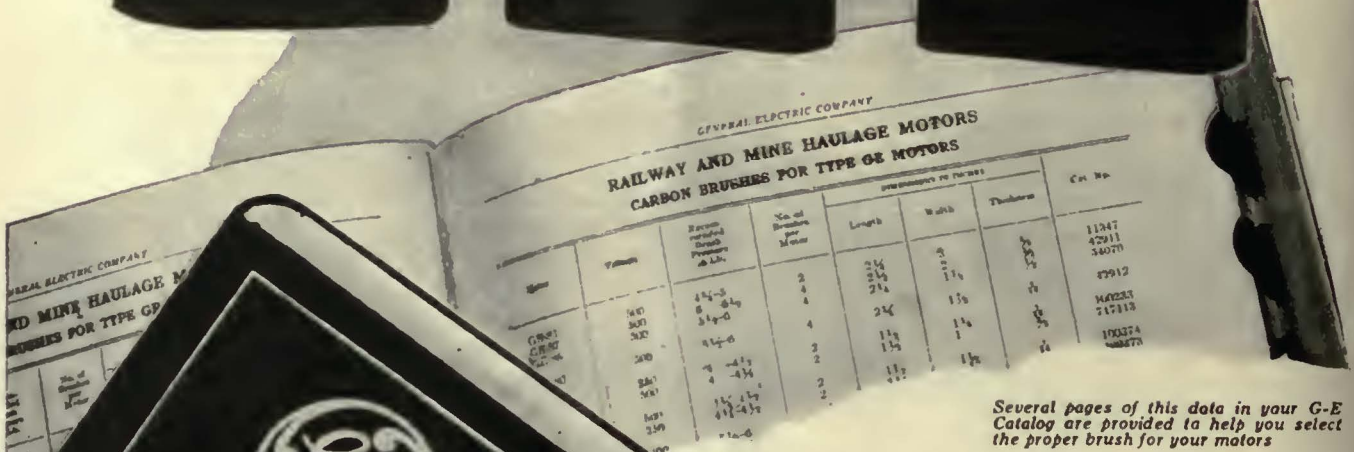
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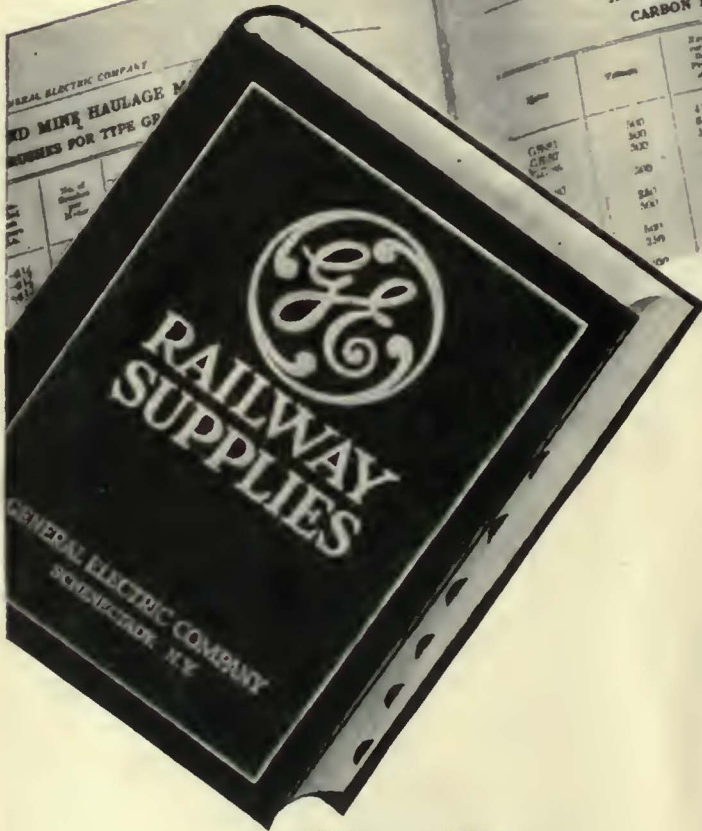
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and offices in principal cities





Several pages of this data in your G-E Catalog are provided to help you select the proper brush for your motors



Your Text Book on Equipment Standards

“and nothing but the best would do”

G-E Brushes are founded upon the experience gained in observing the operation of millions of G-E Motors, thousands built for railway service every year.

The success of G-E Railway Motors themselves is evidence of the high standard reached and maintained in G-E Brushes. In fact, the Brushes were developed for the Motors, for *nothing but the best would do.*

By calling upon G-E Brush Specialists you can be sure of proper brush application. And by keeping your G-E Railway Motors equipped with G-E Brushes your “Original Equipment Quality” is maintained.

General Electric Company
Schenectady, N. Y.
Sales Offices in all Large Cities



GENERAL ELECTRIC

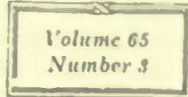
New York, Saturday, January 17, 1925

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Company, Inc.

HARRY L. BROWN, Editor



Repair Shops Are the Heart of Any Transit System

THE importance of adequate facilities for repairing rolling stock was brought out forcibly in the testimony given by several officials of the operating railway companies in New York City and by the chairman of the Transit Commission while testifying in the transit inquiry just concluded there. Under the dual contracts between the city and the companies, the responsibility for providing shops for the rapid transit lines in New York devolves on the city, so that as the hearing progressed, the size, character and extent of the shops now in use by the companies soon became one of the most important questions to be determined by the testimony. The position of the commission and companies was that additional cars, even if provided, could not be kept in service without additional shops, and that delays and accidents are bound to occur more frequently if adequate repair facilities are not available. The contention of the Mayor was that the present shops were not being used to their full capacity.

It is a striking fact, in this connection, that there was general acceptance by all concerned of the principle that good shop facilities are essential to good service. The truth is that the repair shop is the heart of any electric railway system. The track and overhead construction of an electric railway may be compared to the veins and arteries of the human system, and the rolling stock to the blood that is kept circulating. Just as the blood must be brought back to the heart for purification and recirculation, so the cars must be brought into the repair shop for attention, or they will soon be unable to operate.

Even if neglect to provide necessary shop facilities is not carried so far as to stop service, it is poor economy for any company to try to get along with facilities which are inadequate. It is easily possible that a delay on the line due to improper inspection or neglected repair to a car may cause far more loss in fares than would pay for the repair or inspection of that car several times over.

Most railway executives realize the need for good shops, but when appropriations for new tools or increased facilities are being considered there is often the tendency to think the existing facilities are good enough for the present. The situation then arises that additions are made to rolling stock repeatedly without making corresponding provision for shops and storage facilities.

Where this is the case, master mechanics should take the responsibility of bringing to the attention of the management the need and value of increased shop

facilities. This they can best do by keeping records to show the savings obtained from new tools and equipment installed in their shops or from increased facilities provided, and then presenting these figures to the management at the appropriate time.

Brooklyn City Issue Quickly Taken

"WAY oversubscribed within an hour." This is the record that was written last Tuesday after the offering made that day of \$3,750,000 equipment trust certificates of the Brooklyn City Railroad at the new low rate of 5 per cent. From the standpoint of the bankers the sale was a great success. From the standpoint of the railway and the industry the offering was even more of a success. The Brooklyn offering is by 25 per cent the largest of its kind of which there is record in recent annals of electric railway financing. Moreover, the price at which the issue was placed, returning a yield of only 4.50 per cent to 5.50 per cent, is the best that has been obtained for a long while.

In the steam railroad field equipment issues are regarded as choice securities. The success of the Brooklyn City issue reflects the willingness of the investing public to accord well secured electric railway issues a similar standing. This is all the more notable because electric railway equipment does not lend itself to the same ready interchangeability that steam railroad equipment does. In the past this consideration has imposed a differential between the two forms of security decidedly in favor of the steam railroads.

Participating investment bankers report that they experienced no difficulty at all in disposing of these certificates to private investors. The bulk of the sales was made to insurance companies to be held by them until maturity. This is especially significant, as they are usually considered very conservative. Incidentally the offering shows the growing tendency among the electric railways to take advantage of the aid which the equipment trust affords them to modernize and merchandise. The total of issues of over \$200,000 so placed last year was \$9,229,600.

So far as this latest issue is concerned there is nothing burdensome in the terms of the indenture under which the securities are issued. The maximum annual "dividend" requirement on the certificates is only \$187,500, and the maturities are \$375,000 annually over ten years, a period well within the reasonable life of the equip-

This is the issue in January that is devoted essentially to maintenance subjects

ment on which the certificates are secured. The maximum charge in any year will thus be \$562,500. For the year 1924 the company had available a balance of \$2,001,720 after the payment of operating expenses, fixed charges, taxes and rentals. The cash payment required was only slightly more than 25 per cent of the estimated cost of the equipment. Incidentally, for those who are given to reading between the lines, the successful placing of an issue of this kind on such favorable terms is a silent but substantial tribute to a management that has not hesitated to put earnings back into the property to the great benefit of the security holders. Every move of this kind by the Brooklyn City has resulted in added economies in operation, and the new equipment, designed in accordance with good, modern practice, may confidently be expected to do more than pay its way from the start. As indicated previously, the success which has attended the placing of this issue is a distinct achievement for the issuing company and it will react to the benefit of the industry.

Bond Maintenance Is Important to Minimize Return Circuit Resistance

BURIED beneath the paving and frequently neglected, the rail bond is one of the important elements in the electric circuit of the railway system. The outgoing distribution system is checked up carefully, as it can be seen, resistance measurements are not difficult and it can be repaired readily. The track circuit, on the other hand, is frequently neglected, as it is hard to check up and hard to get at for repair. Yet, it is good economy to maintain the return circuit well.

The survey on bond testing and maintenance practice published in this issue points out some of the difficulties experienced with rail bonds and the methods of testing and locating defective bonds for repair. In general, the types of bonds with a welded or brazed contact between rail and copper show up the best in service, as there is comparatively little deterioration until failure comes from a complete break of the connection. This makes the detection of defective bonds considerably easier than with the compressed terminal type, which deteriorate gradually and progressively due to corrosion. But repair of the compressed terminal type of bond is easier than for any of the welded types, as it does not require transporting a welding outfit about the property. However, the work done by the ordinary repair crew in replacing compressed terminal bonds is usually not so good as the repair work on welded bonds.

From an electrical point of view, no method of joining the rails can be superior to a continuous rail section without breaks. This can be approximated by the various types of welded rail joints, which not only do not deteriorate, but have a conductivity equal to that of continuous rail or nearly so. While high conductivity can be obtained through bonded joints, it is ordinarily too expensive to put on a sufficiently large area of copper bonds to get as low a resistance as that of solid rail. While the use of welded joints is to be desired by the electrical engineer, there are many places where welded track joints are not desirable, so that there probably always will be many miles of track with bolted joints. Rail bonds are the only available means of insuring good electrical contact on such joints.

The Annual

Legacy of Laws

FORTY-TWO legislatures meet this year. Some of them are already in session. Messages from the governors to these bodies are being combed by the editorial writers for evidences of a desire on the part of the newly elected executives to include suggestions to the legislative solons that reflect the party platforms. As in the past, there will be much disappointment and despair.

Not so much because it is New York, but because it is one of the first to come to hand in full and one of the most far-reaching in its significance, is the message of Governor Smith of New York of interest. His stand on home rule and his willingness to play Mayor Hylan's game in part at least are well known, but the people of New York were hardly prepared for the shock which Governor Smith had in store for them. The great bulk of the thinking people of the state are still staggering from the blow he has dealt them. He is for home rule and municipal ownership. There appears to be very slim prospect that his public utility program can be put through. A certain sense of security is to be found in that, but the matter does not end there. There are plausible, very plausible arguments for home rule. Mr. Smith makes the best of them, but in the end home rule is distinctly not in the best interests of the community. In the case of New York City it would undoubtedly be fatal. Yet Governor Smith is for it. He's for it on a wider scale than ever before. He defends openly the municipal operation of bus lines and by implication the municipal operation of subways.

But Governor Smith is not the only one who is sounding the home rule cymbals. The same thing is being done out in Ohio. And, strangely enough, the situation there has two anomalies, both arising out of a controversy in Cleveland. First, it apparently was expected that the state commission would grant a certificate of convenience and necessity to a bus service there that would be in serious competition with the Cleveland Railway. Granting of a certificate under such circumstances would be quite contrary to the principle accepted and followed by nearly all commissions. The other anomaly is that the Cleveland Railway is father to an amendment to a state law which would take from the state commission the authority to grant rights to any bus company within the limits of any large city. In other words, this is going back to home rule, whereas the principle accepted and urged by the national utility and bankers' associations and adopted by nearly all of the state legislatures is that of state as against municipal regulation. It seems unfortunate that this tendency exists in Ohio to resort to measures which are out of line with the accepted view on the part of both the commission and the railway. The position of the railway seems to have been taken as a defensive step against the likelihood of an unwarranted and ill-advised act by the commission.

It appears likely now that bus regulatory legislation will be passed this winter in both Indiana and Missouri, thus bringing these states more nearly in line with others on this matter. Moreover, there is need for strengthening some of the present laws governing bus and truck as common carriers. It will be several months before the oratory subsides sufficiently to permit calm calculation of the results.

Bond Testing and Maintenance Practice

Types of Bonds Employed, Causes of Failure, Methods of Testing and Replacement Standards Are Summarized for 25 Electric Railways — While Welded Joints Eliminate Need for Bonds, There Are Occasional Failures, so that Checking of the Return Circuit Is Desirable

EVEN with the large increase in the use of welded rail joints there still are many thousands of mechanical joints in use in this country which require the connection of rail bonds to complete the electric circuit with a reasonably low resistance. In order to determine the trend of current practice in bonding and in bond testing, this paper has conducted a survey of large, medium and small electric railway properties that use rail bonds. It was found that while there is a decided trend toward the various types of welded bonds the compressed terminal type of bond is used very largely on the roads included in the survey. Methods of testing have changed but little in recent years. The method of obtaining potential drop across the bond in millivolts compared with the drop across a fixed length of rail is the one in most common use. Out of the 25 properties included in the survey there are but two that use the bond testing car, although several are in use on other properties.

The table included with this article gives the approximate number of bonds in use by the various companies, with the exception of several roads that have incomplete records. Of the number of bonds as stated by the roads giving this information, there were approximately 400,000 compressed terminal bonds, 80,000 brazed bonds, 250,000 arc-welded bonds and 110,000 gas-welded bonds, making a total of 840,000. Thus the compressed terminal bonds represent 48 per cent of those listed.

About 45 per cent of the bonds are of the unprotected type, the greater number of them being attached to the ball of the rail. In general the welded types are more likely to be exposed than the compressed terminal type. The method in most general use for protection is to place the bonds under the joint plates. The only companies stating that they protect their bonds by placing them under the base of the rail are the Northern Ohio

Traction & Light Company, the Eastern Massachusetts Street Railway, the Detroit Department of Street Railways, the Rockford & Interurban Railway and the Bangor Railway & Electric Company. The latter two companies also use bonds placed under the joint plates.

CAUSES OF FAILURE OF BONDS

The causes of failure vary considerably with the type of bond. In all cases, however, loose mechanical joints are mentioned as one of the chief reasons for failure. With bonds of the compressed terminal type the most important cause given is corrosion, according to nine companies. Loosening of the pins and terminals is given by four companies, and improper application of the bonds by three. Other causes mentioned are splitting of the rail web at the bonding holes, breakage of the strands of the copper, vibration, and burning of the terminals. Breakage of strands is the principal cause for failure of brazed bonds, five companies giving this reason. Failure of the brazing is given by two companies as the chief cause of failure, and vibration by two others. One company states that wheels of automotive vehicles shear off the bonds.

Apart from loose mechanical joints, the shearing off of the bonds by vehicle wheels is the principal cause of failure of both arc-welded and gas-welded bonds, according to ten companies. Other causes for the failure of arc-welded bonds are breakage of strands, improper application, poor welding and air pockets in the weld, and breakage of the rails themselves. Miscellaneous causes for failure of gas-welded bonds are vibration, poor welding and air pockets in the weld.

FEW FAILURES OF WELDED TRACK JOINTS

Welded track joints give little trouble from the standpoint of the return circuit. Breakage of the joints is the principal reason for failure of conductivity.

TYPES OF RAIL BONDS IN USE ON 25 ELECTRIC RAILWAYS

Company	Number of Bonds			Number of Bonds		Per Cent Required Annually
	Comp. Term.	Brazed	Arc Weld	Exposed	Protected	
Los Angeles Railway Corporation, Los Angeles, Cal., per cent...				5	95	1 2
Market Street Railway, San Francisco, Cal.	64,700	4,630	0	12,790	56,370	5
Denver Tramway, Denver, Col.	0	5,000	25,000	0	30,000	5
Connecticut Company, New Haven, Conn.	165,000	25,000	12,000	0	27,000	Under 5
Georgia Railway & Power Company, Atlanta, Ga.	20,000	0	13,200	9,800	23,000	20,000
Aurora, Elgin & Fox River Electric Company, Ill.	100	0	100	0	100	4
East St. Louis & Suburban Railway, East St. Louis Railway, Alton, Granite & St. Louis Traction Company, East St. Louis, Ill.	11,750	0	10,750	0	10,750	11,750
Rockford & Interurban Railway, Rockford, Ill.	1,000	29,100	4,000	2,500	29,600	6,000
Bangor Railway & Electric Company, Bangor, Me.						20
Boston Elevated Railway, Boston, Mass.	32,000	0	46,000	0	55,000	23,000
Eastern Massachusetts Street Railway, Boston, Mass.			38,316	0	18,027	19,499
Department of Street Railways, Detroit, Mich.		0		0		5
Saginaw Transit Company, Saginaw, Mich.	20,120	2,000	0	10,932	13,760	26,400
Omaha & Council Bluffs Street Railway, Omaha, Neb.	8,592	10,000	48,000	0	69,344	17,240
Northern Ohio Traction & Light Company, Akron, Ohio.						10
Pennsylvania-Ohio Power & Light Company and Pennsylvania-Ohio Electric Company, Youngstown, Ohio.	12,433	0	32,350	750	39,900	17,433
Charleston Consolidated Railway & Light Company, Charleston, S. C.	4,000	0	3,000	0	2,000	8,000
Dallas Railway, Dallas, Tex.	0	0	10,000	0	10,000	0
San Antonio Public Service Company, San Antonio, Tex.	5,000	4,000	0	10,000	14,000	5,000
Utah Light & Traction Company, Salt Lake City, Utah.	29,000	0	0	1,500	1,000	29,000
Newport News & Hampton Railway, Gas & Electric Company, Newport News, Va.	14,000 total	all types	0	0	600	5,000
Virginia Railway & Power Company, Richmond, Va.	5,000	0	400	0	18,500	30,100
Seattle Municipal Railway, Seattle, Wash.	0	0	0	0	0	2
Ohio Valley Electric Railway, Huntington, W. Va.						4
Eastern Wisconsin Electric Company, Oshkosh, Wis., per cent	60	50	10	0	60	60

Such failures are infrequent as compared with failures of bonds. The Connecticut Company had a large number of failures of rail welds a few years ago, when it was the practice of the company to weld light rail, but few failures have occurred with heavy rail. On old track the Georgia Railway & Power Company has had as many as 18 per cent of failures of welded joints, but it has had less than 1 per cent on new track. In the period 1921-1923 the Eastern Massachusetts Street Railway had 974 failures out of a total of 89,969 welded track joints. With 347.5 miles of track welded this is 2.8 per mile of single track for the 3 years. The Department of Street Railways, Detroit, has had cracks develop in the upper seams of four joints in new track and 75 joints in old track repaired by the arc-welding process. These cracks were due to lack of proper support of the joints.

The Omaha & Council Bluffs Street Railway has had about 200 failures of welded track joints, or 15 per mile of track that has been welded. On the lines of the Pennsylvania-Ohio Power & Light Company, which uses thermit welds, there have been 12 failures out of 2,930 joints over a period of 8 years, or 0.774 joint per mile of single track. The San Antonio Public Service Company has had failures of 2 per cent of its welded joints. Sixty joints, or 10 per single-track mile, is the record of failures of welded joints on the Utah Light & Traction Company's property. Some failures have occurred on the track of the Newport News & Hampton Railway, Gas & Electric Company where old plates were welded to old rail. However, there have been no failures where the work was done on new track in the original job. Approximately 0.1 per cent of the welded joints have failed on the Virginia Railway & Power Company's track. The Eastern Wisconsin Electric Company has had no failures of welded joints in 2 years.

METHODS USED FOR BOND TESTING

The type of instrument used most widely for bond testing is the Roller-Smith direct-reading bond tester. This device is used with current flowing through the rail from normal car operation and indicates the resistance of the bond in equivalent feet of solid rail. Other types of bond testers used are the standard Weston millivoltmeter, the American Steel & Wire Company's bond tester and the Electric Service Supply Company's No. 34,175 tester. While the small companies ordinarily use but one instrument each, several roads have two and the Eastern Massachusetts Street Railway uses eight Roller-Smith instruments. In Omaha a preliminary check is made of potential drop in the various sections by using telephone pairs as leads and obtaining voltmeter readings. These readings are taken for 24 hours. If this check shows a poor section an individual test is made. On some of the Eastern Massachusetts Street Railway's long country lines with infrequent car service it is necessary to feed current through the rail by means of heater coils used as a loading resistance so as to get a sufficient deflection of the instrument. A somewhat similar device made of resistor grids is used by the Virginia Railway & Power Company to get enough current in the rail. The practice on the Seattle Municipal Railway is for the bond tester to carry in his pocket a flashlight cell. This is connected with the instrument leads so as to furnish current across joints to be tested where there is little or no current in the

rails, such as at neutral points between substations or near the ends of lines.

Bond-testing cars of the type which was developed a number of years ago by Albert B. Herrick are in use only by the Boston Elevated Railway and the Connecticut Company among the roads replying. The Detroit Department of Street Railways is contemplating the use of such a car. This device gives a graphic record of the resistance of each bond as it is run over the track at a speed of 10 m.p.h. or more. By a check of the location it is possible to determine which bonds have failed. It was at first the practice of the Connecticut Company to refer the location of a defective bond to the nearest pole, but several cases where with more than one bond between poles the repair gang dug up the wrong bond led to a change in practice, so that the car is stopped at the defective bond and its exact location painted so there can be no misunderstanding.

MARKING DEFECTIVE BONDS

In general, two methods are used for marking bonds found defective by the meter methods. One of these is to mark the rail with paint, and the other to mark it with a chisel or a center punch. The Pennsylvania-Ohio Electric Company uses several colors of paint to indicate different test results. A few companies use a colored chalk or crayon for the purpose. Another method sometimes used is to determine the location of the defective bond from some fixed point. The Los Angeles Railway, for instance, indicates the location of the defective bonds on the report sheet by pole numbers. In Detroit the indications are given by house numbers where possible, and chisel marks are placed on the rail as additional identification. At Charlestown a count is made from the nearest special trackwork, while the Virginia Railway & Power Company numbers the bonds from the street intersections.

In Seattle the defective bonds are located with respect to the houses, poles, or other landmarks and listed on blank forms, a copy of which is illustrated with this article. This same form is used by the repair man to indicate the type of bond removed and its condition, as well as the type of bond installed in place of it.

On some roads the bonding crew follows immediately behind the bond tester. In this event, only temporary marks are needed. Railways using this practice are the Bangor Railway & Electric Company, the Eastern Massachusetts Street Railway, and the Newport News Railway, Gas & Electric Company.

PERIOD OF TESTING

Considerable difference exists in the length of time that the track is allowed to go between tests of rail bonds. A number of the companies included in the survey make tests approximately once a year. These include the Northern Ohio Traction & Light Company the Connecticut Company; the Eastern Massachusetts Street Railway; the Bangor Railway & Light Company; the Detroit Department of Street Railways; the Los Angeles Railway; the Utah Light & Traction Company; and the Aurora, Elgin & Fox River Railway. The Denver Tramway makes bond tests at periods varying from 6 to 9 months. The Seattle Municipal Railway makes tests in paved streets once a year and on unpaved tracks every 6 months. A 6 months period between tests is used by the Pennsylvania-Ohio Electric Company, the Saginaw Transit Company, the Ohio Valley Electric

Company, and the Eastern Wisconsin Electric Company. Two roads have a period of 2 years between tests. These are the Rockford & Interurban Railway and the Georgia Railway & Power Company. The remainder of the companies included state that the period of testing is irregular.

WHEN BONDS SHOULD BE REPLACED

It is noticeable that the failures of the compressed terminal bonds are progressive as the contacts between steel and copper corrode or work loose, while the failures of the welded and brazed types are more or less sudden. With the latter types, so long as several strands of the flexible portion of the bond remain intact, the resistance of the bond will ordinarily be low enough to carry the current without a drop of potential in the track so great as to cause difficulty in operating cars. This makes it easy to determine if the bonds should be replaced, as there is a wide difference in the readings of the testing instrument between good and bad bonds. With compressed terminal bonds, on the

it is stated that better workmanship which the company is now obtaining will reduce the replacement of bonds to between 5 and 10 per cent a year.

On the lines of the Market Street Railway, when a section of track is overhauled or rebuilt, the bonds are examined and put in first-class condition. Otherwise, the bonds are not investigated. The cost of opening the streets, removing the joint plates and repairing is so high that a slight deficiency in bond conductivity as shown by the testers would not receive consideration, so that the bonds are not tested.

The exposed type of brazed bonds was installed by the Connecticut Company several years ago. A large portion of the bonds have since been replaced in connection with reconstruction work, although at the present time there still are a considerable number of the brazed bonds in service. These are stated to be in as good condition as when they originally were installed. The company now uses the arc-weld exposed type of bond on maintenance work and on new construction on special work.

TRACK		RAIL	LOCATION	R'D'G	TO BE FILLED IN BY REPAIR MAN		
					TYPE OF OLD BOND	CONDITION	TYPE OF NEW BOND
MUNICIPAL STREET RAILWAY, SEATTLE							
LIST OF DEFECTIVE BONDS June 21st, 1924							
LOCATION <u>WESTLAKE LINE, Con't.</u>				DATE OF REPAIR: MONTH _____ YEAR _____			
<u>Westlake Avenue N.</u>							
West	West		4' north of Building No. 1546				
East	East		1st joint south of door 1547				
East	East		Opposite door 1547				
East	East		2nd joint south of 2nd span wire pole S. of door 1717				

Form Used by the Seattle Municipal Railway for Recording Bond Tests and Replacements

other hand, it becomes a matter of determining a limiting resistance which is considered low enough not to cause interference with car service.

A majority of the railways included in the survey give the testing crew tabulated or other information regarding the bonds and the permissible resistance. The equivalent resistance which is considered satisfactory differs with the companies, depending to a certain extent on the amount of traffic and the return current which must flow through the rail. A bond resistance equivalent to 4 ft. of rail is considered satisfactory by the Virginia Railway & Power Company; the Market Street Railway considers the joint all right if the resistance of 1 ft. of rail, including the joint, is not greater than 5 ft. of solid rail; while the Omaha & Council Bluffs Street Railway marks the bond for replacement if it has a resistance exceeding that of 6 ft. of equivalent rail, and the Newport News Railway, Gas & Electric Company replaces the bond if it has a resistance greater than 8 ft. of rail.

NUMBER OF BONDS REPLACED ANNUALLY

The number of bonds repaired or replaced annually varies greatly on the different properties. This is indicated in the right-hand column of the table. On new track, with protected bonds of the welded type, replacements are very few. With the older types of bonds, the replacements may run as high as 20 per cent of those installed. On the Bangor Railway & Electric Company, which has the latter figure for replacement,

Gas-weld bonds are repaired by the Omaha & Council Bluffs Street Railway when they have been removed for any cause. This is done by grinding the head and stretching the bond straight, after which it is bent to a U shape and placed in stock.

The 4,000 ribbon-type brazed bonds on the lines of the San Antonio Public Service Company have not been found satisfactory. This is due to the excess heat in the installation process weakening the ribbon adjacent to the terminals and causing the ribbon to break under the constant vibration.

THEFTS OF BONDS UNIMPORTANT

Most of the companies included in the survey state that the theft of bonds is now a matter of little or no importance, even when the exposed types are used exclusively. This is probably true in large measure to the types of bonds now in common use being shorter and having so much less copper than the old-style bonds that it does not pay a thief to remove them. Then, too, the welded types are so strongly fastened to the rail that it is quite difficult to remove them. Of the companies making definite statements as to the number of such thefts, the Northern Ohio Traction & Light Company states that 2 per cent of its bonds are stolen annually, while the Pennsylvania-Ohio Electric Company states that 1 per cent are stolen. The Georgia Railway & Power Company loses about 50 bonds a year, and the Omaha & Council Bluffs Street Railway approximately the same number.

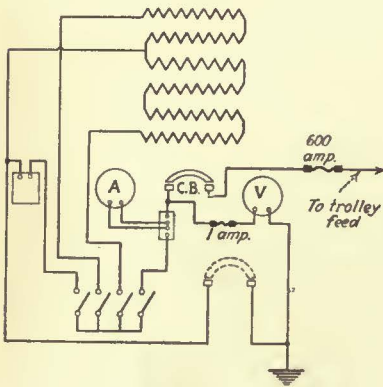
Water Rheostat Used for Testing Circuit Breakers

Close Regulation of Resistance Up to 500 Amp. Is Secured by This Means in Chelsea Shops of Eastern Massachusetts Street Railway

BY H. T. HURLOCK

Engineer Rolling Stock and Shops Eastern Massachusetts Street Railway, Boston, Mass.

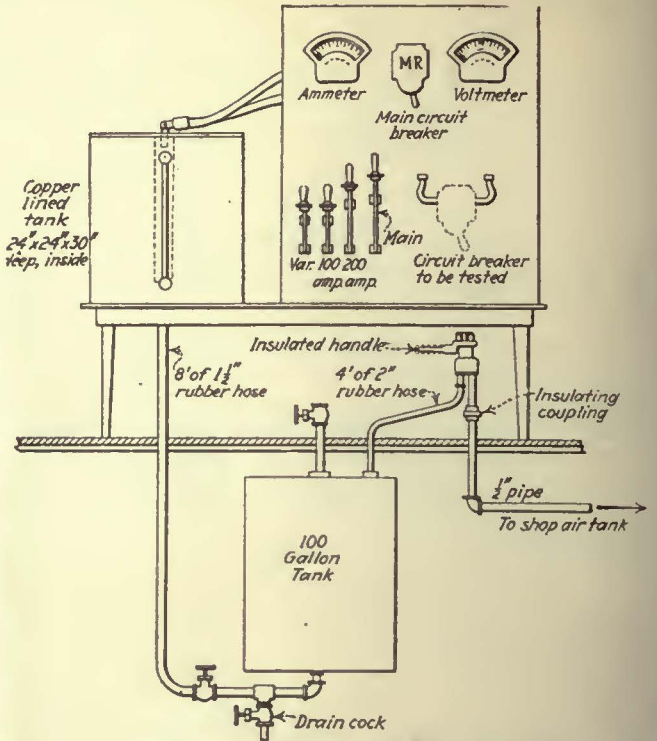
ALL circuit breakers passing through the repair department of the Chelsea shops of the Eastern Massachusetts Street Railway are carefully tested before they are returned to service. The outfit used for this work consists of a water rheostat operating in parallel with two banks of grid resistors. The water rheostat is designed with a capacity of 200 amp., while the fixed resistances are 100 and 200 amp. respectively, giving a total capacity of 500 amp.



Wiring Diagram of the Testing Apparatus

A shop supply of compressed air pumps brine into the water rheostat from a storage tank located under the floor. The air, which is controlled by an engineer's valve, passes into the top of the storage tank, and thus forces the brine up into the rheostat.

To empty the rheostat the air is released to atmosphere, and the brine flows back by gravity into the storage tank. The combination of water rheostat and fixed

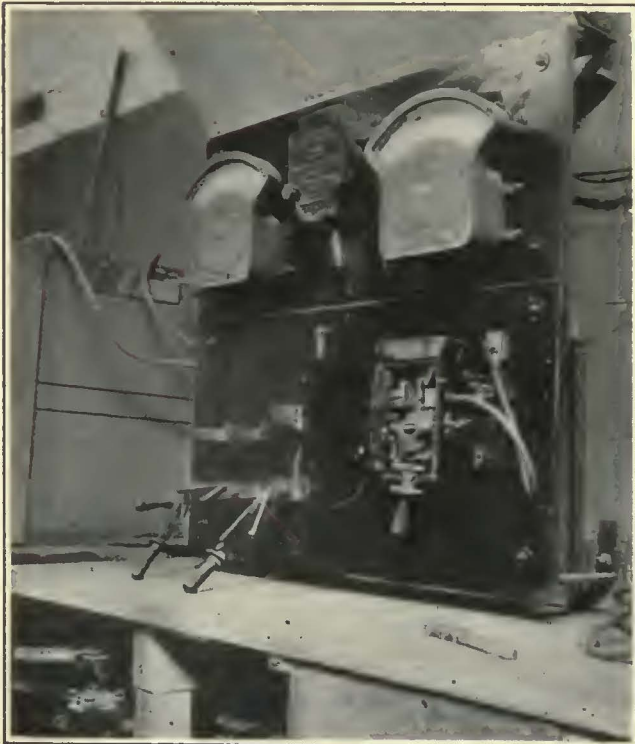


Piping Arrangement Showing How the Level of the Brine in the Water Rheostat is Controlled

resistance permits close regulation up to the full capacity of 500 amp.

The water rheostat, 24 in. x 24 in. x 30 in. deep, is constructed of wood, copper lined, and has a brine capacity of 50 gal. Two electrodes of No. 14 gage sheet iron 3 in. wide are suspended from the top of the rheostat and spaced 7 in. apart. A water gage is added to indicate the height of the brine. Both rheostat and storage tank are mounted on insulated supports, and rubber hose is used for the connections. The entire apparatus has been built from materials on the property and has given satisfactory results.

It is the practice of this company to set circuit breakers to trip at 150 per cent of the full load rating of the motors, after which the adjustment is pinned to prevent tampering by unauthorized persons. Breakers which are found to be inaccurate in service are returned to the shops for adjustment.



Circuit Breaker Testing Panel in the Chelsea Shops of the Eastern Massachusetts Street Railway

Shopman's Badge Uses Company Symbol

AN OCTAGONAL badge has been devised for the use of the shopmen of the Altoona & Logan Valley Electric Railway, Altoona, Pa. The feature of this badge is a closed belt with a buckle at the bottom and the words "Logan Valley" around the circumference.



Characteristic Symbol of the Logan Valley Line Is Used On Shopman's Badge

The symbol is the same as that long used by the company on the sides of its cars. The badges are made of metal and are manufactured by the Whitehead & Hoag Company, Newark, N. J.

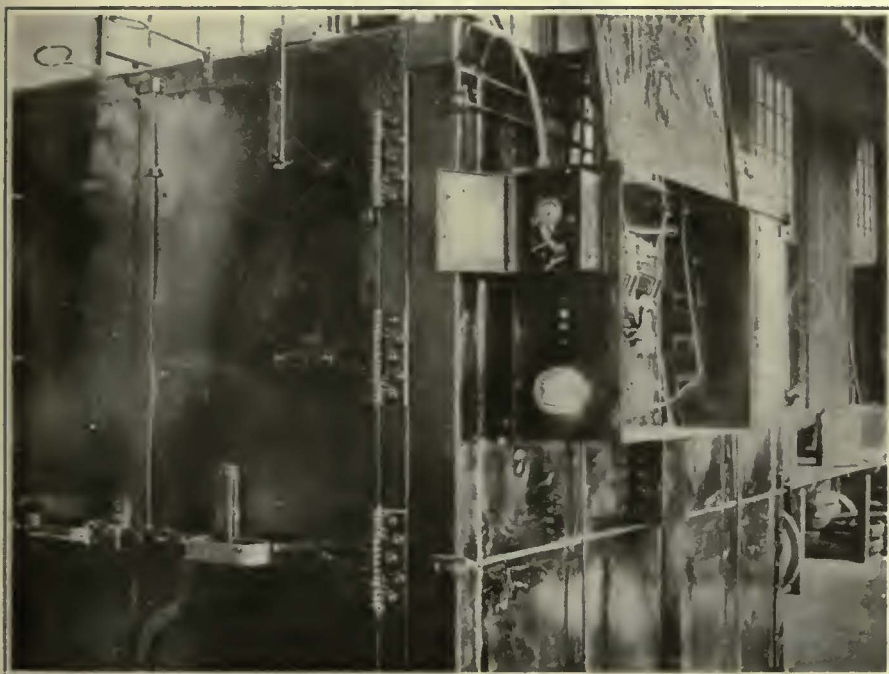
Pull-Ins Reduced 80 per Cent

By Installing Armature Dipping and Baking Facilities and by Changing the Kind of Waste Used in the Journal Boxes the Harrisburg Railways Eliminated the Cause of Many Breakdowns

DURING the past year the Harrisburg Railways, Harrisburg, Pa., has reduced the number of cars pulled in per month from 110 in January to 21 in November. The average ear mileage per pull-in has been increased from 2,950 to 14,504. This improvement has resulted from three principal things. Breakdowns to cars in service have become less frequent since the practice of dipping and baking armatures has been undertaken. A change in the kind of waste used in

moves, it has been found best to use a portable track which is laid down when the doors are open and is taken up before they are closed.

The armature carriage is a box made of sheet metal welded together and placed on wheels. It was built in the welding shop of the railway. Holes have been bored through the top and bottom to take the armature shafts. By this arrangement the armatures are held securely in place. A chain hoist by which armatures are raised



The Baking Oven Shown at the Left Has Been Installed in an Accessible and Well-Lighted Location. The Dipping Vat Shown at the Right Is Made of a Steel Oil Drum. Note the Portable Track Standing Against the Wall

packing journal boxes has reduced the number of hot bearings. A repair man is kept downtown at the square all day to make minor repairs and thereby save having to take cars out of service.

Dipping and baking apparatus was installed in the armature room in April of this year. This location is particularly good because the room has a southern exposure and many large windows, making it sunny and bright. Moreover, it is readily accessible. A dipping vat has been made from a steel oil drum, which has been sunk below the floor. The position of the cylinder is vertical, with the top flush with the floor. Armatures are suspended vertically and lowered by a chain hoist into the liquid.

The electric baking oven, which was built by the Despatch Manufacturing Company, Minneapolis, Minn., is only a few feet away from the dipping tank and facing it. Its general appearance is shown in an accompanying illustration. After having been dipped, the armatures are placed on a carriage and rolled into the oven. Because the oven doors close tightly, with no opening in them for the rails on which this carriage

from the dipping vat moves along a short track so that the armatures can be lowered directly onto the carriage. An important point in connection with the handling of armatures is the use of a copper lining band inside of the grips which are placed on the armature shaft. The use of this lining has proved efficacious in preventing damage to the metal of the shaft.

AUTOMATIC TEMPERATURE CONTROL HAS BEEN PROVIDED FOR THE BAKING OVEN

The baking oven has the usual thermostatic control and also a time control. The temperature range of the thermostat is about 2 deg. Field coils are baked at 220 deg. F. and armatures at 250 deg. F. A cut-out has been arranged so that when the doors are open the circuit is broken. The time control has been provided so that armatures or field coils can be left in the baking oven over Sundays or holidays when the armature repair man will not be on hand to turn off the current. This is so arranged that after a fixed temperature has been maintained for a certain length of time the clockwork mechanism automatically opens the circuit.

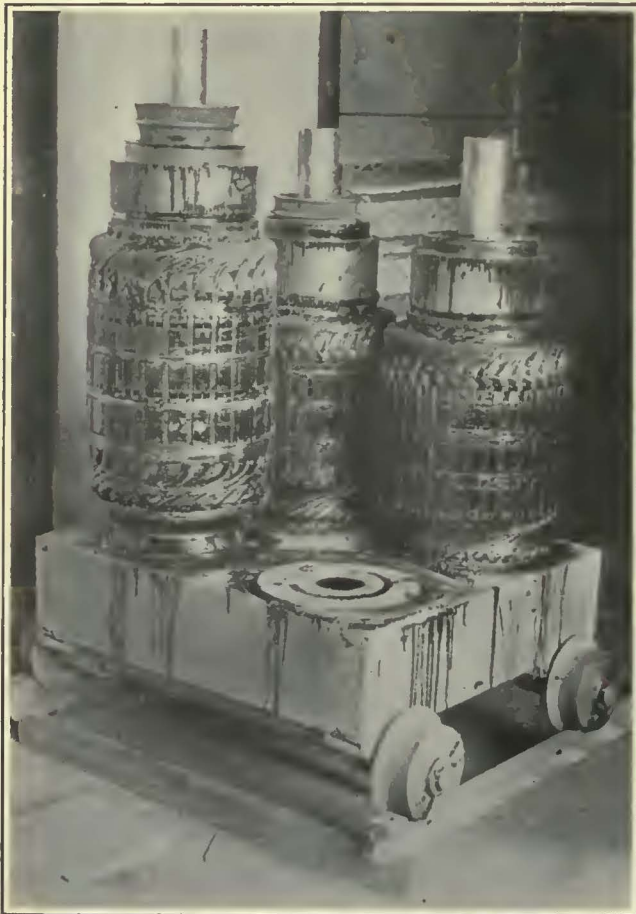
The installation of the dipping and baking apparatus is considered by the railway to have been instrumental in reducing the number of pull-ins. The monthly record shows how the average mileage per pull-in began to increase to a marked extent soon after dipping and baking was undertaken. Monthly figures are given in the accompanying table. December, it will be seen, was not quite so good as November, but in spite of adverse weather conditions was far better than the early months of the year.

PULL-IN RECORD OF HARRISBURG RAILWAYS FOR 1924

Month, 1924	Total Pull-Ins	Car-Miles per Pull-In
January	110	2,950
February	110	2,770
March	93	3,302
April	*70	*4,536
May	62	5,376
June	78	4,055
July	46	6,950
August	55	5,714
September	55	5,545
October	47	6,755
November	21	14,505
December	47	6,821

*Dipping and baking facilities installed in April.

In the early part of the year it was felt by the management that there were too many failures to cars in service, and a careful investigation was undertaken to determine the cause of this situation. One of the causes of pull-ins was hot journals. For example, in



A Welded Armature Carriage Made of Sheet Metal Moves on a Portable Track

December, 1923, 89 cars were pulled in for this reason, and in January, 1924, the total number of hot bearings was 127, although there were not an equal number of cars taken out of service. High-grade lubricating oil and pure wool waste were being used by the company. Chemical analyses were made of the oil and waste. This

was even carried to a point where the chemical characteristics of the dyes used in the wool were studied. No shortcomings, however, were found with either the oil or the waste.

During the investigation, A. F. Rexroth, master mechanic, visited a number of neighboring railway properties to study their methods of journal lubrication. On a trip of this kind to a property operating under conditions similar to those of the Harrisburg Railway, he discovered that extremely satisfactory results were being obtained with a comparatively low-grade wool waste. It was suggested that the 100 per cent wool used at Harrisburg was too high grade.

Accordingly, it was decided to try a different kind of waste containing only 60 per cent wool. This resulted in an immediate reduction in number of hot journals. Its use has been continued and the results have been most gratifying. The number of hot journals each month is shown in the accompanying table.

HOT JOURNAL RECORD, HARRISBURG RAILWAYS

Month, 1924	Hot Journals
January	127
February	*108
March	16
April	10
May	17
June	19
July	8
August	8
September	11
October	6
November	8

*Change made in quality of waste during this month.

After nine months experience with the new waste, the company has decided that pure wool waste is unsatisfactory for journal packing. Records show that in Harrisburg trouble was first experienced with this waste when it was about 60 days old. The supposition is that it became glazed on the surface and failed to carry the oil as it should. Moreover, the theory is held that pure wool waste is not as springy as 60 per cent quality and is, therefore, less satisfactory for journal packing.

A SHOP MAN IS STATIONED DOWNTOWN TO MAKE MINOR REPAIRS

Another important step that has been taken to reduce the number of pull-ins at Harrisburg is the keeping of a repair man on duty at the square. At this location, the two principal loops in the downtown district touch and all cars pass this point once on each trip, except for those on a small line in the suburbs which do not come downtown at all. Stationing a repair man at the square, therefore, makes it possible to repair a car in service without pulling it into the shop, unless the defect is serious.

This man is on duty from 7 a.m. to 6 p.m., and the cost of keeping him there has been saved many times over through the elimination of dead mileage by pulling cars in and pulling out other cars to replace them. As the shops are nearly a mile from the central square, this saving has been very considerable. Moreover, there has been a corresponding saving in labor costs, since it is unnecessary to have shopmen take cars downtown to replace cripples and bring in the latter to the shop. As it happens, the one line which does not pass the square does pass right by the front of the railway shop, so that under the present arrangement every car on the system can be repaired on the road if the defect is a minor one.

Proper Equipment Improves Babbitt Room Results

Convenient Arrangement of This Department in the Snelling Avenue Shops of the Twin City Rapid Transit Company, Together with Specially Designed Equipment, Insures Uniform and Speedy Work

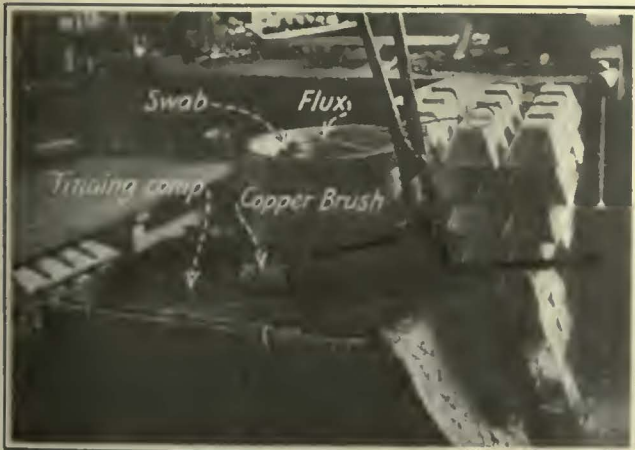
AS DESCRIBED in a previous article in the *ELECTRIC RAILWAY JOURNAL* for Nov. 15, page 834, both solid bronze and babbitt-lined malleable shells are used by the Twin City Rapid Transit Company mechanical department for axle bearings and babbitt-lined bronze is used for armature bearings. The babbitting department is therefore considered of equal importance with other shop departments where the machining operations are carried on, and considerable attention has been given to its equipment and arrangement.

Maximum convenience for carrying on the work has been the first consideration. The department is equipped with a number of low, cast-iron top tables, having these heavy tops supported on substantial steel legs. One of these tables extends across in front of the babbitting furnace as shown in the accompanying illustration, so that it is handy to the furnace and also to the tinning tank, which is near one end of the table.

Malleable shells are tinned by using a special non-acid tinning flux which causes the tinning material to adhere properly to the malleable iron. The tinning material is half tin and half lead, and is put into a small rectangular tank set in a convenient location relative to the babbitting bench. A gas flame under the tank keeps the tinning mixture at the proper temperature. The bearing to be tinned is first preheated by immersion in the babbitt pot, either for removal of the old babbitt in the case of an old bearing, or for preheating only in the case of a new bearing. Old bearings seldom require very much tinning to be done before rebabbitting.

When a bearing does require tinning, however, it is set on the edge of the tinning tank as shown in the illustration, the projecting end being supported on a small cross bar, so that it slopes considerably, thus making sure that any surplus material will drain back into the tank.

At the right of the tank, in an earthen pot, is the tinning flux. This is first swabbed on the interior surface of the bearing. An interesting item in connec-

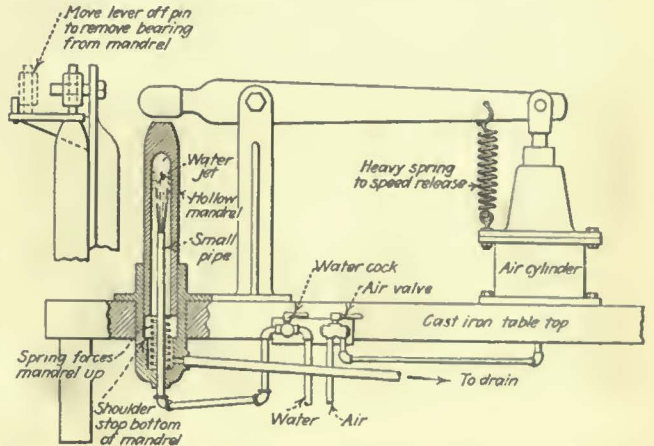


The Tinning Tank and Flux Are Located Convenient to the Babbitt Furnace and Work Bench. The Bearing Is Supported on the Edge of the Tank While Being Tinned



This Brush, Having Bristles Made of Twisted Copper Strands, Is Very Effective for Spreading the Tin on the Inside of the Bearing Shell

tion with this operation, which at first glance may seem to be a very unimportant detail but which is sometimes a considerable source of lost time and annoyance, is the material used for this simple swab with which the tinning flux is applied. It consists of a piece of asbestos cloth fastened on the end of a small wire



A Specially Designed Babbitting Machine Increases Production Over Hand Methods. The Mandrel Is Water Cooled and Is Released from the Babbitt by the Action of the Pneumatic Cylinder and Lever

handle. This is the only material which has been found to resist the corroding action of flux and heat.

Another interesting detail of the tinning operation is the method of applying the tinning material to the face of the bearing. The home-made copper brush, shown in another illustration, is dipped into the molten tin, by passing the long handle through the bearing. The brush is then repeatedly dipped into the tin and rubbed back and forth on the inside surface until the latter is thoroughly coated. The bristles of this brush consist of small twisted strands of fine copper wire, and as one of the brushes lasts for a long time, this method has been found to be much more satisfactory and rapid than that of using an iron to spread the tin.

After the tinning operation is completed the bearing is ready for babbitting. In the case of axle bearings, the babbitt contains a very much higher percentage of lead than for armature bearings. This is true only in the case of malleable-iron shells, of course, as the solid bronze axle-bearing shells are not babbitted. When babbitt is applied to the malleable-iron shells, its thickness varies from $\frac{1}{8}$ in. to $\frac{1}{4}$ in. In armature bearings the babbitt thickness averages about $\frac{1}{8}$ in.

A pyrometer is used in the babbitt pot to check the

temperature, which is maintained at 650 deg. F. to 700 deg. F. Soft babbitt is heated to a temperature of only about 600 deg. F.

For the purpose of increasing the production in babbitting bearings a special machine has been designed, which employs a water-cooled automatic releasing mandrel. Accompanying illustrations show the design of this device. Near one end of the long table in front of the babbitt furnace is mounted an air cylinder and lever, which is supported over the end of the babbitting mandrel so that admission of air to the cylinder will force the end of the lever down on the mandrel. This mandrel itself is hollow, and fits into a steel casting set into the table as shown in the sketch. The mandrel is thus movable within the casting, and



Compact and Convenient Arrangement of Equipment in the Babbitt Room Eliminates Lost Motion and Time. The Babbitt Machine Is Mounted on a Low, Cast-Iron Top Table

is supported on a spring at the bottom. When air is admitted to the cylinder the overhead lever forces the mandrel down in the casting and compresses the spring. A shoulder in the casting limits the distance that the mandrel can travel down. When the air pressure is released the mandrel is forced back into the normal position by the action of the spring.

Leading into the chamber from the bottom of the casting, and extending up into the hollow space inside the mandrel itself, is a small pipe by which a jet of cold water is introduced. A drain pipe leading out from the bottom of the chamber allows the surplus water to flow off. When it is desired to remove the bearing from the mandrel after it has been babbitted, or to replace another one on the mandrel, the lever is moved off the end of the supporting pin and allowed to rest on a short shelf until it is replaced on the pin again after another bearing has been put on the mandrel.

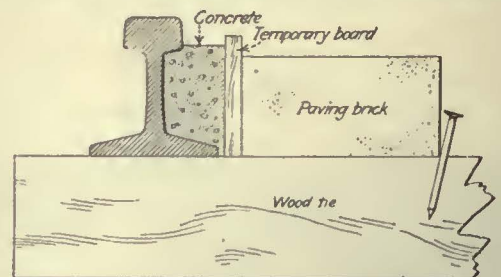
It is evident that this arrangement causes the babbitt to cool quickly after pouring, and the pneumatic device forces the mandrel loose if the babbitt sticks, and avoids any loss of time. With this arrangement, one man babbits approximately 17 armature bearings per hour on general run work, including the time taken to melt out old babbitt on scrap bearings as well as those that are to be rebabitted. When babbitting bearings only, one man easily completes 25 bearings per hour.

Concrete Curb Along Rail Reduces Paving Cost

AN UNUSUAL solution of a peculiar paving problem has been made by the Altoona & Logan Valley Electric Railway, Altoona, Pa. In the district where this company operates brick is used almost universally for paving the streets. Some time ago, however, the railway purchased at a bargain 600 tons of 5½-in. T-rail of special section with a deeper head than standard. As it was found impossible to place a 4-in. paving brick under the head of this rail to make a flangeway some other way of doing this had to be devised. The method finally adopted consists of placing what the company calls a "concrete curb" along the rail. This has not only solved the immediate problem, but also has reduced the cost of paving the railway area. The method of installing the concrete curb is as follows: After the ties have been laid and the rails spiked down a board 4 to 5 in. high is placed in a vertical position along the inside base of the rail. This is held in place by two or three paving bricks placed at intervals against it. The paving bricks in turn are held by nails driven part way into the wood ties, as shown in the accompanying sketch. As soon as the concrete has set, the nails, bricks and board are removed. Two rows of brick stretchers are then laid along the



Appearance of Concrete Flangeway and Brick Pavement Used in Altoona



A Longitudinal Board Held in Place by Paving Brick Nailed Loosely to the Ties Is Used as a Form for Pouring the Concrete

inside of the concrete curb and grouted. On the outside of the rail brick headers are placed in the ordinary way. It is estimated by the company that this concrete curb cost about 7 cents per foot of rail. This is less by about 3 cents per foot than the cost of paving brick. Carefully constructed bolted joints are used by the railway, with special plates which were purchased at the same time as the rail. The plates are seam-welded and the bolts are spot-welded with the nuts on the inside. Having concrete alongside the rail instead of bricks makes it unnecessary to resort to special construction where the bolts project inside the rail.

actually represents the character of service from a particular depot, a check is made about three times per year.

The system is working very satisfactorily and is more convenient than the mileage system formerly used. One clerk takes care of the necessary records, so that no additional force is required over that previously used when the mileage basis was employed. The number of cars which come in for inspection each day is quite uniform, and little trouble is experienced from cars being bunched one day with very few the next. The uniformity is shown by the accompanying table of total inspections for the month of August.

All surface cars, with the exception of old equipment, are inspected according to a schedule designated as A, 500 miles; B, 2,500 miles, and C, 7,500 miles.

SPOTTING CARS FOR INSPECTION

After an inspection has been made the carhouse foreman or his assistant unlocks the resetting device on the meter and turns the traveling hand back to zero. Meters are inspected each night by car placers. On Form 7126, designated as "Daily Report of Cars Inspected by Meter Dials," the car placer each night enters carhouse number, date, serial numbers of cars due for inspection, and inspection letter, this being determined from the position of the traveling hand relative to the stationary hand on the inspection dial. Such cars as are found to be due for the various inspections are blocked in the carhouse so that they will be held for inspection the following day, or if necessary they may be operated as morning rush trippers.

The night foreman must make out a work sheet for each man in the crew. This sheet is ready for the

men when they start work in the morning and it must be signed by the men and turned into the carhouse office at the end of each day. The carhouse clerk transfers the data to individual car record cards, designated as Form 7140. The foreman or his assistant must personally check all cars due for inspection, reset the dial hands to zero and take a statement of the meter on each car.

The carhouse clerk enters the meter reading in the column under "Miles" and subtracts the previous meter reading from the last reading, which gives the total kilowatt-hours consumed since the last inspection, which in turn is divided by the kilowatt-hours per car-mile which has been determined for that class of car at this particular depot. He then enters the miles that the car traveled for that inspection under the present meter reading. Form 7126 is filed away for 60 days and then destroyed. Form 7140 is kept in the carhouse office in the active file until both sides of card have been filled. It is then transferred to an inactive file, where it can be referred to whenever it is desired to determine what troubles a car has shown or for checking mileage of any particular piece of equipment.

The type of inspection used includes first the class "A" inspection, made every 500 miles, which in Philadelphia runs between 4 and 5 days. When a car comes in with the meter dial indicating that it is due for class "A" inspection, the car placer turns this over to the inspection force, repair crew, or cleaning crew, as is necessary. The inspection made consists of the examination of all parts to make certain they are in good condition and for the replacement of pins, cotters, screws, and the like which can be done quickly. Details of work done follow:

CLASS "A" INSPECTION

Trolley—The trolley wheels are gaged, and if they have reached the condemning point they are replaced. Bushings, contact springs, washers, pole, trolley stand, trolley lead, rope and catcher must be inspected, repaired if necessary and all worn parts replaced. A drop of engine oil is applied to trolley contact washers and stands and catchers are lubricated. The trolley rope must be of sufficient length for the pole to reach 23 ft. high.

Controllers—Controllers are inspected for broken or worn-out fingers and segments, which are replaced where necessary. All old grease must be wiped from the contacts. Fingers are adjusted to give $\frac{1}{8}$ in. pick-up to the finger. All dust and dirt are brushed out of the controller with a special brush, and the controller is thoroughly inspected for blisters and burns on the controller cylinder or the base of the fingers. These are filed and thoroughly cleaned. If necessary a very thin coating of shellac is applied to the parts where carbonization has been found. The deflector boards are scraped and brushed to remove the copper dust. Controller segments are lubricated with vaseline or petroleum jelly. Bearings are oiled and the tops of controllers are cleaned of all dirt and grease. In general the controller must be placed in such a condition that it will give no trouble before the next inspection.

Brakes—Brake inspection consists of

inspecting the entire brake rigging, on both body and trucks. If shoes, pins or levers are worn they are replaced, as well as any other part worn to a condemning point. Loose bolts are tightened.

Slack adjusters are inspected carefully and the brakes are applied and released several times to determine if the slack adjuster is functioning properly. If not, it is removed and replaced by one in good order. On cars equipped with solid turnbuckles, manual adjustment of brakes is necessary and the inspector places a pinch bar at least 5 ft. long with one end under the transom iron of the truck and the other end against the brake beam. He then puts his weight against the end of the bar so as to force the beam away from the wheel. With proper adjustment, he will then be able to shake the shoe in the holder with his fingers. This is done on each wheel of the truck. The same procedure is followed on cars equipped with slack adjusters.

The inspector checks air pressure to see that it stands at a minimum of 65 lb. and a maximum of 75 lb. If he finds a variation of pressure he reports it to the foreman or his assistant. Side bearings are lubricated with one part reclaimed compressor oil and two parts of track oil, applied with a $1\frac{1}{2}$ -in. brush.

Fenders—All fenders are tripped from the platform with the plunger and with the tripping gate. They are also reset from the platform to determine if

they are in good working order. Fender parts, including tray and trip gate, are lubricated and any worn or broken parts are replaced.

Glass—All broken glass is replaced, while cracked glass is replaced only when the foreman or assistant foreman finds it necessary.

Window Catches—Window catches on green cars are thoroughly inspected, and where found defective they are replaced with good-order catches.

Seats—All seats are thoroughly inspected, particular attention being given to castings of side supports, broken slats and protruding nails. Defective seats are repaired or replaced.

The foreman or his assistant then inspects the entire car to determine if proper inspection and repairs have been made.

CLASS "B" INSPECTION

The inspection work of all parts as listed under the class "A" inspection is repeated on the class "B"; in addition the following work is done:

Motors—All worn-out or chipped brushes are replaced and the brush springs are inspected for weakness or breakage, commutators are inspected for flash-over. The brush-holder yokes on motors equipped with old-style yokes are thoroughly inspected for a deposit of carbon dust or carbonization. Brush-holders and yokes are wiped clean on motors without brush yokes,

insulators are wiped clean, and the inspection of holders is carried on in the same manner as outlined above. The armatures are inspected for low bearings, and if any are found they are reported to the foreman or his assistant.

Field coils are inspected carefully and gears and pinions are tried for looseness and are lubricated. On the GE-80 motors the waste is raised and the piece of waste resting next to the armature shaft is replaced by a fresh piece and free oil is placed on top of the waste. On all box-frame type motors the oil is not applied to the waste, but is poured into the well that is provided in the motor end housing, which allows the oil to go down into the waste at the bottom of the well, and the capillary action of the waste takes the oil from this reservoir to the armature shaft. All motor leads and cables are inspected and repaired where necessary. All dirt accumulations around the edges of trapdoors are removed so that the trapdoor in the car floor fits properly. Motor bolts, including axle cap, gear case, armature bearing and suspension bolts, are tried for tightness. Axle bearings are examined for wear and those found worn to the scrapping point are replaced.

Lightning Arresters—From April 1 to Sept. 1, lightning arresters are thoroughly inspected on "B" inspection. During the winter, arresters are cleaned on "C" inspections, and those of the adjustable type are adjusted according to a gage furnished for this purpose.

Sanders—All sander parts are thoroughly inspected and repaired or replaced where necessary, to allow proper functioning. Sand hose is inspected for leaks. The ends of hose must be in proper alignment with the rail to make certain that sand will drop on the rail when applied.

Doors and Steps—All doors and steps are inspected and adjustments are made where necessary. Where required all moving parts are lubricated. Doors operated by pneumatic engines have all surplus grease wiped from the engine as well as from underneath, to prevent grease from dropping into the car. All pneumatic doors must open and close in 4 seconds. Door engines must cushion properly. Door control rods and handles are kept clean at all times by men assigned to work on doors.

Engineer's Brake Valve—Engineer's valves are inspected and if not working freely K-000 grease is applied. The engineer's valves and pipes connected to them are kept clean at all times by men who are assigned to work on air equipment.

Gongs—Gongs are inspected and tested to see that they operate properly and that all parts are tight. They must be so adjusted that they can be operated with either toe or heel. Lubricant is used where necessary.

Rheostats—All rheostats and tubes are inspected for looseness and to make certain that no loose or warped resistance grids exist. Leads must not foul underframing. Defective rheostats are removed as a unit and are sent to the shop for repairing.

Circuit and Line Breakers—The circuit and line breakers are examined

and brushed out and all worn parts are replaced.

Air Governors—Air governors are inspected as to condition of contact points and for parts that show wear, worn parts being replaced where necessary. The adjustment must be correct so they will cut in at 65-lb. and out at 75-lb. pressure.

Air Compressors—The air compressor motor is examined for condition of commutator and brushes and is lubricated if necessary. This is done by removing the plug from the oil pipe. If the oil is level with the top of the plug hole, no oil is added. If below, enough oil is poured in through the plug hole to bring it level with the top of the hole. Air vents under the front head and directly under the compressor are cleaned.

Emergency Jacks—Jacks are raised and lowered to see that they are working properly and a drop of oil is applied to the working parts. When found defective they are replaced and the defective jacks are sent to the shop for repairs.

Switches—All switches, including air, light, drum, headlight and auxiliary circuit, are inspected to see that they are working properly. If defective they are replaced.

Couplers—The Tomlinson couplers, carriers and radial bar slides are inspected to see that they are working properly and are lubricated if necessary.

Trolley Catchers and Retrievers—Where bad-order trolley catchers are found they are replaced and the defective ones are sent to the shop for repairs.

Heaters—During the winter months heaters are inspected for defective coils and switches. If coils are found defective the heater is removed as a unit and sent to the shop for repairs.

Head and Tail Lights—All electric head and tail lights are cleaned thoroughly.

Hand Rails—All hand rails except those treated with enamel are painted, together with all malleable-iron window-wiper castings.

CLASS "C" INSPECTION

When a car is due for "C" inspection, the foreman or his assistant makes a very detailed and minute inspection of all car parts. Whenever any part is found worn or in need of replacement he marks that part with a piece of chalk so that the inspection crew will see it readily and make repairs. The carhouse clerks check all cars on "C" inspection to determine the proper setting of meters. The trolley inspection is the same as that outlined under "A" inspection, but in addition the stand is inspected more carefully for wear and is replaced if necessary. The pole and stand are painted with asphaltum paint if necessary, and the tension of the trolley stand is measured with scales provided for this purpose. The tension of the trolley pole is adjusted to 25 lb. with the

trolley wheel 17 ft. from the ball of the rail on all cars, except on the pay-within type, on which it is adjusted to 30 lb.

Controller, Circuit and Line Breaker Inspection is the same as outlined under "A" and "B," with the exception that these three pieces of apparatus are blown out with compressed air and all parts damaged by flash or carbonized are thoroughly cleaned and painted with very thin shellac.

The line breaker cover is thoroughly cleaned with a wire brush and painted on the outside with black asphaltum, as a rust preventive. Fenders are inspected the same as for "A" inspection and sanders the same as for "B" inspection. The brake inspection, as far as adjustment and inspection of the apparatus is concerned, is identical with that outlined under "A" inspection, with the following exceptions:

Brakes—All worn brake-hanger slides and guides are replaced, the piston in the air cylinder is turned one-quarter turn to distribute the wear on the leather, slack adjusters are removed, cleaned, packed with grease and replaced. When worn, they are sent to the shop for repairs. All levers, including body, upright and connecting rods, are removed from the car, thoroughly cleaned and all parts are inspected for wear. All brake pins and levers are lubricated with journal oil, track oil being used only on the side bearings.

Trucks—Journal boxes are examined to see that the waste has not worked away from the journal; if found away it is pushed back into place. At the discretion of the foreman or his assistant, if the waste looks dry, or the journal gives any indication of excessive heating, the journal box is repacked. The journal bearing brasses are inspected and if the condemning point has been reached they are replaced.

All truck parts are inspected for loose bolts. These are tightened or replaced, and if any cracked or broken parts are found they are replaced. The car body is raised sufficiently to allow oiling of center bearings and side bearings of the slide type. Drawbars and couplers are inspected for wear and the radial drawbar slide on Tomlinson couplers is lubricated so that the carrier moves freely.

Motors—The motor inspection is carried out the same as outlined under "B" inspection. In addition, dirt is blown from motors by means of compressed air. Brush-holder tension on all motors is tested and the tension is adjusted on all adjustable brush-holders to the company's standard, information regarding which is provided on separate sheets.

The waste in armature and axle bearings on modern-type motors is turned so that fresh waste rests against the armature shaft or axle. On old-style motors, the waste is withdrawn and a fresh piece is placed next to the shaft. All oil-box lids are examined and any that are loose or missing are repaired or replaced. Clearance between the axle bearing head and axle collar is checked, with the motor

forced against the gear. If the bearing heads have worn so that the clearance between axle bearing and axle collar is greater than $\frac{1}{4}$ in. the axle collar is reset so that the clearance is less than that amount. If at this inspection any motor leads are found to have been connected with two-way connectors due to making temporary repairs the motor leads are replaced. The waste removed from the armature bearings on this inspection is examined by the foreman or his assistant, to determine whether it can be used for axle or journal boxes.

Doors and Steps—The door and step inspection is carried out in the same manner as outlined under class "B," excepting that the pneumatically operated doors are timed to determine that they open and close in 4 seconds.

Air Equipment—Engineer's brake valves are inspected in the same manner as outlined under class "B" inspection. The air compressor also is inspected and oiled in the same manner as under "B," with the exception that before the brush-holders and brushes are cleaned, the dirt from the motor is blown out with compressed air. The air governor inspection is the same as outlined under "B." The emergency valves, such as are used on the SK and SPC type cars, are examined and operated to determine that they function properly. If any of these valves are found to be in bad order or working sluggishly, the valve is removed from the car, a block is bolted to the open end of the valve to keep out dirt and it is then sent to the shop for overhauling and repairs.

Fuse Boxes—Fuse boxes are inspected to determine if the binding screws and wedges are functioning properly and all dust is blown from them with compressed air. The lids must be in first-class condition. After cleaning, fuse boxes are painted with insulating varnish, both inside and outside. A drop of oil is put on the binding screws and the leads in the rear of the fuse box are painted.

Car Body—All seats are inspected as

to their condition, and particular attention is given to broken or cracked castings in the side supports. Seats must be fastened accurately to the wall and floor. All torn and broken seats or seat backs are replaced. Car-body fixtures as a whole are carefully inspected, including emergency jacks. Jacks must be raised and lowered. If a jack functions improperly, it must be replaced with a good-order jack and the defective one sent to the shop for repairs.

In addition to painting the hand rails and window wipers, the headlight and bumper are painted with asphaltum paint. All switches, including air, light, heat, drum and those of auxiliary circuits, are examined and are put in proper working order, by repairing or replacing. Broken or cracked glass is replaced. The register is removed, inspected, and lubricated. Any defective register backs are replaced and the defective ones sent to the shop for repairs.

On cars which are operated in trains, a careful inspection is made of the bus-line jumpers and couplers to see that they are in good order, also that the bus-line jumpers are provided with standard supporting springs and latches.

The air governor is cut off and the air pressure allowed to increase to determine whether the pop valve will open at 90 lb. If it does not, the valve is sent to the shop for repairs and is replaced with a good-order valve. No car is allowed to operate with a pop valve functioning improperly. The emergency valves on all types of cars are cleaned thoroughly and then are tried to determine if they function properly.

After each inspection is finished the foreman or his assistant makes a very careful examination of all work that has been done to see that it has been properly executed. He then signs the car inspection sheet, Form 7126.

GENERAL INSPECTION

A number of items require less attention than at any of the regular periods. These are covered in a general inspection in addition to regular inspections. Several of these are mentioned in the following paragraphs:

Journal boxes are repacked as follows: Curtis D-2, Brill 27 (old type), Brill 39-E and Brill 43-E pony journals on every third "C" inspection, or 22,500 miles. The Brill 39-E driver, Brill 43-E driver, Brill 77-E, Brill 79-E and Brill 27 (new type) journal boxes on every fourth "C" inspection or 30,000 miles. Waste is removed from the journal boxes and if found in good order it is reclaimed. Bad waste is thrown away.

Wheels are inspected for wear and for bad-order flanges by the assistant foreman the first of every month and a record is kept of wheels to be changed. The armature and axle bearings are repacked at the same time as the journals. Waste removed from the armature bearings is used for repacking the axle bearings after taking on particles of waste, hardened or filled with dirt. Whenever a new journal brass is installed the brass on the other end of the axle must be of the same thickness as the new one. A tolerance of $\frac{1}{4}$ in. is allowed.

Circuit and Line Breakers.—Every 6 months the circuit and line breakers are tested with a water barrel resistance. On all two-motor cars the breakers are set to open at 300 amp. as shown on an ammeter, which is in circuit with the water rheostat. On all four-motor cars they are set to open at 350 amp.

When line breakers are checked as to setting on cars equipped with PC control, the relay is examined and adjusted so that when feeding, the relay will not allow the controller to operate rapidly enough to blow the line breaker before the car has accelerated to maximum speed.

OVERHAULING

When trouble is found which necessitates the removal of the car to the overhauling bay for changing wheels, armatures or any work which requires the raising of the body, the assistant foreman in charge of overhauling makes out a detailed report. Such work as is done in the overhauling bay must be indicated on this report, which is then turned into the carhouse office. On Form 7140 are shown repair symbols which are used for entering the repair data on the card in the column "Repairs." For example, when a shorted armature is changed in the shop the number of the motor has AS written back of it. If this trouble repeats, the fields are tested with a Century field tester. Low resistance fields are removed. The recording of all work as shown by the repair symbols on the car record card is entered in the same way as the work is done in order that a continuous check on the performance of the equipment may be had at all times. Whenever wheels are installed the symbol WC is placed back of the number of the set, and the word "new" or "re-

turned" is written in the column under repairs, so that the number of miles traveled by a new wheel or a returned wheel can be determined from the cards.

PULL-INS

Form 7094 is used by the Philadelphia Rapid Transit Company for pull-ins. Whenever a car fails in service and is pulled in, the number of this car is entered in the column "Car In" and the number of the car taken out is entered in the column "Car Out." The route and block number of the car that is pulled in and the type of motor with which the car is equipped are entered in their respective columns, together with the time the pull-in was made. The trouble reported is entered on the card exactly as reported to the carhouse foreman by the transportation department, at whose request the car was pulled in, and the exact trouble found is written in the column headed "Trouble Found." If the car is found to have trouble other than that for which it was pulled in, the exact trouble found is written on this sheet. Each day the foreman fills in the report

of cars operated, etc., in the section shown at the lower left-hand corner of the pull-in sheet. This shows the total number of scheduled cars and wildcats operated, also the number of surplus O.K. cars, short of schedule, disabled for carhouse, disabled for shop, at shop for repairs and at shop for paint. This information is entered each day and is carefully totaled to show the total assignment of cars at the particular depot making out the form. The day foreman signs this sheet above the line at the lower right corner. When completely filled out in duplicate the original is sent to the general office and the carbon copy is retained at the carhouse. The clerk at the carhouse transfers the pull-in information from this sheet to the car card,

On or about April 15 of each year all snow equipment is cleaned and inspected prior to summer storage. A report is submitted by each carhouse foreman to the general carhouse foreman itemizing snow equipment defects that require shop repairs. Motor lids and inspection plates are removed from all non-ventilated motors, and these are stored for replacement during winter months. Window slides on all cars except those equipped with metallic posts are greased with "Smoothene." On cars with metallic posts the slides are wiped with turpentine.

On or about Sept. 15 repairs are made to all car heaters and the inspection of snow equipment is started so that it will be in good operating condition by Nov. 1. On Dec. 1 motor lids and inspection plates are reinstalled on all non-ventilated motors.

RECORDS OF TOTAL CAR INSPECTIONS FOR PHILADELPHIA RAPID TRANSIT COMPANY, AUGUST AND SEPTEMBER, 1924

Day of Month	Inspection Class*			Total	Inspection Class*			Total
	"A"	"B"	"C"		"A"	"B"	"C"	
	August				September			
1	241	53	29	323	172	38	11	221
2	240	49	22	311	247	58	27	332
3	188	51	22	261	261	65	30	356
4	214	54	37	305	227	55	32	314
5	228	64	39	331	241	59	32	332
6	225	60	41	326	221	46	25	292
7	224	64	27	315	196	37	26	259
8	253	51	30	334	243	52	28	323
9	226	53	27	306	238	59	28	325
10	195	43	14	252	253	58	20	331
11	228	46	27	301	229	54	18	301
12	282	44	29	355	245	66	23	334
13	234	55	27	316	222	47	24	293
14	222	49	34	305	204	54	13	271
15	261	39	32	332	231	46	37	314
16	236	52	34	322	271	66	34	371
17	203	41	17	261	240	74	30	344
18	229	42	30	301	250	47	32	329
19	269	45	34	348	256	69	25	350
20	235	65	38	338	220	21	18	309
21	233	41	26	300	218	49	15	282
22	237	64	28	329	252	52	25	329
23	252	33	21	306	261	50	23	334
24	208	45	18	271	259	55	19	333
25	221	46	38	305	243	59	21	323
26	265	47	31	343	288	71	19	378
27	245	55	25	325	238	53	28	319
28	238	59	32	329	234	53	13	300
29	235	63	27	325	204	52	29	285
30	220	50	20	290	224	62	22	308
31	182	44	19	245	...	...	...	...
	7,169	1,567	875	9,611	7,088	1,677	727	9,492
Aver. per day...	232	50	28	310	236	56	24	316

*"A" inspection 600 miles; "B" inspection 2,400 miles; "C" inspection 7,200 miles. The inspection schedule was changed Nov. 4, 1924, to "A" 500 miles; "B" 2,500 miles; "C" 7,500 miles.

Form 7140, using the appropriate abbreviations, so that if a car is pulled in for the same trouble, such as bad brakes, twice in succession, the clerk will report this to the foreman. All pull-ins are treated in the same manner.

On entering the pull-ins on the car record sheet it is possible at all times for a foreman to know and to be able to check who did the work on the car that failed on the street.

Whenever any car parts are put on test by either the testing division or the shops, the part of the apparatus that is on test is entered on the particular car record card. Whenever a part on test shows weakness, wear or breakage, it is reported immediately to the office of the test engineer and the part is held for his inspection.

Whenever a storm occurs, regardless of what nature, the night foreman assigns a man to lubricate all slides on the slide-type doors which are exposed to the weather.

MATERIAL FOR REPAIRS

All parts removed from cars that require shop repairs are tagged properly, giving the nature of the defect and the depot number.

Special Corps Repairs
Fare Boxes

Branch of Traffic Department, Organized in St. Louis and Known as Defective Fare Box Department, Is Responsible for Keeping Fare Boxes in Good Condition

BY THE plan of organizing a special department for the examination and repair of defective fare boxes, the United Railways of St. Louis, under the supervision of its general traffic department, has perfected a system for handling fares which has greatly reduced its losses from theft.

The United Railways installed registering fare boxes on its cars in December, 1918. During the following three years there were discrepancies in the registration of fares which resulted in controversies between conductors, superintendents, and other officials. This led to the organization on Feb. 1, 1921, under the direction of the traffic department, of a "defective fare box department," which has almost entirely eliminated claims against the company.

Naturally, anything of a mechanical nature will get out of order and show defects, because of rough usage, wear of parts, or lack of attention as to cleaning, etc. In addition, in the case of fare boxes, there is the danger over which conductors have no control that passengers will place in these boxes mutilated coins and foreign substances of all sorts, which frequently put the boxes out of commission.

DEFECTIVE BOX REPLACED AS SOON AS POSSIBLE

When a conductor discovers that his box fails to work properly, he is permitted to allow passengers to deposit their fares as usual, but he makes no attempt to register these fares with the registering device of the box. He then must communicate as quickly as possible with the nearest station, through a supervisor or such other official as he may pass en route to the station. When he arrives at this point, the defective box is removed and a new box is placed on the car. The defective box is immediately tagged with the form shown in the first reproduction. The signature called for on this tag is that of the person removing the box. On the reverse side of this tag there are the following blanks: Run number . . . , line . . . , badge number . . . , telltale.

The responsibility for the box, after it has been taken off the car, is with the superintendent of the

division, and it is placed in special storage and is not disturbed by any one until the following day.

Each day there is an automobile service to outlying stations for defective fare boxes by representatives of the defective fare box department. On this trip the defective boxes are changed for boxes in good order, and a receipt is given and taken for boxes delivered and received on special forms provided for this purpose. Defective boxes are then carried to a special office adjacent to the headquarters of the traffic department. Here they come under the attention as to their defects by mechanics who, for this purpose, are under the direction of the traffic department. As each box is opened, a representative of the treasury department is

the result of the test is recorded in the third blank illustrated. As will be noticed, this blank provides space for the signature of the superintendent or foreman and also for the signature of the conductor. The blank is then forwarded to the transportation department and shows that the box either registered correctly or incorrectly. This system was begun on May 1, 1922.

As an illustration of the effectiveness of this inspection, during the month of July, 1924, the transportation department had seventeen claims of defective boxes, and of this number only one claim was allowed. Altogether on this system, the company has about 1,700 registering fare boxes, and the average number found to develop trouble of some kind each day is about 20.

UNITED RAILWAYS COMPANY OF ST. LOUIS
ROLLA WELLS, RECEIVER

RECORD OF DEFECTIVE FARE BOXES EXAMINED AND ADJUSTED

ADJUSTED BY _____ RECORD BY _____ No. 1301

DATE	FARE BOX NUMBER	CAR NUMBER	SHED NO.	CASH REGISTER		CASH RECORD		TOTAL CASH	TOTAL REG.—S		TICKETS	TICKET REG.—L		CONDUCTOR BADGE NO.	DUE CONDUCTOR	CAUSE OF DEFECT	DISPOSITION	
				COM. NO.	CLOS. NO.	SILVER	PENNIES		COM. NO.	CLOS. NO.		COM. NO.	CLOS. NO.					

Register Reading of Fare Box No. _____

Taken from Car _____ Run No. _____ Date _____

Division No. _____ Station No. _____

REGISTER READING WHEN TAKEN OFF CAR

COIN	Small Ticket	Large Ticket

REGISTER READING AFTER TEST IS MADE

COIN	Small Ticket	Large Ticket

This Box is found to register Correctly Incorrectly

Signature of Conductor _____ Signature of Supt. or Foreman _____

NOTE: This form to be used ONLY on claim of Conductor that fare box does not register correctly. Test must be made in presence of the Superintendent or Day Foreman and the conductor making claim.
TEST MUST BE MADE AT FIRST AVAILABLE MOMENT AFTER BOX IS REMOVED FROM CAR.

FARE BOX REMOVAL TAG

SHED NO. CAR NO.

DEFECTIVE BOX NO.

SUBSTITUTED BOX NO.

DATE TIME

PLACE REMOVED

SIGNED

Forms and Tag Used by United Railways of St. Louis in Handling Fare-Box Repairs

No. 1. Record kept of contents of defective fare boxes and adjustment required to put them in good condition.

No. 2. Form used to record result of the test when conductor claims that fare box does not register correctly.

No. 3. Tag attached to defective fare box when removed from car. It is signed by the man removing the box.

present and a proper record is made of the contents of the box on a form provided for this purpose. This shows the amount due to the conductor according to the register and the amount due to the company as not having passed through the register.

The defects in the box are then corrected and a careful record is kept of what has to be done to each box, together with the box number, car number, number of conductor in charge, and cause of defect. A cross-file is kept of the conductors sending in defective boxes. This system has reduced to a minimum the use of trick coins.

CHECKS MADE OF REGISTERING MECHANISM

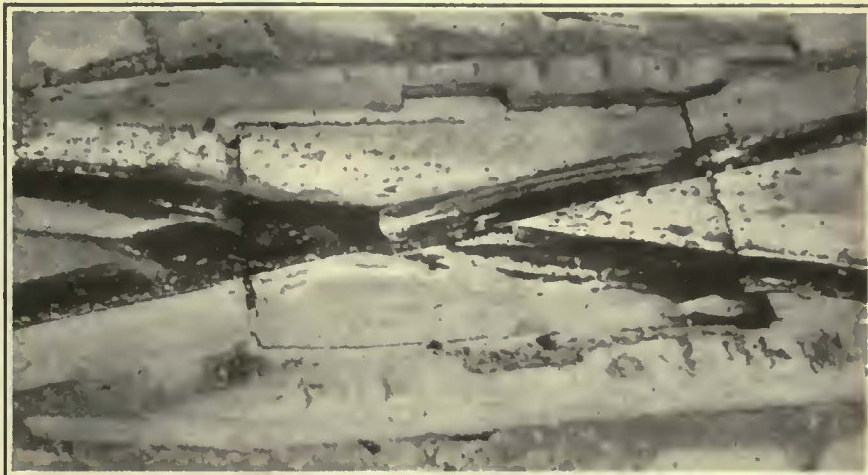
The defective fare box department not only cares for boxes which become choked up or otherwise obviously are out of order, but also cases where the conductors claim that a box is registering more than it should and that he is consequently entitled to a refund. In cases of this kind, the procedure is for representatives of the defective fare box department to test the box out in the presence of both the superintendent or foreman of the station and of the complaining conductor, when he is off duty. The test consists of running through the box a certain number of coins, as specified in instructions drafted for this purpose, and

It may be added that the company has found a system not only valuable as a rapid method of detecting and correcting fare boxes, but it has also been of great benefit to the employment and record department in its work of keeping tab on conductors.

Railway Edition of Pittsburgh Guide Published

THE 17th edition of Lewis' Pittsburgh Guide is known as the Pittsburgh Railways Company edition. Besides the usual list of public buildings, theaters, banks, monuments, charitable institutions and the like, the guide contains a complete list of all the routes operated by the Pittsburgh Railways, together with the route numbers and headways. At the bottom of each page are printed a few words telling the advantages of using the railway. The route numbers of the car lines to take to reach any point in the city are shown in the list of streets and house numbers.

The railway has purchased 5,000 copies at a cost of \$2,500 for distribution to its motormen and conductors and to the traffic policemen in the city. The remaining 80,000 comprising the issue will be sold at news stands and book shops.



At Left, Cupped Rail Repaired by Adding New Material with an Arc Welder. At Right, Manganese Cross-Over Points, Built Up by Arc Welding. Such Repairs Have Stood Years of Service

Maintenance Repairs by Welding

Methods of Filling in Cupped Track Joints and Making Repairs to Corrugations—Costs Given for Various Repairs to Rolling Stock by Welding

BY J. F. LINCOLN

Vice-President and General Manager Lincoln Electric Company,
Cleveland, Ohio

THE passing of car wheels from one rail to the adjacent one, where cars pass in one direction only, pounds out a cup on the second rail. This results from a breaking down of the roadbed, so that it gives an insecure foundation for the joint. The constant pounding soon loosens the bolts which hold the fishplates, and the jar from passing cars becomes more severe. When such a cup has been formed, it is necessary either to take out the rail and install a new one or to repair the old rail by welding. Where the track is in bad condition and all rails are well worn, the introduction of a new rail is not desirable as conditions cannot be made satisfactory. In such cases the usual procedure is to take up all the track where the trouble occurs and re-lay new rails. The expense of doing this is, of course, very high. For such cases it will be readily appreciated that welding offers a considerable saving and there are many cases where tracks have been kept in service by

the use of the arc welder for three or four years in addition to the ordinary life of the track.

When once a rail begins to show corrugations its deterioration is rapid. Therefore it is advisable to make repairs as soon as possible. The metal electrode process has been found quite satisfactory, and after metal has been filled into the various grooves the high spots may be ground off with some form of grinder.

In grinding, some companies use only a reciprocating grinder, while others use both the hand and reciprocating types. The reciprocating process seems to be preferable because it is more economical. The rate of grinding with a hand grinder is rather low and where the filled-in section is considerably higher than other parts of the rail, an excessive length of time is required to bring it down to proper surface.

There are several kinds of electrodes used in the repair of wearing surfaces on rail sections. For carbon steel frogs and carbon steel rails a 60 or 70 per cent carbon steel welding rod gives the best results. This welding rod produced a dense, tough metal of excellent wearing quality. On manganese steel inserts, frogs or cross-overs a 12 to 14 per cent manganese rod should be used.

The general tendency up to the present time has been to use welding rods too large in diameter for the work. High carbon and manganese steel rods often present some difficulty to the operators in order to get a perfect fusion, and the general tendency is to get a sufficient



Supporting Flange Welded to Gear Case, Using Electric Arc Welding

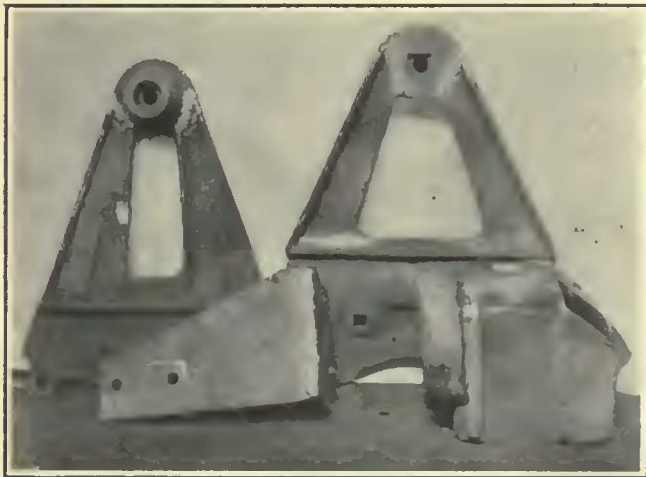


Broken Parts of Track Frames Repaired by Arc Welding

amount of heat by using large rods. These cause damaging thermal disturbances of the metal in the rail head section. Rods of $\frac{3}{8}$ -in. or $\frac{1}{2}$ -in. diameter are recommended for the work. The welding rod may be used bare with entirely satisfactory results. There is, however, some preference among operators for welding rods which have a sodium silicate and lime covering. The tendency of the covering is to quiet the molten metal and to make it easier for the operator to get a perfect fusion.

WELDING ECONOMICAL FOR CAR REPAIRS

The sudden starting and stopping with the consequent reversal of strains in all members of cars results in excessive wear at all points where car framing is



Truck Side Frame Repaired by Electric Arc Welding. Breaks in the Frame or Worn Bolt Holes Can Be Repaired in This Way. The Holes Are Filled In with New Material, then Redrilled

fastened together with rivets or bolts. Also, as there are many moving parts, the rubbing of one over another causes rapid wear. Worn car parts must either be repaired by adding new metal through welding, or the part must be scrapped and a new one installed. It is obvious that the repair of such parts by adding new metal results in a large saving. Also, there are many cases where repairs can be made without dismantling equipment and in such cases the use of welding results in additional saving.

Some figures showing the relative cost of welding by either the oxyacetylene or by the arc process may be interesting. The cost of operating an oxyacetylene torch for repair work of this nature varies from 60 cents to \$1.50 per hour, with an average in the neighborhood of \$1. This takes into consideration the preheating on steel work which is necessary. The following table gives some costs on typical miscellaneous jobs encountered in an electric railway repair shop:

COMPARISON OF REPLACEMENT COSTS WITH COST OF REPAIRS BY WELDING

Description of Job	Cost of Replacement	Cost Using Oxyacetylene Torch	Cost Electric Arc Welding
Bearing housing made of cast steel—repair job.....	\$8.60	\$2.60	\$0.75
Axle cap—renewing dowel pin-holes.....	11.15	.70	.25
Repairing armature shaft, pinion seats and keyway.....	54.00	7.20	1.75
Journal boxes repaired by use of chafing plate.....	6.90	.80	.20
Truck frame.....	60.00	3.00	1.10
Resistance grids—typical repair job.....	3.00	.65	.20
Reducing bore of gear. This job impractical with oxyacetylene. Reduction too small for use of hushing.....	30.00	....	4.10

The metals encountered in the repair of cars include cast steel, cast iron, wrought iron, mild steel and bronze. All of these can be successfully handled in the railway repair shop. A large percentage of the work can be "bench work," and preheating furnaces and torches can be used to good advantage.

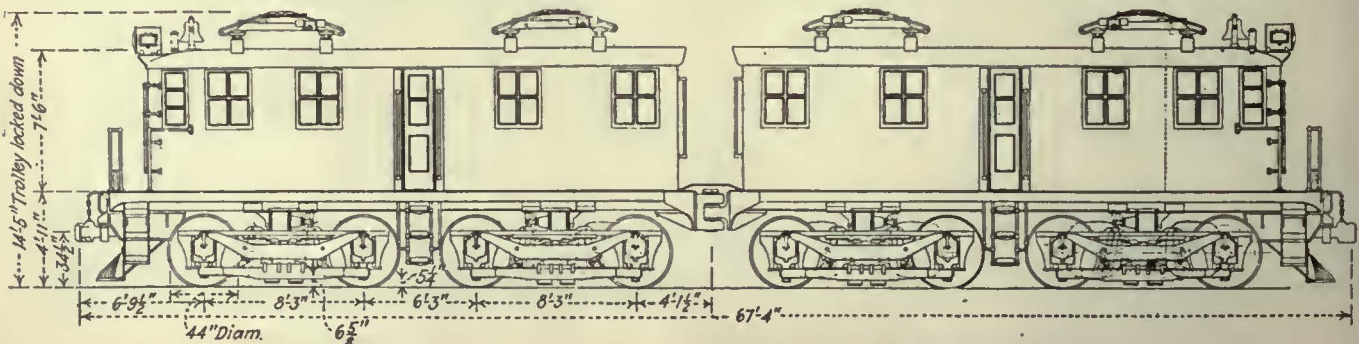
In repairing cars there are many jobs of exactly the same nature since the car equipment is standardized to a large extent. This justifies the spending of a considerable amount of time to solve a particular problem, since similar jobs will recur from day to day.

The capacity of the equipment required is 200 to 300 amp. This permits the use of the machine for either carbon or metal electrode work, on any kind of a job that will arise. There are few cases where it would be necessary to couple two of the units together to get a higher capacity.

Experimental Locomotives for New York Central

Seven Switching and Two Road Freight Locomotives to Be Built Jointly by General Electric and American Locomotive Companies Will Be Equipped for Both Overhead and Third Rail Current Collection

IN ANTICIPATION of the future electrification of the West Side freight tracks running from Spuyten Duyvil to Canal Street in New York City, the New York Central Railroad has placed orders for seven 100-ton electric switching locomotives and two 170-ton road freight locomotives. These will be put in service on the electrified division operating out of New York City. They are to be built jointly by the General Electric Company and the American Locomotive Company. Provision has been made for either third rail or overhead current collection. Specifications for the switching locomotives provide for handling a 1,500-ton trailing train consisting of 75 per cent empties and the balance loaded cars at a speed of not less than 25



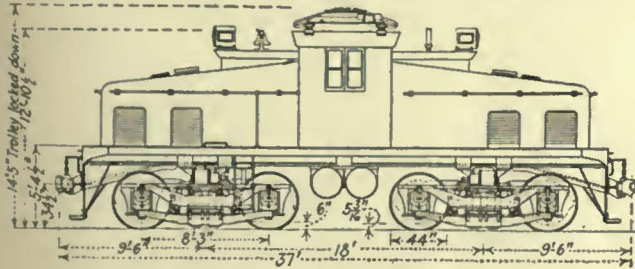
The Road Freight Locomotives Resemble Those Now Used in Passenger Service

m.p.h. The road locomotives will handle a 3,000-ton train of the same general make-up at speeds of not less than 32 m.p.h.

The switching locomotive is of the steeple cab type carrying two equalized swiveling trucks equipped with four GE-286, 600-volt motors. The outline of the locomotive and the general arrangement of the apparatus in the cab are shown in accompanying illustrations. The nominal continuous rating of this locomotive is 1,240 hp., or approximately 310 hp. per motor. A 72:17 gear ratio is used with the cushion gear, of the type in service on the Paulista locomotives, described in *ELECTRIC RAILWAY JOURNAL* for June 11, 1921, and is being used also on the Mexican Railway locomotives, described in this paper Dec. 8, 1923.

To insure ample strength for this character of service the cab platform consists of an integral steel casting. A master controller is provided at the engineer's position on each side of the cab and the control and auxiliary apparatus is installed under the hoods of the sloping end cabs.

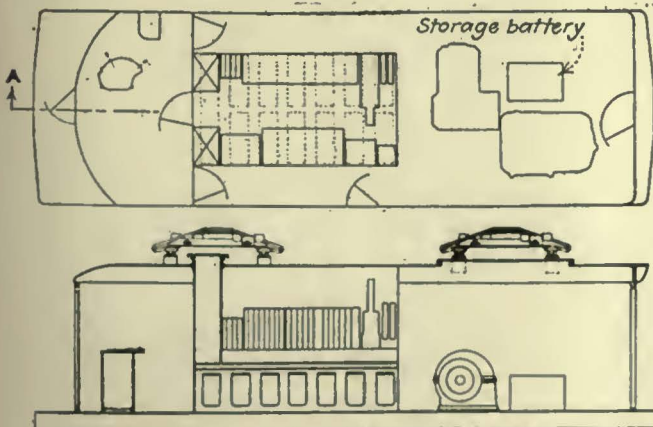
Control is type PCL, with air-operated switches energized from a 32-volt storage battery. In addition to



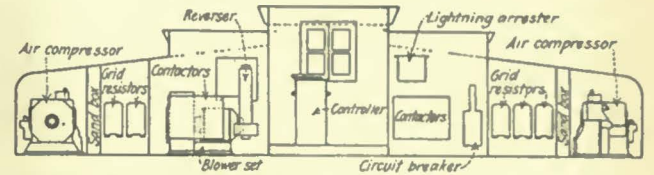
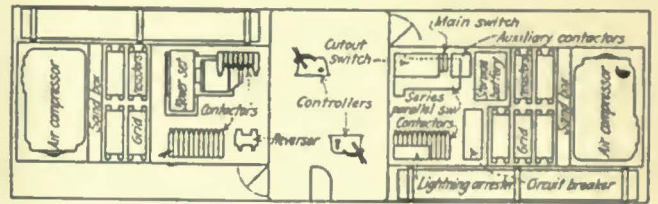
The Switching Locomotive Is of the Steeple Cab Type

operating all control circuits the 32-volt supply is also used for cab lighting and for headlights. Remote control is used for all accessories, including blower motor circuits, compressors and reversers. A high-speed overload circuit breaker is connected in the high side of the main supply. Additional protection against injury to the individual motors is provided by overload relays in each motor circuit, so arranged that a short circuit on an individual motor will trip out the high speed breaker. The battery is charged by being connected in series with the blower motor. To protect against overcharging, a bypass resistance is used in parallel with the battery, thus reducing the charging current. The use of this resistance is controlled by an ampere-hour meter.

The master controller is of the standard design. It has a main operating handle, a reverse handle and a



Section A-A
Arrangement of Equipment on Road Freight Locomotive



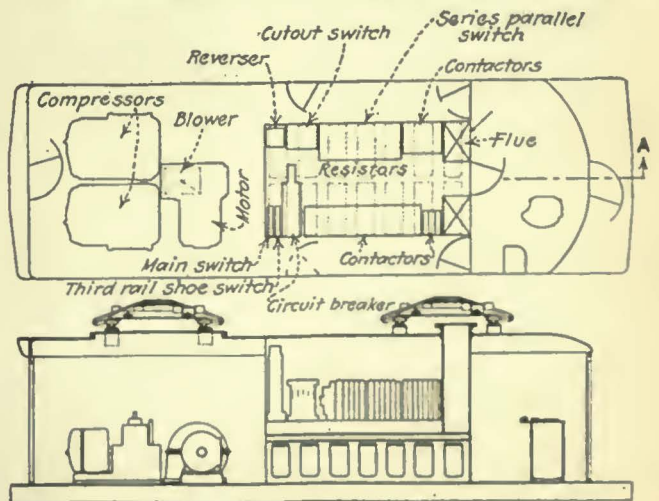
Control and Auxiliary Apparatus Is Installed in the End Cabs

reduced field handle. Three full running speeds are provided with the motors in series, series-parallel and parallel. In addition, two reduced field steps may be used with each motor arrangement, giving a total of nine free running speeds. Air brakes are of Westinghouse type 14 EL, combined straight and automatic. Two CP-26 compressors provide a total of 200 cu.ft. displacement at 130 lb. pressure. Other accessories include a motor-driven blower located in the end cab for ventilating the traction motors, a bell and a whistle mounted on the roof and suitable equipment of air-operated sanders.

ROAD FREIGHT LOCOMOTIVES

Running gear for the road freight locomotives, like that of the two switching locomotives, is coupled by an articulated joint. Motor and control equipment duplicates that used on the switchers. The design of this locomotive is shown on accompanying drawings. A gear ratio of 69:20 permits a maximum speed of 60 m.p.h. Two compressors giving a total displacement of 300 cu.ft. of free air at 130 lb. pressure will be installed.

Two box type cabs are provided, carried on cast platforms similar to those used in the switchers. These will be somewhat similar in appearance to the present passenger locomotives, having rounded ends. There will be a high-speed circuit breaker installed in each cab protecting each half unit independently of the other. Pantographs are of the hornless design operating through a range of 25 in. Two are mounted on each cab. In order to operate over the present electric division and such portion of the West Side tracks as



may be equipped with third rail, contact shoes are provided on both sides of each truck.

One of the novel details is the provision of forced grease lubrication for the pins in the spring rigging. All locomotives will be equipped with solid rolled steel

carries a jack and in case of emergency there are therefore a considerable number of jacks available at the scene of trouble. Many blockades, particularly during snow storms, have been relieved before the arrival of the wrecking car.

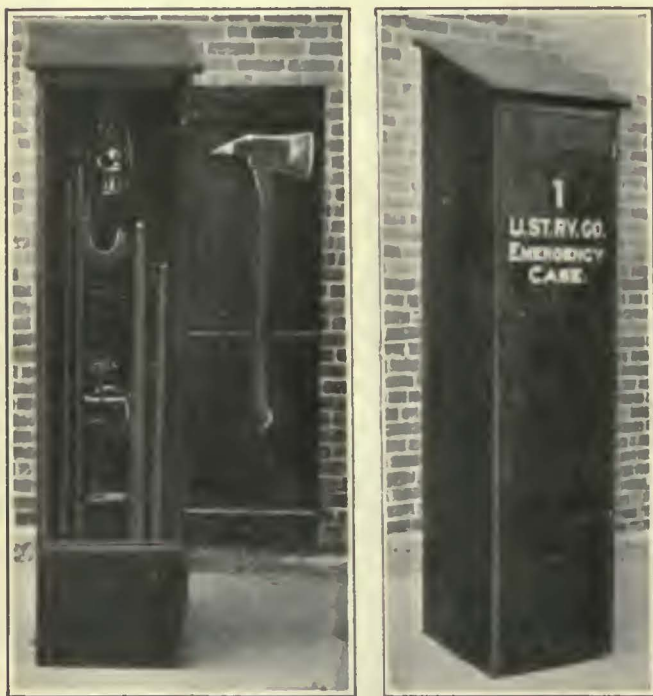
PRINCIPAL DIMENSIONS OF LATEST NEW YORK CENTRAL
ELECTRIC LOCOMOTIVES

	Road	Switcher
Length.....	67 ft. 4 in.	37 ft. 0 in.
Height (over trolley locked down).....	14 ft. 5 in.	14 ft. 5 in.
Wheel base.....	53 ft. 9 in.	26 ft. 3 in.
Rigid wheel base.....	8 ft. 3 in.	8 ft. 3 in.
Maximum safe speed m.p.h.....	60	40
Gage.....	4 ft. 8½ in.	4 ft. 8½ in.

wheels in accordance with the railroad's specifications. The principal dimensions are given in the accompanying table. A delivery of approximately 12 months is promised for this order.

Emergency Tool Boxes at Strategic Points to Relieve Blockades

THE Union Street Railway, New Bedford, Mass., has placed 12 emergency tool boxes at strategic points along its lines. Each case contains one large and one small Barrett jack, two jack handles, two sets of jumping irons, four blocks of wood, two crowbars, two kerosene



Emergency Case Contains Tools Useful in Case of Accident or Blockade

lanterns, one fireman's axe, and 8 ft. of ¾-in. chain, with a large iron hook at the end. Each of these articles is numbered to correspond with the number on the emergency box.

Motormen and conductors are not allowed to use these tools except when human life is in danger. In such cases entrance to the box may be had by breaking the glass in the door and lifting the latch. All officials of the railway and inspectors, however, carry keys to these tool boxes, and are permitted to use the tools to replace derailed cars or relieve blockades. Every railway car

The Readers' Forum

Comment on Foreign Report

MANCHESTER CORPORATION TRAMWAYS

MANCHESTER, ENGLAND, Jan. 2, 1925.

I think the first of my New Year resolutions shall be to reply to your letter of Nov. 11 last, in which matter I have been most neglectful. Perhaps my reason was mainly that you gave me so much excellent matter to peruse but left me so little to criticise.

I need hardly say I have read your report* with the utmost interest, as, naturally, the views of another expert, and particularly one with such a wide experience as yourself and your party, very much interests us, though I think, perhaps, you have been unnecessarily kind in your observations. Let me, however, sincerely congratulate you on your receptivity of the atmosphere of traffic matters in this country and your grasp of the British point of view and interests.

The first paragraph of your introductory remarks, where you instance how little in general principles either country can show the other, is a true commentary on the situation that the necessities of each are vitally different, nevertheless we can each learn from the other innumerable items of detail and operation which cannot be other than beneficial.

Perhaps the outstanding difference in the general operation of our respective services is that which you indicate as to the standard of maintenance prevailing in this country as compared with your own. This aspect struck me when visiting the States and appears to be somewhat the outcome of our respective mentalities. The Britisher likes a solid, substantial, permanent job and devotes unstinted efforts to maintain that which he has in a state of efficiency probably long past its economic utility. On the other hand, it seems to be the temperament in the United States to use a thing to the utmost and then discard it outright, substituting probably a newer and more effective instrument. Our system perhaps gives a better sense of comfort and well-being all along the line; yours, a more alert and up-to-date result for the newer parts of your concerns and perhaps shows up the older by comparison to a greater extent.

You invite critical comment of your report, but as I have previously stated, you are too meticulously accurate to afford this opportunity and your report is most valuable as being an outsider's survey without bias or predilection on the operations of our various passenger transport activities.

My chairman (Alderman James Bowes) desires to associate with me in kindest regards and the best of good wishes for the New Year.

HENRY MATTINSON,

General Manager and Chief Engineer.

*Report of Committee on Foreign Operations of the American Electric Railway Association, published in ELECTRIC RAILWAY JOURNAL, Sept. 20, 1924.

Equipment Maintenance Notes

Spring Support for Portable Drill

THE accompanying illustration shows an "old man" with spring support for a Chicago Pneumatic drill as used in the 39th Street shop of the New York Rapid Transit Corporation, Brooklyn, N. Y. The bracket is clamped to the work in the usual



Pneumatic Drill with Spring Support Drilling Hole for Motor Suspension

manner. The illustration shows the equipment set up and drilling a hole for a motor suspension. A spring which surrounds the drill and rests on the top of the motor frame holds the portable drill firmly against the top support so that it can be fed down by turning the hand feed in the usual manner. This method of sup-

porting the drill allows the motor to be set up and centered accurately. It removes strain from the workmen and provides an efficient support for heavy drilling operations.

Axle Bearings Held by Dowels

AXLE bearings are held to the axle-bearing caps by two dowel pins placed in the ends of the caps on the cars of the Gary Street Railway, Gary, Ind. These pins fit tightly into holes drilled in the thrust flange of the bearing. The dowels, which have a diameter of $\frac{3}{8}$ in., project $\frac{3}{8}$ in. into the flange. They are of sufficient size to make a drive fit in the cap.

Two jigs are used to facilitate the work of spotting and drilling both the cap and bearing. The one for drilling the holes in the bearing consists of a plate with guide lugs and a stirrup for holding the lining in position. A movable plate containing the two bushed holes for guiding the drill is lowered onto the flange of the lining. For drilling the bearing cap, a jig made from an axle lining is used. The flange of this lining contains two bushed holes for guiding the drill. Small lugs placed on the underside of the lining flange keep it in position during the drilling process. The locations of the dowels in the end of the bearing cap are such that they do not enter the oil chamber of the cap.



Fixtures for Drilling Dowel Pin Holes for Axle Bearings

Cars Numbered Only on Windows

AS THE result of a discussion some time ago among officials of various departments of the Boston Elevated Railway, it was decided to alter the method of displaying the car numbers on the exterior of surface cars. For the purposes of the transportation department it was desired that transparent figures be painted on the car windows to enable inspectors easily to determine the



A Transparent Number Is Displayed in Each of the Four Corner Windows of the Surface Cars of the Boston Elevated Railway

car number after dark. For the purposes of the rolling stock department it was desired to have as few numbers as possible because these always have to be hand painted and the process is expensive. As a solution of the difficulty it was decided to place the car numbers in the upper part of each of the four corner windows.

Black paint, mixed with a small amount of varnish, is applied directly to the inside surface of the window glass. Afterward a coat of white is applied to the entire surface. This produces a transparent white number on a black background. Smaller numbers about 6 in. high are painted on the dashers, but the window numbers are the only ones on the sides of the cars.

Finishing Bearing Faces in Small Planer

BY J. L. REIFF

Machine Shop Foreman Kansas City
Railways

WHEN special equipment for the purpose is not available, the joining faces on axle bearing shells may be finished accurately and speedily by using the proper set-up on a small planer. The accompanying illustration shows the method used in the shops of the Kansas City Railways. It will be seen that six half shells are finished at one time.

Curved base blocks are bolted to the bed of the planer. Each block is long enough to take two bearing halves, which are mounted so that the flanges project beyond the ends.



With This Set-up in the Kansas City Shop a Small Planer Is Efficient for Finishing Joining Faces of Axle Bearings

Clamping bolts and bars hold the bearings securely in place. With the arrangement the finished bearings can be removed quickly and a new set applied.

By mounting two tools in the cutting head, the two joining faces are finished simultaneously, reducing the time for doing the work to half.

Hints on Coil Storage

BY A. S. WARNER

Renewal Parts Engineering, Westinghouse
Electric & Manufacturing Company

THE storage of armature and field coils should receive more attention than the storage of housings, bearings, etc., because coils are more easily affected by improper handling and atmospheric conditions than any other part of a motor.

Armature and field coils are securely wrapped in protecting paper and are shipped in wooden boxes or paper cartons. All coils except the largest sizes of field coils are packed one set in a box.

Some don'ts which should be considered when storing coils follow:

Don't remove the coils from containers in which they are shipped

Dick Prescott Reaches Centerville

And Tries to Ride a Street Car



DICK PRESCOTT and Steve White arrived in Centerville bright and early in the morning. This was the first stop on their trip of inspection, and they looked forward with keen anticipation to their visit to the Centerville Railway shop, where they hoped to get suggestions regarding the organization and duties of a shop engineering department.

Planning to spend two days here, they had made reservations at one of the principal hotels, and intended to take their bags over and have breakfast before starting out to the shop. Being anxious to get a first-hand impression of the service in each city they visited, they decided to take a street car to the hotel.

Not being burdened with much luggage, they did not bother to call a red cap, but packed up their bags and started out from the train platform, looking about to get their bearings among the unfamiliar sights in the lobby.

There was no local railway employee in evidence at the station, and although several car lines passed the front of the building, they were at a loss to know which car to take. Dick ventured to ask a uniformed taxicab starter, who reached for their bags, how to reach the Grand Hotel by street car.

"None of these cars go near the hotel," was the reply. "Taxi here'll take you right over. No charge for extra passengers."

"No thanks," said Dick, and the starter disdainfully let go of his bag. As he and Steve walked out to the corner they were besieged by a string of rival taxi drivers.

"Taxi?"

"Taxi, sir?"

"Right up to the hotels! Taxicab."

"No charge for extras! Taxi right here, sir!"

They kept resolutely ahead until they reached the corner. Steve remained to guard the bags while Dick dodged through a stream of automobiles to ask

the conductor on a car which had stopped at the corner how they might reach the Grand Hotel.

"Does your car go past the Grand Hotel?" asked Dick. "Naw, we don't go that way, that's up town," was the reply he received as the conductor signaled two bells. No wiser than before, Dick motioned Steve to stay with the bags, while he approached the traffic officer in the intersection, working his way through a line of taxicabs and still more automobiles that shot past him, and being sworn at by one of the drivers.

"Grand Hotel?" repeated that busy individual, as he changed the traffic signal, and then glanced at Dick. "Why, that's right up town; one o' them cabs'll take you up there for 50 cents."

"Yes, I know that; thanks," said Dick a little impatiently, "but we'd like to ride over by street car."

The officer again changed the signal for traffic, looked at Dick for a moment and then replied:

"Well, if you want to take a car that goes by the hotel, you'll have to walk up 3 blocks and over one and then wait for a No. 4 car going up the hill. The No. 6 car on this street here goes within 2 blocks of the hotel, but you'll have to get on here and ride around the loop down at the square."

"Thanks very much," said Dick as he turned to rejoin Steve at the corner.

"What luck?" inquired the latter, as Dick again successfully dodged his way through the stream of vehicles.

"Well, if the street car ride to the hotel is worth the trouble of finding the car, it ought to be some ride! Come on, let's try it. We've got plenty of time, anyway, and I want to get all the ideas I can while we're here."

"Thank goodness these bags are light," said Steve, as they stood waiting for the traffic to change in the proper direction. "I wonder if the manager of this property ever tried to ride from the depot to the Grand Hotel on a street car."

until ready to use them. The coils may be identified by the information on the container.

Don't hang coils on pegs or place them loose in bins where they will soon collect dust, dry out and swell. Coils exposed to circulating air will deteriorate more quickly than coils kept in containers.

Don't store coils in a room which is too dry and hot.

Don't store coils in a cellar or other damp place.

Conditions are much less favorable for a long life of winding if dried-out coils are used for rewinding than if the coils become hard and brittle due to overheating from overloads after they are wound in the core.

A dried-out coil is hard to wind, it does not shape up easily, and the insulation will crack under the blows of the mallet. To make such coils more easily wound, they should be heated first in an oven. This softens the black plastic varnish and the shaping can be done more easily with less insulation breaks.

After the coils have been wound without injury and the armature dipped, baked and banded, a coil dried out in service may have a long operating life, provided there is no movement of the coil in the slot.

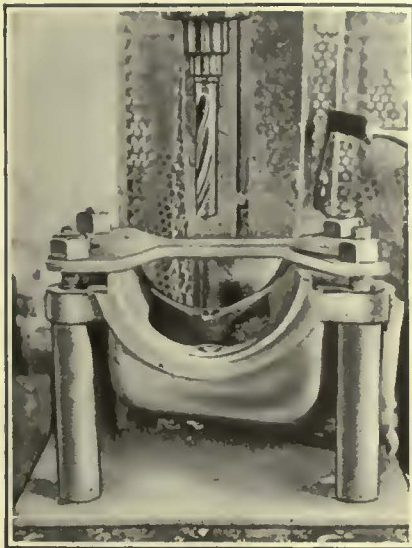
All armature and field coils are insulated with materials which deteriorate rapidly under certain unfavorable conditions of heat and humidity. Even under the most favorable conditions some of the treated materials deteriorate with age. Aside from the deterioration of the material, the coils may be damaged and rendered unfit for use by careless storage and improper handling. The leads of coils that are stored in the original container will be in a better condition for winding and less liable to suffer from dirt and corrosion than those exposed to deteriorating influences.

If proper attention is given to the storage of coils the insulation will be kept in a fresh and pliable condition. This will reduce maintenance costs by permitting maximum life to be obtained from the windings.

Fixture Holds Bearing Cap for Drilling

A FIXTURE for holding an axle bearing cap while the bearing retaining pins are drilled out has been developed in the Wheaton, Ill., shops of the Chicago, Aurora & Elgin Railroad. The fixture consists of a

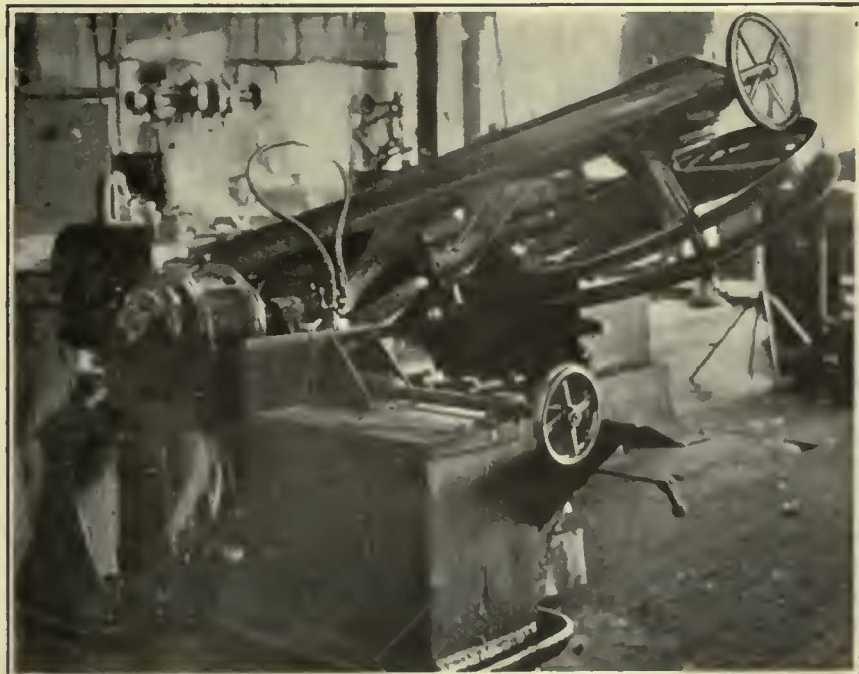
base of $\frac{1}{2}$ -in. steel, approximately 18 in. long by 12 in. wide, at the four corners of which are 2-in. diameter posts, threaded at their upper ends to receive 1-in. nuts. The bearing cap is placed over the four posts as shown in the illustration, being held



The Axle Bearing Cap Is Held In a Fixture While Bearing Retaining Pins Are Drilled Out

in the horizontal position by the shoulders on the posts. It is clamped to the fixture by a top plate and four nuts. The top plate is cut away on the sides to provide clearance for the drill and spindle.

This fixture, which was made in the shops, has facilitated this drilling operation considerably. It requires only a minute or two to set up and the holes are drilled accurately.



Napier Metal-Cutting Band Saw Is Found Fast and Accurate in the Columbus, Ohio, Railway Shops

Band Saw Expedites Metal Cutting

BY O. R. HOTT

Columbus Railway, Power & Light Company, Columbus, Ohio

A NAPIER metal-cutting band saw is used in the car repair shops of the Columbus Railway, Power & Light Company, Columbus, Ohio, for the usual cut-off operations ordinarily performed by a reciprocating hack saw. The accuracy and speed of this band saw make it superior to the other type. It is possible to work within 0.005 in. of a perfect cut through a block of metal 10 in. x 10 in. As the blade travels in the cutting direction only, the saw is considerably faster than the reciprocating type.

The band-saw blade is carried in a movable frame on two 2-ft. diameter pulleys mounted on 3-ft. centers. This frame is hinged so that it may be tilted up to receive the piece of work. The frame is counterbalanced so that the blade may be fed by gravity. In its normal position the frame and saw blade are horizontal. The two pulleys are inclined a few degrees from horizontal so as to provide clearance for the work on the return side of the blade.

The saw teeth, on the lower edge of the blade, engage the work midway between the two pulleys. Two sets of small guiding pulleys twist the cutting portion of the blade so that it will be perpendicular to the work. A stream of cutting oil which impinges upon the blade as it

leaves the work washes off the metal particles.

For cutting various materials, several sizes and types of blades are used. Three different tempers are used, and the number of teeth vary from 10 to 24 per in. The pulleys accommodate a 1-in. saw having a thickness of 0.035 inch. These latter dimensions are uniform for all saws. The saw is driven by a 1-hp. motor through spur gears and a bevel gear mounted on the driving pulley.

After the machine has been started it is unnecessary to give it further attention until the cut is finished. Simplicity and speed are features of the saw which have made it valuable in the Columbus shops.

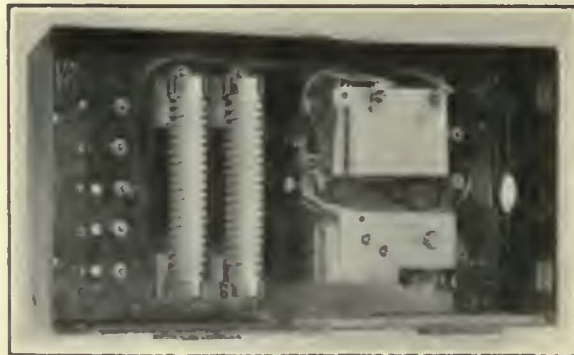
Worn Wheel Flanges Built Up in Detroit

ELECTRIC welding is being used to build up worn flanges of car wheels in the repair shops of the Department of Street Railways, City of Detroit. This procedure is expected to bring about an increase of 20 per cent in the life of the wheels. When flanges are worn to $\frac{3}{8}$ in. thickness or less, the wheels are removed and sent to the repair shop. Here a General Electric continuous-current automatic electric welding machine replaces the worn-out flange metal. A separate driving motor rotates the wheel assembly and the welding operation is continuous and automatic. Two pieces of welding electrode of approximately $\frac{1}{8}$ in. diameter are kept in constant contact with the wheel at different points where the flange needs building up. The wire is supplied automatically from overhead coils, the contact and feed being continuous. The actual welding operation for one wheel is completed in an average time of 1 hour. The rough surface is then refinished on a Norton car wheel grinding machine.



Electric Blast Heater

TO REPLACE hot air stoves and to provide for installations where a combined heating and ventilating equipment is desired, the Consolidated Car Heating Company, Albany, N. Y., has brought out an electric hot air heater. A Sirocco fan, motor driven, draws air in at one end of the heater and discharges it over the heating elements, where it passes out at the opposite end. The air inlet has a brass screen, so that foreign material cannot be drawn into the inside of the heater, and a damper is provided so that the air can be taken either from outside the car or inside, or from both if desired. This arrangement permits of a minimum amount of outside air being



Blast Heater With Electric Heating Coils

used in the most severe winter weather and for a maximum at all other times. The unit can be used solely as a ventilating system during winter when no heat is required. An extension handle can be run from the damper handle out toward the front, or up to any convenient location.

The electric heater has four ele-

ments mounted on porcelain blocks side by side. These in turn are supported on sheet iron plates. The blast heater is not only used in passenger cars, but it has proved particularly effective in cars used to transport fruit and other perishable goods in interurban service. With the usual type of electric heaters mounted around the sides of the car there is danger of their being damaged. If crates or boxes are placed close to such heaters circulation is prevented and uniform heating does not result. With the blast type of heater installed overhead, a uniform distribution of heat results.

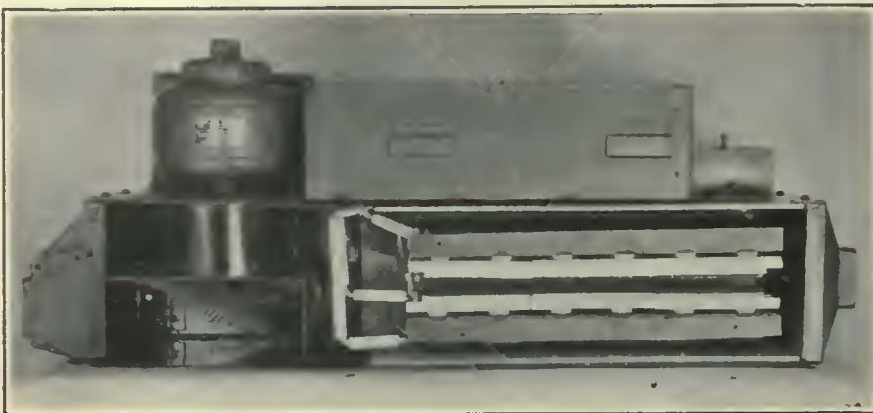
Electric Tapper

A PORTABLE electric tapper has been added to the line of electric tools manufactured by the Black & Decker Manufacturing Company, Towson, Md. The mechanism in the gearing case is so designed that the tap is driven in at a speed of 350 r.p.m. By a slight backward pull on the machine the tap is automatically reversed and is backed out of the plugged hole at double the speed at which it is driven in. No reversing switch is needed. The machine will tap holes in steel up to $\frac{1}{4}$ in., in cast iron up to $\frac{3}{8}$ in. and in brass or aluminum up to $\frac{1}{2}$ in. The machine weighs 8 $\frac{3}{4}$ lb. and is equipped with a universal motor so that it may be operated on either direct or alternating-current circuits.

Quick Change Electrode Holder

A NEW type of welding electrode holder marketed by the General Electric Company allows the welding operator to make a quick change from the burnt stub to a new electrode. Merely striking the stub end of the old electrode causes it to drop out so that the new wire can be inserted.

The new holder consists of a punched fiber tube with a tinned brass plug inserted in the end. A steel spring rod holds the electrode in place against one of several different sized notches provided for the purpose. The welding cable running to the source of power is soldered to the other end of the holder.



Control Switch and Resistance Mounted as an Integral Part of the Blast Heater

Association News & Discussions

Grade Crossing Hazard Discussed by C.E.R.A.

Prevention of Highway Accidents a Main Topic at Dayton Convention—
Pick-Up and Delivery Freight Service and Superpower Develop-
ments Complete Two-Day Program

HIGHWAY safety and prevention of grade crossing accidents, advantages and limitations of pick-up and delivery freight service by electric railways and some of the outstanding factors in superpower development that are of interest to electric railways formed the principal subjects discussed at the annual meeting of the Central Electric Railway Association, held at Dayton, Ohio, on Jan. 8 and 9. Approximately 300 railway and supply members and guests attended the meetings and took part in the well-filled business and social program.

In his annual address, which is printed elsewhere in this issue, President Harry Reid outlined some of the principal developments during the past year and expressed a spirit of optimism and of ever-increasing confidence in the future of electric railways.

Along with these cheerful words, however, came the announcement of the death of S. D. Hutchins of the Westinghouse Traction Brake Company and of James A. Bredt, Cincinnati manager of the Westinghouse Electric & Manufacturing Company, two valued members of the association. Out of respect for their memory those in attendance bowed their heads until the sound of the president's gavel. A memorial to the service and life of each was read by James A. McGowan, chairman of a special committee appointed for the purpose.

CO-OPERATION URGED TO STOP GRADE CROSSING ACCIDENTS

In an address on the prevention of grade crossing and highway accidents by A. E. Makee, president the Ohio Association for Prevention of Grade Crossing and Highway Accidents, a plea was made for co-operation by all of the agencies interested in the conservation of human life and limb and for the use of deliberate and sound judgment in drafting legislation for the relief of present appalling conditions. He cautioned against the adoption of hasty and ill-considered legislation, which would set up arbitrary and ridiculous restrictions and rules that would only result in further disregard for law. Only by that co-operation which is born of a mutual desire to stop the present destruction of life and property, he explained, can an effective step be taken toward the reduction of crossing and highway accidents. In the last analysis these are due to disregard by a very small portion of the motor vehi-

cle drivers for the personal safety and rights of others.

Copies of the proceedings of the conference on grade crossing and highway accidents called by the Governor of Ohio last summer were distributed by Mr. Makee. He said further that the necessity for traffic legislation came from increasing congestion, and that experience and precedent were lacking. He also pointed out that the conditions of future traffic are unknown, and that legislation must therefore be started with sanity and common sense.

Above all other factors, he contended that the most dangerous element in the traffic situation, and the one demanding immediate and decisive action, is that presented by the drunken automobile driver. This hazard to the safety of pedestrians and other users of the highways must be effectively removed, he insisted. Education of drivers was held to be still another important method of reducing accidents. Not much hope was held out for effective results among adults, but the opportunity for work in the schools was considered to constitute a big hope for the future.

CARELESSNESS THE MAIN CAUSE

Practically all grade crossing accidents are the result of carelessness, he said. During the period when steam and electric railroads were originally projected and built the laws were made so as to put the responsibility for accidents on the railroads. With the advent of the automobile, the laws governing its use were made by the automobile men. Consequently, at the present time the pedestrian must look out for himself and must keep out of the way. Common sense and co-operation must accompany the offer to relieve this condition if permanent improvement in conditions is to be made.

According to Mr. Makee, there will always be grade crossings of steam and electric railroads. They can't be eliminated, he said, because new crossings are being put through faster than existing crossings are being removed. He advocated clearing away obstructions so as to give unobstructed view on both the rail line and the highway. This is one step contemplated in the Ohio program. Compulsory insurance as a requisite to the issue of a license is also contemplated, although he admitted that there is a danger from this step, in making the drivers of automobiles feel less personal responsibility.

Physical and mental examination for a license to drive on the highways was also advocated. It was felt that such examinations should be comparatively easy, but that the license also should be easily revocable and hard to reinstate.

A further discussion of the subject of safety regulations at railway grade crossings by Wallace Muir, general attorney Kentucky Traction & Terminal Company, was read by his assistant, Mr. Becker. An abstract appears elsewhere in this issue. George M. O'Connor, claim attorney Detroit United Lines, also read a discussion of the same subject, which is abstracted elsewhere. In introducing his remarks, he said that one of the important elements in the improvement of conditions at railroad-highway crossings was uniformity in the regulations to be adopted by various states. Wide variations in such regulations would lead to confusion and hardship and would make it difficult for tourists visiting several states to avoid violating some of these various laws.

"FULL STOP" LEGISLATION URGED

Charles L. Henry, president Indianapolis & Cincinnati Traction Company, called attention to the recommendation of the recent national conference on grade crossing and highway accident prevention that state legislatures authorize their public utilities commissions to specify those crossings that are considered hazardous and at which all vehicles will be required to make a full stop. He also called attention to the recommendation of the same conference which would require automobiles to slow down to 15 m.p.h. when crossing railroads. This requirement, he said, would at least force the driver to think of what he is doing and would avoid many accidents that are caused by failure on the part of the driver to remember that he is crossing a railroad. Although the first step is to get common sense laws on the statute books, he emphatically pointed out that the next and bigger job is to get behind these laws to see that they are enforced. For this reason he advocated a state constabulary to enforce the highway laws.

Further discussing the subject, J. B. Dugan, secretary Ohio Association for Prevention of Grade Crossing and Highway Accidents, said that it was desired to prepare laws in Ohio which would be in conformity with those adopted in other states. From the proceedings of the Ohio Safety First Conference, he read the proposed measures for reducing grade crossing and highway accidents that were adopted at that meeting.

An important business group which should be interested and made a part of any organization for the reduction of crossing accidents, according to Mr.

Dugan, includes the real estate development companies. They must be interested in this work, he said, in order that they will co-operate to the end of holding down the number of new rail crossings that are put in when new sub-divisions are developed.

J. P. Barnes, president Louisville Railway, outlined briefly the history of the recent Hoover national conference* to reduce traffic accidents. He pointed out how the recommendation for placing the designation of railroad crossings at which vehicles must stop in the hands of the various state public utility commissions had been the means of getting accord between representatives of railroad and automobile interests. He drew a lesson from this incident of the value of frank discussion and honest co-operation, in improving the present appalling conditions. He urged that electric railway men assume personally the responsibility for talking at every opportunity in favor of enforcement of the recommendations of the conference. The question was far above that of a financial problem, he said, and offered an opportunity for an actual service to the American people in improving the present terrible conditions resulting from carelessness and disregard of life.

RESOLUTIONS INDORSE WORK OF HOOVER CONFERENCE

A special committee of the association under the chairmanship of Arthur W. Brady, receiver Union Traction Company of Indiana, had been appointed to review the recommendations of the state committees on prevention of grade crossing and highway accidents. In the absence of Mr. Brady, resolutions indorsing the work of the state conferences and of the national conference held at the call of Mr. Hoover were read by Mr. Barnes.

Whereas at the call of the Governors of Ohio and Indiana, respectively, broadly representative conferences have recently been held in those states for the purpose of ascertaining and recommending practical and effective ways of reducing the awful toll of life, limb and property due to accidents at grade crossings and on the highways, and

Whereas similar conferences of national scope have been held at the call of the National Association of Railway and Utility Commissioners and of the Secretary of Commerce, and

Whereas each of these conferences developed constructive recommendations for the advancement of street and highway safety; now, therefore, be it

Resolved, By the Central Electric Railway Association in annual session convened at Dayton, Ohio, this ninth day of January, 1925, that it heartily commend the National Association of Railway and Utility Commissioners, Governor Donahey of Ohio, Governor Branch of Indiana and Secretary Hoover, for their wisdom, enterprise and keen public spirit as manifested in calling these conferences; and be it further

Resolved, That said association hereby request the electric railway companies, members of the association, to co-operate heartily with all other public and private agencies in carrying out the recommendations of these conferences; and be it further

Resolved, That the said association respectfully and earnestly request the legislatures of the several states within which its member companies operate to give careful consideration to the enactment into law of such of the said recommendations as require legislative action before they may become effective; and be it further

Resolved, That the Central Electric Railway Association hereby pledge its wholehearted support and co-operation to the further development and ultimate adoption

of the constructive and humanitarian program so splendidly begun.

FREIGHT DELIVERY SERVICE

A general discussion of the subject of pick-up and delivery freight service was started by J. P. Longon, auditor Toledo & Indiana Railroad. He said that a pick-up and delivery service which had recently been installed by his company in Toledo was rendered by a large independent transfer company in the city at a charge of 8 cents per 100 lb., with a minimum charge of 25 cents. This charge, however, is effective only in the first zone, which includes an area of approximately 1 mile radius from the center of the business district. Most of the shippers of any importance are located in this area. In a second zone having a radius of 2 miles the rate charged is double that for the first zone, making the cost of pick-up and delivery to the shipper 16 cents per 100 lb., with a minimum charge of 50 cents. A third zone has an approximate radius of 3 miles and the charges are triple those of the first zone. This service in Toledo has just been outlined and the new tariff published. It will be put in as an optional service for shippers in that territory. Previously, free pick-up and delivery had been furnished in some of the smaller communities along the line. The cost of such service, which was absorbed by the railway, varied from 4 to 7 cents per 100 lb. When the free service was put in for these outlying towns the gross revenue from freight increased approximately 18 per cent and two competing truck lines that had been handling most of the l.c.l. freight were ready to sell out. The net revenue from this increase in business went up about 8 per cent, showing that the cost of the pick-up and delivery service which was absorbed by the railway was 10 per cent of the increased gross revenue.

In its tariff the railway assumes the liability for damage to shipments while on the trucks of the trucking company, but its contract with the trucker makes the latter responsible to the railway for all damages to shipments while on the trucks.

Experience with pick-up and delivery service on the lines of the Cincinnati & Dayton Traction Company was outlined by C. M. Byrne, traffic manager. In one case, at a small manufacturing town on the line, a freight business of only a few hundred pounds per month was increased to nearly a million pounds per month by the establishment of a free pick-up and delivery service costing about 5 cents per 100 lb. outbound and 4 cents per 100 lb. inbound. This cost is absorbed by the railway and some of its connecting lines that participate in the revenue.

At another manufacturing town on the line a pick-up and delivery service at a charge of 5 cents per 100 lb. with a minimum charge of 25 cents had yielded little increased revenue because the centrally located industries in the community claim they can handle the shipments at less cost with their own trucks. At the principal shipping point and terminal on the line a pick-up and delivery service has been furnished for some time at 10 cents per 100 lb., with

a minimum charge per shipment of 25 cents. This charge covers territory in some cases 10 miles from the station. The service has resulted in doubling the revenue from outbound freight and trebling that from inbound freight. In these last two cities the charge is added to the freight and paid by the shipper on prepaid shipments or by the consignee on collect shipments. This charge is covered by tariffs and is shown on waybills as advances for drayage. The service assures prompt handling of all shipments and relieves the stations of congestion due to failure of the consignees to take up shipments promptly. Trucks are on hand when the cars are opened and all delivery freight is handled direct from car to truck.

T. H. Stoffel, Westinghouse Electric & Manufacturing Company, described the experiment being conducted in Baltimore after extended investigation by the Interstate Commerce Commission. A charge of 15 cents per 100 lb. is made for the pick-up and delivery service, but after a year of the experiment it has not proved to be particularly successful. An optional pick-up and delivery service that is furnished by the Connecticut Company was also described by the speaker. In this case only about 15 per cent of the shippers use the service, and these are limited to the occasional shippers, the regular and large shippers preferring to use their own truck equipment.

Mr. Stoffel warned against the possibility of discrimination unless the service at all towns on a line is put on the same basis. He said that pick-up and delivery service in a large city is not attractive to the shipper unless all the transportation agencies in the community put in the same service, as otherwise the shipper is required to maintain truck equipment for handling freight over such lines as do not have the pick-up and delivery. Another factor of cost in connection with such service that must be taken into consideration is the clerical work entailed, and Mr. Stoffel maintained that a charge of 8 to 10 cents is not sufficient to cover all of the costs of such service. He expressed the belief that pick-up and delivery would ultimately be made a part of the service of all rail lines, but doubted its advisability until it could be made a universal service.

An outline of the principal phases of superpower development of interest to the railways was given in an address by E. H. Sniffin, manager power department, Westinghouse Electric & Manufacturing Company, and is abstracted elsewhere in this issue.

OFFICERS ELECTED

The nominating committee, consisting of C. L. Henry, H. A. Nicholl and J. A. McGowan, recommended the following for officers and members of the executive committee for the ensuing year, and on motion from the floor they were unanimously elected:

President, F. R. Coates, president Toledo, Ottawa Beach & Northern Railway, Toledo, Ohio.

First vice-president, G. K. Jeffries, Indianapolis, Ind.

Second vice-president, Martin Ackerman, Dayton, Ohio.

*See ELECTRIC RAILWAY JOURNAL, Dec. 20, 1924, page 1042.

Executive Committee: J. P. Barnes, S. W. Greenland, R. I. Todd, A. C. Blinn, H. A. Nicholl, W. S. Rodger, F. W. Coen, J. F. Collins, Myles B. Lambert, James H. Drew, and L. W. Van Bibber.

A dinner, followed by dancing, and

a trip to the McCook government experimental flying field made up the social part of the program. On Friday afternoon the members of the association were entertained at luncheon as the guests of the Ohmer Fare Register Company.

rails and is bound to stay upon its own side and upon its own right-of-way. It does not dart from side to side and cannot be compared to the high-powered automobile from the standpoint of danger.

Whenever the law of our country is such as to require sufficient training on the part of the automobile driver before he is permitted to drive, and when laws are rigidly enforced as to his conduct in the operation of the automobile, we will then, and not until then, reduce grade-crossing and other highway accidents.

If one who is permitted to drive an automobile under a license knew that he would forfeit this right as a result of misconduct on his part, he would be much more careful in the operation of his automobile. If parents could be held responsible for the use of the family car by the minor, in some way other than in damages, this class of accidents would be greatly reduced if not eliminated.

In conclusion, I give for your consideration in the elimination of the grade-crossing accidents this one thought: Take such steps as are necessary to control the driver and the user of the automobile. If it can be done by legislation, then let's legislate; if it can be done by arousing a public opinion to the proper consideration of the situation, then let's take steps to arouse and incite such a public opinion. If it is necessary to take drastic steps, such as the forfeiture of the right to drive an automobile, forfeiture of the automobile itself, requiring the "stop, look and listen rule," imputing the negligence of the driver to all occupants of the machine, and any other such drastic measure which will be helpful in the saving of human lives, then let's take such steps.

Preventing Grade Crossing and Highway Accidents*

BY WALLACE MUIR

General Attorney Kentucky Tracton & Terminal Company

THERE has been an ever increasing loss of life and property resulting from the grade-crossing accident, and unless some action is taken by public officials, by the railways of the country and by the public generally, this tremendous toll will necessarily continue to increase. The desired end cannot be accomplished by the railway companies or by the public generally, acting alone; if anything is to be accomplished it must be the result of a concentrated effort on the part of both the railways and the public. The railways cannot, even were it possible for them to do so, eliminate grade crossings, if the public continues every year to construct nearly twice as many crossings as were eliminated by the railway in the same time.

It seems to me that in order to reduce grade-crossing accidents we must first determine the cause. When we realize that in the United States there are 7,600 people killed and more than 2,000,000 injured every year, as the result of accidents, the situation becomes so appalling as to demand the attention of all the people throughout the length and breadth of this country. As a result of accidents millions of dollars per year are lost in wages and millions of dollars per year are lost in production. It is claimed that of the people killed each year, one-fourth are children under 15 years of age. Such waste of life is an indictment of the citizenship of this country, and particularly of the officials of city, county, state and nation.

Confining ourselves to highway fatalities in the United States, I am informed that in 1923 there were 22,621 persons killed, divided as follows: steam railway crossing accidents, 2,268; street car accidents, 2,006; accidents from other vehicles, 1,559; motorcycle accidents, 336; automobile accidents, 16,452. There were 678,000 injured with an economic loss of \$600,000,000. It is estimated that in 1924 there will be an increase in fatalities of 15 per cent, and in 1925, the number will be 55,000 people killed and 1,500,000 injured. The question is, is there not some way in which we can bring to the attention of the American people this astounding condition? A large number of steam railroads throughout the United States and many electric interurban lines are gradually eliminating grade crossings. In 1923 the railroads in the United States eliminated 1,130 crossings at an approximate cost of \$70,000,000, but during the same time

local authorities established 3,554 new grade crossings. At this rate it will be readily seen that the grade crossing can never be eliminated, if the counties and states continue to exercise their right to build and construct grade crossings instead of prohibiting the construction of such crossings. But I do not believe the elimination of the grade crossing will stop the sacrifice of human lives and loss of property, for we are told that even where the grade crossing has been eliminated by viaduct or underground passages the reckless automobile driver, heedless and blind to danger, a devil of speed and a slave to recklessness, continues to kill and maim by wrecks at such points.

The engineer who pulls a train is a man of mature years, sober and discreet, who has had years of experience and is constantly under the supervision of superior officers, and he knows that one act of forgetfulness will cause him to lose his position. The operator of the interurban electric car is of the same character. He reaches this position by intensive training and careful inspection, and the train, whether steam or electric, is confined to two

Increasing Confidence in Electric Railway Future*

BY HARRY REID

President Central Electric Railway Association

THE past year has developed an ever-increasing confidence in the future of electric railways, and much of the uncertainty which has existed for several years past is giving way to a feeling of optimism, which is evidenced by improvements which have recently been made or are under way in the various branches of service rendered.

It is realized more fully than ever before that a large part of the local or short-haul travel, which formerly meant so much to operating revenues, has been lost to the motor vehicle, both privately owned and public, and that if passenger income is to be maintained or increased, it must be done through intensive development of the longer haul travel. The public is demanding, and is willing to pay for, faster and more comfortable transportation, and to meet this requirement a number of our lines have found it necessary to revert to the heavier and easier riding type of rolling stock and provide a so-called de luxe service, including parlor, dining and sleeping cars, and I believe results as a rule have been very satisfactory.

I understand parlor or chair cars, with an extra charge for the service, are being operated on at least five of our member lines, and that four or five others are preparing to furnish such service. Other improvements resulting in operating economies which are being provided are modern motive power and automatic substations, in both interurban and major city operation.

Material progress is being made in the standardization of freight rolling stock, accounting, operation and methods, through the efforts of the various subsidiary associations. This is particularly true of the Traffic Association, which during the past year has perfected the details and agreements necessary for the publication of a joint through passenger fare basic tariff covering practically the entire territory traversed by Central Electric Railway Association lines. Joint through rates and divisions have been established with both electric and steam

*Abstract of discussion before the Central Electric Railway Association, Dayton, Ohio, Jan. 8-9, 1925.

*Address before annual meeting of the Central Electric Railway Association, Dayton, Ohio, Jan. 8-9, 1925.

lines, to and from much additional territory, thereby increasing materially the scope of operations and making available to electric lines a much greater volume of tonnage, and at the same time enlarging the markets of shippers because of the superior service rendered.

Substantial improvements have also been made in freight station and terminal facilities, such for example as the Indianapolis terminal, and I believe others are under way or projected at such important points as Cleveland, Detroit, Fort Wayne, etc., all of which will no doubt result in material increases in volume of tonnage and economies in operation. There has been an appreciable increase in the number of freight cars in service of a more standardized design, making possible a freer interchange of equipment, and thereby expediting the movement of freight and resulting in substantial savings in cost of handling.

A matter of much importance to the industry is the better understanding which the public generally now has of the problems and difficulties of the electric railways, brought about by the educational efforts and the public relations activities of the various properties. It is becoming increasingly evident to the public that the electric railway is the backbone of the prosperity and growth of their communities. As a result, civic authorities and regulatory bodies are co-operating to a greater extent than ever before in the solving of transportation problems.

One of the most serious problems confronting the electric railway industry today is the unfair competition of the motor vehicle, which in many localities is unregulated and operated by irresponsible parties, taking the cream of the traffic in territory which electric railways have built up through many years of effort.

It is generally conceded that the motor bus and truck have an important place in the transportation of the country, in serving communities and districts isolated from rail lines, as feeders to rail lines, and also that they can be made an efficient auxiliary to existing electric railways, when service is properly co-ordinated. But the unregulated motor vehicle is destructive alike to public welfare and the prosperity of electric railways. It is the general opinion, which has been amply demonstrated, that electric railway operators, with their knowledge and experience in the transportation business, are best qualified to meet the transportation requirements of the public, and that bus operation in the territory served by their lines, and where there is need for such service, should be supplied exclusively by them. Realizing that the public can best be served by providing the type of transportation best suited to the demands, and as a means of conserving revenues, many of our member lines have provided auxiliary bus service. However, in order further to protect our interests and investments, and in order that the public may have safe, reliable and satisfactory transportation service, it would seem necessary that electric railways forestall as much as possible the encroachment of independent bus operators in their territories, by themselves

providing the service demanded by the public. At the same time such steps as may be necessary should be taken to secure necessary legislation providing for proper bus and truck regulation,

under the jurisdiction of the same authorities governing the operation of rail lines, with a provision requiring a certificate of convenience and necessity in each case.

Superpower and the Railways*

BY E. H. SNIFFIN

Manager Power Department, Westinghouse Electric & Manufacturing Company

A DOZEN years ago I advocated that the railways should take their power from the central station. Most of them have by this time adopted that policy, and found the advantage of it. What, then, is the interest of railway men today in this question of power, and more particularly in the superpower phase of the subject? Superpower does not mean local interconnection of existing systems, but the establishing of great power zones, themselves interconnected, using 220,000-volt trunk transmission lines. You are interested, for you are large users of power. The populations of our most congested districts use for their transportation from 30 to 40 per cent of their total energy consumption. Even in the less populous districts the power for traction service averages around 20 per cent. I find, too, that of your total operating costs, power constitutes something like 15 to 17 per cent. So I take it you are interested in any movement that will tend to improve the availability and the cost of this indispensable commodity. Moreover, the importance of this question reaches to every inhabitant of the country.

If you will permit me to exaggerate a little bit—and not so very much either—I venture the assertion that our position today, relative to what we can do, compares, in its state of undevelopment, to the place we occupied in 1885 when direct current was the only system of transmission we knew. Do you realize that electric service today is touching only about 65 per cent of our population; that only about one-third of our homes use it, and that inefficient isolated plants still aggregate as much total power as all the central station plants combined? Power generation as we conduct it today is taking about twice the coal it should. If all this power were developed with the efficiency of our best existing central stations, it would save about 150,000,000 tons of coal per annum and perhaps the labor of half a million people. Is it not impressive to know that more than 80 per cent of the potential water power of the United States still remains undeveloped—more undeveloped water power than all the power we are using today?

Can any one doubt that the steam locomotive must sooner or later go the way of the horse? The railroads use today about as much coal in their locomotives as all the industrial plants of the country combined. Much of this coal can be saved; but more important still, the railroads will have to be electrified to meet the country's growing transportation requirements.

So we can see clearly what lies ahead

of us. We have got to utilize every available source of power that we possess, and bring this power to every one everywhere. And that is what we mean by superpower. Many power developments not considered heretofore feasible because of an inadequate market would be entirely practical as part of a comprehensive system. You cannot run trolley cars through some sections of the country, because it wouldn't pay. For the same reason it has not been possible to run transmission lines to many places where they would have been a great blessing, but in my opinion there is enough saving possible in our present methods of operation to enable us to extend the benefits of electric service to the tillers of the soil, and I think the idea will not reach its full fruition until we do.

The public has heard about superpower and is interested. It does challenge the imagination, even of the layman. Articles are written about it and the politicians are listening. A recent candidate for the Presidency stood openly for the government ownership of public utilities. Governor Smith of New York thinks the water powers of that state belong exclusively to its own citizens. Maine has a law prohibiting the export of its hydro-electric power. Governor Hunt of Arizona was recently re-elected on the issue of whether Arizona would join the seven-state agreement concerning the power development of the Colorado River. Six other states had consented, but Hunt opposed it. If a state intends to confine the use of its water power within its own borders it might just as well cut off its railroads and its telephone and telegraph lines at the border, and its highways. I do not suppose there is any provision in our federal constitution that has conferred more benefit on the country than the clause which provides for free trade and free intercourse between the several states.

But there's a still more important phase of this subject—one that you have heard before, and will hear more of, and one that comes pretty close to your own interest. That is the question of government ownership. That question has not yet become a dominating issue which the power people have had to meet. It is in the air, and as the public imagination comes to grasp more clearly the economic elements of a general power supply, the very fact of this greater public interest will naturally incite political agitation.

There are today in this country more than 1,000 municipally operated electric power plants. Most of them are small and aggregate a meager portion of the total central station capacity. They do, however, constitute about 20 per cent of the total number of central stations. A few of them, where they are

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large in size and of modern design, are efficient plants. Most of them are economically indefensible. They constitute less than 4 per cent of our total central station capacity. Within the past 5 years more than 800 of these small municipal plants have gone over to private ownership. The greater part of these plants have owed their existence to the mass emotion that political appeal so easily excites when it champions the people against the corporation. If the corporation can make money in serving the public, why should not the people save that money, that profit, and supply their own service at cost? Why not, indeed, if they can reach the same cost?

The public debt of the country—federal, state, county and municipal—is about \$35,000,000,000. This debt would be more than doubled if the government took over all the utilities. Also the present per capita tax of nearly \$100 which we now require for the cost of government would be greatly increased. The proponents of the public ownership idea argue that the government could raise the money at less cost by the issuing of tax-free bonds. True, but where would the money come from which private ownership now pays to the government in taxes, some \$665,-

000,000? Government must go on. The people must support it in one way or another. So increased taxes would have to supply the deficit.

Now, gentlemen, we have forged ahead under the rule of private initiative, the law of the survival of the fittest. The public must be protected both as customers and owners of our utility companies. They are protected by government control and regulation. But government operation has never proved its case, either in theory or practice.

We have already made a good beginning with superpower. Such a system already stretches 600 miles across the Southeastern states, representing the co-operation of seven different companies. California is wired up practically continuously throughout its length. In other sections of the country other systems are taking form. Presently a few great systems will cover the whole United States. Ultimately we shall have a system of universal power supply. We must have it, for it seems to be the one agency with which we can meet our increasingly difficult economic conditions. Its fullest national development is an indispensable element in our future prosperity and happiness.

Uniform Traffic Laws Proposed*

By GEORGE M. O'CONNOR

Claim Attorney Detroit United Lines, Detroit, Mich.

WE ARE, of course, chiefly concerned over the grade crossing situation as it confronts the interurban electric railways, and the seriousness of our problem can best be appreciated by realizing that there are today some 200,000 level grade crossings along the interurban routes. Through municipal development and annexation, these are increasing at the rate of 2,000 per year. Separation of these grades will cost on an average of \$10,000 each, necessitating a total expenditure of \$2,000,000,000. The interest alone on this sum of money at 5 per cent amounts to \$271,000 per day, so that the financial impossibility of speedily undertaking the work and keeping pace with it is evident.

Available statistics show that of all accidents, automobiles are involved in more than 75 per cent. Observations taken in 1924 of 306,000 motor drivers approaching railway crossings showed that less than 3 per cent brought their vehicles to a stop. Some 20 per cent looked in both directions, the same number looked one way, and the balance trusted to luck, stepped on the gas and went across.

Accidents arise principally from three causes, namely, incompetency, recklessness and carelessness.

Not all persons are qualified to drive motor vehicles even though they have a knowledge of the laws governing traffic on the highways and are familiar with the workings of a motor vehicle, and the experience of many electric railway companies in their labor employment departments is that but one man out of three can qualify as a

motorman. Yet the state will issue a license to drive an automobile without question; the defects which would disqualify the motorman are not considered by the license issuing officer. This can and should be prevented.

You will ask me then how we are to stop accidents. I can answer this by saying that as soon as chickens learn how to cross the street they will stop being killed, as I believe that many motorists employ the same amount of brain power when crossing railroad tracks that chickens do when crossing the road in front of moving automobiles. Then you will ask how we may reduce accidents; this I can answer more easily.

Educate the people, commencing in public schools, following it through all societies that are engaged in accident prevention, and especially interest the daily newspapers, which should be vitally concerned in giving the information impartially and fairly; then if the motorist does not learn or does not care to learn, have each state of the Union follow its sister states Mississippi, Virginia, Tennessee, Montana and North Carolina, in which states they have well defined "Stop Laws" with penalties, and grade crossing accidents are nearly nill.

I suggest and urge that the public utilities officials of each state adopt as soon as possible the following uniform traffic laws:

1. Make it a penalty for any motor vehicle to cross railway tracks without coming to a full stop.

2. Adopt a universal and distinctive color scheme for lights at railway-highway crossings so that there can be no confusion as to what these lights mean.

3. Make crossing warnings universal as to design.

4. Prohibit the use by others of anything in the slightest indicative of railway crossing warnings, both in the form of stationary signals and whistles.

5. Prohibit all other signs or lights within a specific distance of crossings.

6. Require a rigid test, both physical and mental, of all applicants before granting of motor driver's license.

7. Prohibit the use of red lights on the rear of all motor vehicles except for stop signs and that a universal and distinctive rear light of some other color be used.

New York Electric Railway Association

THE midwinter meeting of the New York Electric Railway Association will be held at the Hotel Commodore, New York, on Thursday, Jan. 22. The morning session will begin at 10 o'clock. There will also be an afternoon session. A banquet will be held at the Commodore in the evening. The two speakers at the dinner will be Clifford E. Paige, vice-president Brooklyn Union Gas Company, whose subject will be "A Changing Public Sentiment," and Dr. Warren W. Giles, who will speak on "Personality — the Business Man's Greatest Asset."

A list of the papers and discussions at the two sessions follows:

"High-Voltage Insulators and Their Relation to Radio, as Affecting Railways," by G. B. Smith, engineer Ohio Brass Company.

"Modernizing Fare Collection," by P. O. Lund, Eastern representative Johnson Fare Box Company.

"Interurban One-Man Operation, Tangerine Line," by J. M. Bosenbury, superintendent motive power and equipment Illinois Traction System, Springfield, Ill. The discussion on this paper, with illustrations, will be led by George L. Kippenberger, assistant general manager St. Louis Car Company.

"Light-Weight Interurban Cars," by W. J. Clardy, general engineer Westinghouse Electric & Manufacturing Company.

"Recent Developments in the Field of Gas-Electric Buses," by J. C. Thirlwall, railway engineering department, General Electric Company. The discussion on this paper will be led by J. A. Queeney, president Philadelphia Rural Transit Company.

"Freight Traffic—Its Source and Development," by Fred W. Brown, general superintendent Michigan Railroad, Grand Rapids, Mich.

"Essentials of Discipline," by F. S. Macy, physician in charge, Medical Bureau, Brooklyn-Manhattan Transit Corporation.

A report of the proceedings of the Accountants' committee will be presented by E. H. Reed, auditor Brooklyn City Railroad.

Indiana Utility Convention

A ONE-DAY meeting of the Indiana Public Utility Association will be held in Indianapolis on Jan. 22. The meeting will be held along with that of the Indiana Sanitary and Water Supply Association, separate sessions being held in the morning with a joint luncheon, a joint program in the afternoon and a joint banquet in the evening.

Among the speakers will be William

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H. Hodge, president Public Utilities Advertising Association, who will discuss the uses of advertising by public utilities; General George H. Harries, who will speak on "Our Obligations As Citizens," and W. S. Vivian of Chicago, who will discuss "Public Relations." Harry Reid, president Interstate Public Service Company, has called meetings of the managers and members of the Women's Public Information Committee at the same time.

"Transportation Night" in New York

SAFETY and transportation were the subjects discussed at the third regular meeting of the Metropolitan Section held in New York, Jan. 9. Difficulties in schedule making for a three-track elevated railroad where express and local trains running in one direction on two tracks must all operate in the reverse direction on a single track were told by S. D. Smith, superintendent Manhattan Elevated Division, Interborough Rapid Transit Company. To accomplish this every move has been studied and mapped, every motion synchronized and every man instructed how to do his part. Successful operation results from thorough co-operation from top to bottom of the organization. A discussion along these lines was given by D. O'Rourke, trainmaster of the same company.

Safety and public relations was the subject of a paper by T. P. Brannon, Long Island Railroad. He said that last year this railroad carried 92,000,000 passengers on 395 miles of track in "comparative safety." C. E. Hill, safety engineer New York Central Lines, said that 90 per cent of all accidents are due to the human element. Education is the remedy. Safety work was started 12 years ago on this railroad and in the eleven years since it was begun has resulted in saving the lives of 1,450 employees and preventing 57,000 injuries.

Martin Schreiber, manager Southern Division Public Service Railway of New Jersey, spoke about methods of selling transportation. He mentioned in particular four points. First, the rolling stock should be attractive in design and appearance. In the second place one-man operation, where a single trainman is in complete charge of the car, appeals to the public. Third, having a single man on the street in charge of all phases of the operation of a single line is likely to improve the quality of the service on that line. Fourth, advertising is necessary in order to sell transportation.

C. E. Morgan, vice-president and general manager Brooklyn City Railroad, said that from the study of machines industry has turned to the study of men. Time was when, in dealing with men in the mass, leaders of industry failed to consider man as a human factor. Now, however, the employee is looked upon as a co-operative unit with a brain distinguishing him from the inanimate material units which he utilizes in the interest of himself, his employer and of mankind. The objective in personnel work in any industry is to enlist the maximum co-operation and interest of the human element in the success of the undertaking. To

secure the co-operation of your employees you must remember that all are human beings and every effort should be devoted to harmony and co-operation.

Musical selections were heard between the talks and Conrad Young

entertained the audience with a humorous monologue. A. L. Hodges, secretary of the Metropolitan Section, announced that the membership had increased from 726 at the time of the previous meeting to 771 at present.

American Association News

New Headquarters for A.E.R.A.

THE headquarters office of the American Electric Railway Association is to be housed in the Johns-Manville building at 41st Street and Madison Avenue. Negotiations have been completed for engaging the entire 14th floor of this building, comprising 6,000 sq.ft., and the office will be moved some time prior to May 1, possibly as early as March 1. The removal will be announced later. This area compares with some 4,300 sq.-ft. at the present location at 8 West 40th Street, which is quite inadequate for present activities. An exceptionally good rate as prices go today was secured for the new office. The expense for the new space is not much greater than the present rental, which is on a lease taken out several years ago, except as represented by the increase in space. The association was considered to be very fortunate in the arrangements it was able to make.

Codification of Power Failures

THE personnel of the committee of the Engineering Association committee on codification of power failures has now been completed. The membership, as announced by President Clark, is as follows:

W. E. Bryan, superintendent of power United Railways of St. Louis, chairman.

Representing the committee on power generation and conversion: H. T. Connolly, Annapolis, Md.; C. E. Bennett, Atlanta, Ga.

Representing the committee on power transmission and conversion: Adrian Hughes, Jr., Baltimore, Md.; W. J. Quinn, New York, N. Y.; N. R. Love, Denver, Colo.

Purchases and Stores and Stores Accounting

A JOINT meeting of the purchases and stores committee of the Engineering Association and the stores accounting committee of the Accountants' Association was held in New York on Jan. 12 and 13. Methods of co-operating with other purchasing agents' associations were discussed. It is planned to send representatives to Washington for the coming conference concerning the adoption of standardized invoice forms.

After considerable discussion concerning the advantages and disadvantages of a central storeroom, it was the feeling of the committee that such a plan is desirable. Centralized store-keeping arrangements on a number of railways were described, among them

being that of the Philadelphia Company, holding company for the Pittsburgh Railways. It was felt by the committee that it is poor policy to rely on the manufacturer to keep on hand a stock of emergency material. In spite of the expense, it was thought that the railways should keep these supplies in their own storeroom.

Standardization of forms was approved for the purchase requisition, purchase inquiry, purchase order, and some sort of a record of receipt of goods. The committee felt that it would be undesirable to recommend carrying standardization beyond this point at present. Co-ordinating purchases of materials and supplies with the annual budget was discussed. It was decided to recommend that the purchasing agent should notify the budget officer of the company periodically of the total value of purchase orders signed. This notification has been found helpful.

Cleveland was selected as the location of the next meeting, which will be on March 23. The June meeting, for which a definite date has not yet been selected, will be held in Boston.

Those present were: H. H. Lloyd, chairman; J. Y. Bayliss, J. Fleming, C. A. Harris, A. E. Hatton, A. C. Kennedy, P. F. McCall, A. A. Ordway, and F. L. Wheaton of the purchases and stores committee. The stores accounting committee was represented by R. A. Weston and F. E. Wilkin.

Bolt, Nut and Rivet Standardization

A MEETING of the sectional committee of the American Engineering Standards Committee on standardization of bolts, nuts and rivet proportions was held in New York City on Jan. 8. Reports of various sub-committees included standard sizes of small rivets; sizes of tinners', coopers' and belt rivets; sizes of wrench head bolts and nuts, and wrench openings; sizes of slotted heads for machines and wood screws; sizes for track bolts, plow bolts and carriage bolts. The various dimensions proposed by the sub-committees were discussed and changes and revisions were made. After the tables have been corrected the reports will be printed and circularized for criticism.

A report was presented of an informal conference with foreign representatives of standardization bodies held on Oct. 28, by the staff of the American Engineering Standards Committee. Suggestions resulting from this conference were considered and a resolution was passed to provide for co-operation with all foreign standardization bodies.

The News of the Industry

Amendment to Ohio Bus Law Is Sought

An amendment to the Freeman-Collister law, giving the State Public Utilities Commission control of motor bus transportation in the state, has been introduced into the General Assembly of Ohio now in session.

This amendment specifically takes out of control of the state commission buses operating wholly within municipalities and contiguous territory. The amendment was drawn to meet the needs of Cleveland, where the Cleveland Railway has been threatened with motor bus competition. It has the backing and support of legislators from all the larger cities of the state.

The amendment introduced into the Senate has already been favorably acted upon by the Senate automotive committee and will be voted on by the Senate during the week ended Jan. 24. Political leaders appear confident that the measure will pass. A similar amendment is also pending in the House.

Passage of the amendment by the General Assembly would prevent issue of a certificate of convenience and necessity by the State Public Utilities Commission to the outside motor bus interests which have been trying to get bus rights in Cleveland.

John J. Stanley, president, has publicly announced that the Cleveland Railway is willing to operate buses in Cleveland in accordance with the terms of the service-at-cost plan under which cars are operated in Cleveland.

Flexible Rates Will Be Recommended for Atlanta

Establishment of a flexible car fare in Atlanta, in accordance with the recommendations of the John A. Beeler Organization, will be suggested by the traction committee of the City Council at its next meeting and will probably be adopted by the street railway department of the Georgia Railway & Power Company. The schedule recommended will be "Schedule D," which provides for 10-cent cash fares, tickets four for 25 cents and a 5-cent fare for all school children under 12 years.

Should this schedule fail to check the losses sustained by the railway, and should the cost of service in the next 2 years exceed the gross revenue of the railway by 20 per cent, "Schedule E" would automatically become effective. This provides a 10-cent cash fare, tickets four for 25 cents, transfers given with cash fares only, and a 5-cent fare for school children under 12 years of age. If, on the other hand, the revenues of the department should show a sufficient increase, "Schedule C" would be put into effect. This makes cash fares 5 cents each, with free transfers, no tickets sold to adults, and tickets

sold to school children at the rate of three for 10 cents.

The maximum charge provided in the schedule—"Schedule H"—consists of 10 cents cash fare, no tickets sold, free transfers, and 5 cents fare for school children. The minimum charge—"Schedule A"—consists of a 5-cent cash rate, tickets six for 25 cents, free transfers, children's tickets three for 10 cents.

It is pointed out that while the cash rates for adults is 10 cents under the new schedule, this is more than counterbalanced by the 5-cent rate for school children, making the actual cost of carfare per family smaller than at the present time. It is recommended by the Beeler Organization that jitneys be entirely eliminated from the streets of Atlanta.

Thompson Hampers Mayor Dever's Purchase Plan

Former Chicago Mayor Appears in the Role of the Man with Monkey Wrench in an Effort to Discredit His Successor's Municipal Ownership Aspirations

POLITICS, the specter which Mayor Dever has been fighting for months, finally has taken a good grip on the Chicago \$450,000 transportation issue. As a result the Mayor, with his local traction chairman, Alderman Schwartz, has conceded defeat in his plan for a February referendum on municipal ownership. With this concession, Major R. F. Kelker, Jr., and his associates in the appraisal of the Chicago Surface Lines have pocketed the figures they had ready for the aldermanic committee and are quietly working out many details of the valuation which were slurred over in the first hasty summing up.

It was former Mayor William Hale Thompson, warm friend of Mayor Hylan, who began making a football out of the Mayor's plans. Discredited by a landslide vote two years ago at the end of a scandalous administration, Thompson has assembled part of his old machine and has announced a slate of Aldermen in about half of Chicago's wards, all running on platforms opposed to municipal ownership.

Other political complications followed. A Republican member of the traction committee accused Mayor Dever of forcing the committee Republicans to neglect campaigning so that Democrats could get busy and take away their wards. Finally Alderman Nelson, a labor mouthpiece and a Thompson candidate, saw Corporation Counsel Busch talking privately and separately to three Dever Aldermen.

"The corporation counsel is here lobbying among the members," Nelson said significantly to Mayor Dever.

"That's untrue," shouted the corporation counsel. "If I were elsewhere, I'd say it stronger."

Nelson, committed to Thompson's old 5-cent fare plank, wanted to know whether the proposed Municipal Railway Board could raise and lower fares.

"Yes, raise or lower them," Chairman Schwartz said.

"Never mind the lowering," retorted

Nelson. "That board will be right on the job to increase fares to care for the certificate holders."

Other Aldermen, quiet during the first part of the ordinance reading, broke out vociferously when Chairman Schwartz came to the section bearing the \$45,000 a-year plum of the Municipal Railway Board appointments. This probably will be around \$125,000 a year when the tentative salary of \$5,000 a year each for the board members is finally raised to a fitting figure.

Alderman Fick, learning that Council would not have an iota of control over the nine-member board, and that the terms would be nine years, denounced the section as autocratic.

"If these men go wrong," he demanded, "how can the common people understand it wasn't us who put them there? We have got to have the say on the three who represent the city."

"And the recall of all nine," added Alderman Mills.

"And cook up a most palatable political broth," broke in Chairman Schwartz sarcastically. "Every two years, when a bunch of new Aldermen come in, we'll have new board members. Why, it will take these men three years to become effective on the job. Give them a chance without this threat."

"The bankers have to concede us that," said Mills, "to protect their surface lines securities due in 1927."

DIFFICULTIES AUGMENTED

Nothing was settled, except that the committee recognized the irony of a suggestion from Alderman McKinlay, representing the exclusive Beverly Hills district, who said that if the Aldermen couldn't trust the Appellate Court judges to decide the fitness of group C board members, he would have the section changed to read "school board" instead, inasmuch as Council ratifies school board appointments.

The Chicago problem has twice bobbed up politically in the state Capitol at Springfield, once in Governor

Small's inaugural address, paving the way for the Small faction of the Republican party to take the issue away from the Democrats by juggling legislation, and again when wet Democrats from Chicago organized to beat the traction ordinance at the referendum.

The liquor interests took their stand because of Dever's crusades on speak-easies in which he closed 4,000 saloons on court orders. In their desire for revenge the wet representatives will stomp the city, they announced, to upset the vote on the Mayor's project. They overthrew a dry as minority leader and henceforth will have control of minority legislation in the house. It is to these men that Dever will have to go for his special laws to cover the proposed purchase.

Under present conditions the outlook for the referendum is in the April judicial election, although the Mayor said a special election might be called sooner.

TERMS OF THE PURCHASE ORDINANCE SUMMARIZED

An official summary of the ordinance, drawn up by Corporation Counsel Busch and Alderman Schwartz, its authors, was issued recently for publication. It ran to the extent of 38 column inches of newspaper space. The need does not appear to exist for the publication of this summary in full, but a restatement of some of the principal provisions may be of interest. Among other things the ordinance provides:

For the acquisition of the existing street railways and elevated lines by the issuance of municipal railway certificates pursuant to the terms of the 1903 and 1913 acts of the Illinois Legislature. The principal and interest of these certificates are payable solely out of earnings of the railway properties and the proceeds of any sale of the properties so acquired and cannot under the law be paid out of money raised by general taxation.

For the acquisition of the elevated "at a specific amount which can be increased only if the municipal railway board so recommends and the City Council passes an ordinance approving this recommendation and this ordinance is submitted and approved at a referendum."

For the construction of subways out of the traction fund and possibly by special assessment immediately after the passage and approval of the ordinance. The construction of such lines it would appear will depend on the success of the city in its negotiations to purchase the elevated lines, the routes of the new subway being governed by the ability to fit the lines into the general scheme.

For so doing in elevated, surface and subway lines that they will all fit into a comprehensive whole.

For the acquisition of any other local transportation properties or any other means of local transportation, including buses, although not described in the exhibits attached to the ordinance, if the railway board so recommends and the City Council passes an ordinance approving the recommendation and the plan is sanctioned at a referendum.

For a depreciation and renewal fund to come out of the current earnings of the system.

For the segregation of all earnings of the railway lines in a fund separate from all the rest of the city's financial funds.

For a barometer fund to be kept at a fixed percentage of the total amount of the purchase certificates outstanding by changing the rate of fare in accordance with terms still to be written into the present tentative contract. The rate of fare, however, is always to be made sufficient to include a percentage of the earnings for the construction of extensions and the purchase of equipment.

For a municipal railway board to be appointed simultaneously with the issuance of the first certificates, this board to operate all of the local properties controlled by the city, but not to have charge of the construction of subway or elevated lines.

One-Man Cars Approved for Buffalo

Complaint of the City Dismissed by the Public Service Commission—Supplemental Rules Suggested by State Body—Ratio of Accidents to Car-Miles Cut Under One-Man Operation

THE Public Service Commission of New York on Jan. 9 dismissed the complaint of the city of Buffalo against the use of one-man cars by the International Railway in that city. At the same time the commission instructed the company to enforce two supplemental rules for the additional safety of passengers. One rule requires that in no case shall the operator receive fares, collect or count transfers, or make up his trip sheet while a one-man car is in action.

The decision of the commission accompanying the order points out that the investigation of its experts and the testimony presented at the hearings show that the ratio of accidents to car-miles operated has been reduced under one-man operation. In no case, says the decision, were any facts developed by the commission's investigation or presented at the hearing to show that any of the recent serious and fatal accidents in Buffalo were fairly attributable to one-man operation or would have been avoided by two-man operation.

During the period of one-man operation 914 accidents occurred with a service of 1,809,867 car-miles, or 5.05 accidents per 10,000 car-miles. During two-man operation 761 accidents occurred with a service of 1,504,118 car-miles, or 5.06 per 10,000 car-miles.

More than 50 per cent of all accidents were due to collision of electric cars with automobiles, it was brought out. Accidents resulting from other causes than collisions with automobiles have been reduced from 2.51 accidents per 10,000 car-miles under two-man operation to 2.21 accidents per 10,000 car-miles with one-man operation.

The commission points out that one-man operation has resulted in an increase in the number of cars on mid-day schedule from 52 under two-man operation to 69. The maximum number of cars operated under two-man schedule was 111. This number has been increased to 132 cars under the present schedule.

The strict enforcement of the two following rules is directed:

The operator of a one-man car must perform no other work than that of motorman unless the conditions then prevailing permit him to do so with safety. In no case, while a one-man car is in motion, shall the operator receive fares, collect or count transfers or make up his trip sheet.

If the operator leaves the car standing to throw a switch, a signal light, to telephone, or for any other purpose, the air brake must be applied in the emergency position; if standing on a grade, the hand brake must also be set firmly. When he leaves the car, operator must remove reverse handle from controller and take it with him.

The case arose out of the complaint in which the city of Buffalo alleged that one-man operation "increases the number of accidents to other vehicles and to pedestrians and decreases the headway of service." An investigation made by the street railway experts of the commission covered a period of several months and included riding and testing both one-man and two-man cars, investigation of all accidents

which have occurred on one-man cars for the first eleven months of 1924, interviews with witnesses of all fatal accidents, examination into the methods of employment, instruction and discipline of operators and inspection and tests of the safety equipment, which is installed at the time that the cars are converted from two-man operation.

In addition the commission held public hearings at Buffalo on Dec. 29 and 30. At these hearings the city was represented by its law department and the company by its attorneys, and numerous witnesses were produced and testimony taken relating to the operation of one-man cars, including type and safety equipment of cars, operation, service, headway, rules and accidents. Executives of street surface railway systems, operating one-man cars in New York, Philadelphia, Boston, Albany, Schenectady and other cities, also testified as to the results of such operation on service and accidents.

The cars used in one-man operation in Buffalo are two-man "near-side" cars converted and completely overhauled from the track to the trolley wire. In addition to the circuit breaker on the platform, a line breaker has been installed under the car in compliance with the commission's recommendation. The air braking system is reconstructed and additional pilot, triple, emergency and operators' valves are installed.

The commission says that an added responsibility is placed upon a conductor or motorman who operates a one-man car. Two positions are consolidated into one, and this of necessity requires a better type of employee. To obtain this, supplementary physical and mental examinations are required, special tests are made and individual instruction of one-man operation forms a greater part of the student operator's course of instruction. There is an increase in wage of 5 cents an hour over the prevailing rate of wages paid conductors and motormen of two-man cars. In its comment on the case the commission reviewed the method of examination and selection of operators of one-man cars.

The commission comments on the company's rule which reads:

No act must be permitted to divert attention from the proper performance of duty while the car is in motion, i. e., unnecessary conversation, reading, lounging, looking backward, adjusting equipment, turning signs, stoking stove, attracting the attention of passersby, or any condition of mind or inattention to duty which may lead to an accident.

It says testimony taken tended to show that some operators collected fares and gave and received transfers while the car was in motion. The commission says that this practice should be strictly prohibited. In its opinion the judgment and discretion allowed individual operators by the rule above quoted can be more specifically limited by enforcing the two rules which were previously quoted.

Municipal Men After Increase

The Municipal Railway at San Francisco, Cal., faces a new-year crisis in demands of the platform men for increased pay. The new wage scale submitted would increase the present rate from 67½ cents an hour to 80 cents for a 48-hour week, on a basis of 44 hours' actual work.

William H. Nancy, director of the San Francisco Bureau of Governmental Research, says the new wages, if granted, would give the municipal carmen more than the Market Street Railway men, who get 42 cents an hour at the start and 52 cents after three years of service with a 12½-hour maximum range of working hours.

Mr. Nancy declares he can foresee a possible wiping out of the Municipal Railway depreciation fund, with a financial crisis resulting if the city government meets the demands of the men.

There is much talk of a raise in fares from 5 to 6 cents. Adolph Uhl, manager of the recently organized City Efficiency League, is one of the chief proponents of the fare increase. He contends that if the proposed wage increase is granted the platform men the higher fare will be absolutely necessary. He gives figures showing that the road's yearly profits have been gradually declining from \$88,965 in 1919 to \$8,000 in 1924, owing to increased costs of material and labor.

Mr. Uhl claims that even if the supervisors deny the wage increase the Municipal Railway will still fall behind \$150,000 in the coming fiscal year, due to increased costs and a recent adjustment made in the pay of the city carmen by charter amendment. He figures that this has added \$200,000 to the road's annual expenses.

Another Suit Contests Dallas Fare

A hearing on the petition for a temporary injunction to restrain the Dallas Railway, Dallas, Tex., from charging a 6-cent fare will be held on Jan. 26 before the Sixty-eighth District Court. F. J. Geller, the plaintiff, asks that the officers of the railway be cited to state reasons why the 6-cent fare should be charged. He seeks a reinstatement of the 5-cent rate. He also asks that the property be placed in the hands of a receiver, be disposed of and that creditors be paid with the proceeds of the sale.

The agreement under which the present 6-cent fare is being charged by the Dallas Railway was to expire on Jan. 11, to which date it was extended from Dec. 27 to give John W. Everman, supervisor of public utilities, time to complete his plan No. 3. The plan specifies the extensions and new construction the city will demand shall be carried out by the railway company in return for a continuation of the higher fare.

The company up to a very late hour had not applied for the extension claiming that it would be difficult to borrow the money to make any extensions because of the suit pending before the Supreme Court contesting the right of the city to authorize a 6-cent fare

in the face of the franchise voted by the people specifying a 5-cent rate. Both the suit in the federal court and the one in the District Court were filed by W. S. Bramlette, attorney for Mr. Geller.

Additional Railway Lines Suggested for Detroit

Prospects for additional railway lines for the city of Detroit, Mich., have been increased by the agreement reached with Robert Oakman for the completion of construction of the Oakman line, and by the furnishing of estimates asked by Henry Ford on the cost of the Warren Avenue link, which it is expected Ford will finance.

The Oakman line will run from Grand River Avenue to Michigan Avenue, the only physical connection with the D. S. R. system being at Grand River Avenue. At this point it will connect with the Northwestern Belt, which was also built by Mr. Oakman and has been taken over by the D. S. R. It terminates at the Ford plant in Highland Park.

Many of the Ford employees transferred from the Highland Park plant to the River Rouge plant have homes in Highland Park and the North Woodward district. This has led the Ford organization to seek a direct route between the two plants. When estimates were requested by Mr. Ford of the cost of the lines to the Rouge, figures were also included by the D. S. R. to cover the cost of work on the present single-track Oakman line to prepare for car operation.

The Oakman line will be completed and rented to the D. S. R. with an option to purchase. This line will be completed by Mr. Oakman. It is also expected that Ford will carry out his offer to finance and build a double-track line on West Warren Avenue from the present city limits to the Oakman line. This will connect the D. S. R. lines with the Oakman line at Warren Avenue, but the building of lines on Schaefer Road and Wyoming Avenue, for which Ford made inquiry for estimates, will probably be held in abeyance. The Oakman line is considered the first step in the program of railway construction for that vicinity.

The total cost of the proposed lines in which Mr. Ford expressed interest, exclusive of the Oakman line and certain track on Michigan Avenue that would link the Oakman line with the others, is estimated at \$1,284,435. A statement of the cost was asked by Mr. Ford with a view to his financing the lines and then renting them to the city.

Certain lines in which Mr. Ford is interested would probably make it unnecessary to complete the Oakman line. It is understood that the lines to be built by Ford will be taken over by the city at cost less depreciation. The great expansion of the Ford industries in River Rouge has made it necessary to provide additional transportation facilities in that district just as soon as possible. Lack of funds on the part of the Department of Street Railways has made it impossible for the city to carry out the work at once without assistance.

Seven Cents in Binghamton

As soon after Jan. 15 as the Public Service Commission will give its approval and continuing one year thereafter the Binghamton Railway, Binghamton, N. Y., will charge a maximum fare of 7 cents within the city limits for each passenger. This is an increase of 1 cent over the present rates. This advance in rates is the result of an 8 to 3 vote of the Common Council following the submission of a report by a special committee. The company operated 50 miles of city and suburban railway.

The committee said that the company promised its employees an increase in wages of 2 cents an hour provided the higher fare was allowed. The report stated that the estimated expenses of the railway exclusive of pavement expenses of the year 1925 was \$944,800; that the estimated daily income of the railway based on a 7-cent fare was \$2,625, and the estimated daily expense of the company exclusive of paving costs was \$2,588. These figures make no allowance for depreciation of any railway property.

The company paid \$60,000 in taxes last year, of which \$2,817 was paid upon property which does not produce any income.

At the time of the receiver's discharge, he had on hand approximately \$90,000. This sum was accumulated in the last two and one-half years of the receivership. During this period nothing was paid to the receiver as salary or otherwise, and no allowance was made for attorney's fees.

Upon the discharge of the receiver on Feb. 23, 1924, this sum was turned over to the railway company and the company borrowed \$75,000 more, making the total \$165,000, but out of this amount the company was obliged, under the order of the United States Court, to pay \$98,387 immediately for receiver's fees and allowances to various attorneys. This left a balance of \$66,613, most of which was used to pay old creditors' claims, negligence claims and interest obligations maturing on May 1, 1924.

Members of New York Legislative Committees Named

In the New York Senate the Republican leaders have reduced the size of the public service committee this year from 14 to 12 members. This is the committee to which is referred measures relating to regulation and control of public utilities as well as amendments to the public service commission law. The make-up of this important committee, so far as the Senate is concerned, is practically all new. None of the Republican members of last year were named, and of the Republican appointments Senator Whitley of Rochester saw service on this committee 4 years ago. Warren T. Thayer of Chauteaugay, a manufacturer, has been named chairman.

The Assembly public service committee retains its same chairman, Yale of Putnam, and its five ranking members as of last year. The chairman is a veteran legislator with fifteen years' experience in the Assembly.

Cincinnati Traction Has No Responsibility in Franchise Issues

Neither the Cincinnati Street Railway nor the Cincinnati Traction Company is an applicant for a new franchise and the Cincinnati Street Railway alone assumes the responsibility of considering any question that may arise in connection with a new grant. These facts were emphasized on Jan. 8 at a meeting of the street railway committee of City Council of Cincinnati, Ohio. The committee had under consideration the tentative grant repudiated by the Mayor and his advisers last December. The reference to the Cincinnati Traction Company was contained in a letter received from W. Kesley Schoepf, president.

President Schoepf said that the Cincinnati Traction Company and the Ohio Traction Company now had an understanding with the Cincinnati Street Railway whereby the responsibility of considering any question that might arise in connection with the new franchise was assumed by the Cincinnati Street Railway in view of the fact that it alone would be the grantee in any ordinance passed by the City Council. For this reason he said it was unnecessary for any representative of his company to attend the meeting of the committee and that in not attending no discourtesy was intended. He said that his company when requested would furnish to the Cincinnati Street Railway any information it had respecting the operation of the street railway system. The meeting was the first to be held by the committee since the introduction of the proposed grant of a new franchise by Councilman William Hess, after Mayor George P. Carrel failed to comply with the Council's resolution to submit a report on the negotiations that have been pending virtually three years.

Councilman Frank Duttenhofer, chairman of the committee, in opening the session, stated that it was to be deeply regretted that the negotiations of the committee appointed by the Council a year ago were rendered nugatory at the eleventh hour, but that the regular committee of the City Council would attempt to continue the negotiations in the hope of evolving a franchise that would prove acceptable to the company and be approved by a majority of citizens.

The meeting was attended by city officials and representatives of the Mayor's private advisers, together with delegates from civic and improvement associations. W. C. Culkins, executive vice-president of the Chamber of Commerce, informed the committee that the special traction committee of the organization would make recommendations in relation to the franchise as soon as the investigation and report of Dr. Milo R. Maltbie, traction expert, had been completed.

Samuel Assur, attorney for the Cincinnati Street Railway, made a verbal statement on behalf of his client at the session. He stated that under the new ordinance the operating company would have to create a fare control fund of \$400,000 immediately and that \$200,000 of that would have to be exhausted in addition to approximately

\$237,000, representing one-sixth of the allowed return of capital, before the fare could be increased.

Taxi Operator Offers to Run Municipal Railway in Lincoln

Thomas H. Madigan, veteran taxicab proprietor of Lincoln, Ill., has surprised the City Council by offering to operate the local municipal railway as a private venture. He tendered the Council an annual rental of \$300 for a period of 3 to 5 years. Originally, the railway was profitable and was operated for many years by a stock company. Ten years ago, the company failed and the City Council, rather than abandon the line, took over operation. By strict economy, it was possible to operate without a loss, but during the past year, the expenses have exceeded the receipts. In consequence the Council began considering the question of substituting buses for the railway. The Aldermen now feel that if Mr. Madigan is convinced he can operate the line at a profit and pay \$300 rental, the city should be able to do so. Before accepting the new offer, the Council will investigate other phases of the situation.

More Bus Lines Planned at Detroit

Traffic studies are being made by the Department of Street Railways at Detroit, Mich., in various districts with a view to adding still more bus lines. Single-deck buses will be used largely, as the commission has given up for the present the idea of purchasing double-deck buses. A deadlock between the Council and the Street Railway Commission still exists relative to the purchase of the 50 buses, bids for which were asked and were first opened last fall. As noted in the ELECTRIC RAILWAY JOURNAL for Jan. 10 the Mack Avenue bus line was started by the Detroit Department of Street Railways on New Year's Day and two other new lines have been announced. Service was started on Plymouth Road on Jan. 1.

Columbus Property Questions Jurisdiction on Buses

The Columbus Railway, Power & Light Company has protested against the granting of a certificate to the Columbus Motor Bus Company, organized several months ago to operate buses from the center of the city to Bexley, a suburb. Counsel for the railway contends that the commission has no authority to regulate buses in home rule cities. This question now is pending before the Supreme Court of Ohio in cases from Youngstown and Cleveland.

The protest also declares that the Rail-light Company serves this territory adequately and is "amply able financially and by reason of proper equipment to give any additional electric railway service needed." If the bus company's application for a certificate is granted, the petition alleges, operating revenues of the Rail-Light Company will be impaired with irreparable injury to the public.

Commission's Findings on Oakland Accident Questioned

Officials of the Key System Transit Company, Oakland, and the California Railroad Commission are not in agreement over a report made by the board into the fatal wreck on the Key fill in Oakland the morning of Dec. 4. The report was based on investigations made by W. J. Handford, service superintendent. In it, the companies operating trains on the fill are ordered to reduce their speed from a maximum of 35 m.p.h. to 15 m.p.h., when the block signal system indicates caution and to keep inspectors on trains to see that these orders are obeyed.

The Handford report, based on evidence at several hearings, declared that the accident was due:

1. To failure of the motorman of the San Francisco-Sacramento train to comply with the special rule in the time-table of the Key System Transit Company, which requires that on passing an automatic block signal in "caution" position, the speed of the train shall be reduced so that a stop may be made prior to passing the next signal, should the same be in "stop" position.
2. To improper placing of signals in automatic block signal territory, under conditions where high-speed trains have been injected into operation under control of signals designed for a maximum speed of 35 m.p.h., resulting in inadequate distance being available in which the effect of the automatic emergency application of brakes can function, should a signal in "stop" position be passed by a motorman.
3. To lack of proper and definite supervision of trains running on joint tracks under contract.

Acting on this report, the board ordered the Key System Transit Company immediately to:

1. Reduce the speed of all trains operating within automatic block signal limits.
 2. Issue a special time-table rule requiring all motormen to reduce speed at a block signal indicating "caution" to a maximum of 15 m.p.h., and to proceed thereafter with train under such control that a stop may be made before passing the next signal.
 3. Make frequent checks as to compliance by all motormen of speed requirements.
- Operate the block signal system between the outskirts of Oakland and the Key pier on the basis of two stop signals, one "caution" and two "clear" signals to be in the rear of a train, the second "clear" signal behind a signal indicating "caution."

When these orders were received, C. O. G. Miller, president of the Key System Transit Company, issued the following statement:

We deny that the Key System Transit Company was responsible for the accident on Dec. 4.

We deny that there was any lack of proper and definite supervision of trains and general laxity as to the important of train rules, operating regulations and special instructions relating thereto.

The Railroad Commission reached its decision without a hearing. Had the commission held such a hearing, as is customary in matters of this kind, and permitted the introduction of testimony, we believe it would not have made the report and order it did.

Mr. Miller further stated that at the present time an independent survey of the block signal system is being made by the company and if, as a result of this survey, changes are found to be necessary they will be made regardless of the commission's order.

Clyde L. Seavey, president of the commission, said in reply:

The order issued by the commission is specific and needs no further explanation. Mr. Miller could not have read the full decision. If he had he would not have made the statement he did. No further orders will be issued by this board unless the Key System Transit Company unduly delays execution of the original directions.

Michigan Motor Freight Operator Not a Public Carrier

The difference between a public and a private carrier is clearly set forth in a decision of the United States Supreme Court rendered Jan. 12, 1925, in the case of the Michigan Public Utilities Commission, et al., appellants, vs. Coral W. Duke, doing business as the Duke Cartage Company. The Michigan law provides that no person shall engage or continue in the business of transporting persons or property by motor vehicle for hire upon the public highways of the state over fixed routes or between fixed termini, unless he shall have obtained from the Michigan Public Utilities Commission a permit to do so. This permit is issued only when the public convenience and necessity require it and may be withheld when it appears that the applicant is not able to furnish adequate, safe or convenient service to the public. It also puts all such operators in the class of common carriers, requires them to carry insurance for the protection of the property required by them, etc., and imposes a fee for the privilege of engaging in the business.

The Duke Cartage Company claimed it was not a public carrier, because its entire business consisted of hauling automobile bodies made at the plants of three manufacturers in Detroit to an automobile manufacturer at Toledo and that the company did not hold itself out as a carrier for the public. The court sustained this position. The court also said that a state may rightly prescribe uniform regulations necessary for public safety and order in respect to the operation upon its highways of all motor vehicles—those moving in interstate commerce as well as others and that a reasonable, graduated license fee may be imposed, but the state has no power to impose on interstate commerce conditions and regulations which are unnecessary and unreasonable. This would be done, it said, if it required this private carrier to become a common carrier, with its onerous duties and strict liability. The police power of the state does not extend so far.

Wisconsin Road Reduces Fares

Cash and ticket fares charged by the Wisconsin Traction, Light, Heat & Power Company on its interurban lines connecting Neenah, Menasha and Appleton and between Kaukauna and Appleton were reduced on Jan. 5.

The cash fare between these points has been changed from 20 to 15 cents, with no transfer privilege, however, to city cars. Very substantial reductions have been made in the cost of tickets and weekly passes. The 25-ticket rate of \$4 has been discontinued and in its place a new book of 10 tickets for \$1.35 will be issued. This is a saving of 2 cents per ticket. Passengers who use this ticket are permitted to transfer to and from city cars. Weekly passes are sold for \$1.50 instead of \$1.75. The former rate of 12 tickets for \$1 for use in any 15-cent fare zone has been changed to 10 tickets for 75 cents, with transfer privileges to city cars.

These reductions in fares have been

made possible through the increased use of the company's interurban service by the public and numerous economies in operation.



News Notes

Franchise for Interurban Operation Rejected.—The City Council of Niagara Falls, N. Y., has rejected the application of the International Bus Corporation, a subsidiary of the International Railway, Buffalo, for a franchise to operate Buffalo-Niagara Falls de luxe interurban buses over the streets of Niagara Falls. The company asked the right to operate over Buffalo Avenue, Erie Avenue, Falls Street and Riverway to the International traction terminal at Prospect Park. The City Council said there was no necessity for a Buffalo-Niagara Falls bus route.

Collectors Employed.—Fares Reduced.—To relieve rush-hour conditions in the loading of passengers on its one-man cars the Public Service Railway, Newark, N. J., announced recently that it would place collectors on cars at traffic centers to receive fares. The company also announced a reduction from 8 cents to 5 cents in the fare on the last zone of the Bloomfield line and readjustment of its Kinney and Springfield lines in this city to absorb the line which now serves the Ironbound section. The rate change went into effect on Jan. 15.

Bus Operation Restrained.—Injunctions against seven bus operators operating lines connecting Providence and Attleboro, Crompton and Phenix and Woonsocket and Blackstone, Mass., have been granted in the Superior Court at Providence, R. I., by Judge Chester W. Barrows on petitions presented by the United Electric Railways and the New Haven road. The injunctions restraining the lines are temporary.

Cars Stop While Sun Hides.—Lucius S. Storrs, president of the Connecticut Company, has announced that operations on all the company's lines will cease during the total eclipse of the sun on Jan. 24. The order has been given to comply with the request of Prof. E. W. Brown of the Yale Astronomical Observatory, New Haven, Conn.

Seeks Public Help.—The United Railways & Electric Company, Baltimore, has called upon the public for suggestions in handling traffic during bad snowstorms. The company had printed a large number of folders containing an editorial from the *Public Ledger*, Philadelphia, which was headed "What Would You Do?" The public was asked to make suggestions to the company's service department. The same editorial also was reprinted in the newspapers in the form of an advertisement.

Denies City Officials Are to Blame.—The Corporation Counsel recently filed an answer with Arthur F. Simonson, lawyer of Stapleton, Staten Island, denying the responsibility laid on Mayor Hylan and members of the Board of Estimate of New York City for the

death of Peter Champanis, who was hit by a trackless trolley on March 12, 1922. Mrs. Champanis brought suit for \$75,000 damages, but when the suit was called to trial before Supreme Court Justice Strong in the Richmond County Supreme Court, Assistant Corporation Counsel Draper moved to dismiss action on the ground that the city was not liable, as the trackless trolley cars were being operated without a franchise. Later the complaint was amended making Mayor Hylan and the individual members of the Board of Estimate defendants. The recent answer denied responsibility and alleged Mr. Champanis was killed because of his own neglect.

Pending Settlement Buses Run.—Operation of buses between Alliance and Canton, Ohio, by the Stark Electric Railroad has been resumed under special permission granted recently by the Common Pleas judge. The buses will continue to travel pending a hearing on an injunction request. In a temporary injunction issued the company was restrained from operating buses in Alliance, Canton, or the highways between the two cities. At present the Stark Electric Railroad buses have been leased to Samuel Derenberger, Canton, who has a bus schedule filed with the state officials.

Railway Gets Bus Permit.—The Public Utilities Commission of the District of Columbia recently denied the application of the Bradbury Heights Motor Bus Line to operate a bus line between Hillcrest, Good Hope and the city, but authorized the Capital Traction Company to operate buses from the terminal of the railway line at 17th Street and Pennsylvania Avenue to and into the sub-divisions of Hillcrest and Good Hope. The rate of fare as stipulated in the order, which became effective Dec. 23, 1924, is the same as charged on the electric railway lines.

Suggestions Include Temporary Relief.—Several propositions have been offered in a report of the joint special commission on the subject of the widening of the Boston Elevated Railway structure at Cambridge Street, Boston, Mass. The report has been filed in the Massachusetts Legislature by the Department of Public Utilities, which with the Transit Commission made up the special board. A few suggestions included temporary relief. The commission recommends that nothing be done until the various propositions for the solution of the problem have received further consideration.

Fares Advanced.—The Public Utilities Commission of the Territory of Hawaii authorized some time ago an increase in the fare on the cars of the Honolulu Rapid Transit Company. The new rates are full cash fare 7 cents, token or ticket fare four for 25 cents and children's token or ticket fare three for 10 cents. The decision stated that if the 8 per cent return on the rate base established in this opinion was not produced after the first 12 months it was believed that the full return would be reached "and perhaps slightly exceeded in subsequent years."

Wants City to Control Utilities.—Mayor Frank X. Schwab of Buffalo, N. Y., has instructed Corporation Coun-

sel Rupp to draw up a bill for presentation to the Legislature at Albany which would give to the city the control of public utilities within its boundaries, now exercised by the Public Service Commission. Problems such as Buffalo's one-man trolley car controversy, the Mayor said, would be taken care of in such a bill.

Services Rewarded.—Approximately 1,100 employees of the Wisconsin Public Service Corporation, Green Bay, Wis., who have been with the corporation a year or more recently received life insurance policies ranging from \$500 to \$1,000, according to the term of service. Those who have completed one year's service receive a policy for \$500 to be increased \$100 each year up to 6 years, when the maximum policy of \$1,000 is reached. Those now employed less than a year will receive a policy for \$500 at the completion of a year's connection. The insurance was placed with the Travelers' Insurance Company, which issued individual policies in favor of the employees.

Wants Permission for One-Man Car Operation.—One-man cars will be operated by the Illinois Central Electric Railway on the line connecting Canton, St. David, Bryant and Lewistown, Ill., and in the towns of Canton, Fairview and Farmington if the Illinois Commerce Commission approves.

Bus Petitions Denied.—The Public Utilities Commission of Connecticut recently decided against the petitions of J. F. Farr and Mascot, Inc., both of New Britain, Conn., to establish a bus line between New Britain and Hartford. The Connecticut company is prepared to supply the necessary service by operating buses between the points in question.

Seeks Higher Fare.—The Tide Water Power Company, Wilmington, N. C., has applied to the State Corporation Commission at Raleigh for permission to increase city fares from 7 cents to 7½ cents, using tickets or tokens. The petition also asks for an 8-cent cash fare and a 10-cent local fare to Wrightsville Beach. In spite of every economy in operation, the Tide Water Power Company declares the inroads made by automobiles upon revenues necessitate a higher fare.

Tax Litigation To Be Settled.—In a hearing begun in the Superior Court at Seattle, Wash., the question will be decided whether King County is entitled to retain all the interest on the railway tax paid several months ago. The litigation, in which the Puget Sound Railway & Power Company, the city and county, were involved, lasted 5 years following the purchase of the local railway lines by the city. The county has divided the principal of the tax, amounting to \$401,018 with the state, school, city and port, but Treasurer W. W. Shields, acting on the advice of Chief Civil Deputy Prosecutor Howard A. Hanson, is retaining all of the interest accumulated during the 5 years. This amounts to more than \$250,000. George A. Meagher, assistant corporation counsel, asks that \$113,725 of the interest be turned over to the city, and Assistant Attorney-General Donald Fraser makes a similar demand for \$33,214 on behalf of the state.

Foreign News

London Underground Program Improves Service

The extensions and improvements of the underground system of London, England, are gradually coming into use, so that better service is being introduced on the lines of the Central London, Great Northern & Piccadilly, Baker Street and Waterloo and the Metropolitan District Railways. The southern section of the City & South London Railway was reopened Dec. 1, on the completion of the work of enlarging its tunnels.

Other factors in the rehabilitation program are the addition of new rolling stock, improvements in signaling and train-starting arrangements and the installation of a new 15,000-kw. turbo-generator at the Chelsea power station. Fifty new cars are soon to be delivered to the Metropolitan District Railway. Various station improvements now completed or nearing completion have already been mentioned in the *ELECTRIC RAILWAY JOURNAL*.

Practically all the underground lines are maintaining much shorter headways than heretofore and during the rush hours are operating additional trains or adding cars to the regular trains.

Transportation in Glasgow, Scotland, to Be Improved

Important developments in passenger transportation were dealt with by Glasgow Town Council recently. It was recommended that Parliamentary permission be sought for station and other improvements on the subway recently purchased, which are necessary if the subway is converted from cable to electric traction, as proposed. Another change is improvement of curves on the subway to permit higher speeds of cars. Loop lines or sidings for repair work are also contemplated.

By electric traction it is believed that the maximum speed of trains can be raised to 30 m.p.h., as compared with 12 m.p.h. with the cable system.

The development of bus services was also recommended.

British Tramway Wages Settled

The controversy between the British tramways and the Transport & General Workers Union was settled Nov. 13 by the National Joint Industrial Council unanimously adopting the report of the special tribunal. This tribunal was set up to investigate the claims of the employees in regard to classification, grouping of tramway undertakings and increase in wages.

The report recommended classification and maximum and minimum wages for each class, so adjusted that no man should receive an increase of more than 1s. 6d. a week above the present rate. Extra pay for night work was recommended and it was also proposed that new scales should be stabilized until at

least April, 1926. Besides adopting the award, the Council recommended that it be operative as from Nov. 18.

One of the employer's representatives said the settlement was one of the most satisfactory that had been reached in the history of the tramway industry and that it had been arrived at in a most amicable spirit.

New Electric Railway Planned in England.—Negotiations are taking place for the construction of the Worcester & Broom Railway, for which an act of Parliament was obtained several years ago. The new line when completed will form a direct route between Worcester and South Wales and between Blisworth and Cambridge, and beyond. It is proposed that stations be erected at Worcester, Broughton, Hackett, North Piddle, Radford, Dunnington and Broom. Some of these places are at present 6 and 7 miles from a railway station.

Pekin Sees Street Cars.—The walled city of Peking, China, witnessed on Dec. 17 the inauguration of a system of street cars. Crowds gathered about the street for the trial run of brilliantly decorated vehicles which moved slowly through the city using overhead current. There are 30 miles of track. The plan is to run the system beyond the city walls. It is said that many thousand jinrikisha coolies are worried for fear the new transportation methods will affect their livelihood.

Glasgow Corporation Buys Paisley Tramway.—The tramway of Paisley, Scotland, a private company, was purchased some time ago by the Glasgow Corporation and is now being operated as a part of the municipal tramway system of Glasgow. Paisley is located about 6 miles from Glasgow and through cars operate between the two cities.

Paris Underground Increases Bond Issue.—The bond issue of the Nord-Sud Underground Railway, Paris, France, was increased 34,000,000 francs the last of October. In conformity with the agreement with the Paris municipality, the interest payments are to be deducted from the gross receipts and any deficit between the remainder and expenses will be reimbursed by the city of Paris. In case of the final purchase of the line by the city, the municipality will assume responsibility for payment of interest.

Bradford to Keep Weekly Pass.—The weekly pass is to be continued on the tramways in Bradford, England, but will now be non-transferable. Penny stages are also to be given a 6 months' trial. The tramways committee was in favor of abolishing the passes, but after a discussion with the Town Council the committee was overruled by three votes. It was stated that the income from passes in November was £1,526 a week, or about one-seventh of the gross income of the tramway.

Financial and Corporate

New Income Ruling

Employees of Municipally Owned Utilities Liable for Taxes as Far Back as 1918

All employees of municipally owned institutions, such as water, light and electric railways, which are defined as acting in a proprietary rather than in a governmental capacity, are subject to federal income tax on their compensation. They will have to pay taxes on their incomes as far back as 1918, and the Bureau of Internal Revenue has notified collectors of internal revenue to compel the filing of returns over those years.

The ruling, far-reaching in its application, is based on court decisions in several sections of the country, which have held, in effect, that such institutions as were named were competing with private enterprise and should occupy a similar footing with respect to certain taxation features. Officials of the bureau declined to be definite in the application of the ruling, which was made by Solicitor Nelson T. Hartson, and the problem of enforcement has been left in the hands of local internal revenue collectors.

There are a dozen or more cases, involving similar questions, pending before the bureau, and it was the opinion of officials that final adjudication of these will aid materially in constructing and applying the law.

The Solicitor's ruling made these specific statements:

In deciding whether or not any particular activity in which a state or municipality may be engaged is a governmental function, the attitude of the federal rather than the state authorities should govern.

The compensation received for services rendered in connection with a municipally owned water system is not exempt from income tax.

As a result of the ruling and the expected decision on other similar questions in like fashion, every city or state or other political subdivision operating such quasi-public institutions, it is believed, will find it necessary to go through its records and provide the collectors of their districts with full information about their employees, present and past. From these, the collectors will be able to trace down the persons who hitherto had filed no returns, believing that they were not subject to the federal income tax because they were employees of institutions supposed to be exempt by law.

Knowledge of the bureau's ruling came upon a request by Senator Shortridge of California, who sought to obtain from Commissioner Blair reasons for the assessment of taxes on employees of the municipally owned water and light system of Riverside, Cal. The commissioner's letter to Senator Shortridge caused the bureau to make public the ruling.

Senator Shortridge announced he did not consider the letter as having ended the controversy, and that he intended to press the question in the hope of pre-

venting the ruling being made final in its present form. He asserted that he was not satisfied with the authorities used by Commissioner Blair as the basis for giving the ruling retroactive effect.

The first reaction to the decision is heard from Seattle. It has been estimated there that 2,800 employees of the Seattle utilities, including employees of the Seattle municipal railway, are liable for the tax. Long before the Washington, D. C., decision, however, the matter seems to have been up for consideration in Seattle. In fact, injunction proceedings were instituted by Corporation Counsel T. J. L. Kennedy against the local collector in the federal court to prevent collection of such tax last spring, when notice was served on employees of the Seattle Municipal Railway that they must make income tax returns. The case was still pending when the ruling from headquarters

Bondholders Take Over Danbury & Bethel Property

The Danbury & Bethel Street Railway, Danbury, Conn., has been taken over by the first mortgage bondholders, mostly of Boston, Mass. William Sperry, New Haven, Conn., is general manager of the line.

Robert A. Manwaring, general manager of the New Haven Illuminating Company; William W. Walker, Shore Line Electric Railway, New Haven, and George R. Tweedy of Danbury, appraisers on the property of the Danbury & Bethel Street Railway, have returned figures to the Superior Court showing a total valuation of \$529,981.

The receivership will be continued until such time as the court decides the priority of certain claims against the company and payment of the claims has been made in accordance with the court's findings.

New York Companies Doing Better

17,000,000 More Passengers Carried in 1923 than in 1922—Group Still Shows Deficit, but the Operating Ratio Is Down—Interesting Five-Year Comparison of Fares

OPERATING revenues of electric railways in New York State other than those in New York City for 1923 show an increase of approximately \$700,000 over those for 1922, with a decrease in operating expenses of approximately \$1,300,000. For the sixth consecutive year, this group of companies has failed to have gross income sufficient to meet fixed charges. The net loss for 1923 was smaller than in 1921 or 1922 and the operating ratio is more favorable. Analysis of the figures indicate that this better showing is the result of both increased operating revenues and decreased operating expenses and fixed charges. In its report for the year the Public Service Commission says that this may be attributed in part at least to the fact that with only one exception there were no serious interruptions of electric railway service because of strikes and the effect upon the riding public of those initiated in prior years is gradually disappearing. The number of passengers carried during the year 1923 (616,377,402) shows an increase of approximately 17,000,000 more than in 1922. There were 643,870,858 passengers carried in 1921 and 748,233,247 in 1920. These facts are all

taken from the report of the Public Service Commission filed with the Legislature on Jan. 15.

During the year the receivership on the Buffalo & Lake Erie Traction Company's property was terminated, and a new company known as the Buffalo & Erie Railway was formed to take over and operate a portion of the former property. The urban portion within the city of Erie, Pa., has been included within a separate corporation to be known as Erie Railways. Operation of the urban lines of the Walkkill Transit Company within the city of Middletown was discontinued and bus service was substituted.

The commission has been officially informed that approximately 30 per cent of the motor buses sold during the past year were purchased by electric railway corporations. Such buses have been put in service upon lines designed to render service in recently developed territory in which there is a reasonable demand for service, which is too light to support the expenditure required for electric railway construction. They have also been put in operation within older sections of cities in which there has been inadequate service, or to sup-

STATEMENT OF DIFFERENT FARES CHARGED IN NEW YORK STATE OUTSIDE OF NEW YORK CITY

Item	1920		1921		1922		1923		1924	
	Cities	Per Cent of Total	Cities	Per Cent of Total	Cities	Per Cent of Total	Cities	Per Cent of Total	Cities	Per Cent of Total
5 cents.....	19	33	16	28	15	26	13	23	13	23
6 cents.....	5	8	9	16	5	8	4	7	3	5
7 cents.....	24	43	16	28	24	43	27	47	24	43
8 cents.....	9	16	16	28	13	23	13	23	15	27
10 cents.....									1	2
Total.....	57	100	57	100	57	100	57	100	56	100

RESULTS OF OPERATIONS OF ELECTRIC RAILWAYS IN NEW YORK STATE OUTSIDE OF NEW YORK CITY

Item	1921	1922	1923
Railway operating revenues.....	\$42,824,208	\$41,858,280	\$42,530,753
Railway operating expenses.....	37,290,565	36,978,228	35,674,050
Net revenue railway operations.....	\$5,533,646	\$4,880,052	\$6,856,704
Railway tax accruals.....	2,779,829	2,872,018	2,938,251
Railway operating income.....	\$2,753,813	\$2,008,034	\$3,918,453
Net revenue, other operations.....	817,335	1,302,688	1,101,937
Non-operating income.....	1,086,074	924,942	854,571
Gross income.....	\$4,657,220	\$4,235,664	\$5,874,961
Interest charges.....	8,548,575	9,034,475	8,620,343
Other deductions from gross income.....	642,060	694,362	623,402
Net income.....	Loss \$4,533,411	Loss \$5,493,173	Loss \$3,368,784
Dividends during year.....	419,659	1,770,977	1,213,458
Passengers carried (fares and transfers).....	643,870,858	599,080,364	616,377,402
Revenue car-miles.....	91,059,219	92,481,319	92,135,786
Mileage in New York state.....	2,001	1,990	1,971
Operating ratio.....	87.08%	88.34%	83.88%

with the trustee until final payment of principal and "dividends" on the entire issue.

It is explained that the equipment covered by the certificates is of the latest standard type for operation in urban service. It will consist of 335 double-end, four-motor, front-entrance, center-exit, double-truck, steel frame cars with complete safety-type control. Cars similar to the new ones are now being operated successfully by the railway.

EXCELLENT DIVIDEND RECORD

The bankers explain that the company has an uninterrupted dividend record since 1855 except for the period from October, 1919, to September, 1922. Cash dividends aggregating 10 per cent were paid during the fiscal year ended June 30, 1924, on \$12,000,000 of capital stock then outstanding. The capital stock was increased to \$16,000,000 by a stock dividend of 33½ per cent paid Sept. 30, 1924, which substantially offset the absence of dividends from 1919 to 1922. A quarterly dividend of 2 per cent and an extra dividend of one-half of 1 per cent was paid Dec. 1, 1924, upon the increased capital stock.

The Chicago, Aurora & Elgin Railroad issue is dated Dec. 1, 1924. The offering price was par to yield 6½ per cent. The notes are to be secured by pledge with the trustee of \$1,000,000 principal amount of the company's refunding and improvement mortgage 6 per cent gold bonds, series C, due Dec. 1, 1934. Application to create both the issues of bonds and notes has been made to the Illinois Commerce Commission. The proceeds from the sale of the notes will be used to fund current loans and for additions and betterments. Thomas Conway, Jr., president of the railway, explains that for the twelve months period ended Oct. 31, 1924, gross earnings were \$2,358,726. Net earnings during the same period before depreciation were \$503,327 as compared with annual interest of \$232,000 on the company's funded debt to be outstanding upon completion of the present financing.

plement present lines now overloaded. Such service has been rendered in Utica, Syracuse, Rochester and Buffalo. In the cities of Cohoes and Rochester, trackless trolleys have been installed. In this connection it is pointed out that electric railways desiring to engage in the motor bus transportation business have been obliged under existing laws to organize separate corporations for that purpose. The commission favors an amendment of the law so as to permit street railways to operate auxiliary bus transportation under such safeguards and regulation as may be proper.

The mileage decrease for the year is shown as 20 miles, of which approximately 18 miles was due to the abandonment of its entire road by the Orange County Traction Company. The commission says that in cases where sections of electric railways are abandoned, motor bus service is usually provided. The total of 1921 includes some of those roads over which operation has been discontinued and it is probable that some of these will be permanently abandoned.

In a proceeding instituted before the commission, entitled "In the Matter of the Application of the Village of Mamaroneck for a Prohibition Order against the Public Service Commission and New York & Stamford Railway" and later carried to the state courts, the Court of Appeals affirmed an order of the Appellate Division, Third Department, reversing an order of the Special Term (Howard, J.) denying the petition of the village of Mamaroneck for a prohibition order to restrain the commission from approving the tariff schedule filed by the New York & Stamford Railway. The decision holds that the authority granted to the commission by chapters 134 and 335 of the laws of 1921, amending the Public Service Commission Law, to modify rates of street railway contained in franchise with municipality was taken away by the enactment of chapter 891 of the laws of 1923, and that such authority did not continue for purpose of granting application made prior to June 1, 1923, the date on which chapter 891 of the laws of 1923 became effective.

The commission has again renewed its recommendation to the Legislature for the early enactment of detailed statutory provisions setting forth the extent to which the Legislature intends that the commission shall exercise regulatory powers over the operation and maintenance of bus lines. The commis-

sion says that its jurisdiction over bus lines is apparently expressly limited to the granting of certificates of convenience for the operation of such lines or routes outside of New York City. Unless this is the legislative intent it requests a modification of this provision so far as lines operating in and out of New York City are concerned.

\$4,500,000 Financing Placed

Brooklyn City Railroad Equipment Issue and Interurban Note Issue Before the Public

Two issues of electric railway securities were offered to the public by Halsey, Stuart & Company, New York, during the week ended Jan. 17. They were \$3,750,000 of Brooklyn City Railroad equipment trust 5 per cent gold certificates, series A, and \$750,000 of Chicago, Aurora & Elgin Railroad two-year 6½ per cent secured gold notes.

The Brooklyn City Railroad issue was dated Jan. 15, 1925, and is due serially in equal amounts of \$375,000 yearly until Jan. 15, 1935. The issue was priced to the public to yield 4.50 for the Jan. 15, 1926, maturity to 5.50 per cent for the Jan. 15, 1935, maturity. The certificates are to be issued under an equipment trust agreement and lease to the Brooklyn Trust Company, as trustee, whereby title will be held by that company to equipment costing in excess of \$5,000,000, or more than 133 per cent of the principal amount of the issue.

The equipment will be operated by the railroad at a rental sufficient in amount to provide for the annual installments of maturing principal and "dividends" on the certificates. The title to all the equipment will remain

Traffic Declines Again on Detroit Municipal Railway

The city of Detroit, Department of Street Railways, has given out operating statistics for the months of November and October, 1924, compared with similar months of 1923. The accompanying table shows the traffic and income figures.

CITY OF DETROIT, DEPARTMENT OF STREET RAILWAYS

	November, 1924	November, 1923	October, 1924	October, 1923
Total revenue from transportation.....	\$1,597,608	\$1,799,220	\$1,680,926	\$1,867,943
Total operating revenue.....	1,649,701	1,886,857	1,730,559	1,966,187
Total operating expenses.....	1,167,655	1,401,541	1,235,365	1,449,921
Net revenue from railway operations.....	\$482,046	\$485,316	\$495,194	\$516,266
Taxes and rent deductions.....	59,845	59,379	59,798	59,379
Net operating income.....	\$422,201	\$425,937	\$435,396	\$456,888
Total non-operating income.....	14,763	1,006	10,966	43,143
Gross income.....	\$436,964	\$426,943	\$446,362	\$500,030
Total deductions from gross income.....	402,719	366,364	415,349	378,045
Net income.....	\$34,245	\$60,579	\$31,014	\$121,986
Total car-miles operated.....	3,765,393	4,077,195	3,955,498	4,302,638
Total passengers carried.....	34,980,603	39,071,049	36,909,526	40,590,326

Reorganization Likely Soon

Receivership of New York Railways May Be Lifted Feb. 1—Security Holders Reconciled

Difficulties among the several protective committees involved in the reorganization of the New York Railways, operating about 70 miles of line principally in Manhattan Borough, New York City, have been composed and it is expected the plan of readjustment will be declared operative about Feb. 1. The reorganization will be placed in effect substantially as drawn, only minor changes in regard to the method of the participation of security holders in the subsidiary lines having been made.

The proposed plan of reorganization calls for the acquisition by the new company, through foreclosures and creditors' sales, of all assets of New York Railways now in the hands of the receiver except such property now owned which is not used in the operation of the railway system. No assessments of any description are to be levied against any security, and new money required for purposes of the reorganization and for capital requirements is to be provided out of the proceeds received from the sale of non-operating assets.

The drastic reductions in capitalization and annual fixed charges by which it is proposed to establish the new company along sound financial lines follow:

FINANCIAL SET-UP OF SUCCESSOR TO NEW YORK RAILWAYS

Existing company:	Principal	Fixed Charges
Bonds—fixed charges.....	\$39,425,198	\$1,751,093
Stocks—dividend rentals...	3,836,700	346,966
Total fixed charges securities.....	\$43,261,898	\$2,098,059
N. Y. Rys. adj. inc. bonds..	30,609,487	1,530,474
N. Y. Rys. stock.....	17,497,060	.....
Total.....	\$91,366,445	\$3,628,533
New company:		
Total fixed charge bonds...	\$19,353,060	\$967,500
New income bonds.....	19,435,472	1,166,128
Preferred stock—184,830 shares.....	No par	.....
Common stock—90,200 shares.....	No par	.....
	\$38,788,472	\$2,133,628

The *Wall Street Journal* says that operating results for the five months ended Nov. 30, 1924, after giving effect to the changes in maintenance allowances contemplated in the reorganized company, show good earning prospects. Substantial reductions were made in operating costs, particularly in the operation of power plant, and large additions made to gross income as a result of a cut in maintenance from 38 per cent of total transportation revenues to 25 per cent. The latter rate was adopted in accordance with the suggestions of expert engineers, and brought maintenance charges in conformity with maintenance charges effective on other electric railway systems.

Comparative operating statistics for five months ended Nov. 30, 1924, and 1923 are given in the accompanying table.

Gross income of \$750,997 for the five months represents an approximate an-

COMPARATIVE STATEMENT OF NEW YORK RAILWAYS FOR FIVE MONTHS

	1924	1923
Gross revenue.....	\$3,543,581	\$3,856,388
Operating expenses:		
Maintenance of way and structures.....	482,859	778,271
Maintenance of equipment...	349,656	558,469
Operation of power plant.....	242,608	423,551
Operation of cars.....	1,092,901	1,138,165
Injuries to persons and property.....	266,405	281,419
General and miscellaneous expenses.....	165,255	201,117
Total operating expenses...	\$2,599,684	\$3,380,994
Taxes.....	298,429	349,431
Total operating expenses and taxes.....	\$2,898,113	\$3,730,425
Income from railway operation	645,468	125,963
Non-operating income.....	105,529	116,001
Gross income (available for interest).....	\$750,997	\$241,964

nual rate of \$1,800,000. In the opinion of competent engineers testifying before the Transit Commission this amount can be increased by approximately \$1,200,000 through various changes in operating methods and capital investments approximating \$3,800,000. Whether or not earnings in accordance with these estimates are possible of immediate realization is uncertain; substantial increases appear entirely possible with able management of the reorganized properties, and ample funds for working capital are provided in the plan. It has been estimated that earnings in the first year of operation under the plan will cover all fixed charges, including interest on \$19,435,472 of 6 per cent income bonds.

Bus Lines in Pennsylvania Taken Over by Electric Railway

Buses operated by the West Chester Transportation Company between Wilmington, Del., and West Chester, Pottstown and West Chester and West Chester, Norristown and Valley Forge and other points in Chester and Montgomery Counties in Pennsylvania have come under the control of the Peoples Transportation Corporation, a subsidiary of the West Chester Street Railway.

Through the acquisition of the holdings of the West Chester Transportation Company the new owners have obtained an additional fleet of 14 modern motor coaches, together with a large terminal building in West Chester. The structure is one of the largest there and is well adapted to the requirements of the bus transportation business, having been laid out to suit the purpose by the former owners.

The motor coach routes which were operated by the West Chester Transportation Company will be consolidated with the unified electric railway and motor coach system of the West Chester Street Railway Company and the Peoples Transportation Corporation.

Comprehensive plans for the betterment of the service and a rearrangement of schedules to afford more convenient and efficient service are being worked out and will be put into effect in the near future.

The story of the co-ordination of the bus and the railway in southeastern Pennsylvania by these companies was reviewed at length in the *ELECTRIC RAILWAY JOURNAL* for Nov. 22, page 881.

Sixteen-Mile Georgia Interurban Suspends

Service on the Atlanta Northern Railway, or Marietta interurban line, the stock of which is owned by the Georgia Railway & Electric Company, was discontinued on Jan. 14 because of losses resulting from unfair bus competition. The road has about 16 miles of track. The discontinuance of service was not precipitate. It followed an announcement made as far back as Nov. 21, 1924, in a letter to city authorities of Marietta, Smyrna and Atlanta and to county commissioners of both Fulton and Cobb Counties, that the road could no longer continue unless the bus as a competitor was eliminated. This announcement was repeated twice in statements before the City Council of Marietta, not as a threat but simply as a declaration of the inevitable fact that the inroads into the line's revenues soon would make a discontinuance of service necessary.

In the year 1923 the Atlanta Northern Railway failed to earn bare operating expenses, taxes, renewals and interest on debt by the sum of \$19,500. Since the operation of buses began the railway receipts have decreased \$202 a day, or at the rate of \$73,730 a year, making the aggregate loss in operations at the rate of \$93,200 a year. This means that it is costing \$93,200 a year more to run the road than it is taking in. The attitude of the company is that the line cannot possibly resume operations until it is in a position to earn its way.

With the opening of the new concrete road from Marietta to Atlanta, a line of buses began operating between Marietta and Atlanta, running along the highway, over the streets of Marietta, Smyrna and Atlanta, crossing the bridge over the Chattahoochee River immediately paralleling the line of the Atlanta Northern Railway. These buses could only operate by the consent of the governmental authorities of Marietta, Smyrna and Atlanta, the County of Cobb and the County of Fulton. Any one of them could forbid the operation of buses over the particular section of road or streets under its several jurisdictions.

The railway respectfully suggested that in the public interest this ought to be done. It said that "to permit these buses to operate on a roadway provided for them at public expense, a large portion of which this company has itself paid for, over a bridge which this company built, taking away the revenue essential for the support of the railway service, is manifestly unfair to the Atlanta Northern Railway, and in the end would, as we pointed out to county and city officials in a letter on Nov. 21, 1924, mean the discontinuance of its operations." The railway further said:

The buses operating without charge on the recently paved public highway built at public expense, free of cost to the bus operator, and running over pavements and bridges for which this company paid, free of any charge to the bus owner, resulted in grossly unfair competition with the interurban line. The bus charges only the full cash fare, depriving the interurban line of its profitable customers, leaving the interurban only the low-priced commuters. The company called attention to the fact that this would unquestionably increase the loss of the interurban line to such an extent that it could not continue to operate.

Personal Items

W. E. Thompson Vice-President

Third Avenue Railway Official Made an Executive, but Retains Transportation Post

W. E. Thompson, for 6 years superintendent of transportation of the Third Avenue Railway, New York, has been elected vice-president of that organization. Mr. Thompson will continue in charge of transportation, following the line of activity in which he has specialized throughout his railroad career of more than 20 years.

Mr. Thompson has made a special effort toward the development of sound industrial relations in the transportation department and in fostering better public relations through immediate and tactful response to all complaints and suggestions. He was a leading factor in presenting to the people of the Bronx and to the city at large the advantages of the Third Avenue Railway's plan involving co-ordination of trolley and bus service with transfer privileges between the two, in connection with the proposed granting of bus franchises by the city of New York.

He is interested in every movement for the betterment of his own organization and the industry at large. He was most active and successful in the development of the new Metropolitan Section of the American Electric Railway Association and at the organization meeting of that section on Sept. 24, 1924, he was elected its first president.

Mr. Thompson was born in 1876 in Mecklenburg County, Virginia. After attending the local schools, at the age of 18 he entered industrial life in a tobacco manufacturing business in his native county. Before many years he entered the street railway business, starting at the bottom with the old Virginia Passenger & Power Company, Richmond, now the Virginia Railway & Power Company. After service on the cars, and as starter and inspector, he became division superintendent under S. W. Huff, now president of the Third Avenue Railway, who was then general manager of the Richmond company.

In 1908 Mr. Thompson was called to Brooklyn as chief inspector and assistant superintendent of transportation of the Coney Island & Brooklyn Railroad, again under Mr. Huff, who had left Richmond to become president of the Brooklyn company. In 1911 he became superintendent of transportation, and in 1914 when the Coney Island & Brooklyn Railroad was taken over by the Brooklyn Rapid Transit Company he was made superintendent of the Brooklyn & North River Railroad, which was jointly operated by the Brooklyn Rapid Transit, New York Railways and Third Avenue Railway. Mr. Thompson remained in that position until 1919, when he became connected with the Third Avenue Railway as superintendent of transportation.

A portrait of Mr. Thompson was

published in the *ELECTRIC RAILWAY JOURNAL* for Oct. 4, 1924, at the time of his election to head the Metropolitan Section.

F. R. Coates Heads C. E. R. A.

Well-Known Toledo Official Elected President of the Central Association at Dayton Meeting

Frank R. Coates of Henry L. Doherty & Company and president of the Toledo, Ottawa Beach & Northern Railway, Toledo, Ohio, was elected president of the Central Electric Railway Association at the meeting in Dayton, Ohio, on Jan. 9. Mr. Coates was formerly president of the Toledo Traction, Light & Power Company, where



F. R. Coates

he resided, but he removed to New York about a year ago to assume general supervision over all of the utility properties of that company.

Mr. Coates' hobbies have been described as smiling, baseball and boating. His chief aim doesn't have to be described. It is making friends. As one of his immediate associates in the Doherty organization said of him, that company has in Mr. Coates a philosopher of the genuine type, whose good humor is impervious to such trifles as franchise troubles, street car strikes and delays in the receipt of equipment.

For a long time it was thought that Mr. Coates had no invulnerable spot, but that spot is said to have been discovered several years ago during the ninth inning of a game between his "Rail-Light," composed of men from the Toledo company, and a Cincinnati team being played to decide the national amateur championship. Just when two were on, two out and the score tied, someone sent a hurry telephone call from New York to Toledo for Mr. Coates and it was relayed to the ball park. After a while Mr. Coates' philosophic soul calmed down and he answered the phone.

Mr. Coates was born in Philadelphia on June 20, 1869. He was graduated

from Lehigh University in 1890, and took a post-graduate course the following year. Mr. Coates found some time aside from his scholastic pursuits to interest himself in Lehigh athletics and captained the track team for two years, starred on the football eleven and class lacrosse team and managed the nine. To anticipate inquiries it had best be stated that Mr. Coates' activities with the track team consisted in holding the mile walk record. He began work as a rodman with the Baltimore & Ohio Railroad at Pittsburgh. By 1892 he had advanced through the ranks to supervisor of the Wheeling division.

In May of the next year he was made assistant roadmaster of the New York Division of the New York, New Haven & Hartford Railroad in charge of maintenance and new track construction, and in December, 1895, he hung his hat on the roadmaster's hook.

Still not satisfied, he jumped several more rounds, and in October, 1900, became chief engineer of the Chicago, Great Western Railroad. In May, 1904, he entered the engineering and construction business and built bridges for electric railroads and hydro-electric plants until December, 1909, the last two years devoting his time to the Stone & Webster Engineering Corporation. Then he was made vice-president of the Inter-Ocean Steel Company with headquarters at Chicago. He remained there until December, 1911, when he went to Toledo as president of the Toledo Railways & Light Company. At Toledo he had a large part in the settlement of the franchise matter. Behind that sentence, however, there is a big story, far too big to be told here.

During the Spanish War Mr. Coates joined the Fourth Connecticut regiment as regimental adjutant.

Mr. Coates is second vice-president of the American Electric Railway Association.

Roy W. Mathisson Appointed Auditor at Knoxville

Roy W. Mathisson was appointed auditor of the Knoxville Power & Light Company, Knoxville, Tenn., on Jan. 1. Mr. Mathisson went to the Knoxville property from Birmingham, Ala., where he occupied the position of chief clerk in the auditor's office of the Birmingham Electric Company. In 1915 Mr. Mathisson became general auditor of the Houston Lighting & Power Company, Houston, Tex., and remained there until 1917, when he entered the air service of the United States Army, with which he continued until January, 1919. In February, 1919, he entered the service of the Birmingham Railway, Light & Power Company, now known as the Birmingham Electric Company. He continued in that position up to the present time. Mr. Mathisson was born in New York City. He attended the public schools and high school in Birmingham. Later he took a course at the Alabama Polytechnic Institute, Auburn, Ala.

C. A. Briggs, who has held the position of secretary and auditor of the Knoxville Power & Light Company, will retain his position as secretary and in addition to his duties of that office will have other duties assigned to him.

Harold E. West, a member of the Maryland Public Service Commission, has been made chairman of that body to succeed Ezra B. Whitman, who resigned the chairmanship. Mr. Whitman continues as a member of the commission.

Edward P. Bell has been appointed acting superintendent of overhead construction of the Chicago & West Towns Railway, Oak Park, Ill. The appointment was effective Jan. 1, 1925.

R. Colwell, superintendent of the Edmonton Street Railway, Edmonton, Alberta, since 1921, has been appointed traffic manager of the Winnipeg Electric Railway. The system at Edmonton is municipally owned and operated.

Paul Romig has been named superintendent of railways by the Menominee & Marinette Light & Traction Company, Marinette, Wis.; Wilfred Bellmore has been named supervisor of traffic, Oscar Carlander has been placed in charge of equipment and carhouse and John Burns in charge of rail equipment.

C. L. Fosters is chief engineer of the Laurel Light & Railway Company, Laurel, Miss.

Obituary

James A. Brett, electrical engineer and inventor and Cincinnati district manager of the Westinghouse Electric & Manufacturing Company, died on Jan. 8 at Hamilton, Bermuda. Mr. Brett was widely known in the electrical industry. Many of the first interurban electric railways in the East were constructed under his direction. After finishing school he entered the Sprague Electric Works of Mount Vernon as an apprentice, and did much of the early development work on electric railway apparatus. For a number of years he took an active part in the railway construction work both in the East and in the Middle West. He went to Cincinnati as manager of the Cincinnati district of the Westinghouse company in 1905.

Safford S. Delano, formerly of St. Louis and for the last 25 years treasurer of the American Car & Foundry Company, died at his home in New York City Dec. 27. With the organization of the car company in 1899, Mr. Delano went to St. Louis from Detroit to become treasurer of the new organization. In 1908 his headquarters were moved to New York. He was 68 years old.

Joseph E. Dozier, formerly general manager of the Nahant & Lynn Street Railway, died on Jan. 7 at Miami, Fla. Mr. Dozier started his career with the Atlanta Telephone Company in Atlanta, Ga., the city of his birth. He later went North and accepted a position with the New England Telephone & Telegraph Company at the Milk Street Exchange, Boston, Mass. In 1895 he was appointed manager of the Quincy exchange. Very soon after this Mr. Dozier became manager of the Nahant & Lynn Street Railway, which position he filled for 14 years with great success. He next became connected with the Northway Motor Organization of Boston and Natick.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

Manufacturers of Ten Countries Contribute to Java Electrification

A typical example of the increasing participation of American manufacturers of railroad equipment in foreign fields is furnished in the case of the Java State Railways, which is planning to use modern cars and trailers for suburban passenger service on a section that includes the cities of Batavia and Meester Cornelis. To this work of modernization manufacturers in ten countries are contributing. They are the United States, India, Holland, France, Belgium, Cuba, Switzerland, Canada, Germany and England.

Makers of equipment in the United States are furnishing the major part of the electrical equipment, the rubberoid for the roofs, the devices for coupling in emergency to the existing steam trains, the vestibule buffers, the pneumatic door-operating mechanisms and the car seats.

The General Electric Company is electrically equipping 10 of the cars and the Westinghouse Company five. The other 15 of the 30 cars on order are trailers. The Electric Storage Battery Company, Philadelphia, is furnishing Exide batteries, and the J. G. Brill Company, Philadelphia, the car seats. The pneumatic door-opening mechanism is manufactured by the Consolidated Car Heating Company, Albany, and

the rubberoid by the Ruberoid Company, New York.

India is furnishing the teakwood for the roofs. France is contributing the wood for the floors. The all-steel bodies are being built in Holland. The window glass, wheels and axles are from Belgium, and mahogany for interior trim from Cuba. Switzerland is supplying the wiring devices and Canada the asbestos linings. The truck springs are from Germany and the air brakes from England.

The trolley voltage is 1,500, direct current, and each motor car will carry a motor-generator set to supply 65-volt current for operating the control mechanism and air compressors, supplying the lights and charging the storage batteries. The so-called subway type of ceiling fan will be used in motor cars and trailers.

G. E. Orders Show Increase

Orders received by the General Electric Company for the three months ended Dec. 31 totaled \$80,009,978, an increase of 7 per cent over a similar quarter in 1923, according to figures made public by Owen D. Young, chairman of the board of directors.

For the year 1924 the orders received totaled \$283,107,697. This compared with \$304,199,746 for 1923, a decrease of 7 per cent.

ELECTRIC RAILWAY MATERIAL PRICES—JAN. 15, 1925

Metals—New York

Copper, electrolytic, cents per lb.	15.125
Lead, cents per lb.	10.55
Nickel, cents per lb.	31.00
Zinc, cents per lb.	8.22
Tin, Straits, cents per lb.	58.50
Aluminum, 98 to 99 per cent, cents per lb.	27.00
Babbitt metal, warehouse, cents per lb.: Fair grade.....	60.00
Commercial.....	28.00

Bituminous Coal

Smokeless mine run, f.o.b. vessel, Hampton Roads.....	\$4.20
Somerset mine run, Boston.....	2.125
Pittsburgh mine run, Pittsburgh.....	1.875
Franklin, Ill., screenings, Chicago.....	1.95
Central, Ill., screenings, Chicago.....	1.95
Kansas screenings, Kansas City.....	2.50

Track Materials—Pittsburgh

Standard Bessemer steel rails, gross ton.....	\$43.00
Standard open heartb rails, gross ton.....	43.00
Railroad spikes, drive, Pittsburgh base, cents per lb.....	3.05
Tie plates (flat type), cents per lb.....	2.425
Angle bars cents per lb.....	2.75
Rail bolts and nuts, Pittsburgh base, cents, lb.....	4.025
Steel bars, cents per lb.....	2.10
Tie, white oak, Chicago, 6 in.x8 in.x8 ft.....	\$1.60

Hardware—Pittsburgh

Wire nails, base per keg.....	2.85
Sheet iron (28 gage), cents per lb.....	3.60
Sheet iron, galvanized (28 gage), cents per lb.....	4.75
Galvanized barbed wire, cents per lb.....	3.55
Galvanized wire, ordinary, cents per lb.....	2.60

Waste—New York

Waste, wool, cents per lb.....	16
Waste, cotton (100 lb. bale), cents per lb.: White.....	13-19
Colored.....	10-15

Paints, Putty and Glass—New York

Lined oil (5 bbl. lots), per gal.....	\$1.18
White lead (100 lb. keg), cents per lb.....	0.167
Turpentine (bbl. lots), per gal.....	0.92
Car window glass, (single strength), first three brackets, A quality, discount*.....	84.0%
Car window glass, (single strength), first three brackets, B quality, discount*.....	86.0%
Car window glass, (double strength) all sizes, A quality, discount*.....	85.0%
Putty, 100 lb. tins, cents per lb.....	4-6

* Prices f.o.b. works, boxing charges extra.

Wire—New York

Copper wire base, cents per lb.....	17.25
Rubber-covered wire, No. 14, per 1,000 ft.....	\$7.25
Weatherproof wire base, cents per lb.....	20.00

Paving Materials

Paving stone, granite, 4x8x4, f.o.b. Chicago, dressed, per sq.yd.....	.....
Common, per sq.yd.....	.....
Wood block paving 3 1/2, 16 lb. treatment, N. Y., per sq.yd.....	\$2.67
Paving brick 3 1/2x8 1/2x4, N. Y., per 1,000 in carload lots.....	51.00
Paving brick 3 1/2x8 1/2x3 N.Y., per 1000 in carload lots.....	45.00
Crushed stone, 1-in., carload lots, N. Y., per cu.yd.....	1.85
Cement, Chicago consumers' net prices, without bags.....	2.10
Gravel, 1-in., cu.yd., f.o.b. N. Y.....	2.25
Sand, cu.yd., N. Y.....	1.25

Old Metals—New York and Chicago

Heavy copper, cents per lb.....	12.25
Light copper, cents per lb.....	10.50
Heavy brass, cents per lb.....	8.00
Zinc, old scrap, cents per lb.....	4.50
Lead, cents per lb. (heavy).....	8.75
Steel car axles, Chicago, net ton.....	\$22.75
Cast iron car wheels, Chicago, gross ton.....	22.75
Gravel (short), Chicago, gross ton.....	27.75
Rails, (relaying), Chicago, gross ton.....	26.50
Machine turnings, Chicago, gross ton.....	14.25

Rolling Stock

Brooklyn City Railroad, Brooklyn, N. Y., has placed an order for 335 cars. In the design these cars are similar in nearly all respects to the 200 cars ordered more than a year ago except in seating arrangement. With the idea of getting passengers to move away from the doors the new cars will have longitudinal seats on one side and cross seats on the other instead of cross seats in the center and longitudinal near the ends. The same sunburst will be painted on the dashers that is now used in Brooklyn to indicate front-entrance cars. The detailed specifications of these cars follow:

Date order was placed.....Dec. 23, 1924
Date of delivery—Commencing April, 1925
Builders of car body:

150 Brill,
100 St. Louis,
85 Osgood-Bradley.

Type of car.....Front entrance,
center exit, pay as you pass

Seating capacity.....50

Weight:

Car body.....21,245 lb.
Trucks.....11,000 lb.
Equipment.....8,755 lb.
Total.....41,000 lb.

Bolster centers, length.....21 ft. 6 in.

Length over all.....44 ft. 0 in.

Truck wheelbase.....5 ft. 4 in.

Width over all.....8 ft. 4 in.

Height, rail to trolley base...10 ft. 9 1/2 in.

Body.....Steel, 0.25 copper bearing

Interior trim.....Cherry

Headlining.....Agasote and Nevasplitt

Roof.....Arch

Alr Brakes

Westinghouse Traction Brake Company

Armature bearings.....Bronze

Axles.....Heat-treated

Bumpers.....Hedley Anti-Climber

Car signal system.....Faraday buzzers

Car trimmings.....Statuary bronze

Center bearings.....Oil retaining

Side bearings.....Plain

Conduits and junction boxes.....Sherarduet

Control.....Safety Car Devices Company

Curtain fixtures.....National and Acme

Curtain material.....DuPont Fabrikoid

Destination signs.....Hunter

Door operating mechanism

National Pneumatic and Consolidated

Fare boxes.....Johnson

Wheelguards.....Root

Gears and pinions.....Nuttall

Hand brakes.....Peacock

Heater equipment.....Gold

Headlights.....Crouse-Hinds

Journal bearings.....Plain

Journal boxes.....Cast steel

Lightning arresters.....Type M. P.

Motors.....Four Westinghouse 510 A.

Paint.....Devoe & Reynolds

Power-saving device.....Arthur

Registers.....International

Sanders.....Ohio Brass

Sash fixtures.....Dayton

Seats:

150 Brill,

100 St. Louis,

85 Heywood-Wakefield.

Seating material.....Cherry slat

Slaek adjuster.....Type J

Step treads.....Feralun

Trolley catchers.....Ohio Brass

Trolley base.....Ohio Brass

Trolley wheels.....Columbia

Trucks:

310 pairs Brill,

25 pairs St. Louis.

Ventilators.....Railway Utility

Wheels.....26-in. rolled steel

Track and Line

Wisconsin Railway, Light & Power Company, Milwaukee, Wis., will merge the Myrick Park and Market Street lines by building cross-over tracks running north and south at Third and Main and Fourth and Main Streets in La Crosse. Work on this improvement will begin as soon as weather conditions will

allow for the laying of new track: The plan is to eliminate the perplexing traffic problem in the downtown section.

Stockton Electric Railroad, Stockton, Cal., has applied to the Railroad Commission for a certificate to exercise a franchise granted by the city of Stockton and to construct, maintain and operate an extension to serve the Fair Oaks district in the city of Stockton. The district is not now served by any railway.

Nashville Railway & Light Company, Nashville, Tenn., spent more than \$500,000 during 1924 for extensions and additions to property. Of this amount \$161,802 was used for reconstructing and improving tracks.

Power Houses, Shops and Buildings

Staten Island Rapid Transit Railway, New Brighton, S. I., has filed plans for the construction of a one-story local substation, near Sand Lane, estimated to cost \$18,000. The company will also build a one-story substation near the Old Town Road, Glasmere, to cost about \$16,000, and a similar station near James Street, Atlantic, to cost a like amount.

North Branch Transit Company, Bloomburg, Pa., it is reported, suffered the loss by fire on Jan. 6 of its car-house, workshop and warehouse as well as cars, including the snow-fighting equipment. The loss is estimated at \$150,000.

Trade Notes

Gramm & Kincaid Motors, Inc., Lima, Ohio, has organized to manufacture a complete line of motor trucks and buses. The organizers are B. A. Gramm, motor truck builder, and R. M. Kincaid, recently vice-president and general manager of the Garford Motor Truck Company.

Mitchell-Rand Manufacturing Company, New York, N. Y., announces among the 1925 changes in the organization the following: W. B. Stevens, formerly of the sales department, has been made manager direct factory sales department. R. E. Dunne has joined the sales force. He was for several years assistant manager of the New York Office of the Hope Webbing Company.

Truscon Steel Company, Youngstown, Ohio, has announced that Oscar W. Loew will assume charge of the advertising and sales promotion work effective February. Mr. Loew has had a wide experience in merchandising and marketing.

Union Switch & Signal Company, Swissvale, Pa., has received an order from the Pacific Electric Railway for materials for the installation of automatic block signaling through its Hollywood-Glendale Subway, Los Angeles, Cal., embracing 14 style "N" color light signals, with the necessary impedance bonds, a.c. relays and transformers for their control. In connection with this signaling, a new Union type "F" elec-

tric interlocking is being installed at the Fourth and Hill Streets terminal, Los Angeles. This plant will involve a 15-lever frame interlocking machine with the layout, including three single switches and four double slips, all of which will be operated by style "M" switch movements using 110-volt, 50-cycle alternating current. The Union Switch & Signal Company will furnish the materials and the field installation will be made by the railway company's signal construction forces.

Sangamo Electric Company, Springfield, Ill., has opened a direct sales office in Boston, Mass., in charge of Stafford J. King, who for the past 12 years has been the Sangamo sales engineer located in the New England territory. He will be assisted by W. H. Carpenter and R. D. Savage, who are at present also located in that territory. Leonard G. Hunt has been transferred to Boston to be associated with Mr. King. Both prior to and subsequent to his graduation from the University of Illinois Mr. Hunt was associated with the company, and for the last 3 years has been a district sales engineer with headquarters at the factory. A stock of meters and accessories has been placed in Boston to render adequate service in the New England territory.

New Advertising Literature

Heine Boiler Company, St. Louis, Mo., has issued a 35-page illustrated pamphlet entitled "Heine Longitudinal-Drum Boiler." The booklet is known as Bulletin No. 52.

Conveyors Corporation of America, Chicago, Ill., has issued a new bulletin describing the American high duty conveyor equipment of the steam jet type for handling ashes from power houses where machinery with large capacity is necessary. The company states that this conveyor is in successful operation in a number of large, well designed plants. The pamphlet contains 10 pages. It is illustrated.

General Electric Company, Schenectady, N. Y., has issued a 127-page volume called the Arc Welding and Cutting Manual. It is designated Y-2007. The volume is profusely illustrated. It is divided into three parts, the first devoted to general information on arc welding, the second to a training course for operators, and the third giving a number of applications of arc welding.

Foamite-Childs Corporation, Utica, N. Y., has issued "Correct Protection Against Fire," a 24-page booklet. The booklet is a popular treatise on fire protection for all sorts of risks, written in non-technical terms. The "A," "B" and "C" classifications of fires made by the Underwriters' Laboratories are defined and the proper safeguards for each class of fire are charted. This chart is a novel feature of the Foamite-Childs booklet. The text covers the characteristics of all the different extinguishing agents in detail. The size and type of extinguishers most suitable for use in the home, motor car, and all classes of industrial and institutional risks are illustrated and described in detail.

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Ample space to wind up all the chain without jamming or binding. An excess of slack cannot put this brake out of commission.

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This company operates 50 city-type busses at Youngstown and Warren, Ohio, and New Castle, Pa., and 23 De Luxe busses on its interurban routes. Both fleets ride on General Cords exclusively. These paragraphs, from a letter by Mr. R. N. Graham, tell why:

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"After nearly two years' experience, I have no hesitation in unqualifiedly recommending the General Cord for coach, stage and bus service, and no hesitation in recommending The General Tire and Rubber Company in responsibility, efficiency and keen co-operation in everything that tends to render automotive transportation successful."

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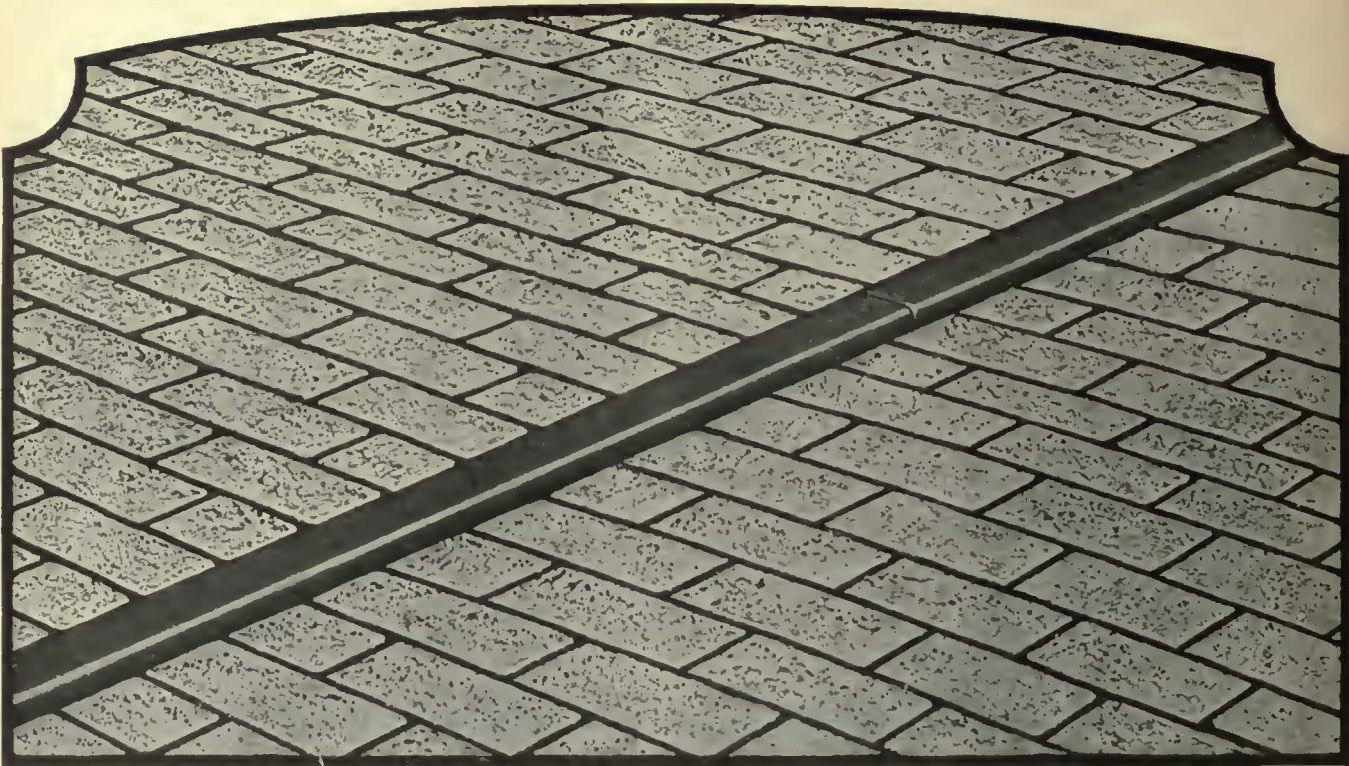
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Well-known leading roads, noted for efficient and economical management, use Miller Trolley Shoes. There are dozens of them, all over the country, from Coast to Coast.

Miller Trolley Shoes have long since passed the trial stage on these roads. They have been "*standard equipment*" for five or more years.

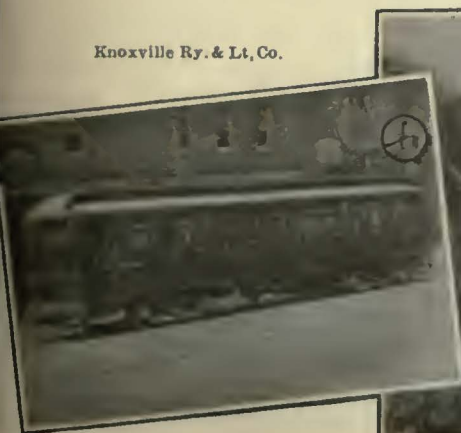
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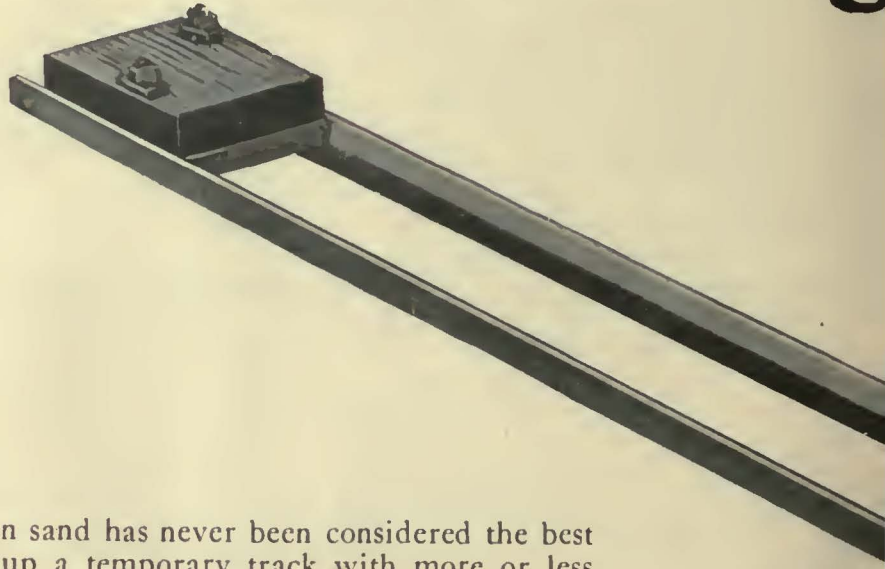
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Building a house on sand has never been considered the best practice. Sealing up a temporary track with more or less permanent paving, is hardly any better.

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Dayton Resilient Ties imbedded in concrete make as nearly permanent track construction as it is humanly possible to build at this time. The resilient feature not only reduces upkeep on rolling stock, but prevents disintegration of the concrete foundation also.

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SEAMLESS STEEL

TROLLEY POLES

Reinforced where reinforcement is needed, without adding superfluous weight or sacrificing resiliency.



THE standard "SHELBY" Poles are made from 13 gage material, as years of practical experience have shown that a lighter gage may fail by local injuries, and a heavier gage simply adds to the weight of the pole without increasing its strength to a corresponding extent. The theoretical requirement for a pole of minimum weight points out a method for increasing the strength of the pole without a proportionate increase in the weight. This method consists of the use of a reinforcement at the base end and on the inside of the 13 gage member.

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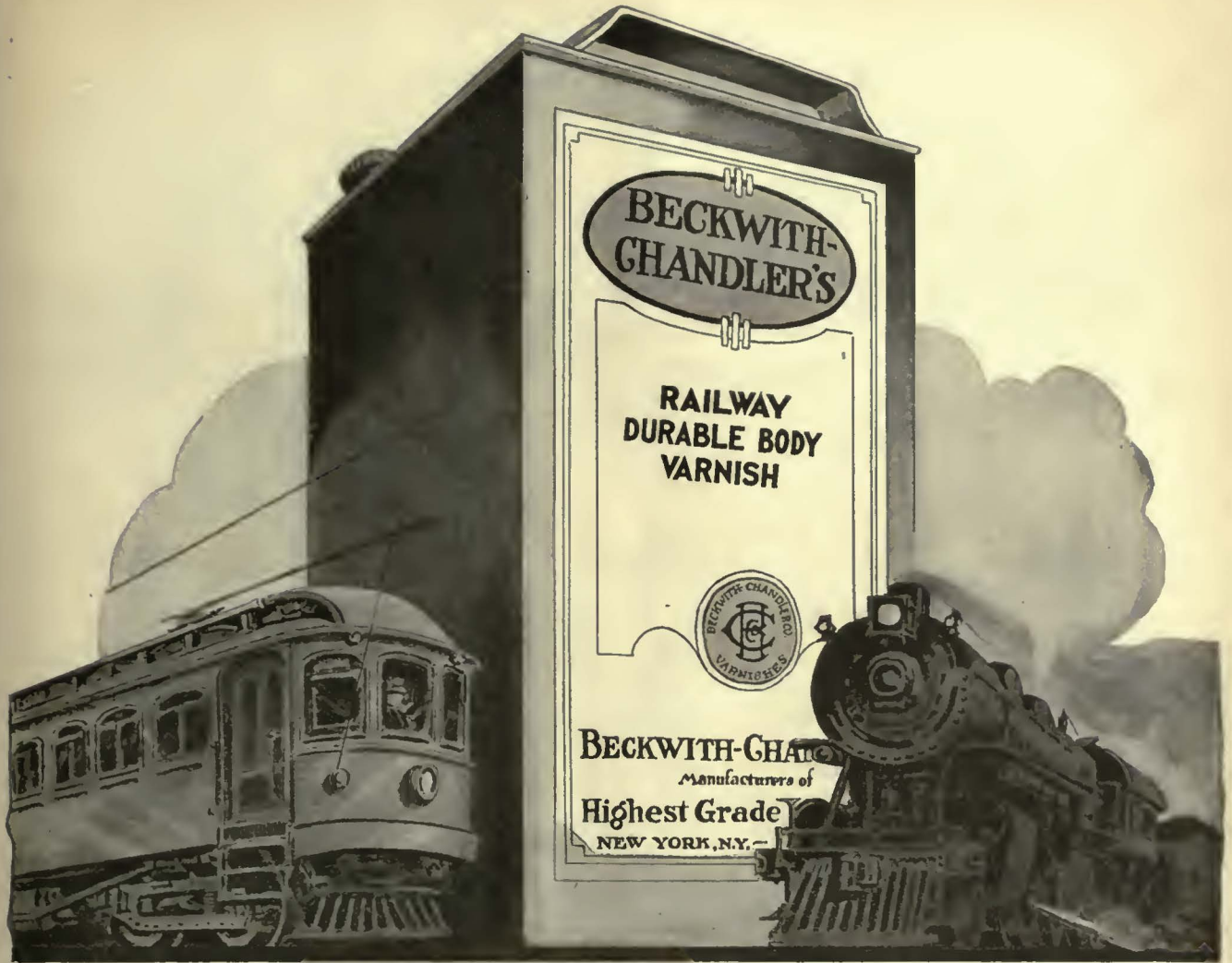
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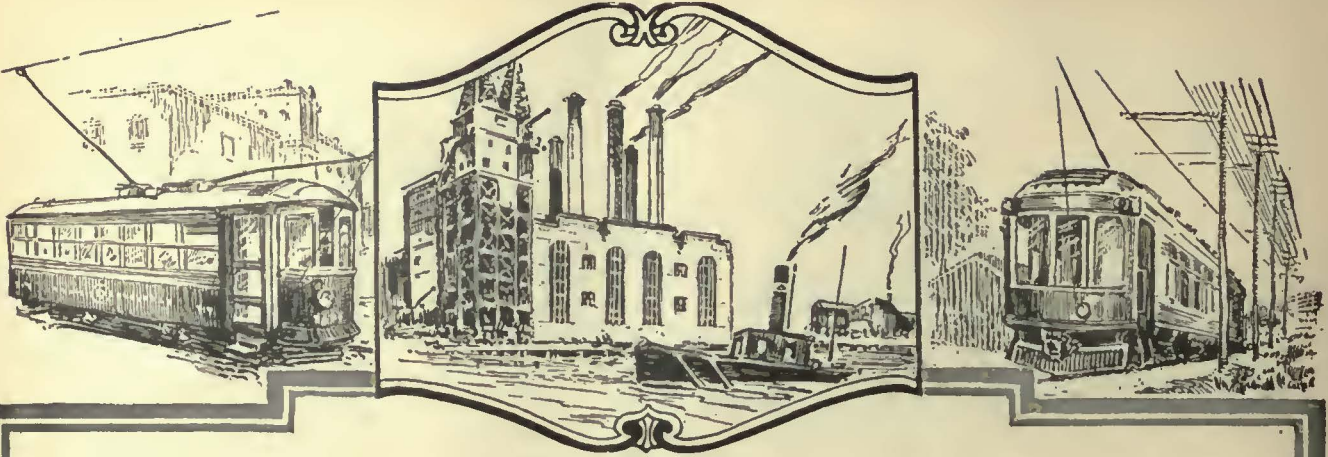
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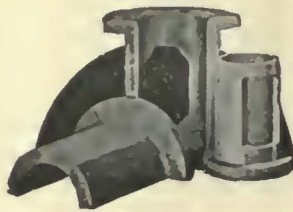
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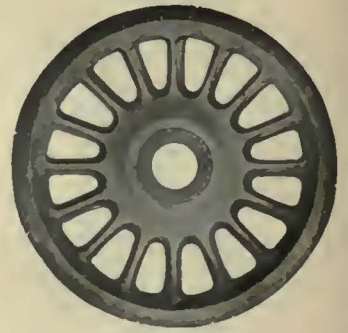
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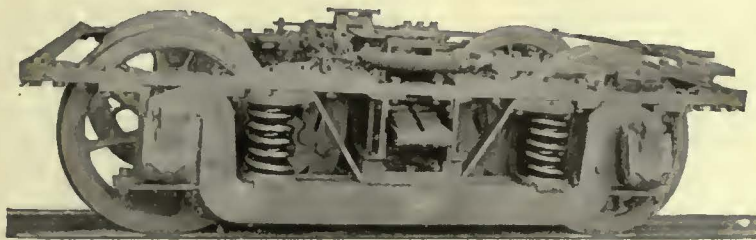
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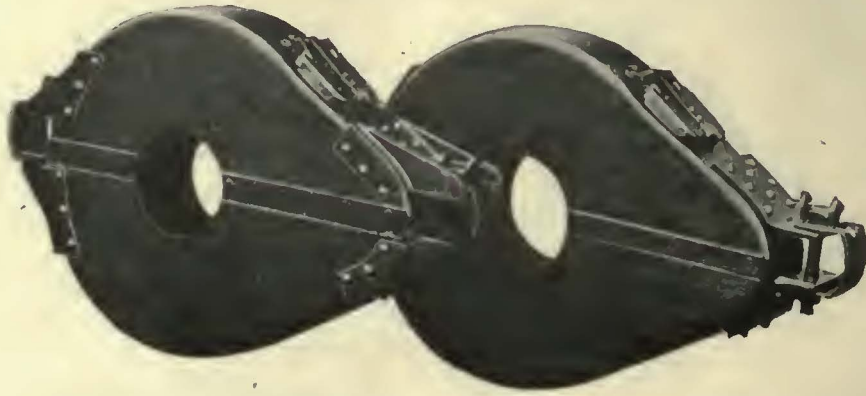
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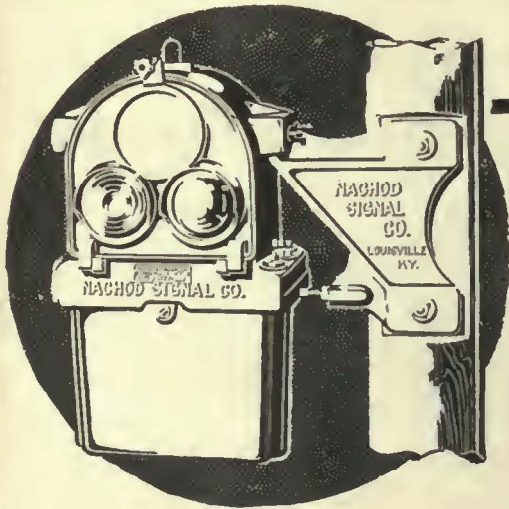


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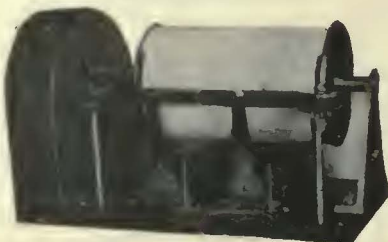
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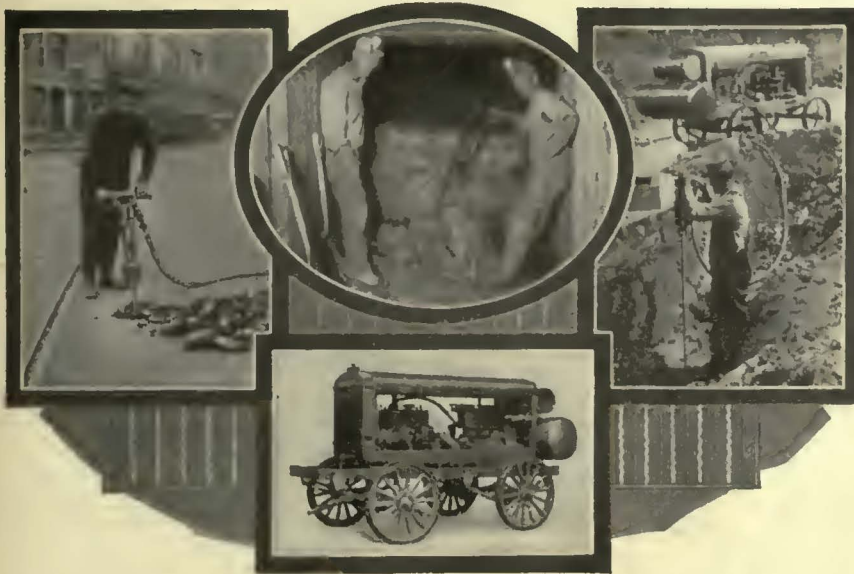
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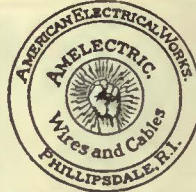
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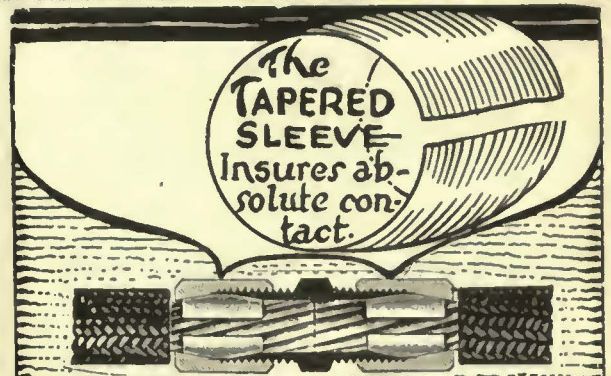
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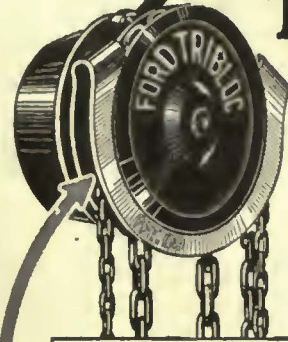
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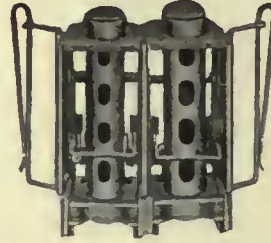
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Each barrel a separate unit, permitting the conductor to interchange the barrels to suit his personal requirements, and to facilitate the addition of extra barrels.

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Let Us Give You Particulars

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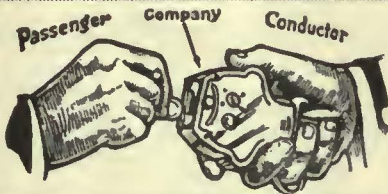
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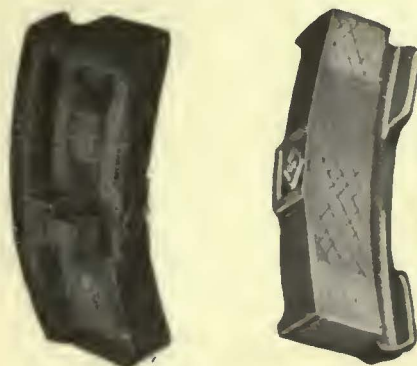
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make poor "boosters" for your service in rainy weather.

Breakdowns mean long delays and rain-drenched patrons...

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Reversible—Replaceable Box

To start with this box is made of rolled plate which of course wears longer than the softer cast metal.

When inner surfaces have worn it is necessary only to put front plate in rear and rear plate in front.

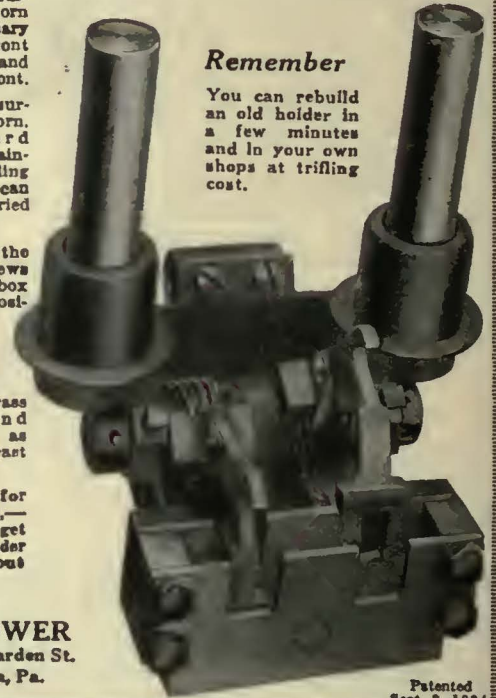
When all four surfaces are worn, new standard parts are obtainable at trifling cost,—a stock can easily be carried at all times.

What's more the four cap screws that bind the box together are positively secured against loosening by a special form of soft brass locking band washer. Just as secure as a cast box.

Write now for further details,—or better still get a Flower Holder and try it out yourself.

Remember

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Sept. 2, 1924

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35

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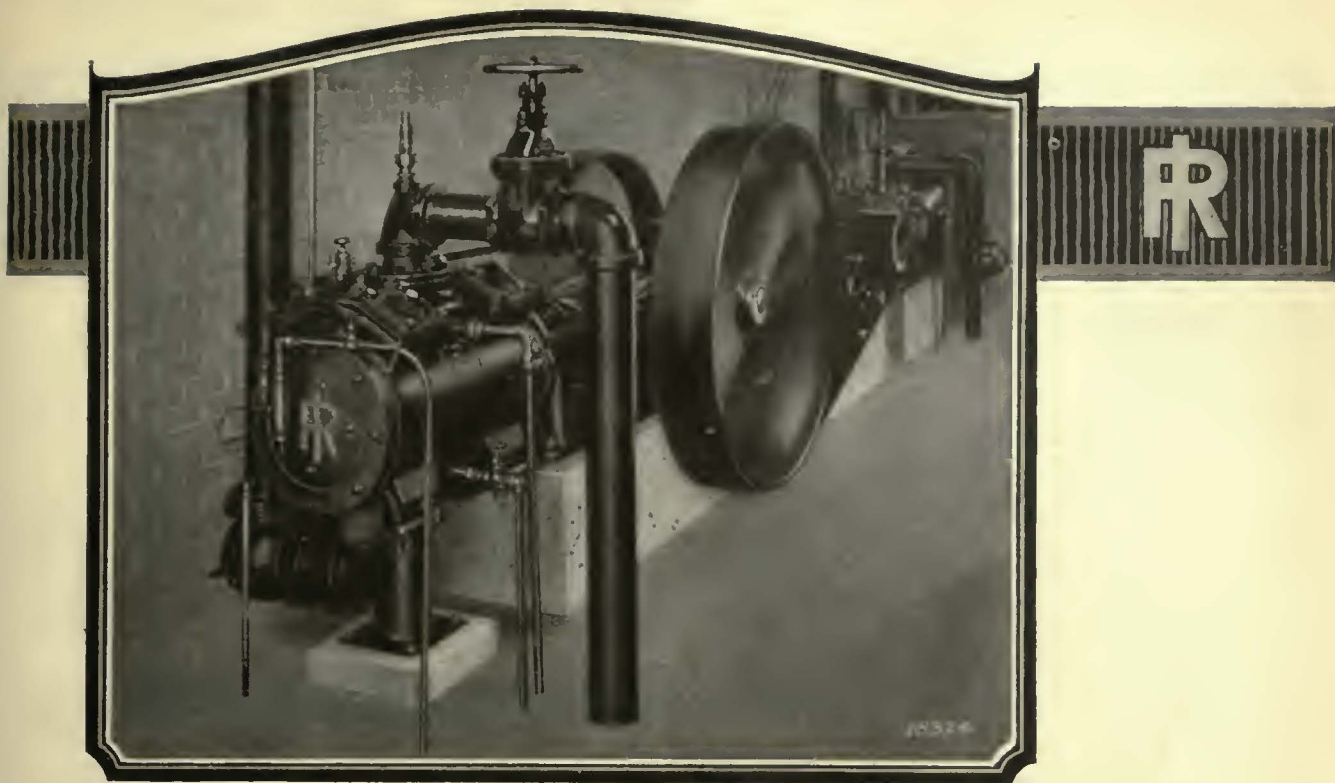
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Ramapo Ajax Corp.
- Crossing Signals (See Sig-
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Railway Track-work Co.
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Hemphill & Wells
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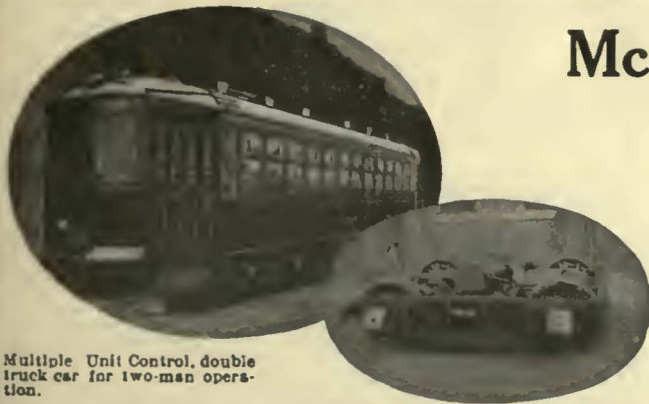
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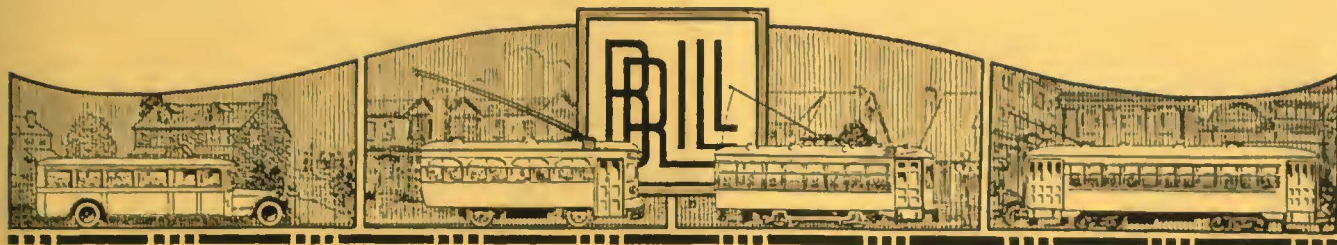
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