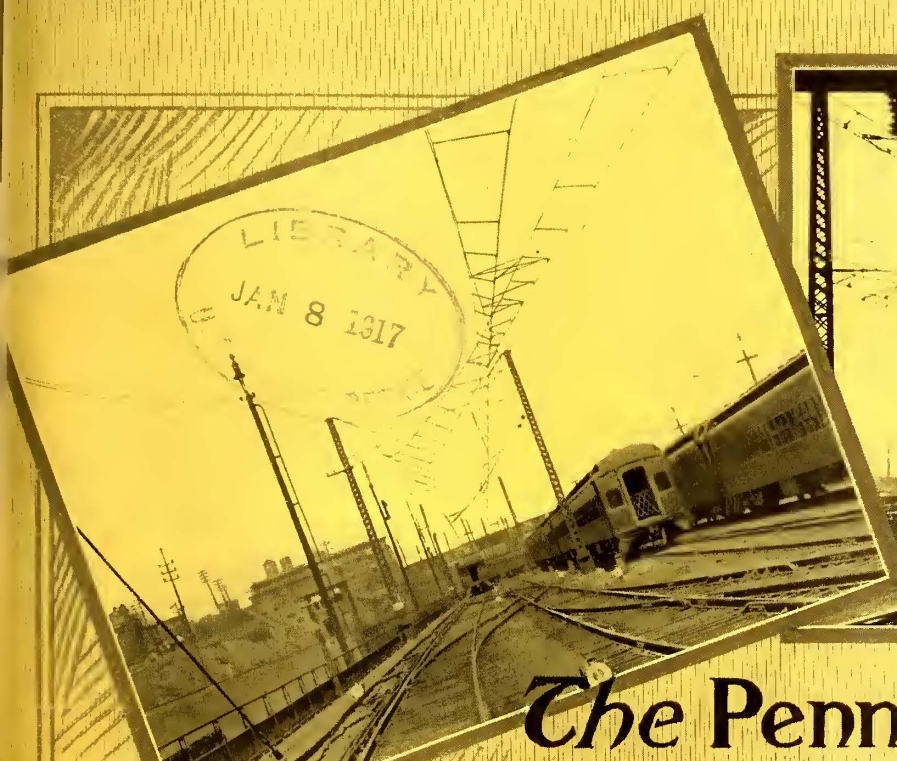


# ELECTRIC RAILWAY JOURNAL

New York, January 6, 1917

McGraw Publishing Co. Inc.

Vol. 49, No. 1 10c a copy



## The Pennsylvania's Choice



Within the 20.3 miles between Broad Street, Philadelphia, and Paoli, there are 93.6 miles of the highest class electrified railroad. The operating current is transmitted over the catenary suspended trolley wire at 11,000 volts, single phase.

For this important electrification, the Railroad held to the high standards it has set in the railroad field.

For the line of contact between the car and the distribution system it chose

## Phono-Electric

the *only* trolley wire that has made good in every kind of electric railway service—a wire that will give the least spitting and burning at high voltage—and consequently a wire that will give the most wear—two to three times the life of ordinary trolley wire.

**Bridgeport Brass Company, Bridgeport, Conn.**





# Westinghouse

## HL

### Unit Switch Control

Takes  
The Danger  
From The Platform

All heavy circuit breaking devices are located *beneath* the floor of the car where they belong, and are all contained within one compact steel case.

HL Control retains all the simplicity of the drum type, while securing the advantages of power operation.

The master controller is manipulated with much less physical effort, therefore allows better control of the car.

Our Leaflet 3865 describes HL Control in detail.

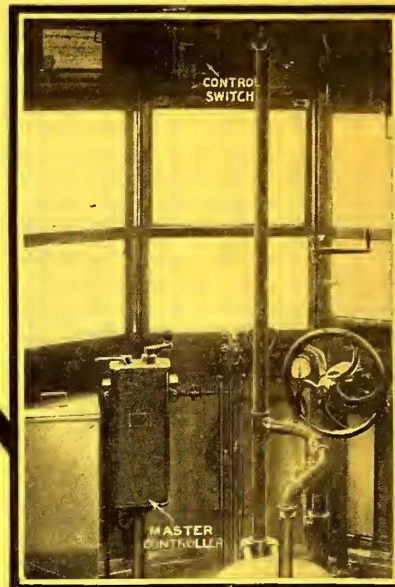
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East Pittsburgh, Pa.

Sales Offices in All Large American Cities

508

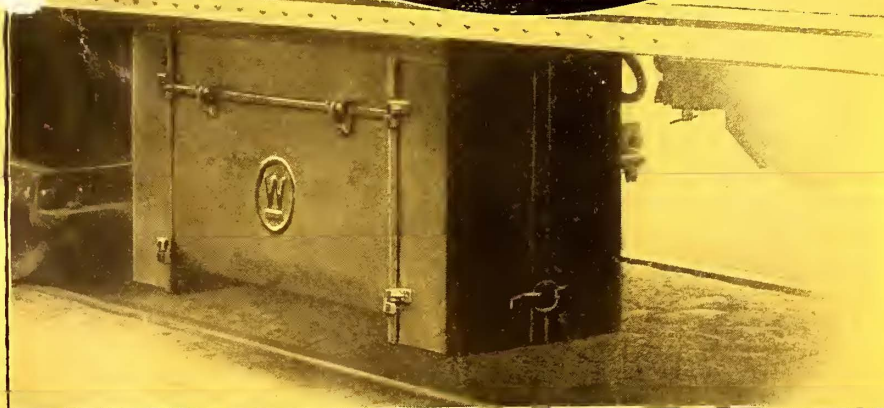


The Master Controller and Control Switch shown, are the only control parts located on the platform. All main circuits and circuit breaking devices are beneath the floor.



Master Controller

Over 200 roads  
now use HL  
Control





# ELECTRIC RAILWAY JOURNAL

VOLUME XLIX, No. 1

NEW YORK, JANUARY 6, 1917

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Mirror Used in Safeguarding Crossing.

Electric Shoveling.

Frogless Switch Makes Continuous Rail for High-Speed Track.

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JAMES H. MCGRAW, President. A. E. CLIFFORD, Secretary. J. T. DE MOTT, Treasurer. H. W. BLAKE, Editor.

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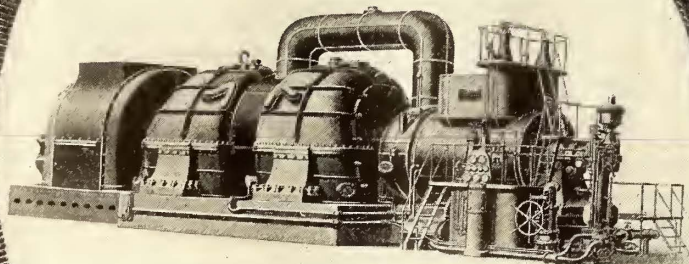
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# A Glimpse Into the Future

Westinghouse  
Steam Turbines of  
45,000 and 70,000 KW.  
are now under Construction.



Who dare predict the possi-  
bilities of the future?

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East Pittsburgh, Pa.

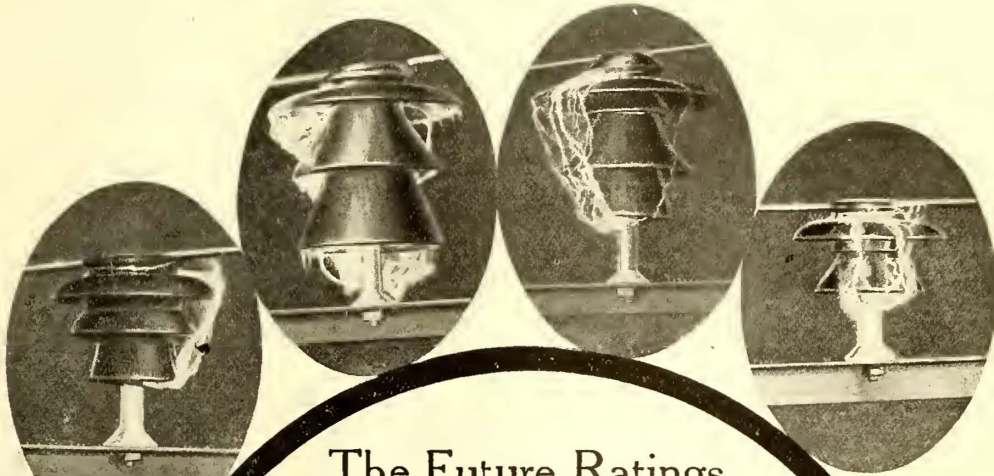


# Westinghouse



# Westinghouse

## Porcelain Insulators



### The Future Ratings of Westinghouse Insulators

will be based on tests under conditions resembling those of actual service as closely as can be obtained in a laboratory.

The illustrations were obtained from photographs taken while the insulators were being tested, cemented to a metal pin mounted on a steel cross arm grounded, having the line wire tied to the insulator as in service.

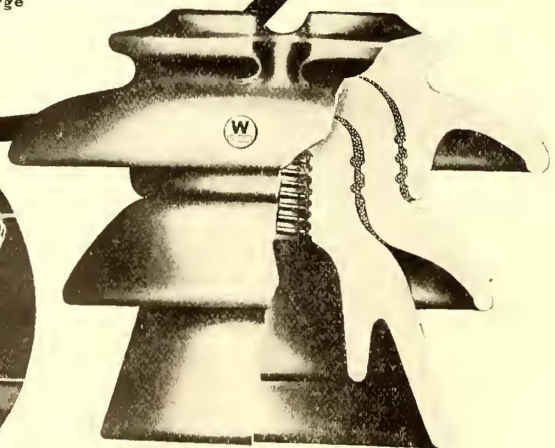
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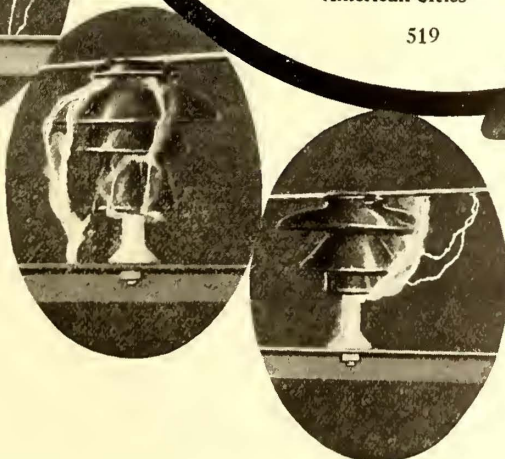
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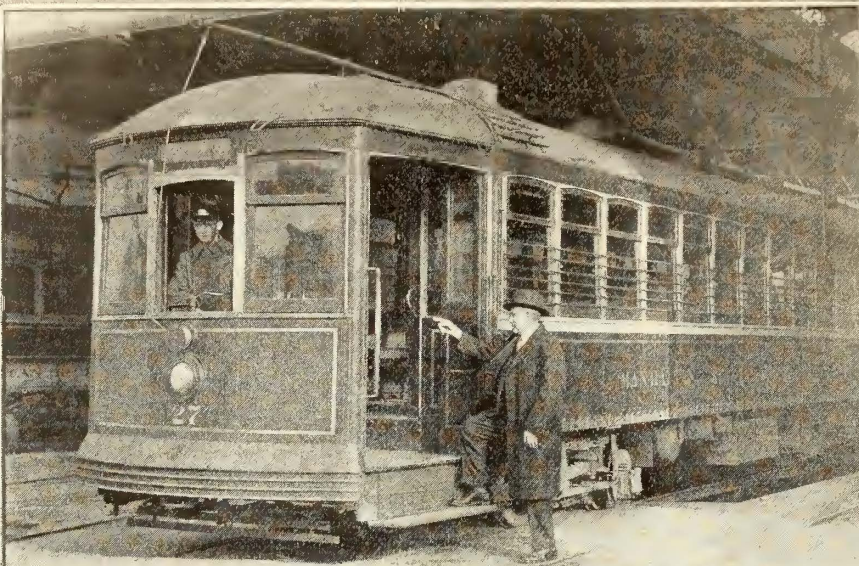
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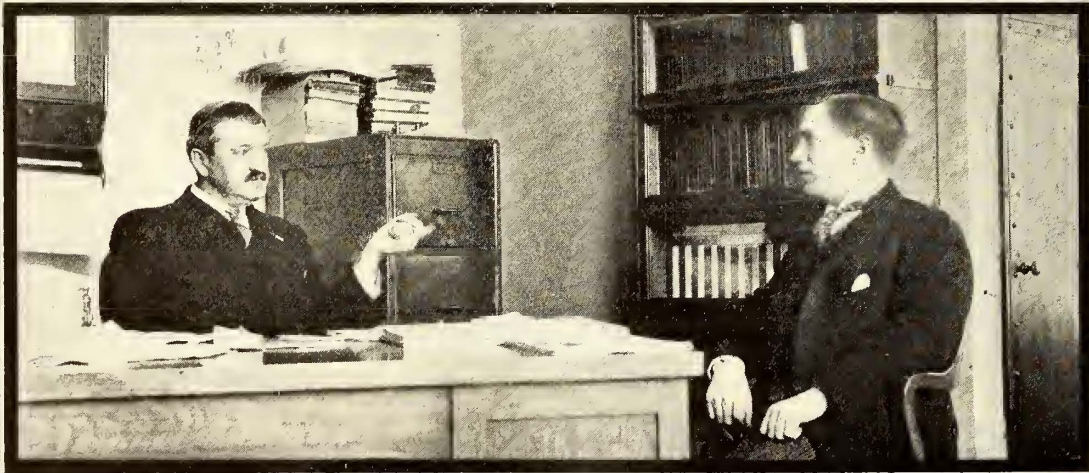
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Pittsburgh  
High-Voltage  
Insulator Co.*







The Westinghouse Inspector-Specialist is a practical railroad man, direct from the car-barn ranks. He knows the air-brake game from A to Z. Moreover, he knows how to impart his knowledge to others, whether it be to the barn-man to procure the best possible conditions of air brake equipment, or to the motorman to guarantee safety and to improve transportation movement.



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CHICAGO:

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NEW YORK:

City Investing Building

ST. LOUIS:

Boatmen's Bank Building



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who are not a Subscriber*

Look through the pages of this issue and see what a feast of useful, inspiring information has been prepared for the readers of the Electric Railway Journal.

Then resolve that hereafter you will be a subscriber so that you will not miss a single issue of the Electric Railway Journal throughout 1917 and thereafter.

*To You  
who are not an Advertiser*

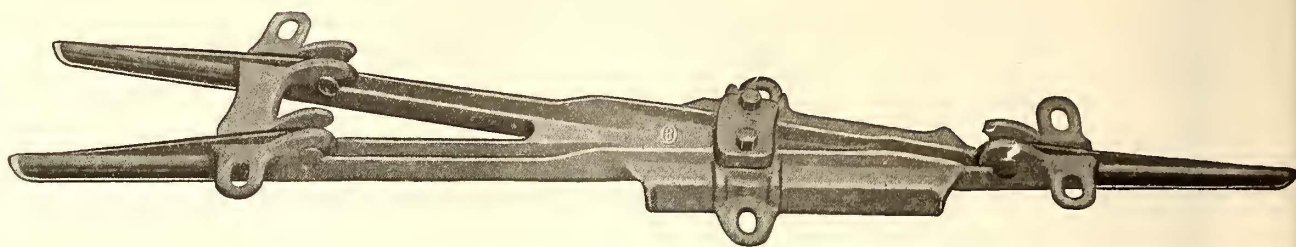
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**Electric Railway Journal**

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O-B Type E Frog—Patented

## Cutting the Cost of Line Work

It's cold work on top of the tower wagon this time of year. The linemen are all bundled up—heavy mittens and unwieldy coats.

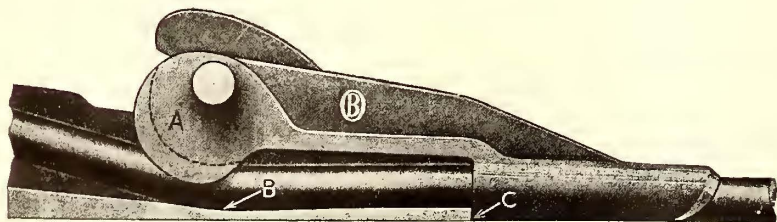
Why let time be wasted—expensive time—fussing around with small bolts, nuts, washers, screws? O-B Cam Tip Devices do away with this useless expenditure of energy.

For instance, in the O-B Type E Frog, O-B Cam Tips form the approach. They are just slipped under the hooks, then turned over and down. They force the wire firmly into the groove and when the lips are clinched around the wire there is a smooth passage for the trolley wheel. O-B Cam Tips are readily renewable.

A single wedge secured by two large bolts holds the wire solidly.

But ease of installation is only one point of superiority. There are the extra long legs, to protect the wire, the groove in the pan to steady wheel, O-B Sherardizing on all iron parts.

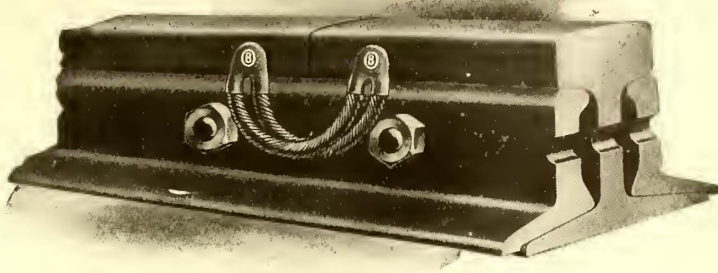
Look up complete line of O-B Cam Tip Devices—frogs, cross-overs, section insulators, strain plates—in Catalog No. 16 or write and say you are interested.



O-B Cam Tip, installed, cross-sectioned to show cam action

**The Ohio Brass Company**  
Mansfield, Ohio





O-B Type J Bond Installed—Patented

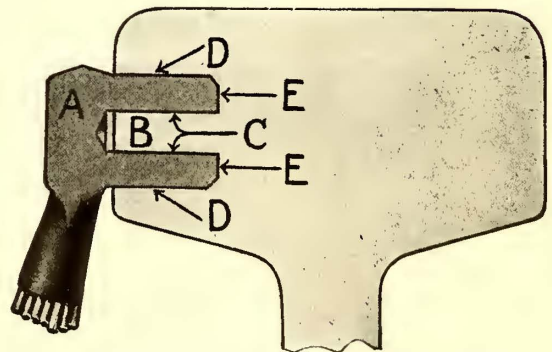
## Economical, Efficient Bonding

Carefully and conservatively compiled figures show the O-B Type J to be an exceptionally inexpensive bond to install, considering labor, materials and depreciation on machine. This is due partly to its short length and partly to the perfection of the milling machine.

This machine is easily handled and speedy. A crew of three men can install from 100 to 150 bonds a day when they have ordinary traffic interruptions. Frequently an experienced crew installs considerably more than 150 a day.

Because of its large contact area (see cross-section), the O-B Type J Bond has excellent electrical efficiency. Its long life under vibration is due to its shape.

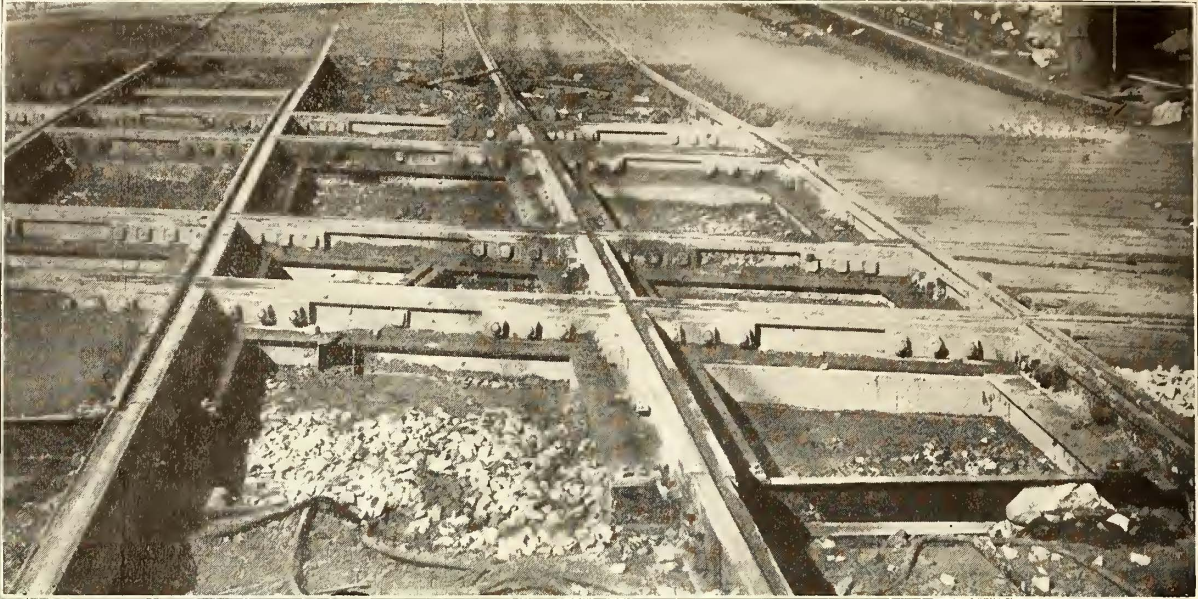
If you are interested in the O-B Type J Bond, we will be glad to tell you more about it.



This cross-section of the Type J Bond installed shows the large contact area. The bond is forced against the rail at C, D and E.

**The Ohio Brass Company**  
Mansfield, Ohio





*International Steel Crossing Foundation at crossing of  
Cleveland Railway and Wheeling & Lake Erie R. R. Installed 1915.*

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## Soon Pay for Themselves by Reducing Maintenance Costs

Picture in your mind's eye a resilient unit steel crossing foundation in which all your crossing joints are bridged and in which every square inch comes into effective bearing. That's the International Steel Crossing Foundation. No portion can get out of surface without being resisted by the entire foundation. The wheel loads cannot be concentrated over a point that is free to sag—it is evenly distributed over the unit. Rails and bolts do not work loose. Pat-

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Let us submit comparative estimates for your job.

### The International Steel Tie Company

General Sales Office and Works: Cleveland, Ohio

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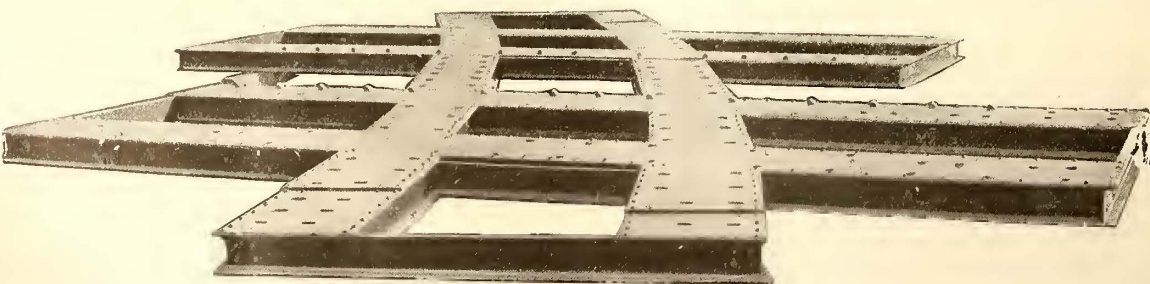
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## AT ST. LOUIS

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The United Railways Company of St. Louis are firm believers in "Golden Glow" Headlights. They have been using them on some of their cars for a year or so and are now installing more of them on both their city and suburban cars.

Their cars now operate through the streets of St. Louis headed by beautiful beams of soft, non-blinding "Golden Glow" light.

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The Company, the Men and the People have adopted this light because of its efficiency and economy.

All St. Louis is wide awake to its advantages.

**ELECTRIC SERVICE**

**SUPPLIES Co.**

PHILADELPHIA  
17th and Cambria Streets

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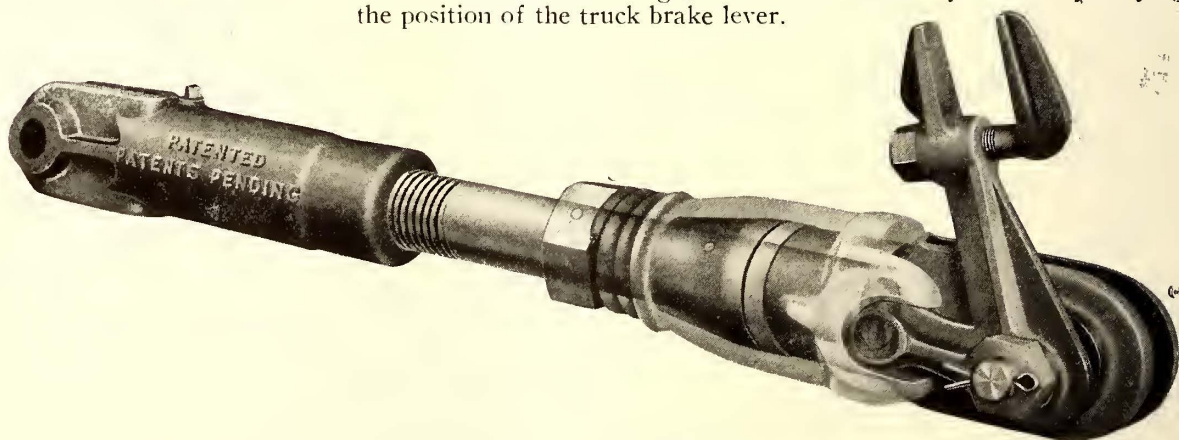
# Anderson Slack Adjusters Make All Cars Brake Alike

Every electric railway car leaving a barn is in danger, until the motorman learns how his brakes are set, unless the car is equipped with automatic truck brake adjusters. Every time you change crews on the street your car is in danger of collision, until the new man learns his stopping distance.

You can eliminate this condition on any car by a few minutes' work in installing Anderson slack adjusters, which make every car handle and brake alike. Moreover these adjusters at the same time decrease brake shoe wear, reduce pull-ins for brake setting until new shoes are needed and lessen power consumption.

The Anderson brake adjuster is really an automatic turnbuckle and can be installed without change in present brake rigging. Heat, cold, snow, mud or dirt cannot affect its operation. By its gradual action it compensates for any slack, no matter how small, but makes allowance for trucks greatly affected by load. This prevents locked wheels when the load leaves the car.

Proper brake adjustment must take place on the truck itself. The Anderson adjuster does not attempt to regulate piston travel because this causes uneven braking and brake shoe wear by constantly varying the position of the truck brake lever.



Put these slack adjusters on your old cars. Can be applied to almost any double or single truck car. Send for information and data sheet.

## Holden & White

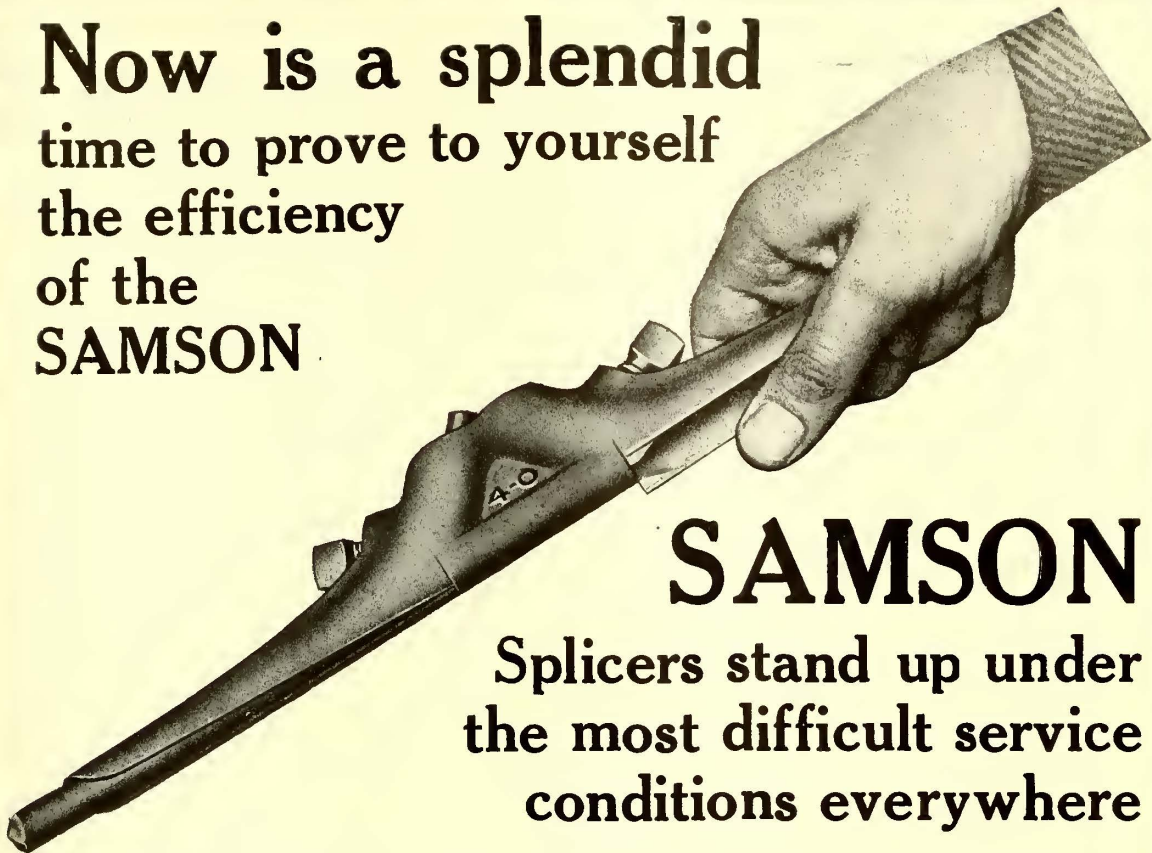
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1508 Fisher Building, Chicago

U. S. Metal & Manufacturing Company, New York and Washington; Gray Railway Supply Company, St. Louis; C. E. A. Carr Company, Toronto; C. F. Saenger & Company, Cleveland; W. M. McClintock, St. Paul.



Now is a splendid  
time to prove to yourself  
the efficiency  
of the  
**SAMSON**



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Splicers stand up under  
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Sleet, cold, heavy traffic and consequent heavy current consumption make overhead maintenance doubly difficult. But by using SAMSON SPLICERS you eliminate one source of trouble and expense. The universal reputation of SAMSONS for non-arcing, not forming hard spots, staying upright, and having strength and life in excess of new wire, has been earned repeatedly. It will pay you to investigate.

**DREW OVERHEAD LINE MATERIAL  
REDUCES MAINTENANCE COSTS**

All Drew material is standardized. The designs have been evolved by close contact and co-operation with practical operating engineers. The workmanship is careful and conscientious. The

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The Drew Service Department is at your disposal in solving overhead line problems. Data on any article of Drew manufacture gladly furnished on request.

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Designs

These designs have met with instant approval because they embody long sought electrical and mechanical strength.

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Unqualifiedly the most efficient, rugged, dependable designs ever offered.

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**THE LOCKE INSULATOR MFG. CO., Victor, N. Y.**

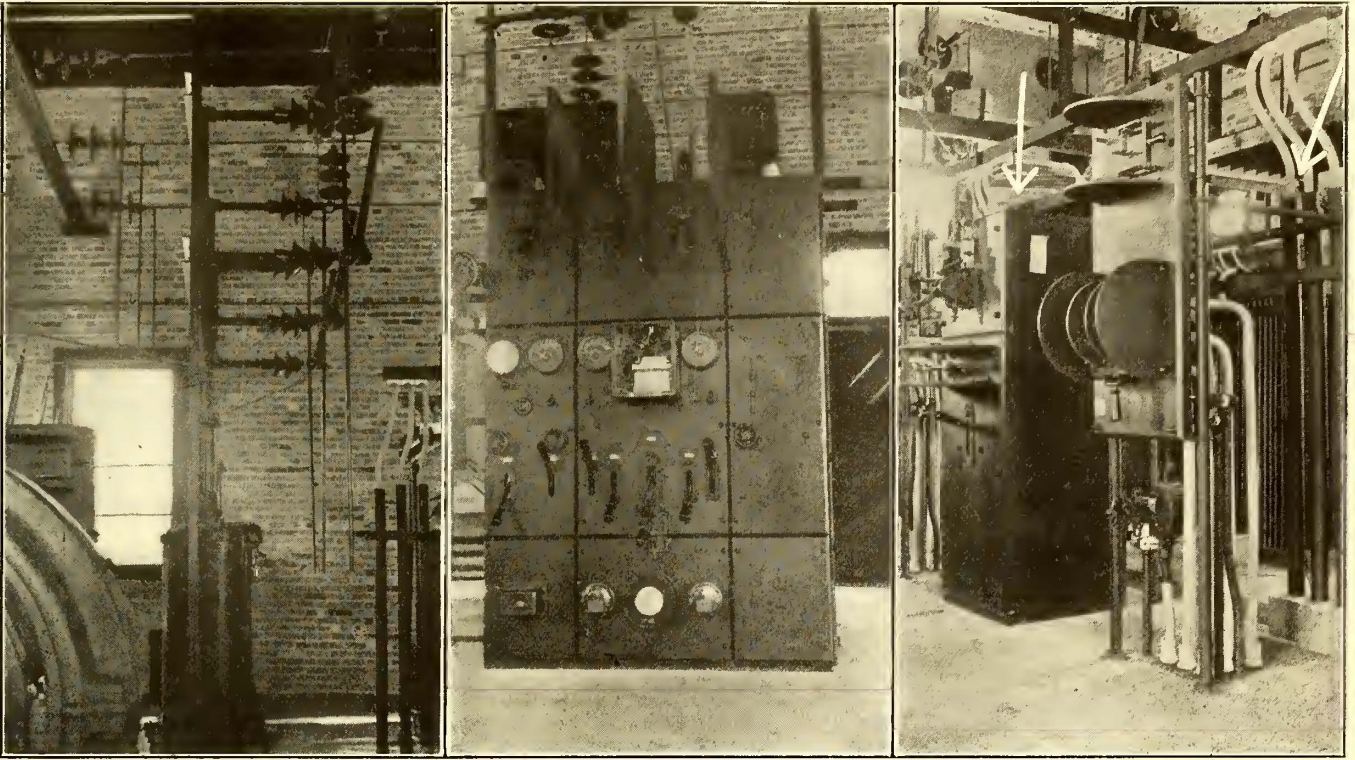
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Where they are used for joining the substation transformers to the high-tension bus bars. The transformers are connected "delta-delta," and the Dossert Connectors enable the quick disconnecting of a defective transformer to permit operation on "open delta."

Many other progressive railways all over the country are using Dossert Connectors throughout their power plants and substations, for bus bar work, for junction boxes in cars, in sectionalizing cases of signal control systems, etc. Our Catalogue will show you what Dossert efficiency is, and what it will do for you—write for your copy now.

## DOSSERT & COMPANY

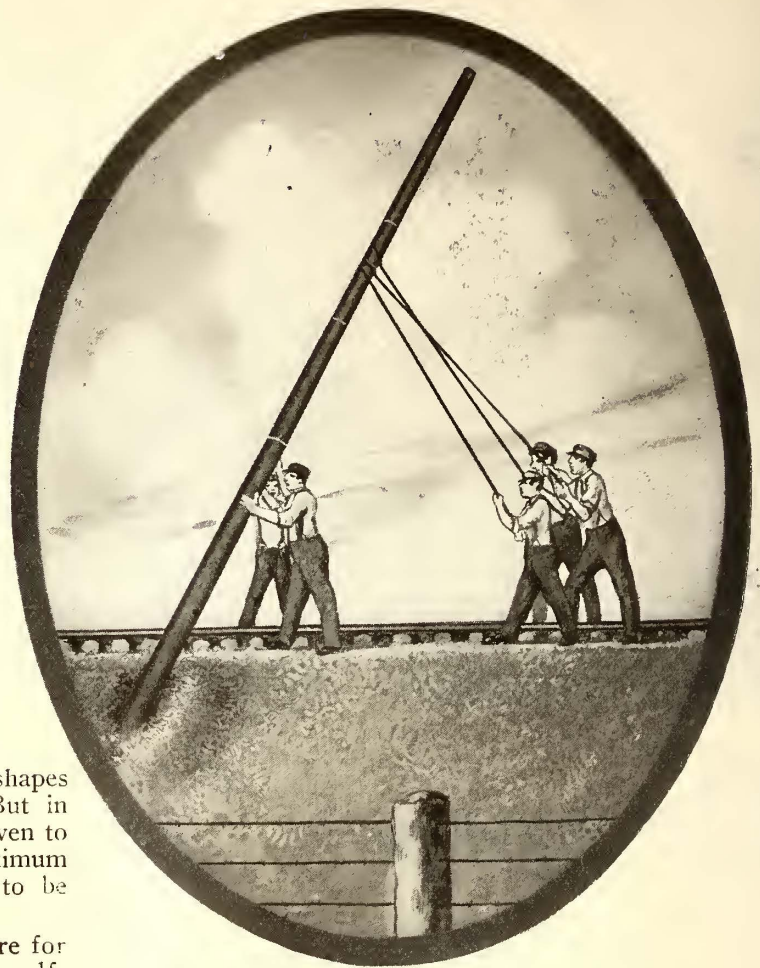
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242 West 41st Street, New York





# The ELRECO Tubular Pole is the Strongest Practicable Pole



One of the most efficient structural shapes known to engineers is the I-beam. But in utilizing an I-beam due care must be given to its installation with respect to the maximum strength of the section and the load to be carried.

The impracticability of such a structure for withstanding strains in *all* directions is self-evident.

The only shape that combines the highest limit of efficiency in unit weight for all-around strength is the circular tube.

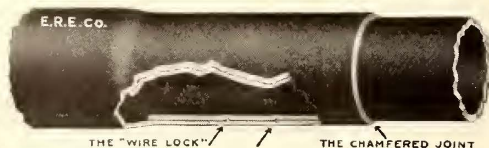
As the circle is the symbol of perfection in geometry, so is the tube the symbol of perfection in poles.

For solid proof consider this case. A 30 ft. Elreco Tubular Pole made up of 6 in., 5 in. and 4 in. sections will weigh about 50 lb. lighter and cost about \$1.00 less than any other form of metal pole of the same all-around strength.

Elreco Tubular Poles are not in use by hundreds of thousands because they were the only ones available in the past, but because they *were* and *are* the best.

Elreco Tubular Poles have made good *at all times* as the best poles, against every other form, style and shape of pole conceivable.

In the City of Chicago more than 50,000 Elreco Poles are in service. Other Cities throughout the World have their proportionate share.



## ELRECO Tubular Poles

Combine

Lowest Cost

Lightest Weight

Least Maintenance

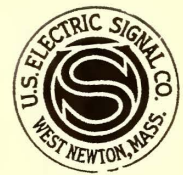
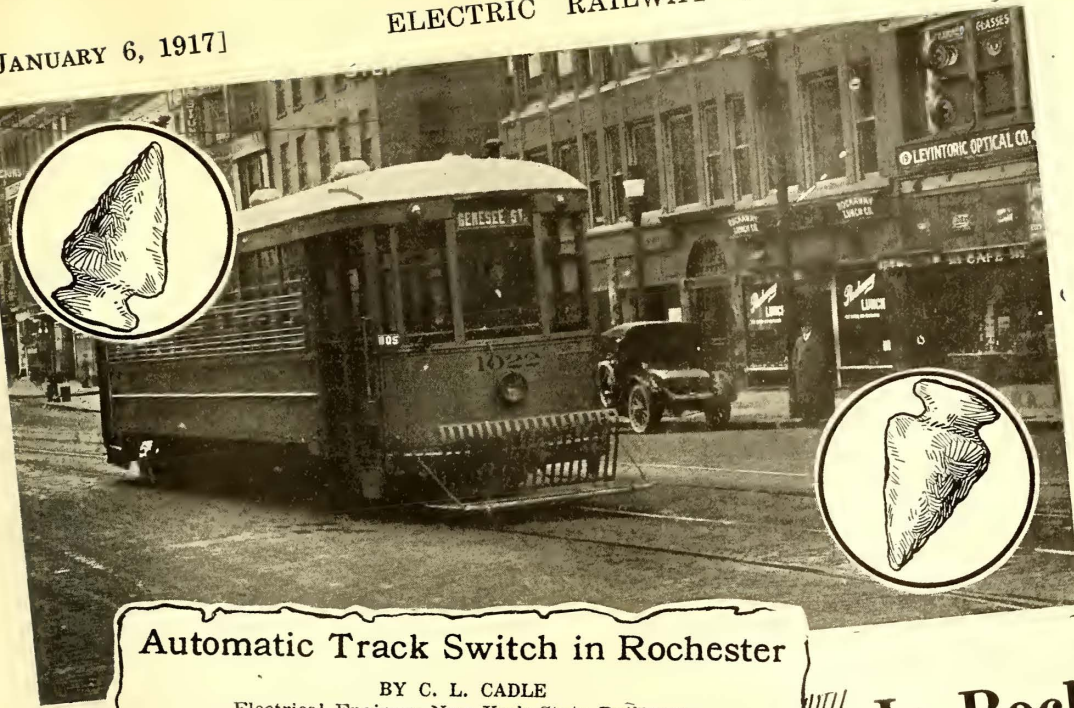
Greatest Adaptability

### ELECTRIC RAILWAY EQUIPMENT CO.

Cincinnati, Ohio

New York: 30 Church Street





### Automatic Track Switch in Rochester

BY C. L. CADLE  
Electrical Engineer New York State Railways,  
Rochester Lines

In November, 1915, the Rochester lines of the New York State Railways installed at one of the busiest points on its city lines a new type of track switch which is saving its first cost at the rate of about once in every three months, and which has given very satisfactory results from an operating standpoint ever since it was placed in service.

The principal features of the switch that differ from those of the old type generally in operation throughout the country are, first, that it is driven by a motor, thus permitting the introduction of a train of gears to retard the motion of the switch point when it moves from one side of the bed to the other. This causes the switch to operate without splashing. In addition to this the switch point is firmly held in the position to which it is thrown by means of a spring that is connected with a train of gears, and in consequence, the switch point cannot fly back between the trucks of a car and thus make it split the switch. The third important feature is a control that is effected by both a cut-in contact and a cut-out contact so arranged that a following car which is extremely close to the car operating the switch is prevented from throwing the switch point between the trucks of the first car as it passes over the switch point. In the accompanying illustration the cut-in contact is shown just ahead of the trolley pole of the car in the foreground. The cut-out contact does not appear in the picture, being attached to the trolley wire near the frog, approximately over the switch.

**United States  
Electric Signal Co.**  
West Newton, Massachusetts

Western: Frank F. Bodler  
Monadnock Bldg., San Francisco

Chicago: Warren Moore Osborn  
McCormick Bldg.

Foreign:  
Forest City Electric Service Supply Co.  
Salford, Eng.

## In Rochester It's a 300% Investment

Rochester, N. Y., is a busy town—traffic at the corner of Main and State Streets requires 150 switch-movements an hour—and making those switch-movements is a

### “Collins” Non-Splitting Electric-Track Switch

It does not allow the remotest chance of the switchpoint being thrown between the trucks of a car by a following movement under the contactor.

It does **not** splash the foot-traffic with mud or water—

It is **not** subject to derangement by dampness—

It **cannot** be damaged by a car standing under the contactor—

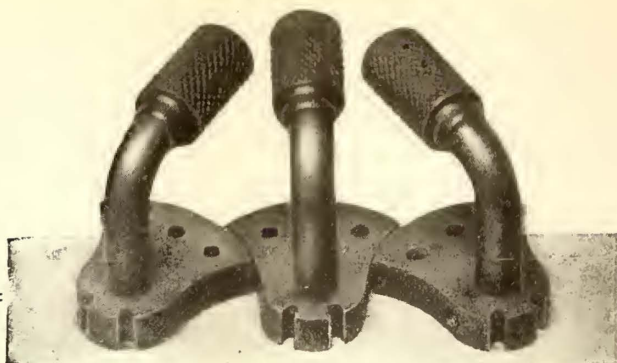
But it **does** handle the traffic—accurately, surely, safely—

It does pay for itself every three months—

And what more can you ask of a switch?







East Bound Car



West Bound Car



# The INTERLOCK

## that makes LAP ORDERS Impossible



with the

# SIMMEN SYSTEM

## of Continuous Cab Signals

The device shown above is another example of the simplicity of the Simmen System. By means of this simple mechanical arrangement lap orders are positively prevented. The dispatcher cannot make a mistake.

Each lever controls a signal point and has three definite positions. The upright position indicates that a "meet" is scheduled for that siding, and therefore gives a red signal to trains approaching from both directions.

The levers leaning to the right give the green signal to east bound trains only. The levers leaning to the left give the green signal to west bound trains only.

These control levers are arranged in the same consecutive order that the signal points which they control are arranged on the railroad. It will be obvious that the simple seg-

ment which moves with each control lever prevents setting any given lever in the east bound clear position, when the lever controlling the adjacent siding is in the west bound clear position. Thus lap orders are prevented.

The Simmen System enables the dispatcher—miles away—to give a positive continuous signal *in the cab* of the train and the train itself gives the dispatcher a return signal *automatically*. The method is so simple that many railroad men can scarcely believe it possible, until they have been convinced by a personal investigation.

Why not decide today to investigate the Simmen System thoroughly? You will be interested and enlightened and may profit by the experience.

**Simmen Automatic Railway Signal Co.**  
1575 Niagara Street, Buffalo, N. Y.

PACIFIC COAST REPRESENTATIVE—W. H. Crawford, 609 Spalding Bldg., Portland, Oregon





## Chapman Automatic Signals

### Handled Heavy Traffic Perfectly During the Eastern States Agricultural Exposition

at Springfield, Mass. The only single-track section on the Springfield Street Railway Company's line leading to the fair grounds is on the 2600-foot North End Bridge over the Connecticut River.

A Chapman Signal is in service at each end of the bridge, and these signals were most valuable in facilitating safe and rapid service. During the show, cars were operated in groups of five across the bridge, first in one direction, then in the other—and 60 cars an hour were easily handled in each direction.

The Springfield Street Railway finds Chapman Signals also extremely useful in controlling regular traffic movements over its suburban and interurban lines, including its through service to Holyoke and Westfield.

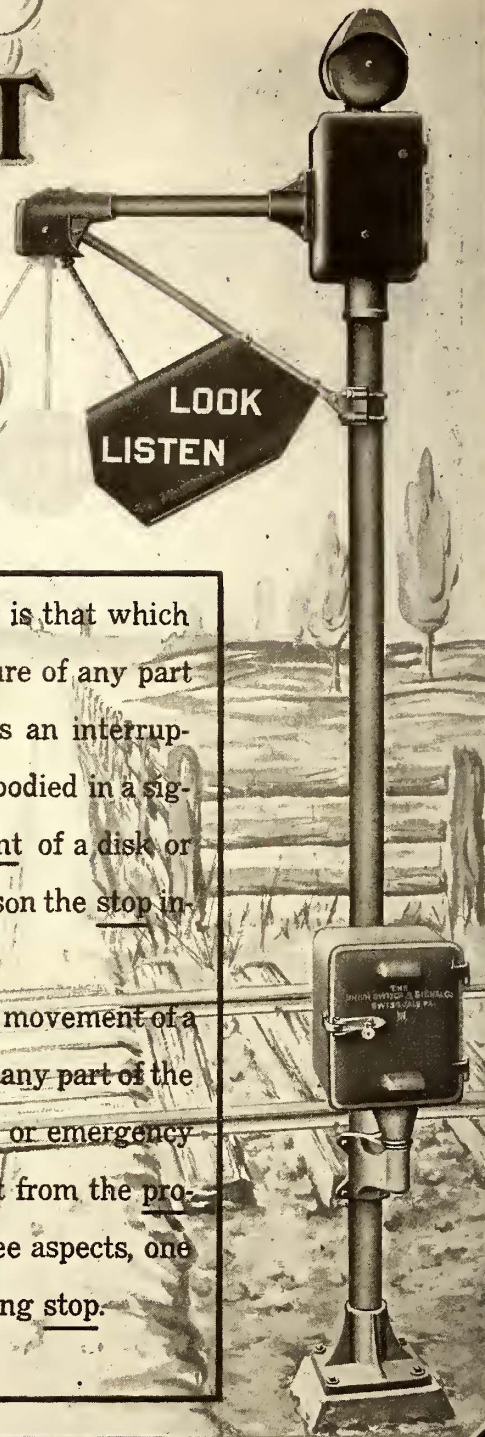
Chapman Signals are giving similar results wherever installed—they promote speed with safety—protect lives and schedules. Find out about them. Write today for detailed information.

**Charles N. Wood Company, Boston, Mass.**



# UNION THREE ASPECT FLAGMAN

Style DW



The most important principle in railway signaling is that which requires a signal to indicate stop when there is a failure of any part of the apparatus to function properly, or when there is an interruption of the power supply. This principle cannot be embodied in a signal indicating stop solely by the continuous movement of a disk or arm, because when such movement ceases for any reason the stop indication will be lost.

This signal, while displaying stop indication by the movement of a disk in normal operation, is so designed that a failure of any part of the apparatus or the absence of power will cause a second or emergency stop indication, which is entirely different and distinct from the proceed indication. In other words, this signal has three aspects, one indicating proceed and either of the other two indicating stop.

For additional information see Bulletin 86.

## The Union Switch & Signal Co.

Founded by Geo. Westinghouse 1881.

SWISSVALE, PA.



Hudson Terminal Bldg.  
NEW YORK

Peoples Gas Bldg.  
CHICAGO

Canadian Express Bldg.  
MONTREAL

Candler Annex  
ATLANTA

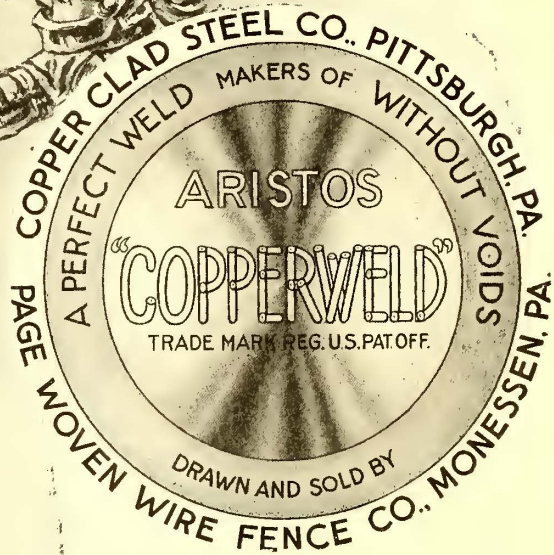
Railway Exchange Bldg.  
ST. LOUIS MO.

Pacific Bldg.  
SAN FRANCISCO

Represented by the GENERAL ELECTRIC CO. in Australasia, South Africa and Argentina







*Your Protection Against  
"Old Jack Frost"*

# Aristos "COPPERWELD" Copper Clad Steel Wire

can not be beaten to a "yield point" by winter weather. It will retain its perfection throughout the heaviest of snow and ice storms—and therefore reduces maintenance costs.

Aristos "Copperweld" costs less per pound than copper wire, is 7 per cent lighter (size for size), is 60 per cent stronger and gives better service. It also has 126 per cent greater elastic limit.

Are you interested? Then write!

Western Sales Office:  
Steel Sales Corporation  
Chicago, Illinois

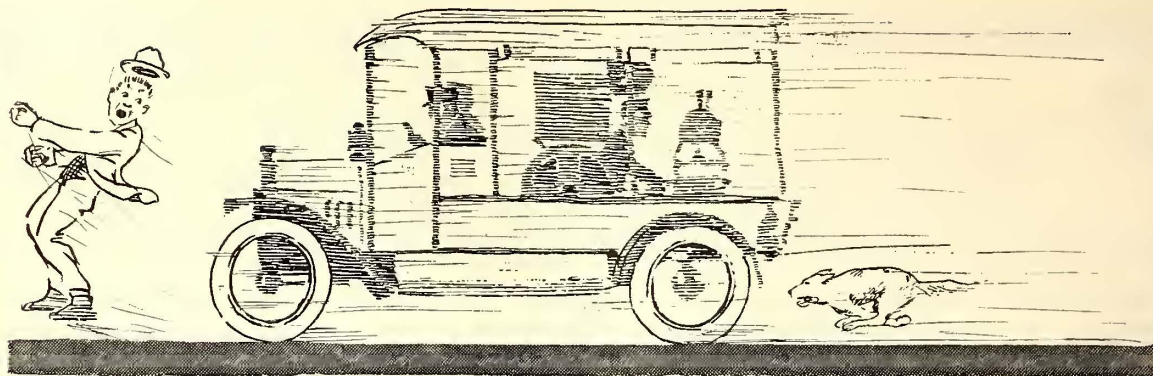


Eastern Sales Office:  
Page Woven Wire Fence Co.  
30 Church St., New York

Made from the product of COPPER CLAD STEEL CO., Pittsburgh, Pa.  
Drawn and Sold Exclusively by

## PAGE WOVEN WIRE FENCE COMPANY MONESSEN, PA.



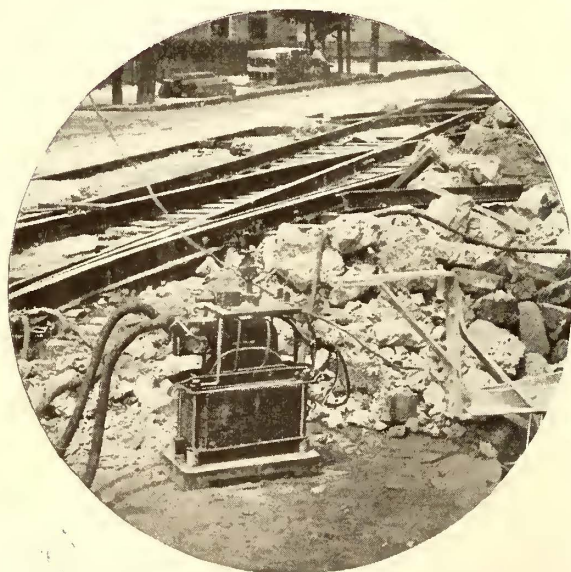


## The Whole Outfit Gets There—*FAST*

The complete outfit—tools, supplies and bonding gang, all get to the work at one time—and get there *fast*.

Time saved means money saved, and this saving is in *your* pocket if you use the

## Champion Bonding Truck

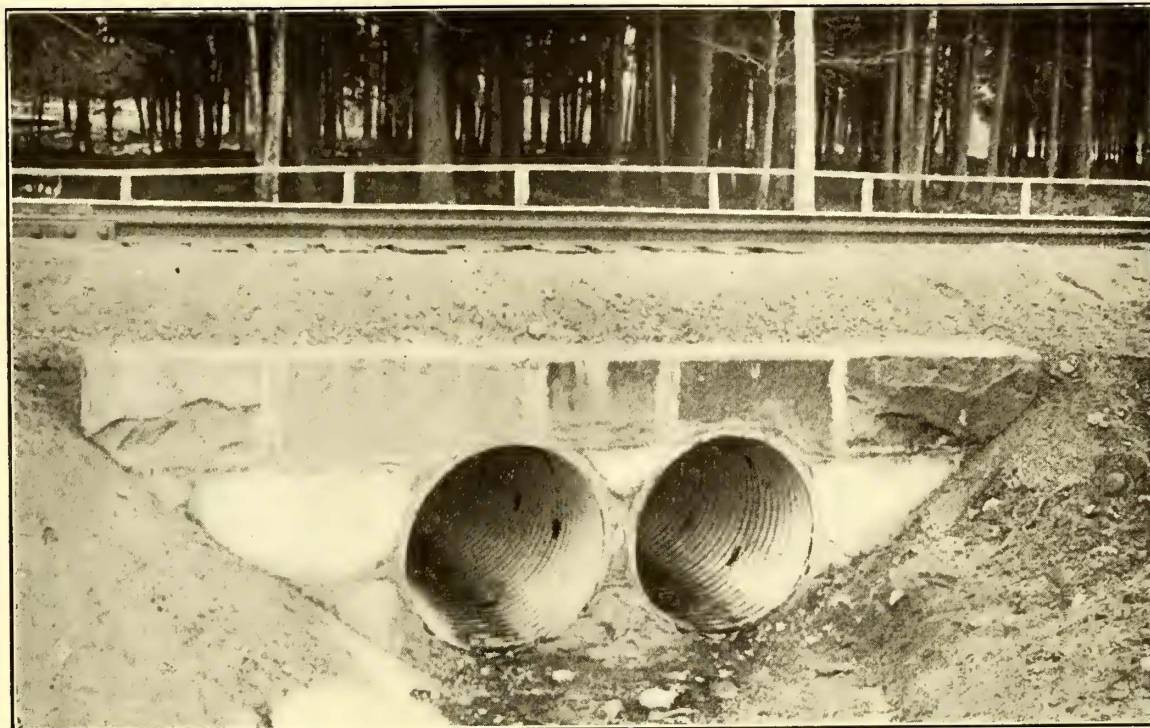


for Your  
Rail Bonding Job

No Interference  
with Schedules

The Electric Railway Improvement Co.  
Cleveland, Ohio





# “ARMCO” IRON CULVERTS

## Give Long and Faithful Service

because of the extreme purity of the iron of which they are made. Large numbers of satisfied users, all over the country, confirm this statement. “Armco” Iron Culverts withstand severe conditions not only because of their resistance to corrosion, but also because their corrugated form and overlapping joints confer ample strength to carry heavy fills and the rolling loads of railway traffic. For use under extreme conditions, they are obtainable in gauges heavier than standard.

Write the nearest Manufacturer for information and prices on “Armco” (American Ingot) Iron Culverts, Siphons, Flumes, Sheets, Roofing and Formed Products.



Resists Rust

**Arkansas, Little Rock**  
Dixie Culvert & Metal Co.  
**California, Los Angeles**  
California Cor. Culvert Co.  
**California, West Berkeley**  
California Cor. Culvert Co.  
**Colorado, Denver**  
E. Hardesty Mfg. Co.  
**Delaware, Clayton**  
Delaware Metal Culvert Co.  
**Florida, Jacksonville**  
Dixie Culvert & Metal Co.  
**Georgia, Atlanta**  
Dixie Culvert & Metal Co.  
**Illinois, Springfield**  
Illinois Corrugated Metal Co.  
**Indiana, Crawfordsville**  
W. Q. O'Neill Co.  
**Iowa, Des Moines**  
Iowa Pure Iron Culvert Co.  
**Iowa, Independence**  
Independence Culvert Co.

**Kansas, Topeka**  
The Road Supply & Metal Co.  
**Kentucky, Louisville**  
Kentucky Culvert Co.  
**Louisiana, New Orleans**  
Dixie Culvert & Metal Co.  
**Maryland, Munsey Bldg., Baltimore.**  
Wm. M. Baker  
**Massachusetts, Palmer**  
New England Metal Cul. Co.  
**Michigan, Bark River**  
Bark River Bridge & Cul. Co.  
**Michigan, LaSling**  
Michigan Bridge & Pipe Co.  
**Minnesota, Minneapolis**  
Lyle Corrugated Culvert Co.  
**Minnesota, Lyle**  
Lyle Corrugated Culvert Co.  
**Missouri, Moberly**  
Corrugated Culvert Co.  
**Montana, Missoula**  
Montana Culvert & Flume Co.

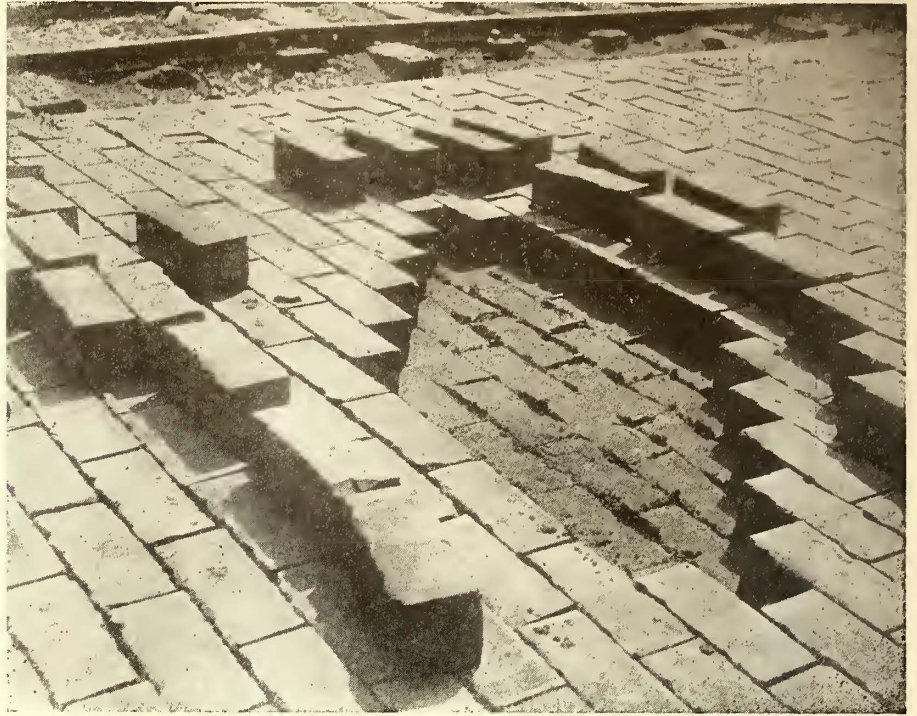
**Nebraska, Lincoln**  
Lee-Arnett Co.  
**Nebraska, Wahoo**  
Nebraska Culvert & Mfg. Co.  
**Nevada, Reno**  
Nevada Metal Mfg. Co.  
**New Hampshire, Nashua**  
North-East Metal Culvert Co.  
**New Jersey, Flemington**  
Pennsylvania Metal Culvert Co.  
**New York, Auburn**  
Pennsylvania Metal Culvert Co.  
**North Dakota, Wahpeton**  
Northwestern Sheet & Iron Wks.  
**Ohio, Middletown**  
The Ohio Corrugated Culvert Co.  
American Rolling Mill Co.  
**Oklahoma, Shawnee**  
Dixie Culvert & Metal Co.  
**Oregon, Portland**  
Coast Culvert & Flume Co.

**Pennsylvania, Warren**  
Pennsylvania Metal Culvert Co.  
**South Dakota, Sioux Falls**  
Sioux Falls Metal Culvert Co.  
**Tennessee, Nashville**  
Tennessee Metal Culvert Co.  
**Texas, Dallas**  
Wyatt Metal Works.  
**Texas, El Paso**  
Western Metal Mfg. Co.  
**Texas, Houston**  
Lone Star Culvert Co.  
**Utah, Woods Cross**  
Utah Corrugated Cul. & Flume Co.  
**Virginia, Roanoke**  
Virginia Metal Culvert Co.  
**Washington, Spokane**  
Spokane Cor. Culvert & Tank Co.  
**Wisconsin, Eau Claire**  
Bark River Bridge & Culvert Co.



# These Bricks KNIT into a Vibration-proof and Water-excluding Track Paving

**Wire-Cut Lug**



It retains its smoothness and durability. Its sharp, square edges assure this.

Wire-Cut Lug Brick gives the greatest permanency of construction. It resists abrasion and breakage. Its uniform lugs and rough edges form a positive bond for the cement filler.

And remember that the wire-cut

method is the most durable pavement for extremely heavy traffic.

Mr. Railway Man, it's up to you. Do you want a pavement that will go to pieces in a few months' time, or do you want the pavement that is put down to **stay** down?

Ask our paving engineers to help you. They'll be glad to.

Manufacturers Licensed by

## Dunn Wire-Cut Lug Brick Co., Conneaut, Ohio

### LICENSEES:

Corry Brick & Tile Company, Corry, Pa.  
 United Brick Company, Greensburg, Pa.  
 One plant at Conneaut, Ohio.  
 Sterling Brick Company, Olean, N. Y.  
 Reynoldsville Brick & Tile Co., Reynoldsville, Pa.  
 Danville Brick Company, Danville, Ill.  
 Clinton Paving Brick Company, Clinton, Ind.  
 Alton Brick Company, Alton, Ill.  
 Medal Paving Brick Co., Cleveland, Ohio.  
 One plant at Cleveland, Ohio.  
 One plant at Carrollton, Ohio.  
 One plant at Malvern, Ohio.  
 One plant at Wooster, Ohio.  
 Metropolitan Paving Brick Co., Canton, Ohio.  
 Four plants at Canton, Ohio.  
 One plant at Willow, Ohio.  
 Bessemer Limestone Co., Youngstown, Ohio.  
 Three plants at Bessemer, Pa.  
 Peebles Paving Brick Co., Portsmouth, Ohio.  
 Two plants at Portsmouth, Ohio.  
 One plant at Firebrick, Ky.

Murphysboro Paving Brick Co., Murphysboro, Ill.  
 Southern Clay Mfg. Co., Chattanooga, Tenn.  
 One plant at Robbins, Tenn.  
 One plant at Coaldale, Ala.  
 One plant at Birmingham, Ala.  
 McAvoy Vitrified Brick Co., Philadelphia, Pa.  
 One plant at Perkiomen Junction, Pa.  
 Windsor Brick Company, Akron, Ohio.  
 Hocking Valley Brick Co., Columbus, Ohio.  
 One plant at Logan, Ohio.  
 Veedersburg Paver Co., Veedersburg, Ind.  
 Springfield Paving Brick Co., Springfield, Ill.  
 Terre Haute Vitrified Brick Co., Terre Haute, Ind.  
 Albion Vitrified Brick Co., Albion, Ill.  
 Alliance Clay Products Co., Alliance, Ohio.  
 Westport Paving Brick Co., Baltimore, Md.  
 One plant at Westport, Md.  
 The Mack Mfg. Co., New Cumberland, W. Va.  
 Four plants at New Cumberland, W. Va.  
 The Hydraulic-Press Brick Co., St. Louis, Mo.  
 The Barr Clay Co., Streator, Ill.  
 Burton-Townsend Co., Zanesville, O. Two plants.

The Trimble Paving Brick Co., Dayton, Ohio.  
 One plant at Trimble, Ohio.  
 One plant at Glouster, Ohio.  
 The Thornton Fire Brick Co., Clarksburg, W. Va.  
 One plant at Thornton, W. Va.  
 Indiana Paving Brick & Block Co., Brazil, Ind.  
 Standard Brick Co., Crawfordsville, Ind.  
 Shawmut Paving Brick Works, Shawmut, Pa.  
 The Pennsylvania Clay Co., Pittsburgh, Pa.  
 One plant at Conway, Pa.  
 One plant at Crows Run, Pa.  
 One plant at Bradys Run, Pa.  
 Clydesdale Brick & Stone Co., Pittsburgh, Pa.  
 Plant at Elwood City, Pa.  
 John Kline Brick Co., Wickliffe, Ohio.  
 Streater Clay Mfg. Co., Streater, Ill.  
 Martinsville Brick Co., Martinsville, Ind.  
 Cleveland Brick & Clay Co., Cleveland, Ohio.  
 Jamestown Shale Paving Brick Co., Jamestown, N. Y.  
 Purington Paving Brick Co., Galesburg, Ill.  
 Four plants.





## NATIONAL PNEUMATIC Manual and Pneumatic Door and Step Control for the New Cars of Syracuse and Utica

Because of their traffic-accelerating features, ease of operation and general reliability—the National Pneumatic Company's door and step control was specified

### For Thirty-Five Peter Witt Car Rider's Cars

In these cars, the two sliding doors at the center are independently operated from the conductor's stand by means of National Pneumatic engines, type GM 25/8x6.

Manually-operated equipment is used at the front of the car, but provision has been made for pneumatic engine operation eventually should traffic demand it.

# NATIONAL PNEUMATIC COMPANY

50 Church St. New York

515 Laflin St. Chicago





# Practical advice in the shop is trouble saved on the road

That is one of the many benefits secured through our free Expert Service. Read the following partial report from one of our Experts:

"The manager understands of course that if the bearings are in poor condition, even the best oil will not prevent trouble, but he is greatly perturbed by the hot boxes on their interurban cars. I have made *suggestions* to obviate this and bring about permanent betterments to the service, as follows:

"First—The work of rebabbitting journal brasses should be done at the main shop and by one man, so as to place the blame for poor work that is being done.

"Second—That a more liberal supply of new brasses be placed in service, as there are a number of the old ones that must be scrapped.

"Third—That as soon as possible rebabbitting of journal brasses be discontinued and the brass be allowed to wear to a scrapping point and then taken out of service.

"Fourth—On account of the high speed and weight of cars, there should be a more liberal renewal of high grade packing, as a large proportion of the journal packing now in service is short strands, and while it would prove satisfactory in slower service, it is not conducive to good operation under the present conditions.

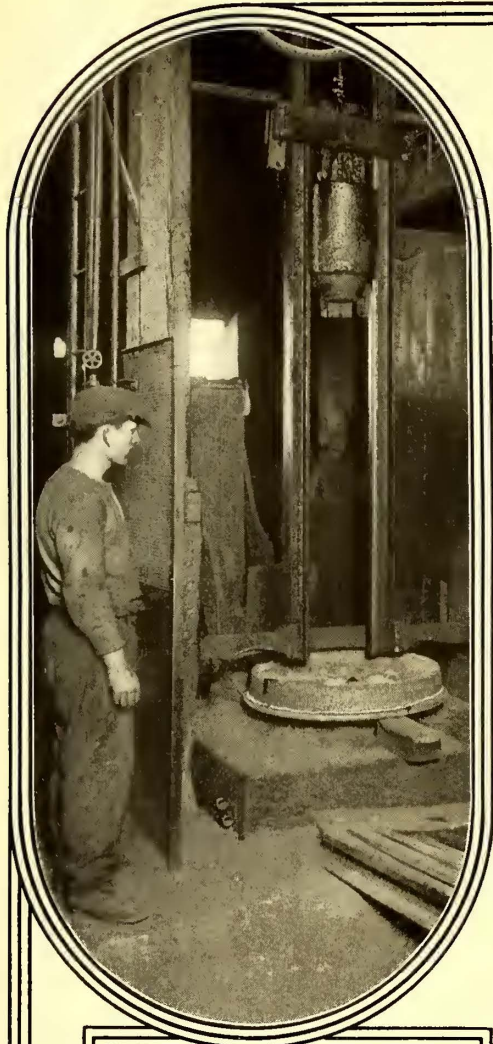
"Also, I have *requested* them to discontinue a practice which, no doubt, has been the cause of a part of the journal trouble, and if continued it will ruin the journals. I refer to a block of wood that has been made in the form of a journal brass and when they have a hot journal they remove the brass and put in the block of wood with a sheet of emery cloth on its face and then run the car. The result is another hot journal, as it is impossible to remove all the emery from the journal without removing the journal box. Furthermore, any irregularity in the journal face or diameter will be aggravated by such a proceeding and new journal brasses will have so little surface in contact with the journal that the weight per square inch is out of all proportion to what it should be. This was proven by an inspection of journal brasses that had only been in service twenty-four hours. The journal box dust guards have not had the attention they deserve, and there are a number of journals without them."

Little things? Yes. But it was the viewpoint of a practical outside man that discovered them and realized their important effect on good service. That is what our Experts will do for you—point out the little faults, far reaching in their unfavorable effect on your service, that you have lived so close to that they have been unnoticed. And note that our man made only SUGGESTIONS and REQUESTS of the railway officials—no commands, no arbitrary demand that such and such a thing be done—it is up to the officials to accept or reject our recommendations. But the wide-awake railroad man is looking for practical advice. And we are equipped to give it to him.

## Galena-Signal Oil Co.

Franklin, Pa.





# The Drop Test for Davis Steel Wheels

Here is a test that is mighty important to an electric railway man. It is made to insure full strength in every wheel that leaves our foundry. It is your guarantee that your passengers and equipment are not subjected to the hazard of broken wheels.

After the wheels have been tempered they are taken to a special machine for the drop test. Here, supported at three equidistant points on the underside of the flange, they sustain two blows from a 500-pound weight dropped from a height of 6½ feet and directed against the hub.

Probably no set of actual service conditions short of a collision or accident would call for such wheel strength. But Davis Steel Wheels are designed with an extra large factor of safety. That's why they are so well known for strength and safety, regardless of the fact that *they save 20% in weight.*

The "one-wear" feature makes Davis Steel Wheels the most economical for electric railway service. The hard, tough manganese steel tread gives full life service without grinding, wheel removals or truck changes.

Let us show you the economical possibilities of Davis Steel Wheels. A request will bring all the data.



Taping Davis Steel Wheels to insure proper mating in service

## DAVIS Steel Wheels

The steel wheel with the one wear tread.

No turning—no trouble with motor clearances.

A hard, tough manganese tread and flange.

A soft, ductile steel plate and hub.

Reduction in weight.  
20% saving in weight.

Minimum Maintenance Cost.

Strength — safety — economy.

The steel wheel backed by years of successful service.

You are not expected to adjust your conditions to meet our product. Davis Steel Wheels are made to meet A. E. R. A. Specifications and your service requirements.

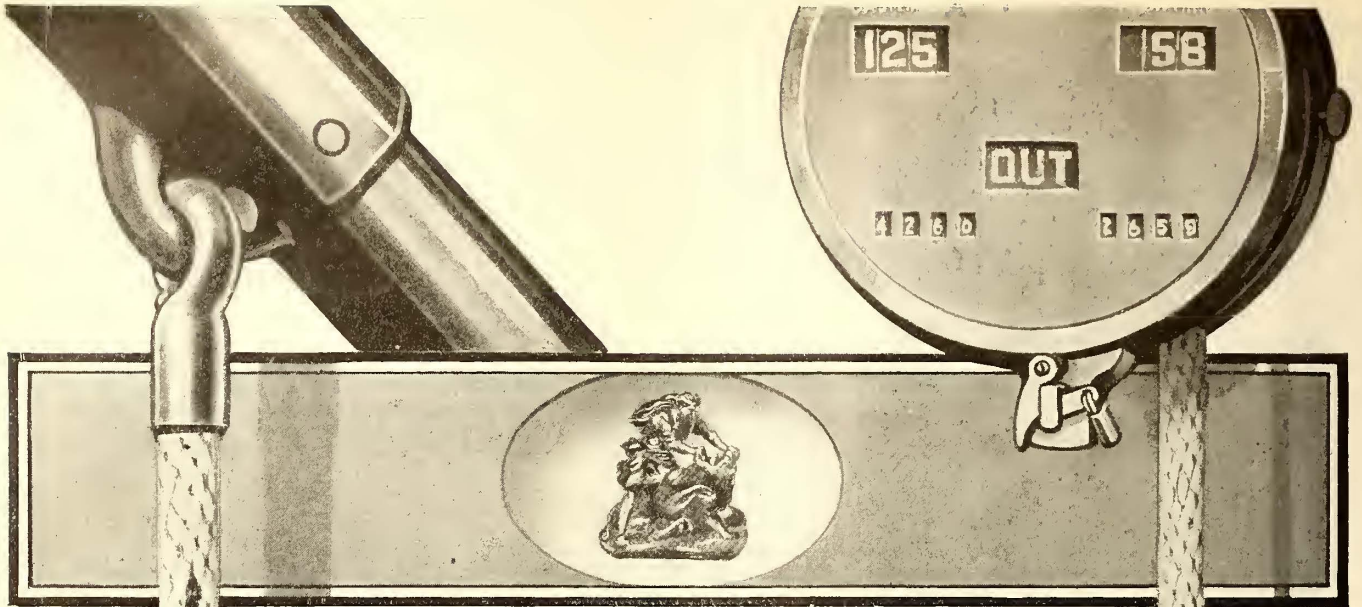
Write.

# American Steel Foundries

1100 McCORMICK BUILDING

CHICAGO





## Samson Spot Trolley Cord

is highly resistant to all actions of the weather because it is firmly braided and thoroughly waterproof. It saves repair, expense, time and trouble. No abrasion—no swelling in the catcher.

All Samson Spot Trolley Cord bears our trade mark—the Colored Spots.

## Samson Bell and Register Cord

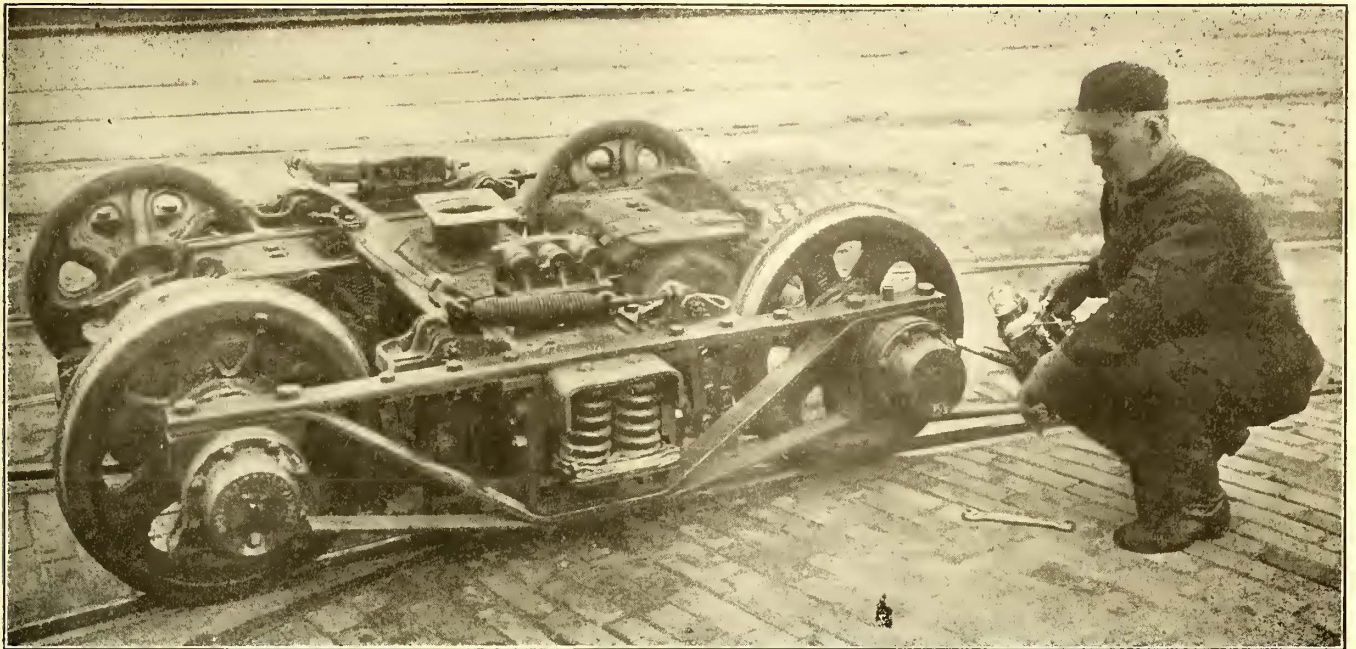
is made of the same extra quality cotton yarn as used in Spot Cord. It wears better, looks better—and costs less than other materials.

Can be obtained in all sizes and colors, with wire center if so desired.

We are anxious to send you samples and prices. Write for them.

**SAMSON CORDAGE WORKS**  
**BOSTON, MASSACHUSETTS**





Said the Shop Foreman:

"Nothing to it when it comes to lubricating

## Hess-Bright Ball Bearings

"All we have to do is to loosen one nut and force in the grease; and the grease will go of itself to where it can do the most good.

"We Don't Have to Worry

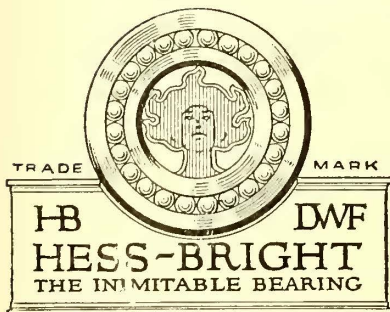
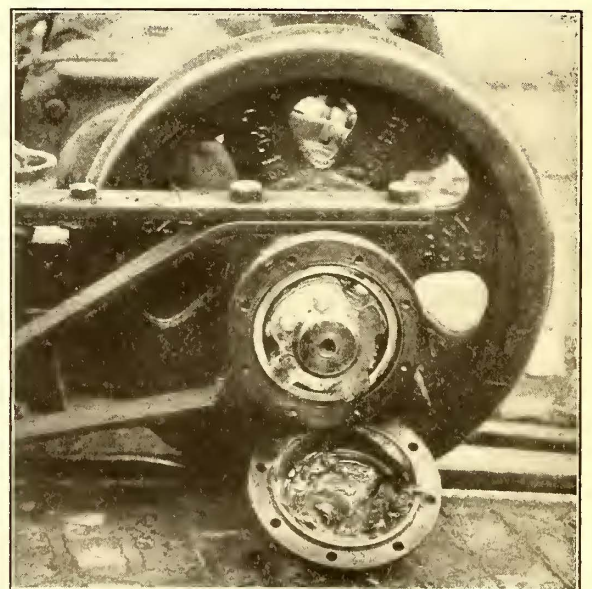
"About having the packing char or glaze

"About dirt or sand getting into the journals

"About having the packing fall away from the bearing

"About having the cars delayed on account of hot journals

"And the time between lubrication is measured by months now instead of days."

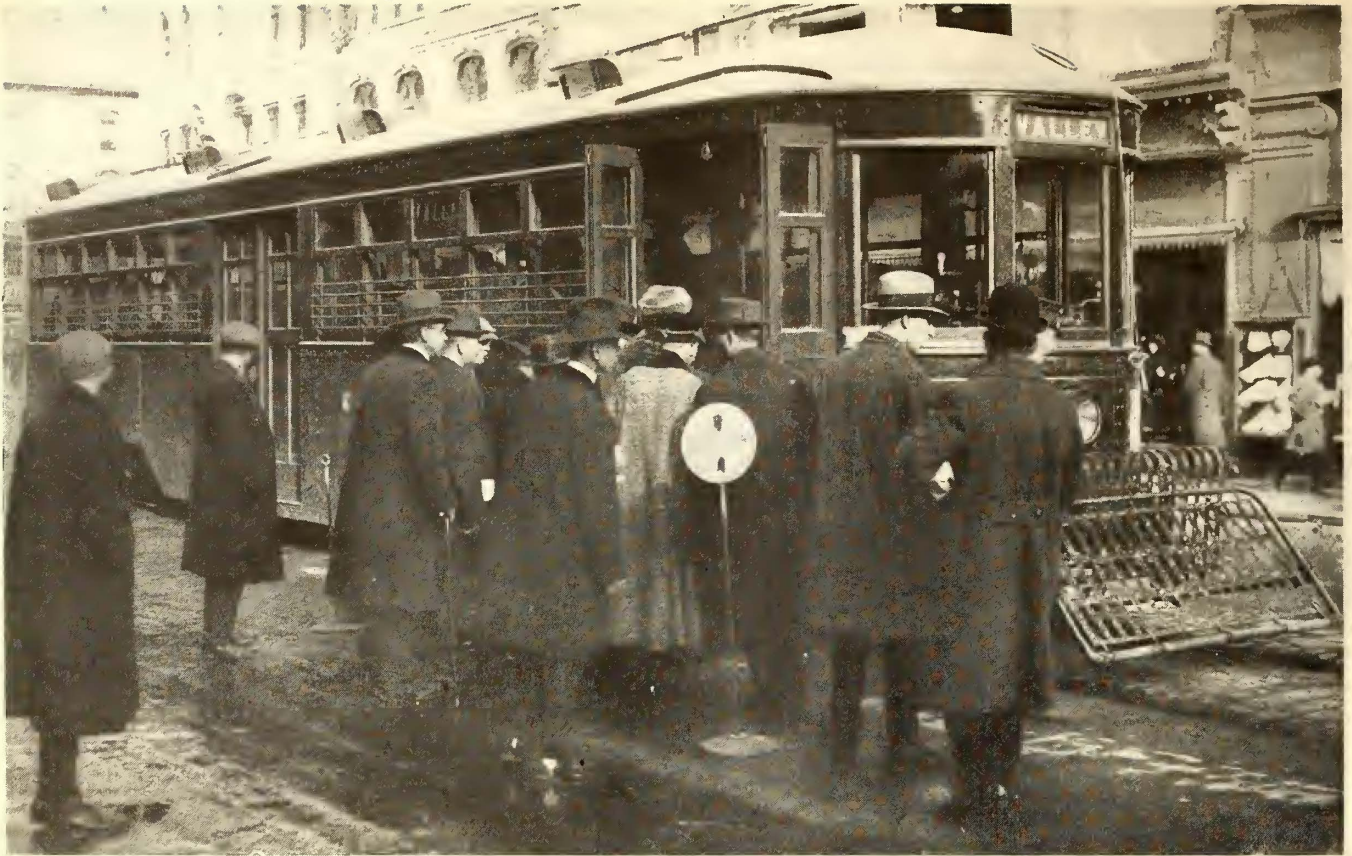


Hess-Bright  
Ball Bearings  
spell  
Maximum Revenue  
Mileage

THE HESS-BRIGHT MANUFACTURING COMPANY  
FRONT ST. & ERIE AVE., PHILADELPHIA, PA.

HESS-BRIGHT'S CONRAD PATENTS ARE THOROUGHLY ADJUDICATED





One of Thirty-Five Car Rider's Cars on which DURADUCT is used.

# A Specification for Duraduct

Reg. U. S. Pat. Off.

For twenty-five Arch-Roof, Front-Entrance, Center-Exit, Pay-Enter Cars for Syracuse and for ten like cars for Utica as follows:

"All light wiring inside of car-body is to be installed in DURADUCT, and all light or signal wiring underneath car is to be installed in a proper size Duraduct."

Why not write Duraduct into your specifications? It's going on the best cars of the best railways!

Sample on Request

## TUBULAR WOVEN FABRIC CO.

MANUFACTURERS

PAWTUCKET, R. I.

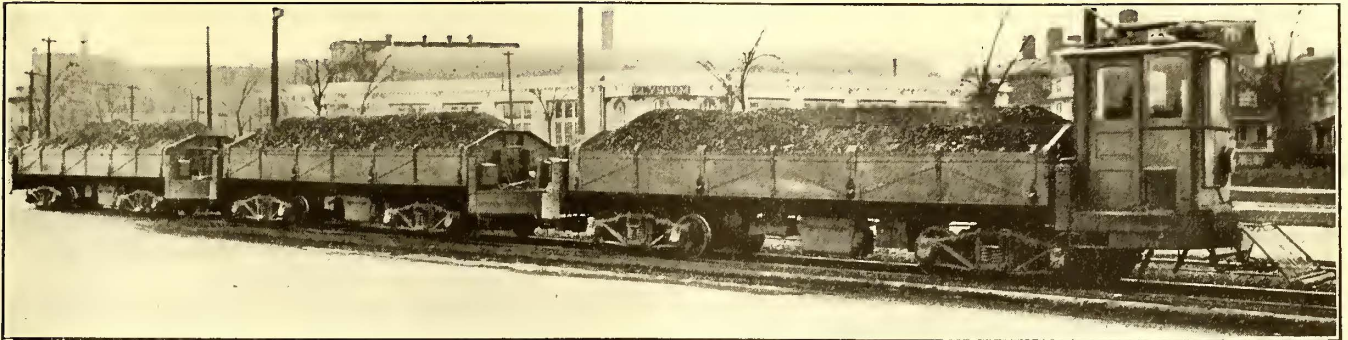
A. HALL BERRY, General Sales Agent

97 Warren Street, New York

9 South Clinton Street, Chicago

Distributors for Canada: *Northern Electric Company*  
LIMITED





This All Steel Train of Differential Electric Dumping Cars belongs to the Cleveland Railway Co., Cleveland, Ohio. They save enough labor within one year to pay for themselves. They make more money than passenger cars.

### THE DIFFERENTIAL ELECTRIC DUMPING CAR

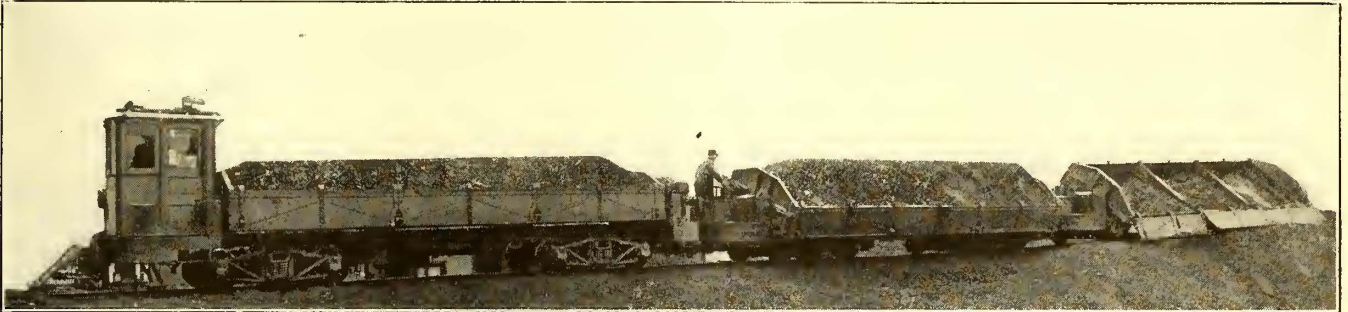
is low and may be loaded while in tilted position. It is Electrically operated and discharges the contents far from the tracks. It is light and quick and pleases Everybody.

Trains of them are operated and unloaded in congested districts without interfering with passenger car schedules. Ask us NOW for detailed information about this big money-saver and promoter of better public relations.

Southern Office and Works :  
Nashville, Tenn.

Differential Car Company

141 Broadway, New York

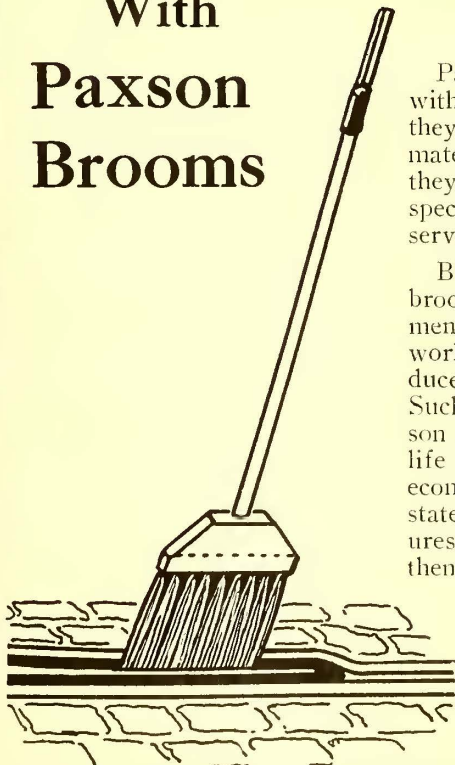


# Sweep Up!

With  
**Paxson  
Brooms**

Paxson Brooms fairly bristle with goodness. Not only are they made of the best obtainable materials and made right, but they are designed to meet the special requirements of railway service.

Blind men can make ordinary brooms, but it takes wide-awake men with a clear vision of the work the broom has to do to produce efficient, durable brooms. Such men stand behind the Paxson and assure you of that long life and efficiency that spells economy. This is not a general statement. We have specific figures that prove it. Write for them.



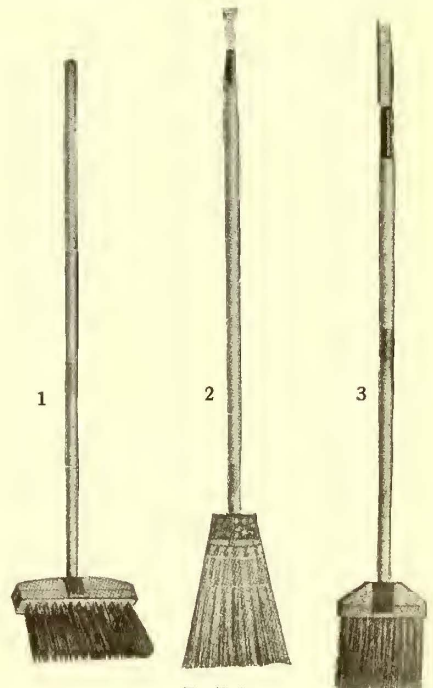
**J. W. Paxson Co.**

1021 No. Delaware Ave.,  
Philadelphia, Pa.

A crossing broom that will stand hard work. Of flat, tempered steel wire bristles.

A split bamboo broom for light work with snow or dirt in curves, frogs and switches.

A fine wire broom built to handle all debris that may get into frogs, switches and curves.



Built for rapid work. Makes a clean sweep, and serviceable the entire year.

"Fan" bristles make a strong cleaning edge, and give durability to the broom.

A hard service broom made with flat tempered steel bristles.



# SKEE BALL ALLEYS

The Bowling Game with a Punch that has a thrill for player and spectator alike. The leaping balls give a life to the game that no crowd can resist. A smashing big success for three years and daily growing stronger. Read the following:

The J. D. Este Company,  
Philadelphia, Pa.

Wildwood, N. J.,  
November 13, 1916.

Gentlemen:

At your request to hear from me as to my success with your game of Skee-Ball, would say:

Three years ago I purchased from you four Skee-Ball Alleys. At that time I had just acquired a property on the Boardwalk at Wildwood, New Jersey. My object in buying the Skee-Ball Alleys was to attract a crowd and thereby form a new amusement center; in this I have been amazingly successful, due entirely to Skee-Ball.

Not only has Skee-Ball increased the value of my property, but it has been very profitable to me to operate. The first year my four alleys earned an average of \$52.15 (or \$13.04 each) daily throughout the summer. The second year I purchased two more alleys and my earnings were increased. Last year was by far the most successful of the three. On the 3rd of last September my six alleys earned \$262.00, an average of \$43.66 per alley per day.

I attribute my success partly to the fact that I use the greatest care in keeping my alleys clean and in good condition. The balls are sandpapered, the carpet scrubbed, the woodwork rubbed down and the brasswork polished daily, so that after three years of the hardest kind of pounding they look practically as good as new.

With best wishes for your continued success and with kind personal regards, I am

Very sincerely yours,  
(Signed) JOHN T. BYRNE.

This is just one experience out of hundreds, in towns and cities ranging in population from 500 to 5,000,000—genuine, actual experiences, not guess-work or estimates.

Our books show that 42% of our alleys have been sold on repeat orders; in other words, nearly one-half of our alleys were sold to customers who had already tried out the game to their entire satisfaction.

We have again been obliged to enlarge the size of our factory to meet the steadily increasing demand; the factory is now 500% larger than it was in 1914.

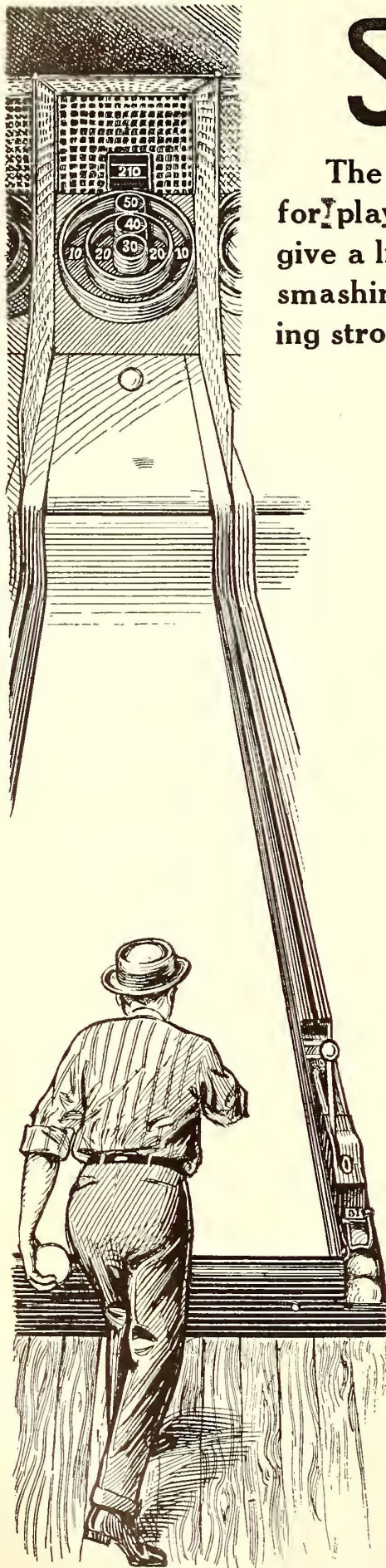
Get your order in now, even if you do not want immediate delivery, as materials and labor are advancing so rapidly that we cannot maintain the present price after February 15th, 1917.

*Skee-Ball is fully covered by domestic and foreign patents. Users of infringing games will be prosecuted. They are liable to injunction and for all profits and triple damages.*

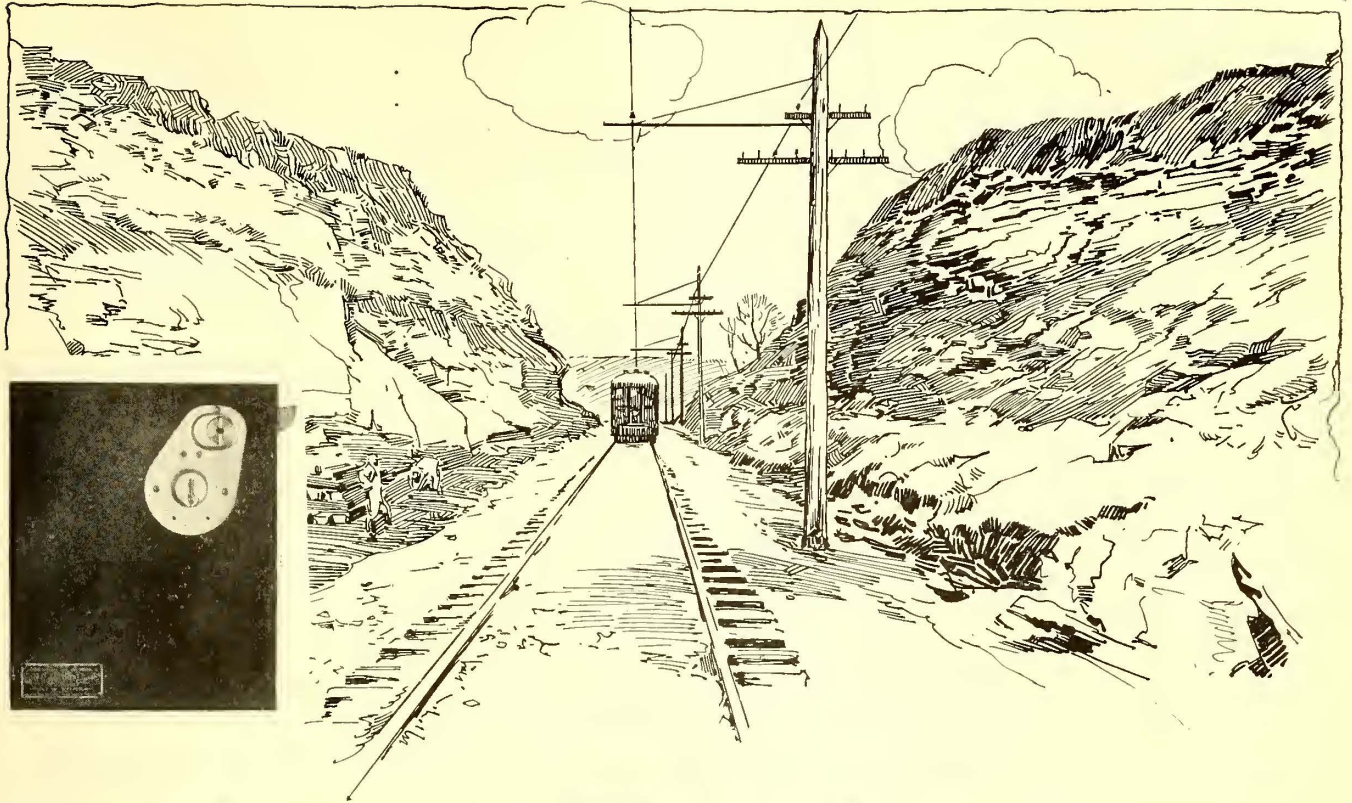
WRITE FOR ILLUSTRATED CATALOGUE.

## The J. D. Este Company

Owners - Patentees - Distributors  
1536 SANSOM STREET, PHILADELPHIA







# The Missouri Short Line has a Rico Coasting Recorder on Every Car

The Missouri Short Line (Kansas City, Clay County & St. Joseph Electric Railway) is one of the most up-to-date interurbans extant. It was one of the first to appreciate the merits of all-steel center-entrance cars for interurban passenger service, and it is equally progressive in handling freight and express. Naturally a live road of this kind is 100 per cent equipped with Rico Coasting Recorders.

Coasting records under the varied city and right-of-way conditions exceed 30 per cent right along, the record for September 1916 showing 32.5 per cent. Such records with modern, correctly-designed equipment show clearly that the Rico Coasting Recorder embodies

**The True Principle  
for Measuring  
Operating Efficiency**



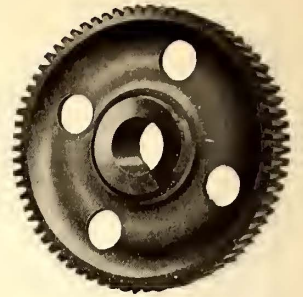
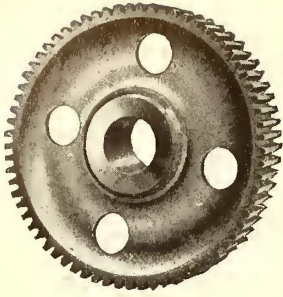
**Time is the Essence of Railroading**

RAILWAY IMPROVEMENT CO.



61 BROADWAY, NEW YORK





## Grade M Sales Exceed Those of Other Grades

A survey of the business in railway motor gearing during the year 1916 indicates strongly the preeminent success of

# Grade M Gears and Pinions

Although all grades of G-E gearing have shown a healthy increase in sales over the previous year, the percentage of increase for Grade M has been the highest. It is also noteworthy that the sales of this grade have steadily increased ever since it was placed on the market.

Out of a total of over 93,000 gears and pinions (comprising 8 grades) sold during 1916, almost forty per cent were Grade M.

This proves that more and more roads are discovering the true economy of

## The More-Miles-per-Dollar Gearing

# General Electric Company

Atlanta, Ga.  
Baltimore, Md.  
Birmingham, Ala.  
Boston, Mass.  
Buffalo, N. Y.  
Butte, Mont.  
Charleston, W. Va.  
Charlotte, N. C.  
Chattanooga, Tenn.  
Chicago, Ill.  
Cincinnati, Ohio  
Cleveland, Ohio

Columbus, Ohio  
\*Dallas, Tex.  
Dayton, Ohio  
Denver, Colo.  
†Detroit, Mich.  
Des Moines, Iowa  
Duluth, Minn.  
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Erie, Pa.  
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General Office: Schenectady, N. Y.

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Memphis, Tenn.  
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\*Oklahoma City, Okla.  
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Pittsburgh, Pa.  
Portland, Ore.  
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St. Louis, Mo.  
Salt Lake City, Utah  
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Schenectady, N. Y.  
Seattle, Wash.  
Spokane, Wash.  
Springfield, Mass.  
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Toledo, Ohio  
Washington, D. C.  
Youngstown, Ohio.

\*Southwest General Electric Company.

†General Electric Company of Michigan

For CANADIAN BUSINESS refer to Canadian General Electric Company, Ltd., Toronto, Ont.

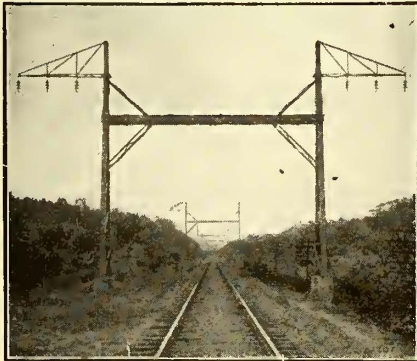
GENERAL FOREIGN SALES OFFICES, Schenectady, N. Y.; 30 Church St., New York City; 83 Cannon St., London, E. C., England



# AMERICAN BRIDGE COMPANY

HUDSON TERMINAL-30 CHURCH STREET, NEW YORK

*Manufacturers of Steel Structures of all classes particularly* **BRIDGES AND BUILDINGS**



Track Spans, Panama

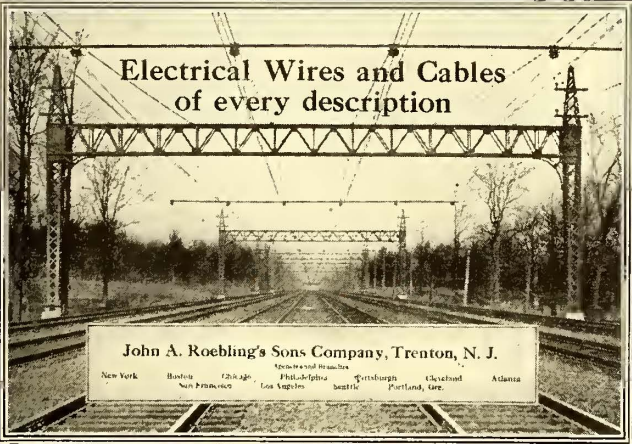
**SALES OFFICES**

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United States Steel Products Co., 30 Church Str., N. Y.

Electrical Wires and Cables  
of every description



John A. Roebling's Sons Company, Trenton, N. J.

Specialties and Branches  
New York Boston Chicago Philadelphia Pittsburgh Cleveland Atlanta  
San Francisco Los Angeles Seattle Portland, Ore.

## The Coal & Iron National Bank of the City of New York

Capital, Surplus & Profits \$1,635,000  
Resources Nearly \$10,000,000.

Offers to dealers every facility of a New York  
Clearing House Bank.

When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.

### EDWARD P. BURCH, Engineer ELECTRIC RAILWAY VALUATIONS

Dime Bank Bldg., Detroit Plymouth Bldg., Minneapolis

Frederick Sargent  
Wm. S. Monroe

A. D. Lundy  
James Lyman

**SARGENT & LUNDY, Engineers**  
1412 Edison Bldg., 72 W. Adams St., Chicago, Ill.

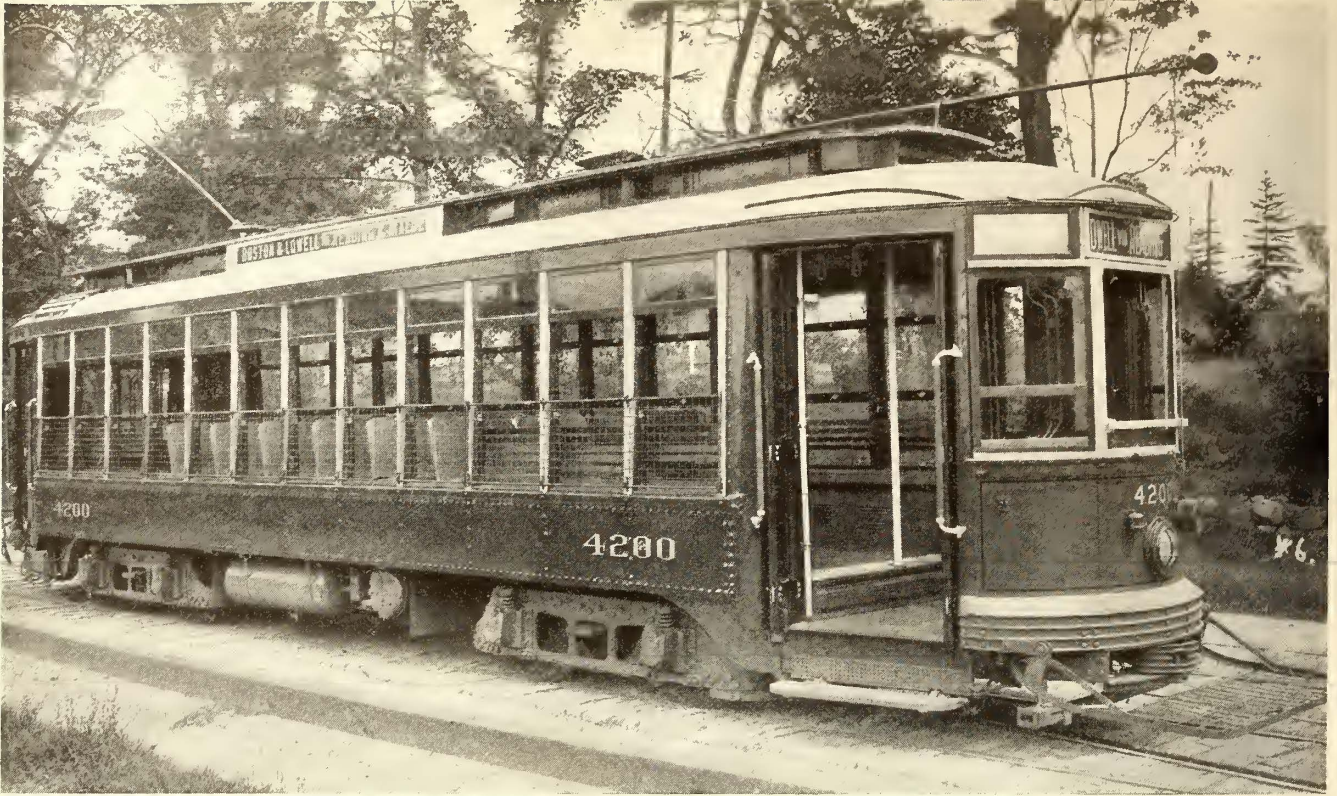
The famous men of the  
electric railway field  
contribute the benefit  
of their experience to the

**ELECTRIC RAILWAY JOURNAL**

### NEILER, RICH & CO., INC. Engineers

Manhattan Building, CHICAGO, ILL.  
Reports, Appraisals and Valuations, Railway and Lighting Properties





One of several hundred cars of the Bay State Street Railway equipped with Duff Emergency Jacks

# BARRETT

## Emergency Type Car Jacks

### Reduce Delays from Vehicle Breakdowns

Barrett Emergency Type Car Jacks are more than Safety Insurance.

Their users have found them a first-rate tool for clearing the track of broken-down vehicles.

With one of these jacks on each of your cars, you don't have to wait for a wrecking car to clear the track.

In many cases, you won't need a wrecking outfit at all.

### Reduction of Blockade Delays Means Less Loss of Revenue Mileage

For every car-mile that you lose, you may sacrifice 30 to 40 cents revenue.

The unnecessary losses of one blockade will pay for a goodly number of Jacks.

Ask us for prices on these Revenue Conservers.

We maintain an Engineering Dept. for the design of special Jacks to meet individual conditions.

## THE DUFF MFG. COMPANY

Pittsburgh, Pa.

New York: 50 Church Street

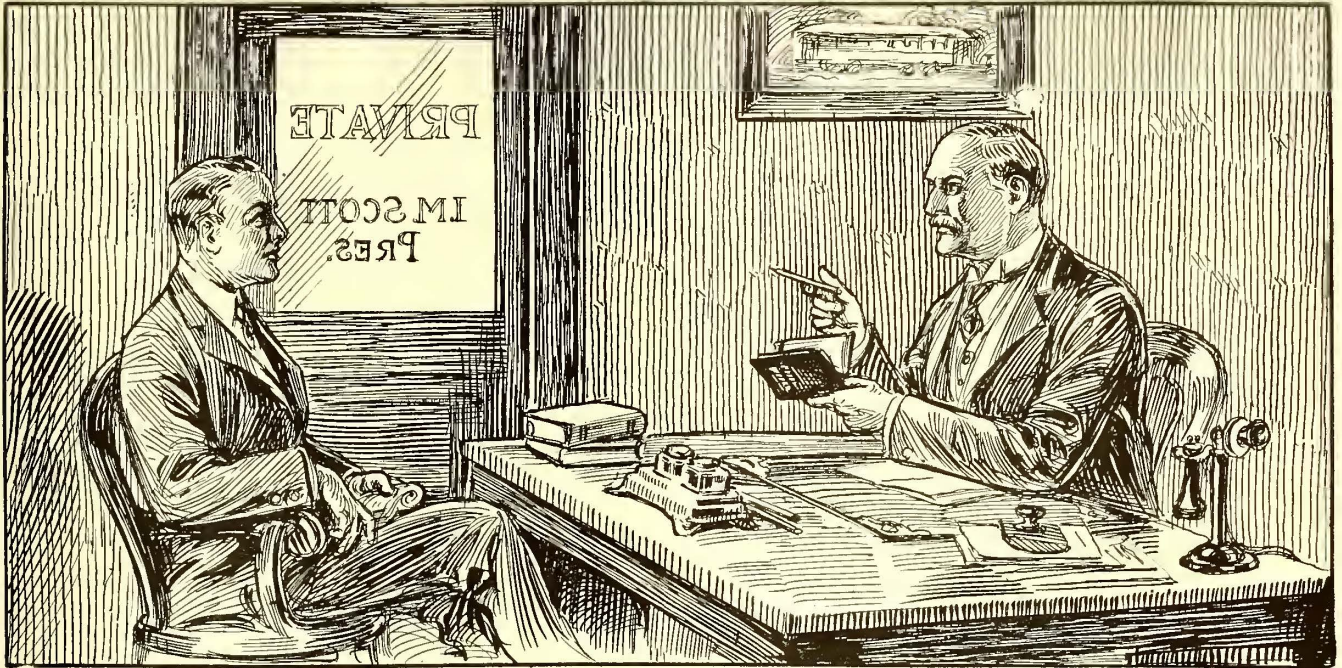
Chicago: People's Gas Building

Atlanta: Candler Building



No. 239  
"Bay State"  
Emergency  
Jack





# “This is the BIGGEST Little Book I Ever Saw!”

“It’s given me some mighty practical tips on economy. For instance, here on pages 6 and 7, I find a handy formula for figuring the comparative costs of copper and aluminum.

“I wish you’d figure it up, and see how much we can save by using aluminum conductors on that new Southwood extension. If it’s a real saving—and I feel sure it will be—we’ll plan to use aluminum wherever we can, all over the system.

“Be sure to give me back this book, for it’s too valuable to lose. I want our Overhead Engineer to have a copy, too—he’ll find it very useful. Ask Miss Freeman to write for it right away, please. Tell her to address the



**ALUMINUM COMPANY  
OF AMERICA  
PITTSBURGH, PA.**

New York Boston Chicago San Francisco

CUT THE COUPON

Aluminum Company of America, Pittsburgh, Pa.

Gentlemen: Kindly mail me your new book on “Aluminum Electrical Conductors.”

Name.....  
(Full name and title.)

Address.....  
(City and Street.)

Occupation.....



# The Great Business "A Good Product- Conscientious"

## RAILWAY TRACK-WORK COMPANY

WILLIAM D. GHERNY, PRESIDENT  
ANTHONY M. NARDINI, VICE PRESIDENT  
WILLIAM B. GOODALL, SECRETARY & TREASURER

30TH & WALNUT STS.

CABLE ADDRESS "RAILTRACK"  
WESTERN UNION CODE

PHILADELPHIA, December 15, 1916.

Electric Railway Journal,  
239 West 39th Street,  
New York City, New York.

Gentlemen:-

Recent additional shipments of Reoiprocoating  
Track Grinders for use in various foreign countries  
prompts me to advise you that all of our foreign business  
(now forming a respectable proportion of our entire  
business) is directly the result of our advertising in the  
Journal.

Knowing as we do, the effective part that our  
advertising in the Journal has played in aiding us to  
convince electric railway officials in this country of the  
value of our machine for their use, with the resulting  
rapid growth of our business, when we add to that the  
results produced in foreign markets, it makes our investment  
in the Journal look very satisfactory.

It looks as though a good product, good  
advertising and conscientious service to customers is a winning  
combination.

We compliment you in this connection on the excellent  
result of your Copy Service Department. Its efforts in connection  
with our advertising have been extremely helpful.

Very truly yours,

*William B. Goodall*  
Secretary & Treasurer.

WBG/C.



# Building Combination Good Advertising— Service to Customers”



The sun never sets on  
the work of the  
**RECIPROCATING  
TRACK GRINDER**

They are in regular use not only on scores of railways in America but also in foreign cities from Moscow to Shanghai.  
They have *proven* their superiority from every angle of economy, efficiency and perfection of finished work.  
We are ready to prove these facts to you at our risk.

**Railway Track-work Company, Philadelphia, U. S. A.**

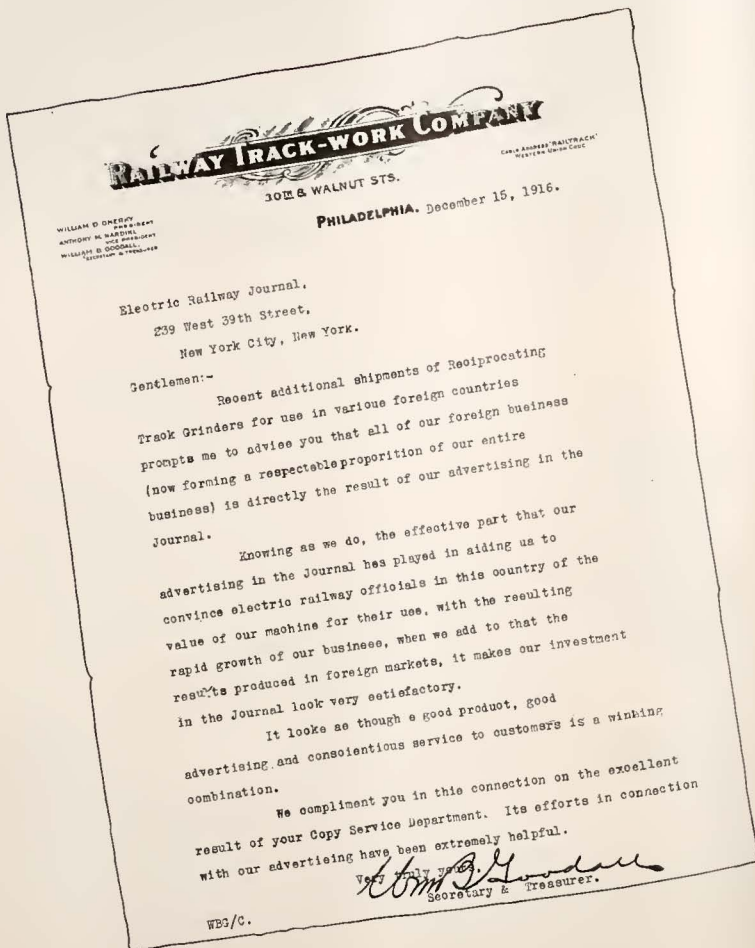
Reprinted from  
**Electric Railway Journal**  
Issue July 15, 1916







# The Great Business "A Good Product— Conscientious



# Building Combination Good Advertising— Service to Customers"

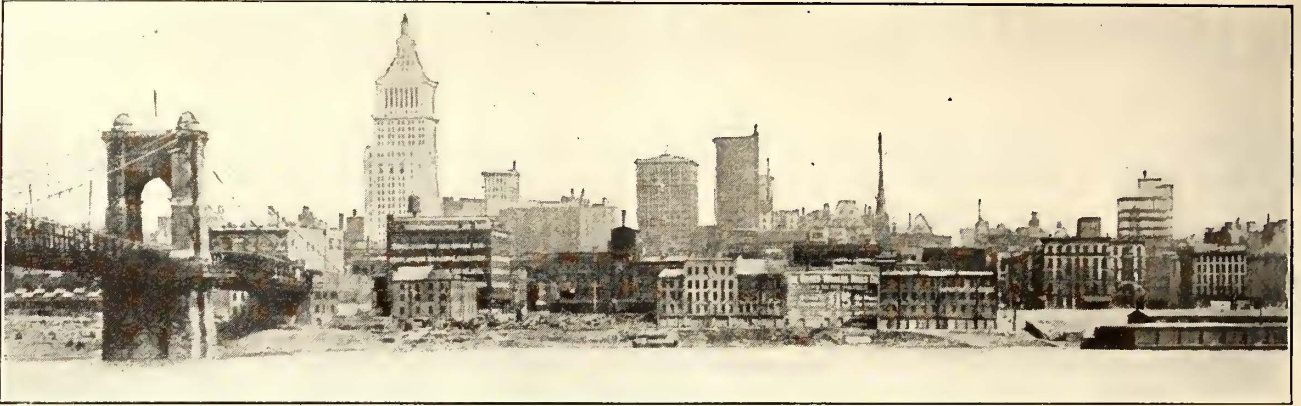
The sun never sets on the work of the  
**RECIPROCATING TRACK GRINDER**

They are in regular use not only on scores of railways in America but also in foreign cities from Moscow to Shanghai.  
They have proved their superiority from every angle of economy, efficiency and perfection of finished work.  
We are ready to prove these facts to you at our risk.

**Railway Track-work Company, Philadelphia, U. S. A.**

Reprinted from  
**Electric Railway Journal**  
Issue July 15, 1916





A View of the Cincinnati Skyline Opposite Covington

# Ten Years Deltabeston Service

and Still Going Strong in  
the Hills of Old Kentucky

The South Covington & Cincinnati Street Railway was one of the pioneer users of Deltabeston Wire for railway motor rehabilitation. It began this work as early as 1904.

About ten years later when the equipment department had occasion to make a general examination, it found that

**ONLY THE OUTER INSULATION  
NEEDED RENEWAL**

To go back to the efficient, everyday service that is so characteristic of D & W Products. That's why the equipment department said:

**Good For Ten Years And Then Some!**



## D & W FUSE CO.

PROVIDENCE, R. I.

A. Hall Berry, 97 Warren St., New York



Agents—Pettingell-Andrews Company

Western Electric Company

Central Electric Company





## Resolve to Use the Thermit Insert Rail Weld in 1917 and Thereafter

Because by reducing the percentage of breaks to a minimum—

The Thermit Insert Weld avoids the expense of street openings which cost far more than the joints or welds.

The Thermit Insert Weld avoids the bad feeling due to tearing up streets in front of business buildings.

The Thermit Insert Weld avoids the heavy losses due to rerouting car service.

The Thermit Insert Weld gives a continuous rail which assures quiet running and long life to your cars.

The Thermit Insert Weld, by eliminating the hard-riding track, also promotes increased use of your service.

New York, Kansas City, Boston, San Antonio, Dallas, Milwaukee, Pittsburgh, Chicago, Youngstown, Los Angeles are some of the cities where

## Thermit Welds Are Making Good

### GOLDSCHMIDT THERMIT CO.

120 BROADWAY, NEW YORK

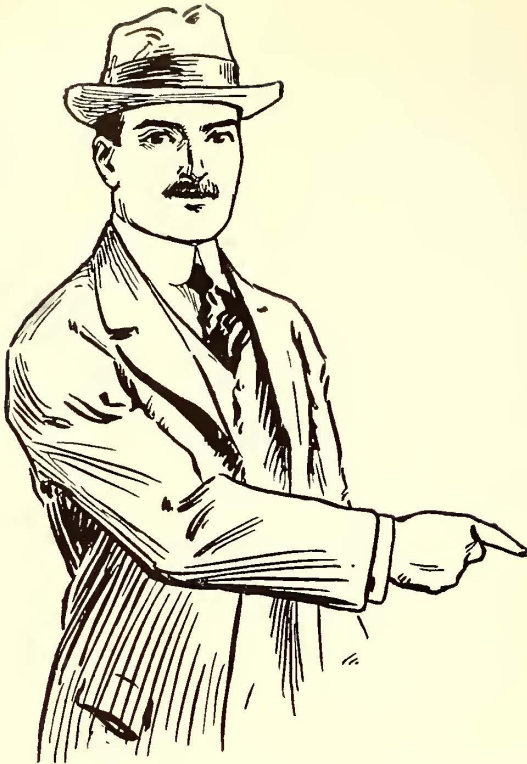
329-333 Folsom St., San Francisco

103 Richmond St., W., Toronto, Ont.

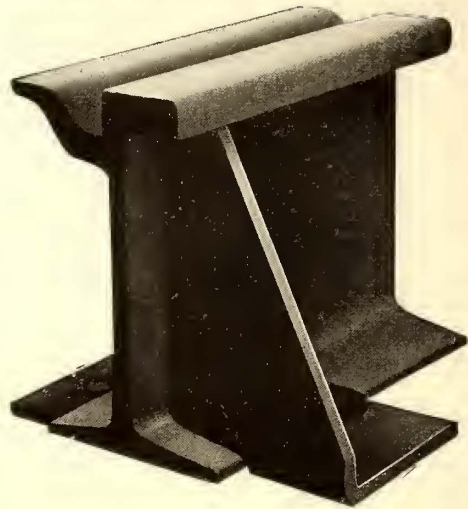
7300 So. Chicago Ave., Chicago







*“—And Now I’ve  
Found It”*



“I’ve been hunting for years for a rail brace that would hold my track rigid to gage, do away with the rail drilling menace and stop waste due to rusted threads,” said the Roadmaster, “—and now I’ve found it.”

## The Combination Rail Brace and Tie-Plate

does all of this—and more. It saves on ties—costs less than tie rod—facilitates paving—and gives better service.

Open hearth steel  $\frac{3}{8}$ " or  $\frac{7}{16}$ " thick for girder or "T" rails.

Start saving now. Write for cost data today.

### Steel Car Forge Company

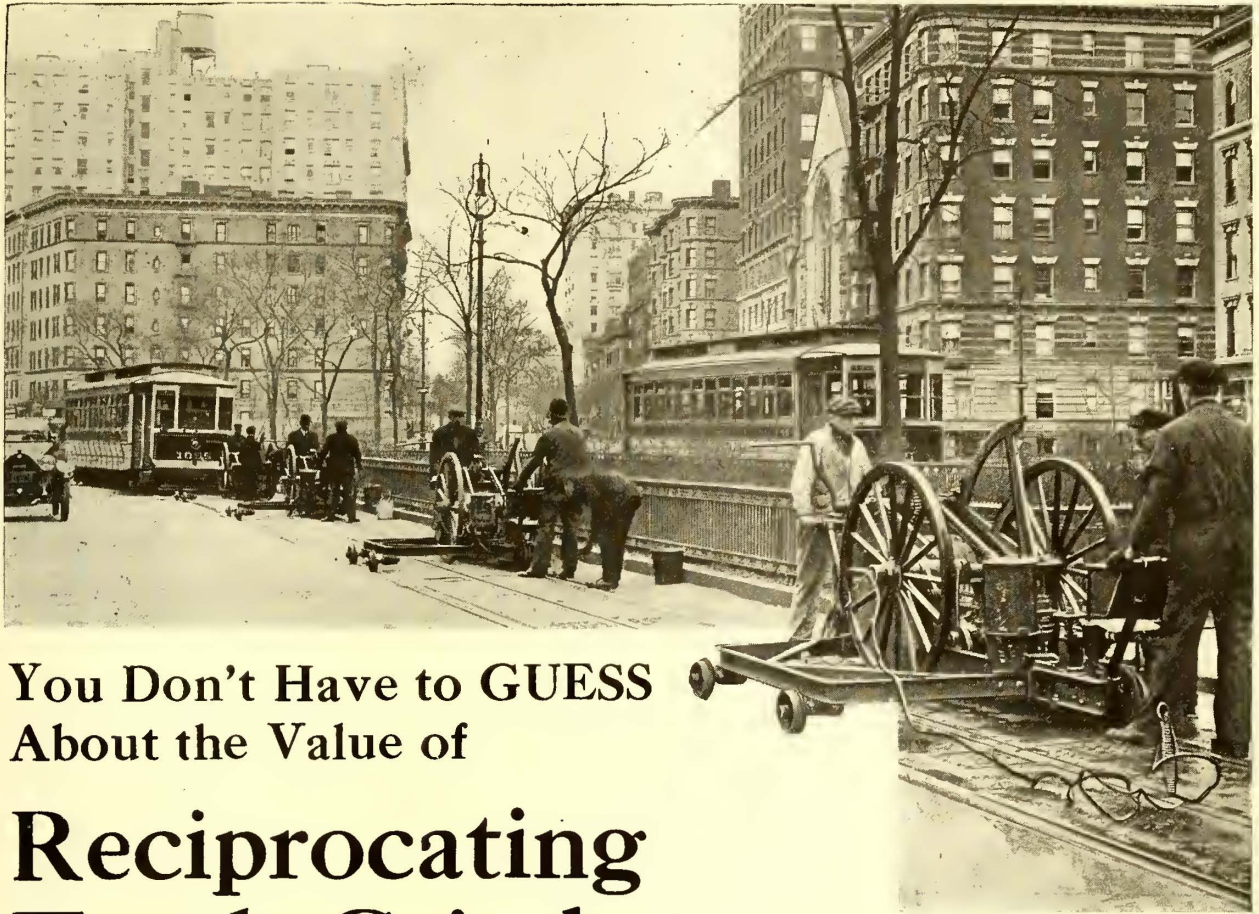
Pittsburgh

New York

Chicago

Works: Ellwood City, Pa., and Hammond, Ind.





You Don't Have to GUESS  
About the Value of

# Reciprocating Track Grinders

You Can Demonstrate it on your own tracks

And you can do that without a nickel of expense for the machine.

In the past few years more than 60 railway companies have put a Reciprocating Grinder at work on their tracks with the clear understanding that if they were willing to give up the machine after a fair, square trial of it they were simply to say so and we would take it back—all at our expense.

In not a single instance has a machine come back.

This demonstrates two things: First, the supreme efficiency and economy of the Reciprocating Track Grinder.

Second, that it so greatly improves track conditions that no railway having once demonstrated the improvement produced by this machine is willing to be without it.

The elimination of corrugations and cupped joints produces a big saving in maintenance cost, increases life of track, decreases wear and tear on rolling stock, and is a source of satisfaction to the public.

## Railway Track-work Co.

30th and Walnut Sts., Philadelphia, U. S. A.



**PUBLIC SERVICE ELECTRIC COMPANY**  
BROAD AND ARMY STREETS  
Philadelphia, Pa. -19127

Templeton Kenty & Co. Ltd.  
1022 So. Central Ave., Chicago, Ill.

Please deliver to PUBLIC SERVICE ELECTRIC COMPANY  
Prospect Park Station, P. O. Box 111722  
C. S. Curtis MARK ON YOUR ORDER NO.

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**THROUGH HEAT ORTO**

PLEASE FURNISH THE FOLLOWING CARE OF FRANK V. ROBERT

**PUBLIC SERVICE ELECTRIC COMPANY**  
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**ADIRONDACK ELECTRIC POWER CORPORATION**  
PURCHASING DEPARTMENT  
Glens Falls, N. Y.

Order No. 0-1311

To Templeton, Kenty & Co. Ltd.,  
1022 So. Central Ave., Chicago, Ill.

**ADIRONDACK ELECTRIC POWER CORPORATION**  
PURCHASING DEPARTMENT  
Glens Falls, N. Y.

Order No. 4-19827

To Templeton, Kenty & Co. Ltd.,  
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**ADIRONDACK ELECTRIC POWER CORPORATION**  
PURCHASING DEPARTMENT  
Glens Falls, N. Y.

Order No. 13253

To Templeton, Kenty & Co. Ltd.,  
1022 So. Central Ave., Chicago, Ill.



- 1 - No. 318 Simplex Pole Jack including 8 ft. 5/8" chain
- 1 - 5 ft. steel lever-bar
- 1 - 1 - Beam Base complete

For pulling or straightening poles of all sizes, under any conditions, the No. 318 is a big dividend payer. The first dozen poles handled will easily defray the whole cost of the Simplex.

**Atlantic City NY COMPANY**

THIS NUMBER MUST BE PLACED IN EACH ORDER 1195

ORIGINAL

Templeton Kenty & Co. Ltd. Chicago, Ill.

1 #318 Simplex pole jack complete 28  
FOB Chicago 2 1/2 - 10 days

**LOCAL ORDER COMPANY**

Templeton-Kenty Company, Chicago, Ill.

Please ship us by New York Central Freight subject to the conditions specified below.

MATERIAL

1 - Simplex Pole Jack - No. 318, complete steel lever and 1 Beam Base,

**Send for Bulletin Catalog No. 216**

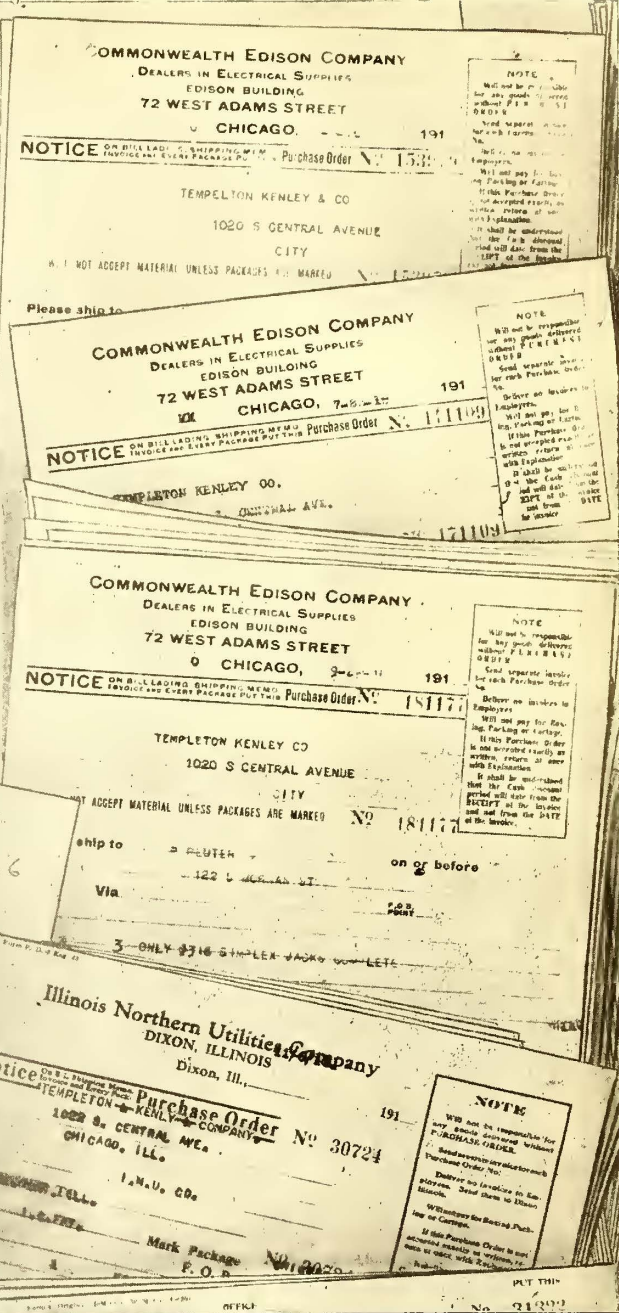
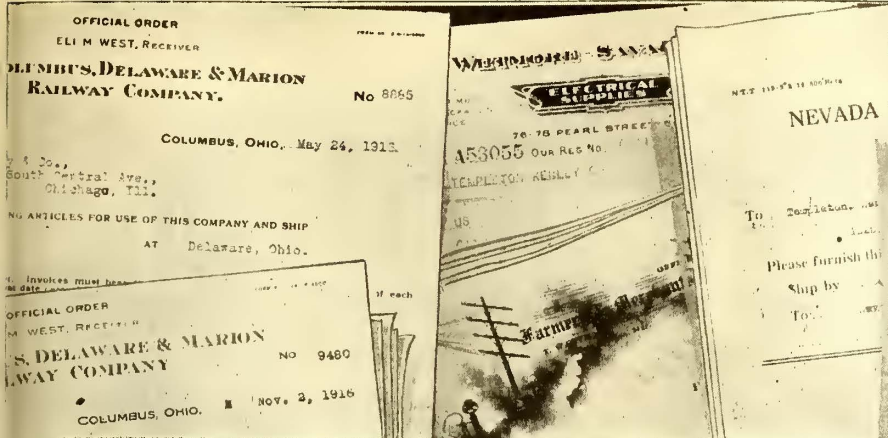
75-76 DEARL STREET BOSTON

ORDER NO. 447303

1 - Simplex Pole Jack - No. 318, complete steel lever and 1 Beam Base,

**There's A Simplex Jack**





# PROOF

## OF THE EFFICIENCY AND VALUE

### of The No. 318

# Simplex Pole Jack

## Reduces the Labor and Cost of Pulling Poles.

## Makes Straightening of Poles a One-Man Job.

Every telephone, lighting and power, public utility and electric railway company will find this tool of extraordinary value.

**TEMPLETON, KENLY & CO., LTD.**  
1024 So. Central Ave.  
CHICAGO, U. S. A.

Send This Order To  
Your Nearest Jobber

Gentlemen:

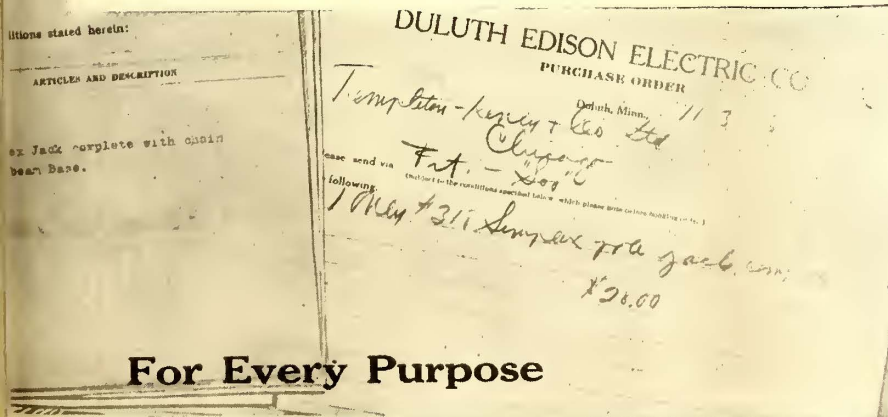
Please furnish

\_\_\_\_\_ 318 Simplex Pole Jack including full equipment at \$28.00 complete—F. O. B. Chicago.

Name \_\_\_\_\_

Address \_\_\_\_\_

Ship Via \_\_\_\_\_



### For Every Purpose







# Economical Welding



Any weld at all will cost less than replacing a worn rail or a broken part, but no weld is really economical unless it is made at the lowest possible cost.

## The Lincoln Arc Welder

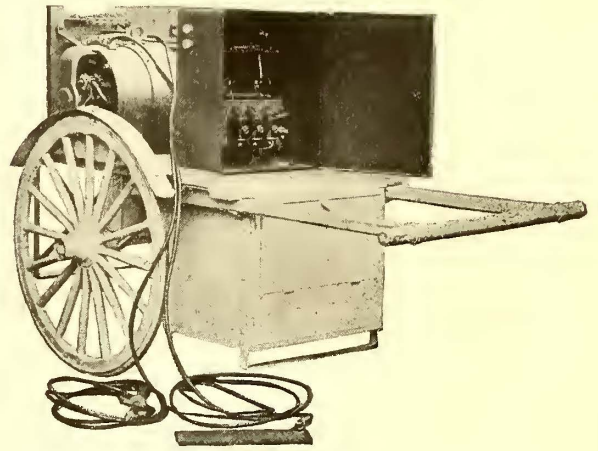
will do track or shop welding at lower cost than any other apparatus.

### Saves Power

The Lincoln Arc Welder is simply a motor operated by current from the trolley wire. This motor in turn drives a generator which delivers current at 150 to 180 amperes. To do this the motor only takes 7 to 8 kw. power from the line.

In other types, the welding current is produced by "cutting down" the voltage of the line through a cast iron resistance. The excess power is **wasted** in the resistance and consequently 80 to 100 kw. must be taken from the line.

The Lincoln Arc Welder saves 70 to 90 kw. in power.



**Faster Welding** with the Lincoln Arc Welder the rail or piece to be welded is the positive electrode, hence it is always hot and the molten metal sticks to it readily. The operator can work much faster.

**Saves Trolley Wire.** The Lincoln Arc Welder taking only 7 to 8 kw. will not cause burning of the trolley such as frequently occurs when more power is taken.

*Investigate the Cost of Lincoln Welding*

## The Lincoln Electric Co.

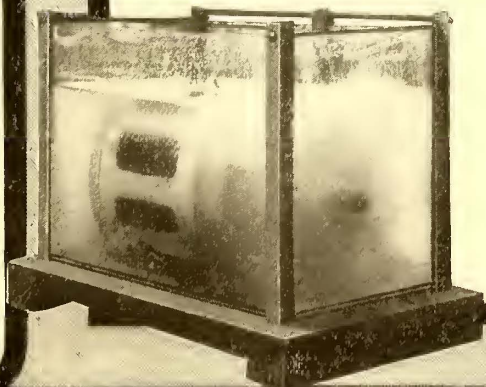
Cleveland, O.

New York City  
(Singer Bldg.)  
Buffalo  
Grand Rapids

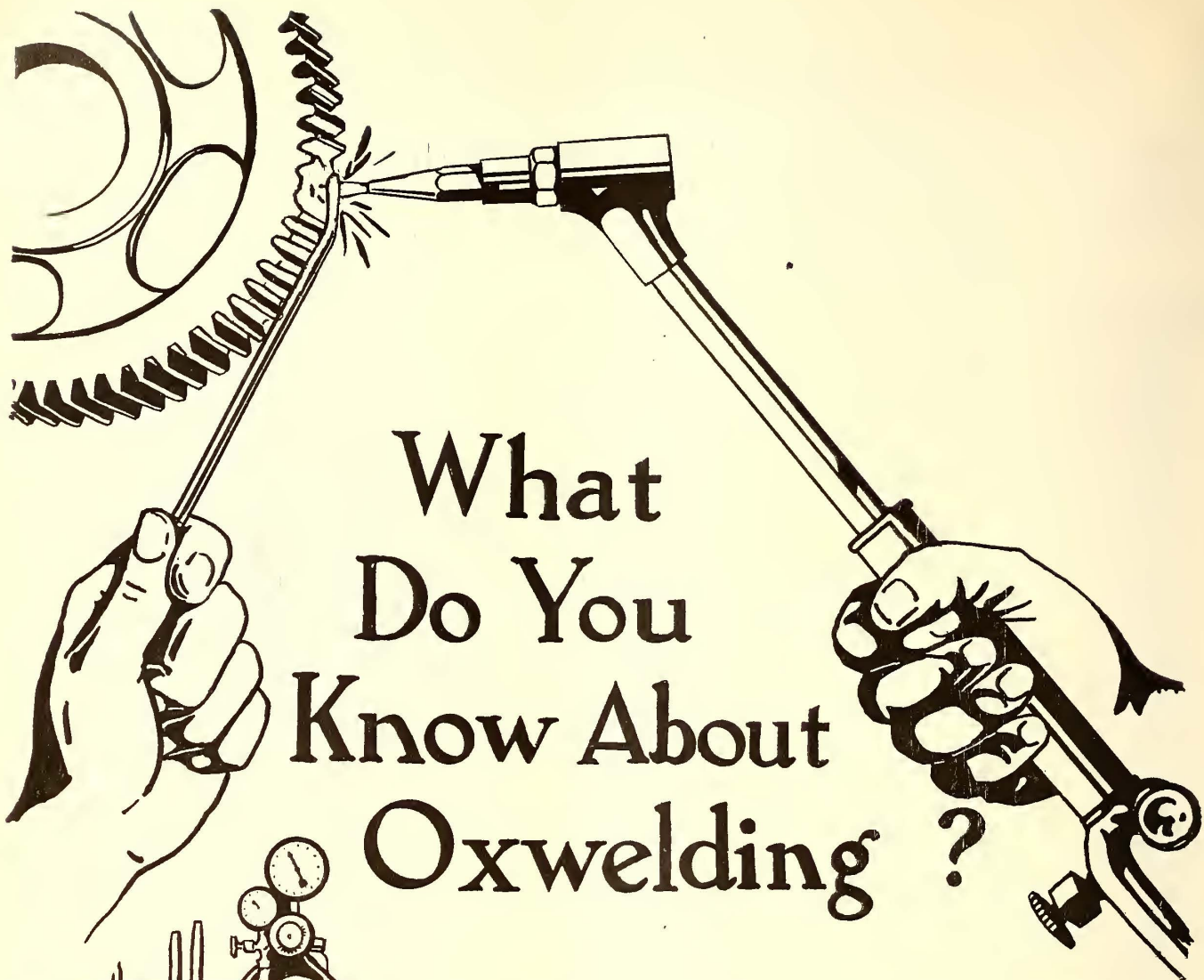
Chicago  
Columbus  
Detroit  
Toronto, Canada

Philadelphia  
Pittsburgh  
Charlotte, N. C.  
Syracuse

Agencies in other principal cities







# What Do You Know About Oxwelding ?

You probably know that it is oxy-acetylene welding and cutting with the highly developed Oxweld apparatus.

**But have you ever investigated the possibilities of Oxwelding in your own business ?**

Many a master mechanic and maintenance engineer has saved his company thousands of dollars per year by employing Oxwelding in repair work, bonding and track maintenance. Now comes a new application (originated by a user) which radically reduces the cost of car parts by cutting them from scrap steel plate.

And yet the surface hasn't been scratched. In addition to these uses which *you know* will increase the efficiency and reduce the cost of your department, you may develop *new* applications that will lead to further economies for your company.

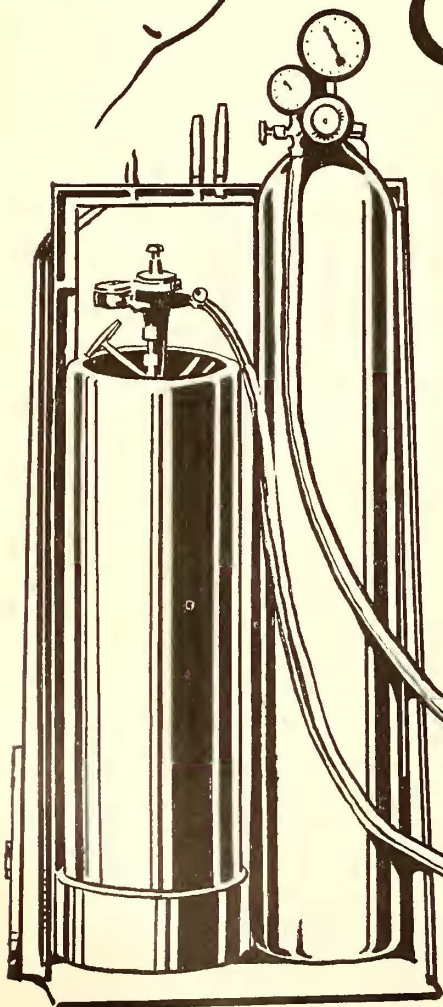
Surely a process of such unlimited possibilities is worthy of careful investigation. We have made it easy for you by preparing special articles on Oxwelding in the electric railway business.

*Just ask for Bulletin Series 700-J.*

**Oxweld Acetylene Co.**

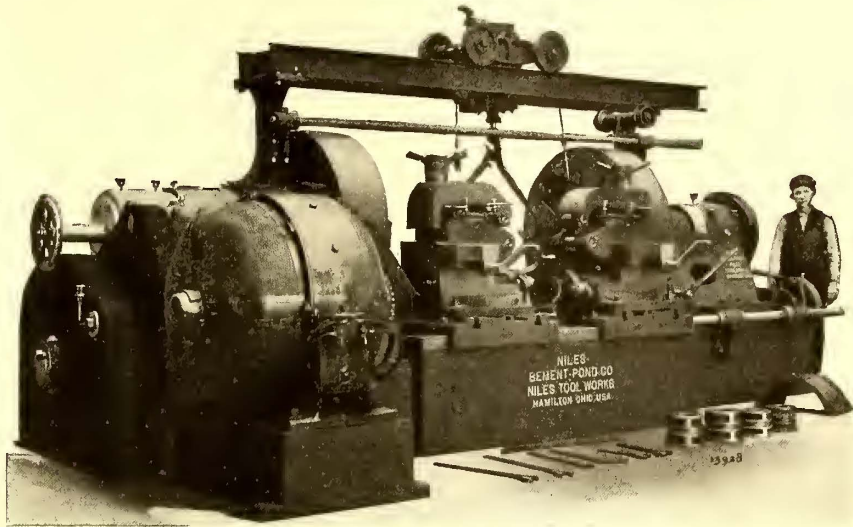
Newark, N. J. Chicago Los Angeles

*Largest Makers of Welding and Cutting Equipment and Supplies in the World*





# Complete Machinery Equipment



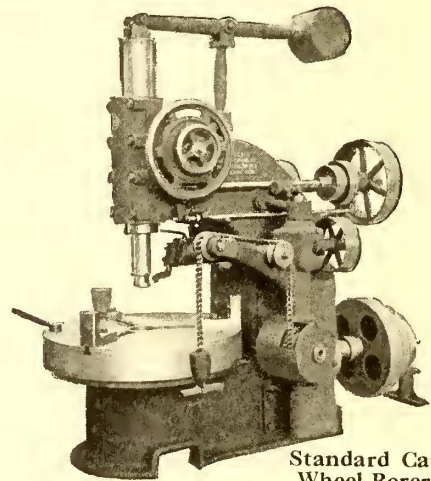
Car Wheel Lathe

## For Electric Railway Repair Shops

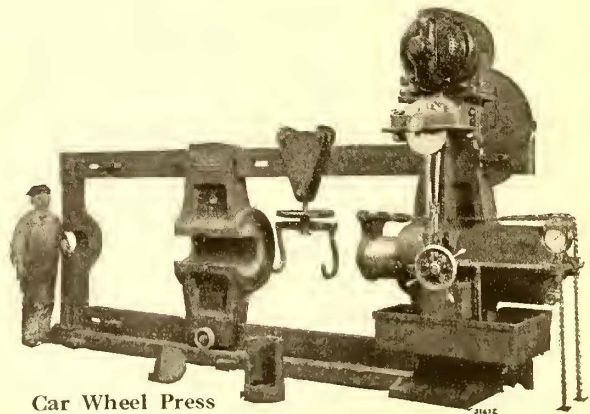
A Car Wheel Lathe is probably the most important part of a Repair Shop equipment. The Car Wheel Lathe shown above is of heavy massive construction and is equipped with all the modern improved devices for the rapid handling and turning of steel car wheels. It is designed for wheels from 26" to 42" diameter and will take in axles having either outside or inside journals.

Right-hand head is traversed by a motor and has a friction safety device to prevent the possibility of accident in case the faceplates are brought up too forcibly against the wheels. A convenient caliper device, "Sure Grip" drivers and patented pneumatic tool clamps are provided.

We shall be pleased to send you descriptive circulars and catalogues showing all the various machines required for repair shop work.



Standard Car Wheel Borer



Car Wheel Press

## NILES-BEMENT-POND COMPANY

111 Broadway, New York

25 Victoria St., London, S. W.

**SALES OFFICES AND AGENCIES**—**Boston:** 93-95 Oliver St. **Philadelphia:** 405 N. 21st St. **Pittsburgh:** Frick Bldg. **Cleveland, O.:** The Niles Tool Works Co., 730 Superior Ave. **Hamilton, O.:** The Niles Tool Works Co. **Cincinnati:** The Niles Tool Works Co., 336 W. 4th St. **Detroit:** Kerr Bldg. **Chicago:** 571 W. Washington Blvd. **St. Louis:** 516 North Third St. **Birmingham, Ala.:** 2015 First Ave. **San Francisco:** 16 to 18 Fremont St. **For Colorado, Utah, Wyoming and New Mexico:** Hendric & Bolthoff Mfg. & Supply Co., Denver. **For Seattle:** Hallidie Machinery Co. **For Canada:** The John Bertram & Sons Co., Ltd., Dundas, Montreal, Toronto, Winnipeg, Vancouver. **Japan:** The F. W. Horne Co., Tokio. **Italy:** Ing. Ercole Vaghi, Milan. **France:** Glaeuzer & Perreaud, 18 Faubourg du Temple, Paris. **Russia:** S. G. Martin & Co., Ltd., Petrograd and Moscow. **Brazil:** Comptoir-Technique Bresilien, P. O. Box 802, Rio de Janeiro.



# 75% Efficiency is 33 $\frac{1}{3}$ % Inefficient

A man or a machine only 75% efficient must do one-third better to be 100% efficient.

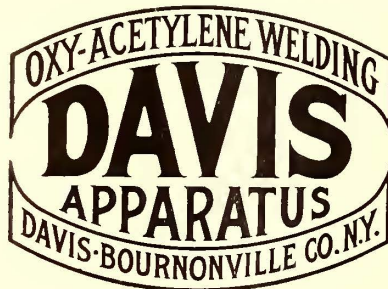
100% efficiency is not necessarily perfection—but, the standard of 100% is essentially the "best obtainable"—therefore, it is the basis for comparison of less efficient performance.

One of the most prominent industries in the United States, employing a large amount of Davis-Bournonville apparatus with much success, recently said—bantering the salesman about the price—"When we can get welding torches 75% as efficient as the Davis-Bournonville torches, at sufficiently lower price, we will consider them!"

Consider, yes! But the chances are they will not willingly employ tools, machines or men, that ought to be and could be 33 $\frac{1}{3}$ % more efficient than they are. This would mean that the 75% efficient man does in four days what he ought to do in three days—that the 75% efficient welding torch should give one-third better results than it does—and, if efficiency is based on both gas consumption and manual performance, that four tanks of oxygen are used when three would do the work, four hours' time consumed when three should have been enough, or, the welded job is only three-fourths as good as it ought to be—

*also, 75% efficiency may mean loss of prestige and reputation for efficient performance.*

Davis-Bournonville oxy-acetylene and oxy-hydrogen apparatus is the standard for efficiency, and has been since this company introduced the positive-pressure process of oxy-acetylene welding to the metal working industries in the United States, ten years ago—because it provides the highest efficiency obtainable, with the greatest development of apparatus, and most extended application in the metal working trades, and the widest range of equipment made for the use of the oxy-acetylene and oxy-hydrogen processes.



## Leads the World in Range, Efficiency and Apparatus in Successful Use

Davis-Bournonville Welding and Cutting Apparatus is in successful use by the most prominent concerns in the United States and Canada engaged in iron and steel production and metal working—foundries, rolling mills, ship yards, navy yards, scrap yards, railroad shops, locomotive and car shops, steel furniture, sash and door plants, tube mills, pipe and pipe bending works, by automobile and motor truck makers, manufacturers of automobile metal bodies, ornamental iron workers, on construction work and for wrecking, and in hundreds of small and large repair shops and garages, for welding and building up broken and worn castings.

(Our No. 3 factory building was completed and occupied in mid-summer, 1916, affording 30,000 additional square feet of floor space. We are now adding two more stories with 20,000 square feet more floor space, to keep up with the demand for "Davis apparatus.")

## Davis-Bournonville Company

General Office and Factory: Jersey City, N. J.

Sales Offices: New York, Chicago, Boston, Philadelphia, Pittsburgh, Cleveland,  
Detroit, St. Louis, San Francisco, Toronto





"**B**OYS," said the General Manager at the luncheon Round Table one day, "a lot of great work has been done in fare collection these past years, but we're still a long way from getting all the money."

"Ye gods, we certainly need the coin more than ever, with 34-cent copper staring us in the face," muttered the Purchasing Agent.

"Yes, and our poor, old nickel has just been stretched to give another half-mile of riding to Hillcrest-on-the-Styx," said the treasurer with a sigh.

"Gosh, it can't be said we haven't tried," put in the Superintendent of Equipment. "Only the other day we sold a fine lot of railings and other fare-collecting junk that we had stuck in the cars at one time or another.

"How you can expect to train the public to a new system of fare collection every few months is the thing that's getting my goat," grumbled the Superintendent of Transportation. "And it gets the conductors up in the air, too."

"I've noticed," added the superintendent of timetables, "that some of those experiments slow down the line instead of speeding it up."

The General Manager laughed. "Boys, it looks as if I started something when I mentioned fare collection. Well, I'm going to try once more, but this time it's going to be

"A fare collection system that won't cost us anything for new equipment, that won't call for changes in the cars, that has no register ropes or rods, that doesn't puzzle the passenger one minute, and that **GETS THE MONEY**. I refer to the

## Rooke Automatic Register!

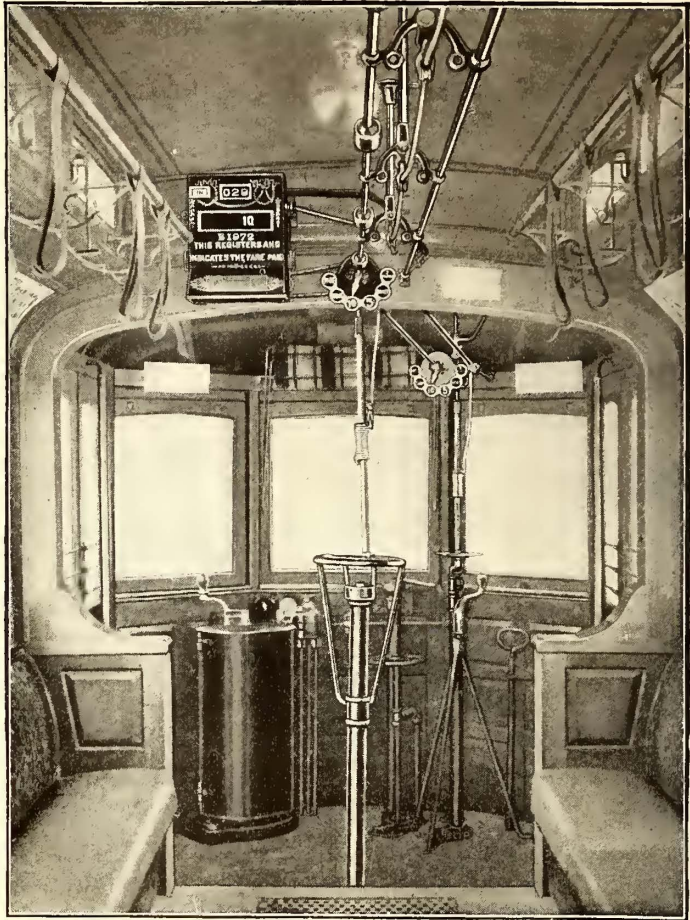
"Let's talk further about it at our next luncheon."

Rooke Automatic Register Co.,

Providence, R. I.



# The Ohmer System



An Ohmer Fare Register equipment adapted to one man, two man, pay as you enter or pay within operation.

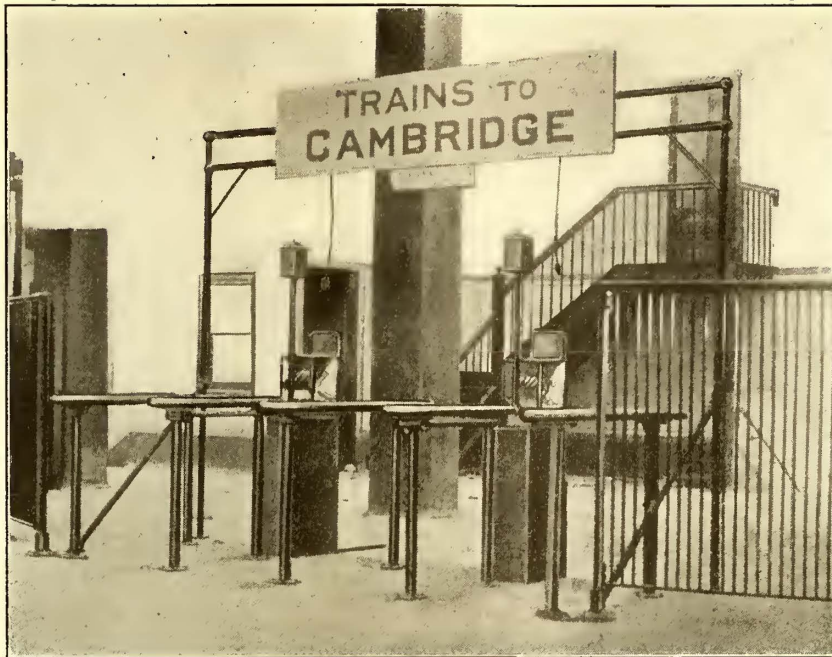
**T**HE Ohmer System is a success because it constrains the conductor to collect the right fare, to register it correctly and turn it in, irrespective of its registration.

The Ohmer System is a success because it recognizes the tendencies to fail on the part of the conductor and eliminates those tendencies by a system of registration which makes unpaid fares, unregistered or misregistered fares so evident that they are avoided.

The Ohmer System is a success because it eliminates the unworthy conductor, because it makes an efficient man and a "salesman of transportation" out of the man who is worth while.

**Ohmer Fare Register Company**  
**Dayton, Ohio**





## **Boston's Latest Rapid Transit Extension— "South Station Under"— Was Opened for Traffic December 3**

With the opening of this new station, the Boston Elevated Railway has brought Harvard Square, Cambridge, within about 10 minutes' ride of South Station. It is interesting to note that this, as well as most of the other prepayment stations of the Boston Elevated, is equipped with

## **International Motor-Driven Station Registers**

which have proved unsurpassed in speed and accuracy.

You, too, will save money and schedules by doing away with tickets for your station, parks, ferry and other prepayment areas and adopting International Station Registers.

### **OTHER INTERNATIONAL PRODUCTS**

We also manufacture Round and Square Registers; Portable Registers; Fare Boxes for all kinds of Fare Combinations; Coin, Ticket and Transfer Registers; Transfer-Issuing Machines and

HEEREN ENAMEL BADGES

**The International Register Company**  
15 South Throop Street, Chicago



# Increased Safeguards of Fare Collection

The American Fare Box simplifies and perfects prepayment fare collection by combining fare box and fare register, with provisions to collect and register coins and paper tickets through the fare box, and registering transfers and other fares "collected over the box" on the same mechanism.

Passengers pay the fares—coins and tickets, direct into the fare box—the fares being exposed for visual examination—there is no intermediate handling of coins or tickets between payment and registration.

The fares are registered immediately as paid—whether it is a coin or ticket paid into the box, or a fare collected over the box, one turn of the operating handle for each fare, indicated by a bell, makes the registration.

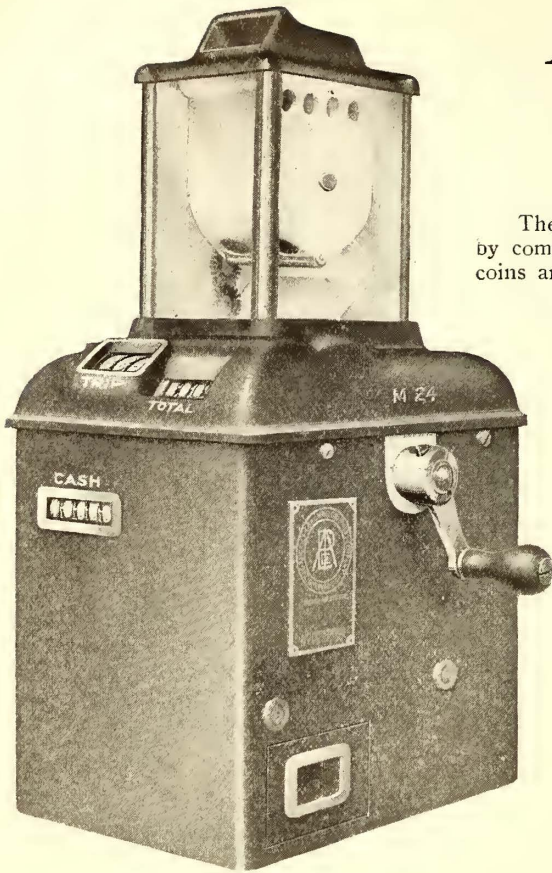
There is no accumulation of coins in the registering mechanism; no "grinding" of coins through the fare box between stops; no divided attention of conductors between fare box and overhead register, and no change required in the form of tickets used.

The full passenger load is indicated each trip on the fare box trip register; total registrations on the total-passenger register; and money registrations on the cash register. Nickels and dimes, as registered, are available for change. Pennies are not registered, but are segregated from full fare coins and deposited in a locked box; tickets also are deposited in a locked box.

The American Fare Box increases the safeguards of fare collection. It is the fare box conditions demand—one registering device, simple and reliable in construction and operation, for all requirements.

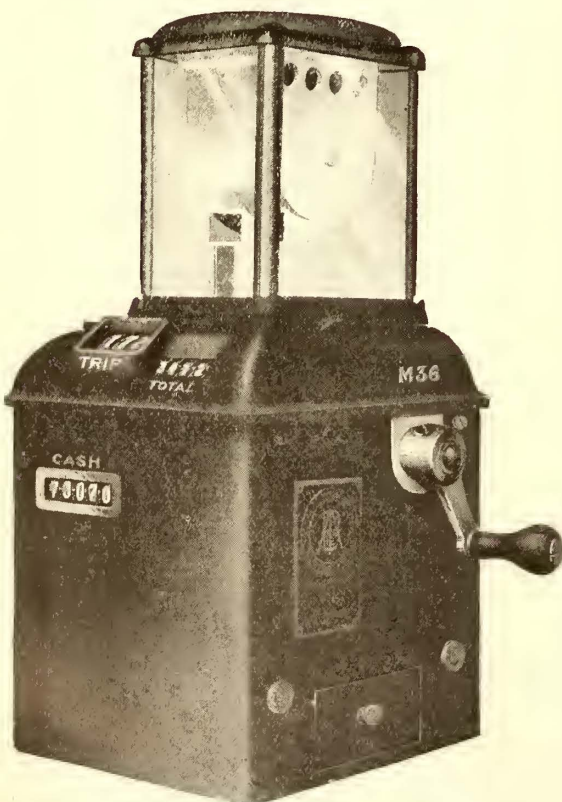
The boxes can be furnished in the types illustrated.

*This is the fare box to investigate.*



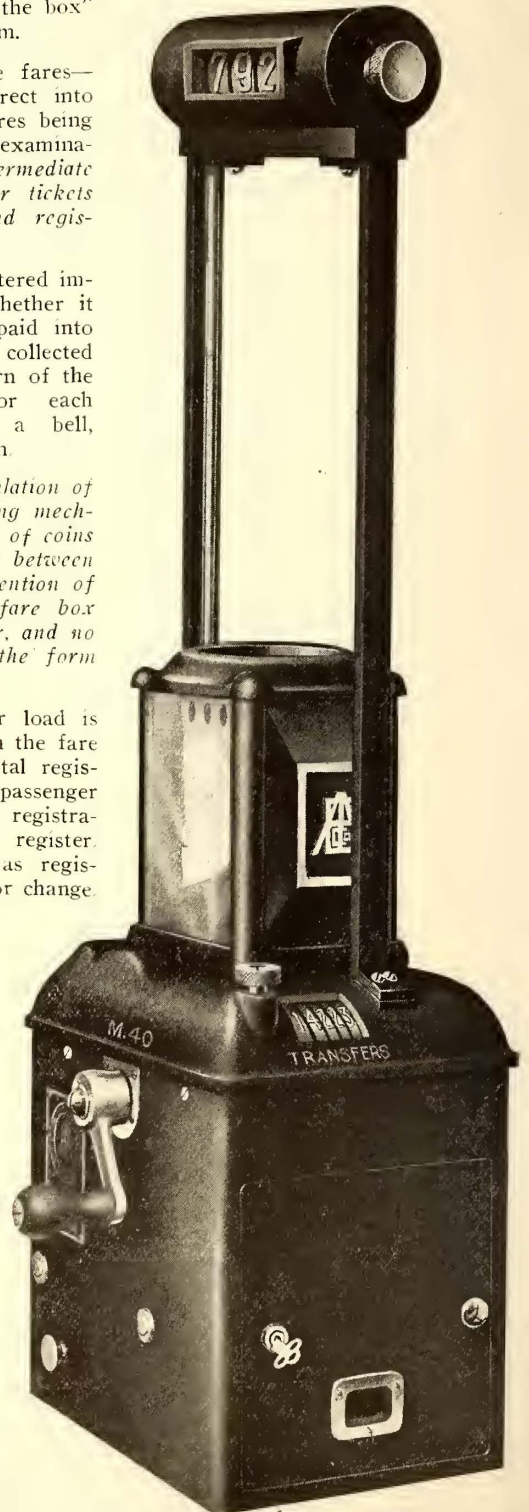
TYPE A

Coin-Ticket Registering Fare Box. Size 9½ in. x 6½ in. x 17½ in. Weight 32½ lbs.



TYPE B

Coin Registering Fare Box. Size 7½ in. x 6½ in. x 16 in. Weight 27 lbs.



TYPE C

Special Fare Box with overhead Trip Register and separate Transfer Register operated direct from fare box handle

The American Railways Equipment Co., Dayton, Ohio

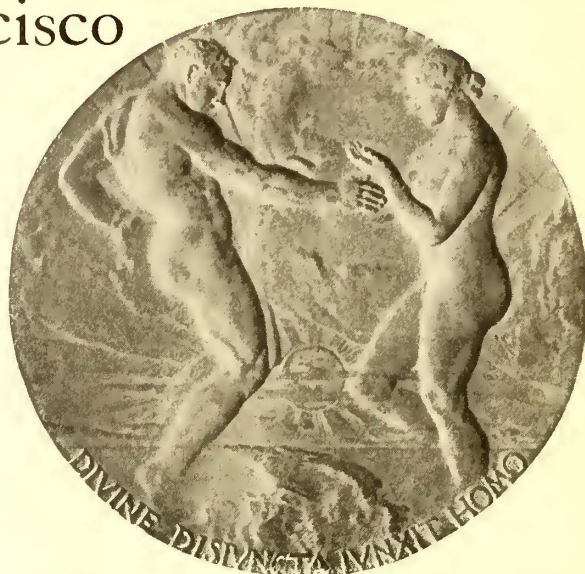
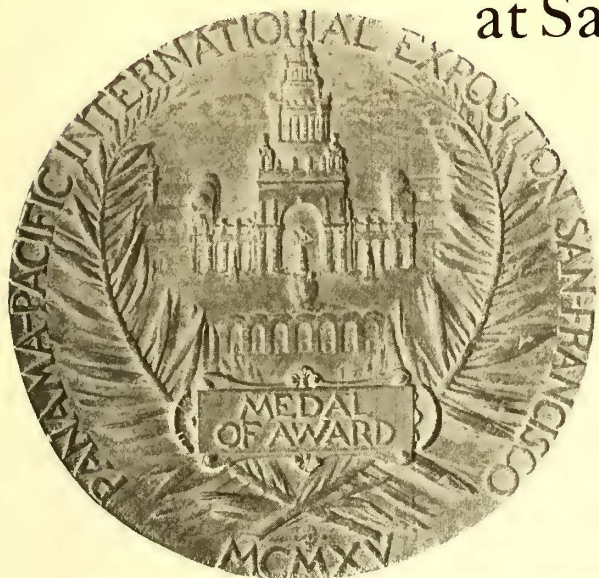


# Awarded Medal and Diploma at San Francisco

## 1916

“Walkover”

The  
Seat  
that  
always  
leads



THE UNITED STATES OF AMERICA  
**PANAMA-PACIFIC INTERNATIONAL EXPOSITION**  
 SAN FRANCISCO, MCMXV.

CELEBRATING THE OPENING OF THE PANAMA CANAL  
 THE INTERNATIONAL JURY OF AWARDS OFFERS

**MEDAL**  
 upon  
**HALE AND KILBURN COMPANY**  
 New York City

for Railway Car Seats, and Interior Steel Trim for Passenger Cars.

*John C. Barker*  
*Charles Moore*  
*Robert F. French*  
*W. H. S. ...*

EDUCATION  
 AGRICULTURE  
 MINING  
 ARTS & SCIENCES  
 MANUFACTURES  
 TRANSPORTATION

1916 PANAMA 1916

*Pioneers in Steel Trim for Passenger Cars, including interior finish, steel doors, etc.*



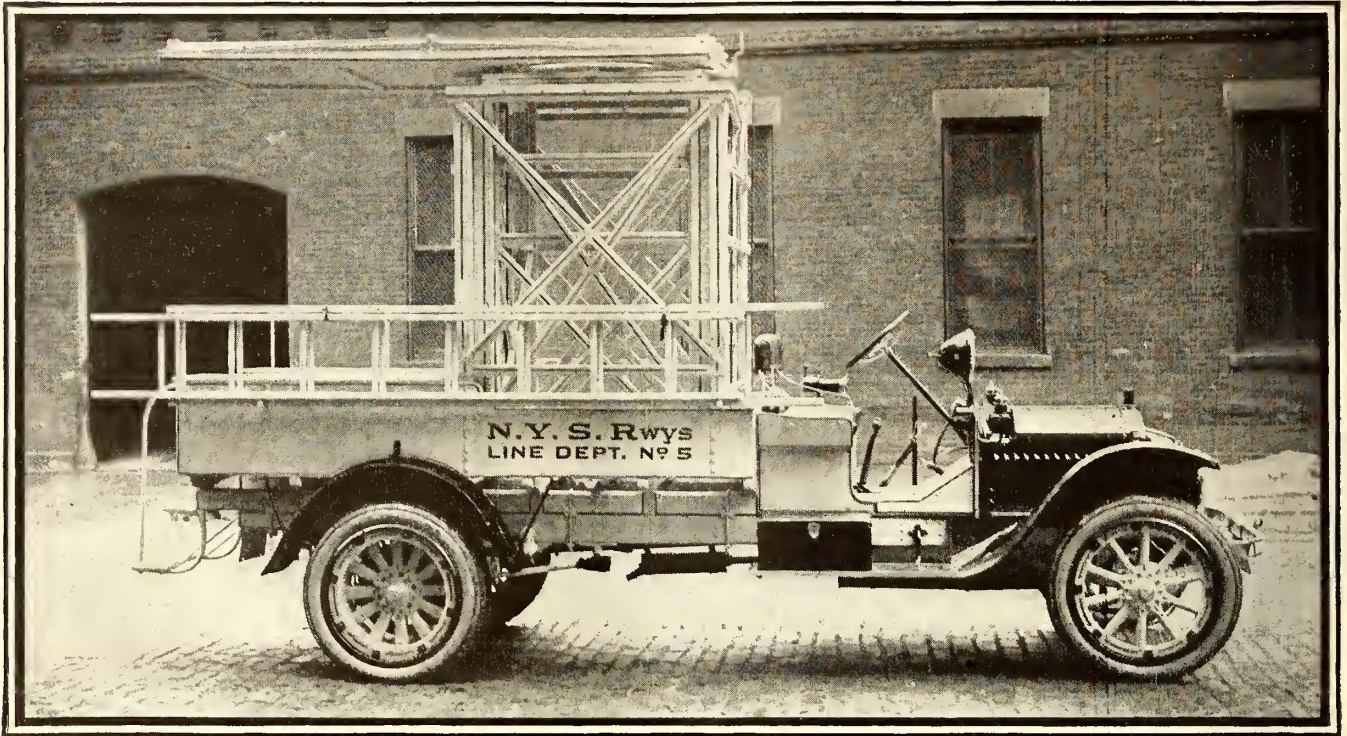
# Hale and Kilburn Co.

Philadelphia    New York    Chicago  
Washington    San Francisco





# WHITE TRUCKS



One of the four White Trucks owned by the New York State Railways, Rochester, N. Y.

## A Significant Fact

While predominating in the total number of motor trucks annually put into service in this country, most of the White output is absorbed by repeat orders from satisfied users—regardless of price competition.

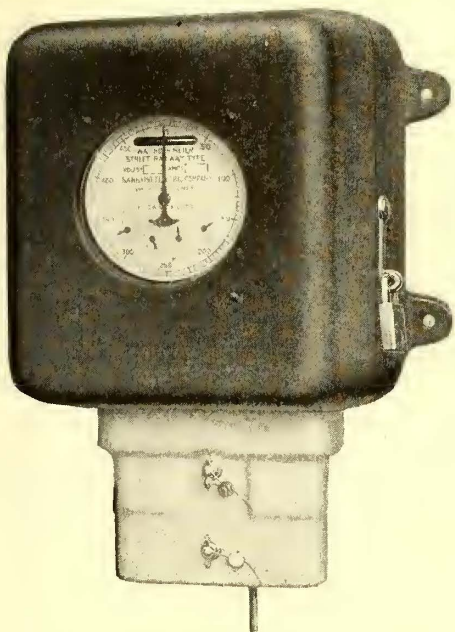


**THE WHITE COMPANY**  
CLEVELAND

*Largest Manufacturers of Commercial Motor Vehicles in America*



# Make It Easy to Attain Efficient Car Operation




Good car operation is simply a matter of fundamental principles and methods of execution. You can't expect motormen to develop these principles on their own initiative, but you can *teach* them to employ the correct methods.

Trained motormen can effect big economies. You can readily train them—teach them the possibilities and limitations of modern equipment; and show them how to effect these economies.

And *the most modern step*: by installing ECONOMY Meters on your cars, you can obtain data which will measure the efficiency of the motormen and the progress they are making.

This system of improving car operation has never failed. It's simple, economical, and without hazard. Large electric railways are accomplishing wonderful results every day. Let us give you the records of existing cases and submit a plan for improving *your* operation.

**ECONOMY**  
  
 BUILT LIKE A WATCH  
**METERS**

**Sangamo Electric Company**  
 Springfield, Illinois

Specialists in Meters for Every Electrical Need



# MILLER TROLLEY SHOE

On 60-Ton Locomotive Hauling Trains  
Up to 1200 Tons



MILLER TROLLEY SHOE TRANSMITTING CURRENT FOR FREIGHT TRAIN ON  
WATERLOO, CEDAR FALLS & NORTHERN RY.

The fact that the Miller Trolley Shoe is a most efficient current collector for high-voltage, heavy-train service is attested again in the case of the Waterloo, Cedar Falls & Northern Railway.

Here's a picture showing it in use on the 1300-volt section of this railway. The 60-ton locomotive used is

equipped with four Westinghouse 308-D-3 275-hp. forced ventilation motors and HL control.

This locomotive, equipped with the Miller Trolley Shoe, hauls between Waterloo and Cedar Rapids, a distance of 60 miles, trains up to 1200 tons, at speeds up to 24 miles an hour on level track.

*Join the many roads that are now using the Miller Trolley Shoe*

## Miller Trolley Shoe Company

53 State Street

Boston, Mass.

SALES REPRESENTATIVES

Holden & White, Chicago.  
W. F. McKenney, Portland, Oregon.  
F. F. Bodler, San Francisco, Cal.  
S. I. Wailes, Los Angeles, Cal.

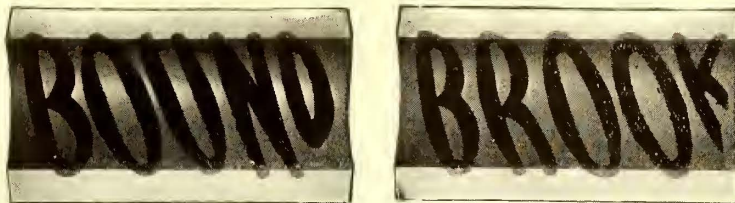
Alfred Connor, Denver, Col.  
T. C. White & Co., St. Louis, Mo.  
W. M. McClintock, St. Paul, Minn.  
A. I. Sanger & Co., Cleveland, Ohio.







**3,000,000**

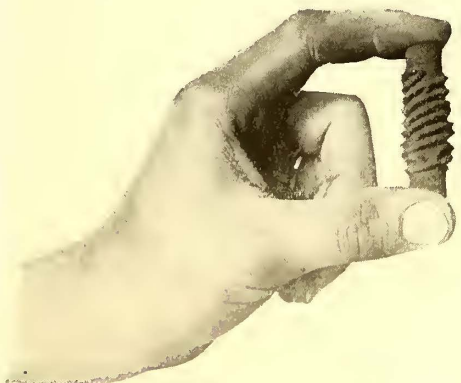


**Graphite and Bronze Oil-less Bearings**

U. S. Pat. Reg.

were made in this modern reinforced factory during 1916. With the early completion of our new works at Lincoln, N. J., for the exclusive manufacture of "Nigrum" impregnated wood bearings, our production will be increased to

**5,000,000 Bearings in 1917**



A Bound Brook Mold. The graphite cannot be forced out under pressure.

We take this occasion to thank our many electric railway customers for their confidence in our product, and to assure both old and new customers that our future service will be even better than in the past.

All genuine graphited "Oil-less" Bearings have always been made at Bound Brook, N. J., in the United States of America, by the

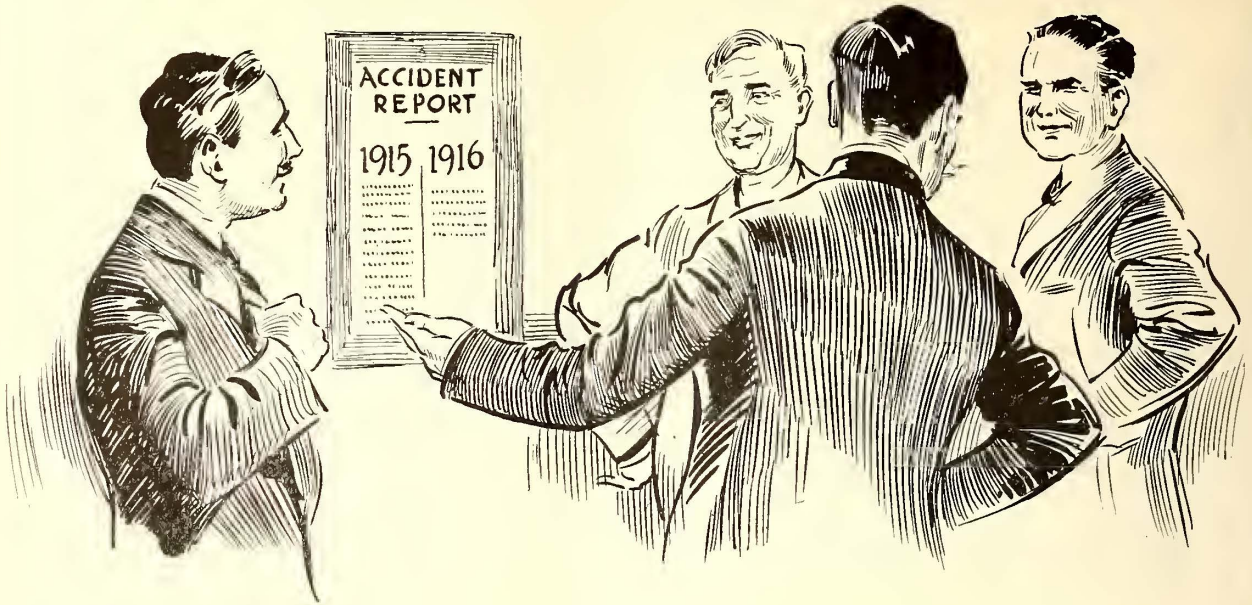


The end of a Bound Brook Bearing is lubricated to take care of end thrust.

**Bound Brook Oil-less Bearing Co.**

Formerly Graphite Lubricating Co.





**“Account No. 92 will look a lot better,”**

said the General Manager, as he scanned the comparison of accidents during 1915 and 1916. “Looks as if we were on the right track at last. Besides saving us a lot of accident expense, the H-B Life Guard and Providence Fender have changed a lot of newspaper knocks to boosts that will surely sweeten things with the public.”

“Another thing I’ve noticed,” remarked the Superintendent of Transportation, “is that we are getting more work and better work out of our motormen on the Marble Avenue line—they’re more at ease now—don’t lose their heads when they see a flock of kiddies playing on the tracks, because they know the H-B is on the job to protect everybody concerned.”

“I’m might glad,” rejoined the Claim Agent, “to see the more friendly attitude of the juries when we do have to let an accident case go to court—but that isn’t often now. It’s easy to convince everybody in court that *we* are doing *our* part to save life and limb, and that the *public* must do *theirs*, too. We’re getting a square deal now.”

“And as to repairing those H-B Life Guards and Providence Fenders,” said the Master Mechanic, “it really costs next to nothing to keep them in A-1 shape.”

“I’m glad to hear these boosts from you men,” concluded the General Manager, “because they confirm my own judgment. When the Board of Directors meets next week, I’ll recommend the installation of H-B Life Guards and Providence Fenders as standards throughout our system.”

## The Consolidated Car Fender Co.

Providence, R. I.

General Sales Agent

### Wendell & MacDuffie Co.

61 Broadway, N. Y.

*Fifth of a series of talks on Fewer Accidents and Better Public Relations*





*Photograph by permission and courtesy of The Connecticut Co.*

Like most of the leading electric railway companies of the United States

**The Connecticut Company**

regards Pantasote and Agasote products as "the standard"—and utilizes them accordingly in the new cars being built by the Wason Mfg. Co.

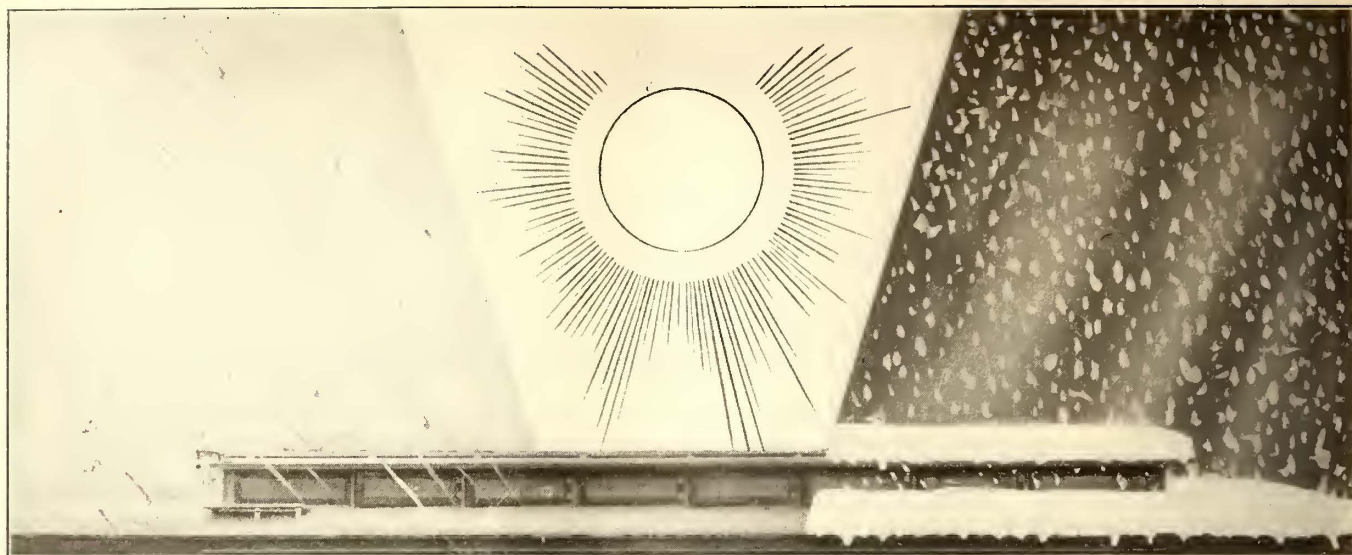
**The Pantasote Company**

11 Broadway, New York

797 Monadneck Bldg., San Francisco, Cal.

People's Gas Bldg., Chicago, Ill.





# For Real Protection Against All Weather Elements: Bayonne Car Roofing

It will **not** deteriorate under the hot rays of the sun—it will **not** rot under rain or crack and peel under frozen snow.

It is no ordinary cotton duck, but a special, closely-woven fabric, every fibre of which is saturated with a weather-proofing, rot-proofing preservative.

This impregnation is a thorough-going mechanical process which makes it necessary for you to give Bayonne Roofing only **one** coat of color paint after it is attached to the car roof.

It's a **time**-saver in installation—a **money**-saver in maintenance. It renews the good looks of old cars—and makes new cars better, inside and outside.

*Write for samples today*

**JOHN BOYLE & CO., INC.**

112-114 Duane Street

New York City

70-72 Reade Street

Branch House, 202-204 Market St., St. Louis, Mo.





# Nevasplit Headlining

was installed in 10 new low-floor type cars built for the Pittsburgh Railways Co. by the Cincinnati Car Co.

Nevasplit Headlining provides a strikingly beautiful surface which is **permanent**.

It cannot warp, peel or fade under any conditions of service, and is waterproof in fact as well as in word.

Its low initial cost and maintenance cost should commend it to you for repairs and renewals as well as for new cars.

Write for samples and prices.

**The Keyes Products Co.,** EQUITABLE BLDG.  
120 BROADWAY, NEW YORK

New York, W. R. Kerschmer Co., Inc., 50 Church St. Chicago, J. E. Simons, Fisher Bldg. San Francisco, Cal., D. E. Ford, Merchants' Exchange Bldg. Italy, American Traffic Company, via Capuccini No. 4, Milano, Italy

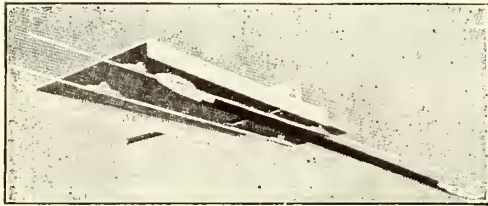


FOR ELECTRIC RAILWAYS  
— O —  
**STEEL BACK  
BRAKE SHOES**

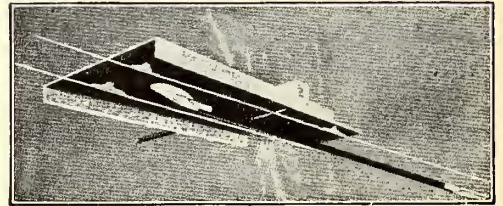
WORKS || PHOENIXVILLE, PA.  
TOLEDO, OHIO.  
STEVENS POINT, WIS.

**THE  
RAILWAY MATERIALS CO.**

OFFICES || CHICAGO  
NEW YORK



**THE  
RYMCO**



**HIGHSPEED TROLLEY SWITCH AUTOMATIC**

FOR INTERURBAN ROADS

Operates Simultaneously and Automatically with Track Switch and can be installed with any style of

**OVERHEAD CONSTRUCTION**

*The systems on which this device has been adopted as Standard include the following:—*

Illinois Traction System.  
Peoria Railway Terminal Co.  
Interstate Public Service Co.  
Evansville Railways Co.  
Ft. Wayne & Springfield Railway  
Toledo & Chicago Interurban Traction Co.  
Springfield, Troy & Piqua Railway Co.  
Toledo, Bowling Green & Southern Traction Co.  
Chicago, Ottawa & Peoria Railway  
Bluffton, Genoa & Celina Traction Co.  
Youngstown & Ohio River Railroad  
Dayton & Troy Electric Railway  
Toledo, Fostoria & Findlay Railway  
Northern Ohio Traction & Light Co.  
Cleveland, Southwestern & Columbus Railway  
Toledo & Western Railroad Co.  
Salt Lake & Utah Railway


Stark Electric Railroad Co.  
Ft. Wayne & Northern Indiana Traction Co.  
Indiana Union Traction Co.  
Chicago, South Bend & Northern Indiana Traction Co.  
Des Moines Interurban Railway  
East St. Louis & Suburban Railway  
Cedar Rapids & Iowa City Railway & Light Co.  
Kentucky Traction & Terminal Co.  
Winona Interurban Railway  
Lake Shore Electric Railway  
Ohio Electric Railway  
Columbus, Delaware & Marion Railway  
Muncie & Portland Traction Co.  
Marion, Bluffton & Eastern Traction Co.  
Kokomo, Marion & Western Traction Co.  
Kansas City, Clay County & St. Joe Railway  
Ogden, Logan & Idaho Railway

**THE RAILWAY MATERIALS CO.**

Railway Exchange, CHICAGO

Singer Building, NEW YORK





"LE CARBONE"  
CARBON BRUSHES

That  
Brand  
is  
Insurance  
of Uniform Service

You cannot get regular constant steady carbon brush **service** without high efficiency in the manufacture of the brushes.

Just remember that the measure of true **economy** is efficiency and price **combined**. You can never secure high service by depending upon price alone.

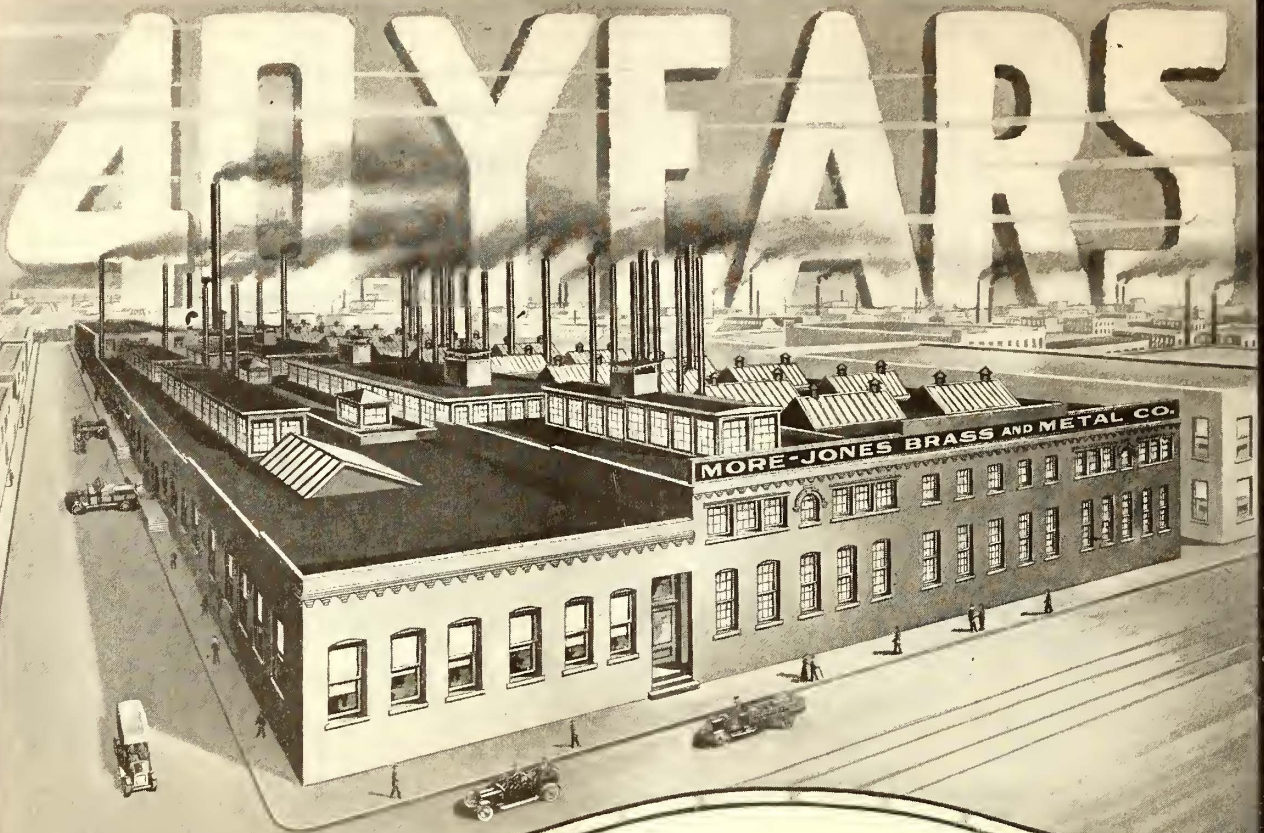
It is the absolute uniformity of efficiency in Le Carbone Brushes which differentiates them and makes them preferred by the men who appreciate most fully the importance of **SERVICE**.

We none of us ever appreciate insurance until "something goes wrong." The Le Carbone Brand is carbon brush insurance. And it's worth having.

**W. J. Jeandron**

173 Fulton St., New York





**O**VER forty years' experience in laboratory and foundry practice is behind the MORE-JONES line of standard equipment for Electric Railways.

We are specialists in the compounding of metal alloys. Our research department has originated many new and valuable combinations, each one best adapted for a specific purpose. Our materials are the highest grade; our manufacturing methods careful and accurate.

We have studied the problems affecting electric railways in the closest and heartiest co-operation with the mechanical experts of various large systems. The most practical ideas that intelligent experiment and exhaustive tests have shown will lead to greater efficiency, longer service and reduced maintenance cost have always been sure of incorporation into MORE-JONES products.

*"We invite inquiries and investigation."*

*The line includes:*

- V-K Oilless Trolley Wheels
- V-K Non Arcing Harps
- Lubricated Trolley Wheels
- M-J Standard Harps
- Contact Springs
- "Tiger" Bronze Motor Axle Bearings
- "Tiger" Bronze Armature Bearings
- "No. 36" Bronze Truck Journal Bearings
- Air Compressor Bearings
- "Armature" Babbitt Metal

**MORE-JONES BRASS & METAL Co.**  
**ST. LOUIS, U.S.A.**



## Tool Steel Gear and Pinion

Extract from a letter April 4th, 1916,  
(( written by the Superintendent Rolling  
Stock on a 3500 car property, to Super- ))  
intendent Motive Power on a 2500 car  
property.

((( "Replying to your inquiry\*\*\*\*, we have  
for the past three years had on test all of the  
better grades of gears and pinions that are manu-  
factured. Prominent in our test are the Tool  
Steel Gear & Pinion Company, \*\*\* (Naming three  
other large companies)\*\*. The result is\*\*\* that  
we have adopted as standard on our system the  
product of the Tool Steel Gear & Pinion Company )))  
of Cincinnati, Ohio. This test was run most  
carefully, and I will give you as follows the  
results that were obtained from the material  
under our observation from the beginning of  
test up to the present time."

Here follows detailed measurements,  
showing type of equipment, measure-  
ments of teeth when new, and after  
94,667 miles, Tool Steel pinion teeth  
having given one-third of their al-  
lowable wear.

"I do not feel that it would be right  
for me to give you comparative figures of mil-  
age made by other companies entering into this  
test\*\*\*\*\*. We have in service or on order  
several thousand gears and pinions manufactured by  
this company. Up to date we have not experienced  
a single case of broken teeth."





“Don't let a single overhauled car leave the shops until its brake rigging has been fitted throughout with

## Boyerized Pins”

said the General Manager, as he and the superintendent of equipment were looking over the open cars and other equipment which were awaiting overhauling for the spring and summer drive.

“When you put in a requisition about a year ago for a sample lot of Boyerized case-hardened pins, the purchasing agent and myself wanted to know why the ordinary kind weren't good enough for you in these hard times.

“You've certainly *shown* us in great shape, not only on the Safety First basis but on the miles-per-dollars basis too.

“Judging by the way our first lot of Boyerized Pins has shown up,” replied the gratified superintendent, “we're perfectly safe in making 'em standard. It's a great thing to feel that you're using Boyerized Pins because they are case-hardened so uniformly.

“We don't have to take chances any more with the stuff turned out by the average blacksmith.”

### BOYERIZED PINS

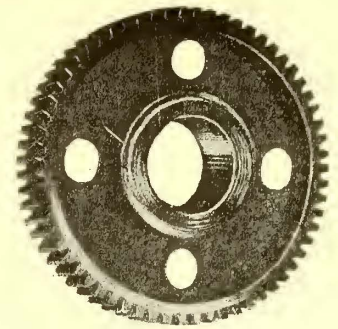
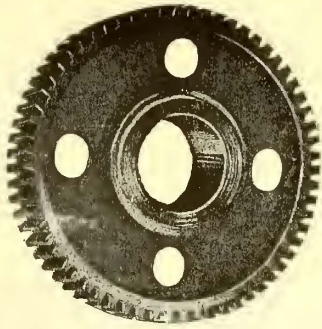
Constitute a Form of Safety Insurance which Returns the Premium Many Times Over

#### Other Products Are:

Bemis Trucks	Lord Baltimore Trucks
Case Hardened Brake Pins	Manganese Brake Heads
Case Hardened Bushings	Manganese Transom Plates
Case Hardened Nuts and Bolts	Manganese Body Bushings
	Bronze Axle Bearings

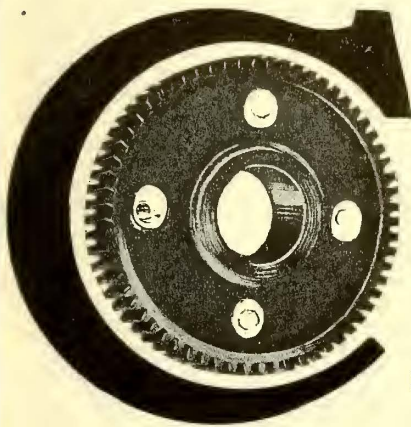
**Bemis Car Truck Co.**  
Springfield, Mass.





A new type of gear and pinion especially prepared and heat-treated, made from a material of fine quality steel blanks, both split, and sold at an exceptionally reasonable price.

Heat-Treated, Star Brand



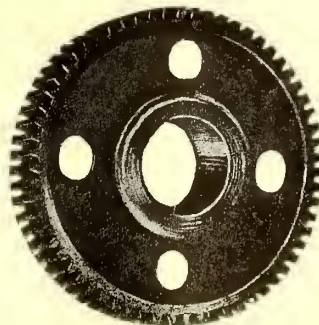
# Catskill

## Gears and Pinions

are cut true to pitch, and then put through the special heat-treating process which gives them exceptional tensile strength and assures a wearing ability of from 3 to 5 times greater than that of ordinary gears and pinions.

Where heavy service is an absolute essential, specify Catskill Gears and Pinions.

May we send complete data?



**W. R. Kerschner Co., Inc.**



50 Church Street, New York





# Columbia Babbitted Bearings



## Run True to Form

After a Columbia Babbitted bearing has gone through the rough cut the finishing cut and the inner planing,

The bore is carefully calipered to see that it is exactly right.

If the bore is right, the bearing is considered worthy to go out into the world as a member of the Columbia family as soon as the oil grooves have been cut therein.



The Calipers prove if the job was well done

And that's true of all the items listed below:

### TOOLS

Armature and axle straighteners  
Armature buggies and stands  
Babbitting molds  
Banding and heading machines  
Car replacers  
Coil taping machines for armature leads  
Coil winding machines  
Pinion pullers  
Pit jacks  
Signal or target switches  
Tension stands

### CAR EQUIPMENT

Armature and field coils  
Brush-holders and brush-holder springs  
Brake, door and other handles  
Brake forgings, rigging, etc.  
Car trimmings  
Commutators  
Controller handles  
Forgings of all kinds  
Gear cases (steel or mall. iron)  
Grid resistors  
Third-rail contact-shoes and accessories  
Trolley poles (steel) and wheels



## Columbia Machine Works & Malleable Iron Co.

Atlantic Ave. and Chestnut St., Brooklyn, N. Y.

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Some Applications of

# NUTTALL

Railway Products



## Here Is the Evidence

These and other important railway properties throughout the world have found by thorough test that Nuttall Railway Products give more and better service and at less cost per mile.

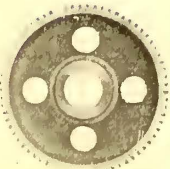
Their experience covers every operating condition and somewhere in all this varied experience is a solution for the problem that may now be troubling you. Let us suggest the proper gear, pinion or trolley for your particular condition and make a test for yourself.

Ask for Catalogues 12 and 13.

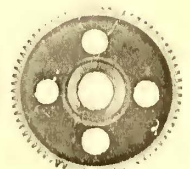
**Gears**

**Pinions**

**Trolleys**

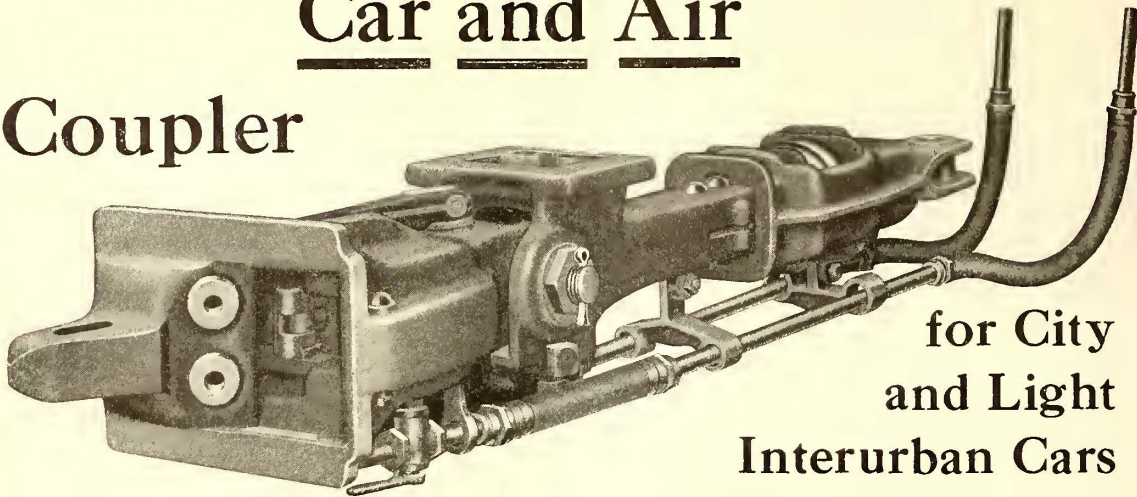


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PITTSBURGH





# The Van Dorn Automatic Car and Air Coupler



for City  
and Light  
Interurban Cars

## Promotes Speed and Safety

### Coupling

It speeds the work of making up trains by insuring a positive connection of both coupler and air under extreme variations of coupler positions, hence giving the greatest safety to employees.

### Uncoupling

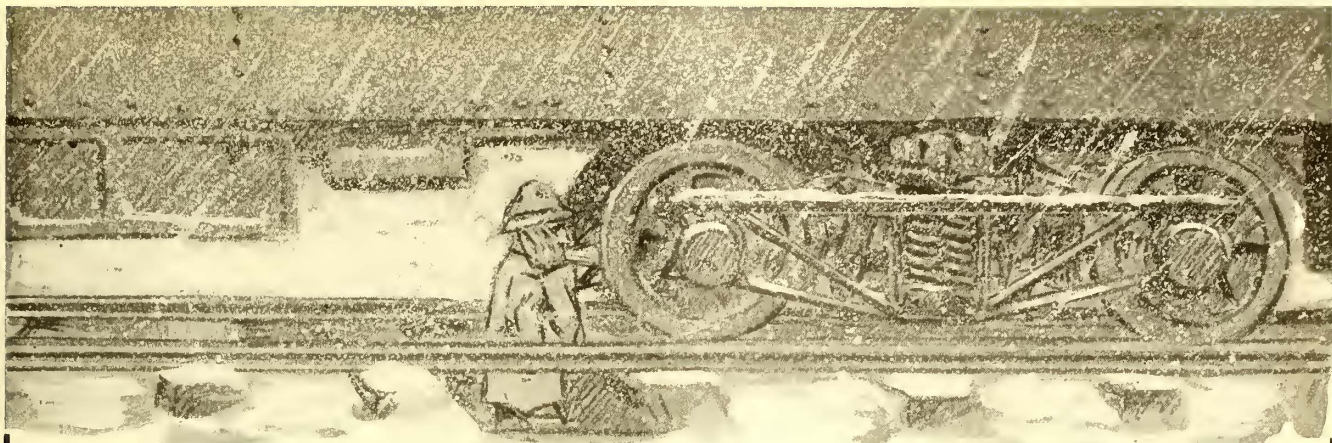
This operation is so simplified that the work can be done quickly and with maximum safety because the trainman need not be between or near the cars when the signal is given to move them.

### Operation

The long hose connections and the troubles ensuing from them are eliminated. The rigidity of the draft connections prevents see-sawing and makes two or more cars move as one. They operate perfectly on curves of 30-ft. radius and abrupt grades causing as much as 10 inches difference in normal coupler levels, without any binding whatever.

**Van Dorn Coupler Co.**  
2325 So. Paulina St. Chicago, Ill.





## Are Your Brakes Getting Least Attention When You Need Them Most?

In these freezing, drizzling days, your equipment inspectors have every temptation to skimp their work—to get their numbed hands and feet out of the cold and the wet.

### *Poor Inspection Is Dangerous*

for, if there ever is a time when you want quick, sure and even brakeshoe application, it's now.

If you have Smith-Ward slack-adjusters on your cars today, you won't have to worry about that kind of trouble. If you haven't got them on your cars,

### Order

### S-W Brake Slack Adjusters

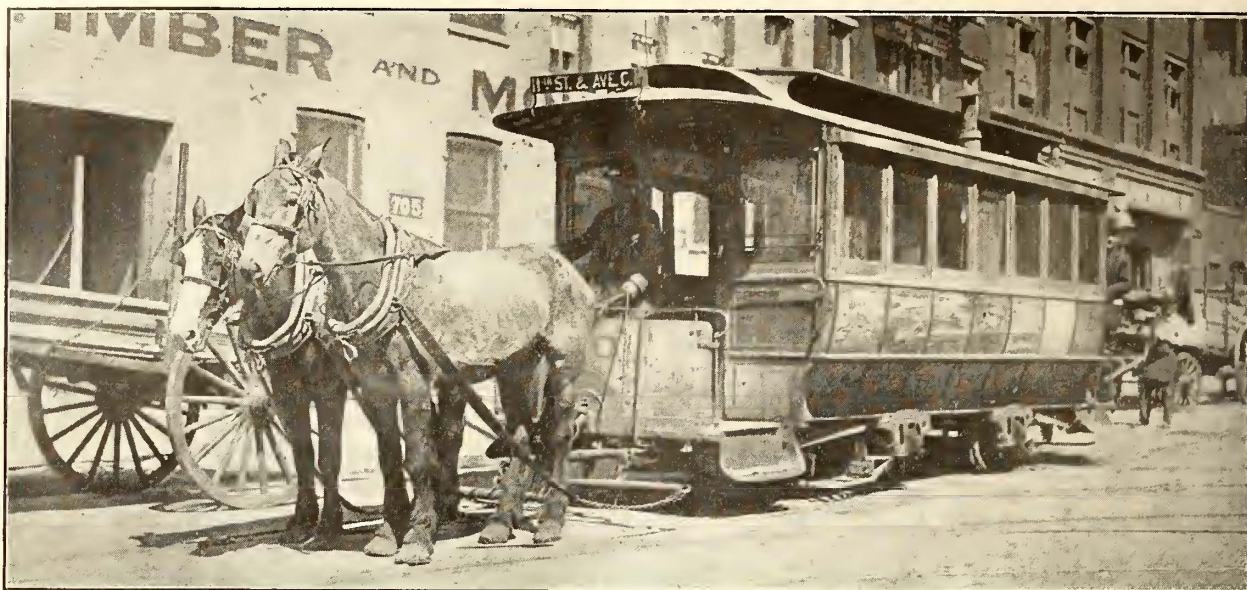
at your earliest opportunity. They will do for you what they are doing for many other roads.

**Increase Safety—Decrease Brakeshoe and Labor Costs**  
S-W Brake Slack Adjusters are made for any truck

## Smith-Ward Brake Company, Inc.

17 Battery Place, New York





## Keeping Pace with the Developments of Two Generations

Horse-car days.

We can all remember the frail little "match boxes" jerking and bouncing along a narrow-gauge "snake-trail" track behind one or two old broken-down cab horses. They tipped the scales at only one or two tons when loaded to capacity, and the speed seldom reached the hair-raising rate of 6 miles per hour.

Yet within this short space of years we have seen the electric car develop into a 60-ton palace, riding as smoothly as thistledown in the air at speeds as high as 70 miles per hour.

Do you fully appreciate the changes of the last 30 or 40 years?

Can you comprehend what this ever-increasing service has demanded of the car wheel manufacturer?

Although the pace has been a hot one, we have never lost our stride, never lagged behind. The Wonderful Single-Service Chilled Iron Wheel was standard in the days of the "hobbie-horse" car, and is standard today with over 90% of the street-car companies of the United States and Canada which operate 100 cars or over.

## ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS

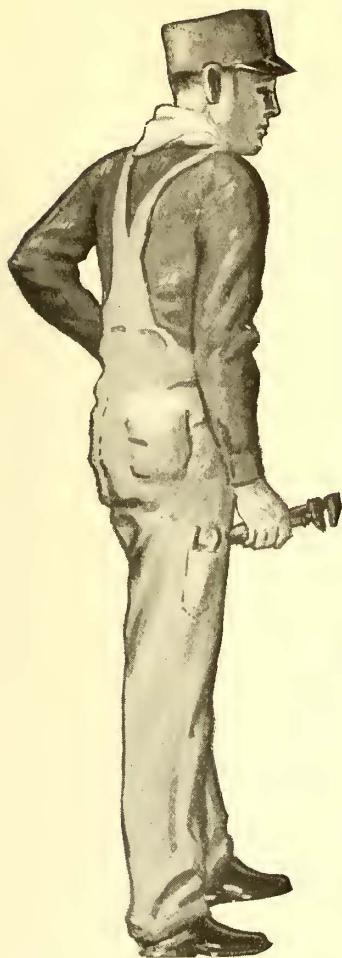
1228 McCormick Building, Chicago, Ill.

Representing Forty-eight Wheel Foundries Throughout the United States and Canada. Capacity 20,000 Chilled Iron Wheels Per Day

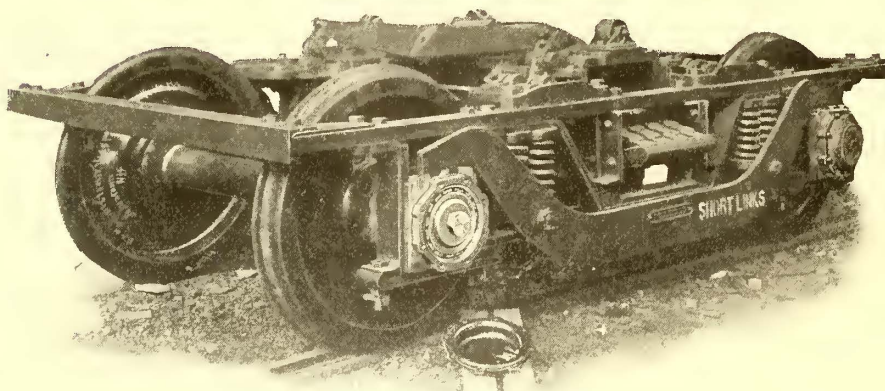


55 Ton High Speed Interurban Service





# “Approbation from Sir Hubert Stanley Is Praise Indeed”



“By golly, that’s the nicest running truck you ever saw,” said a shopman, as he pushed a truck about in the shops of the Chautauqua Traction Company.

Of course, that truck was equipped with Gurney Ball Bearing Journal Boxes.

Your decision to buy Gurney Radio-Thrust Ball Bearings will be endorsed by the men who will use them!



## GURNEY BALL BEARING CO.

Conrad Patent Licensee

JAMESTOWN, N. Y.



Chicago, Ill.

New York City



# Storage Batteries

in

## Electric Railway Service

### LOAD REGULATION

For carrying peaks and fluctuations of load, especially in connection with water-power developments or where power is purchased on the basis of maximum demand, the "Chloride Accumulator" or the "Tudor Accumulator" is adapted.

### LINE REGULATION

Due to the present high price of copper there are cases where the use of a battery for maintaining voltage is more economical than the purchase of copper for feeders. The "Chloride Accumulator" has been largely used in this service by many railways.

### STANDBY SERVICE FOR EXCITER BUS

It is standard practice to install a storage battery connected to the Exciter Bus to prevent interruption in the supply of current for field excitation. Either the "Chloride Accumulator," the "Tudor Accumulator" or the "Exide" Battery can be used.

### OIL SWITCH SERVICE

Storage batteries are used in power houses and sub-stations for the operation of oil switches and supplying current for pilot lamps and emergency station lights in case of failure of the power supply. For this service the "Chloride Accumulator," the "Tudor Accumulator" and the "Exide" Battery are used.

### STORAGE BATTERY STREET CARS

For infrequent service or for conditions where trolley wires are prohibited, storage battery cars offer the most economical and profitable solution of the transportation problem. The "Hycap=Exide" Battery has been largely used in this service. In New York City alone there are in operation nearly 200 storage battery cars equipped with "Hycap=Exide" Batteries.

### MULTIPLE-UNIT CONTROL

The "Exide" Battery and the "Tudor Accumulator" are used by a number of railways for furnishing a supply of low voltage current to be used in connection with the operation of multiple-unit control systems.

### INTERURBAN CAR LIGHTING

A number of interurban electric railway companies have installed batteries on their cars to maintain steady illumination and to overcome fluctuations caused by changes in line voltage, interruptions in third rails at crossings and switches or by temporary failure of power supply. For this service the "Exide" Battery is particularly adapted.

### HEAD AND TAIL LIGHTS

The "Exide" Battery is being used in connection with head lights and tail lights for furnishing current in case of interruptions in power supply.

Detail information on batteries for any of the above services can be secured from any sales office of the company.

## THE ELECTRIC STORAGE BATTERY CO.

Manufacturer of

The "Chloride Accumulator", The "Tudor Accumulator",

The "Exide", "Hycap=Exide", "Tbin=Exide" and "Ironclad=Exide" Batteries

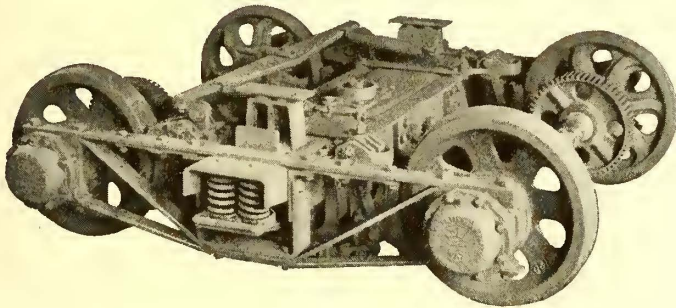
New York Boston Chicago Washington PHILADELPHIA, PA. Rochester Detroit St. Louis  
Cleveland Atlanta Minneapolis Pittsburgh 1888-1917 Kansas City San Francisco Denver Toronto



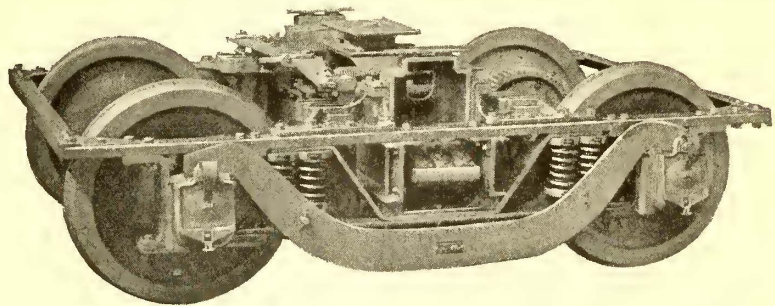
# BALDWIN TRUCKS

## BUILT FOR SERVICE

Designing and building electric trucks to-day is a different proposition from what it was some years ago. Speeds are higher, cars are heavier, and requirements throughout are more severe. Engineering skill, coupled with complete manufacturing facilities, are necessary to the production of the modern electric truck.



Baldwin Truck, Class 66-18-C. Built for New York State Rys. for city service.



Baldwin Truck, Class 84-30-AA. Built for Dayton & Troy Electric Ry. Co. for high speed interurban service.

There is a Baldwin electric truck for every kind of service—freight, city, suburban, and high-speed interurban. We are prepared to study your operating conditions, and to recommend the type of truck equipment best suited to your requirements.

## THE BALDWIN LOCOMOTIVE WORKS

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Railway Feed Wires insulated with OKONITE are unequaled for flexibility, durability, and efficiency, and are in use by the leading Electric Street Railway Companies. OKONITE is preferred above any other insulation for Car Wiring, Telegraph and Telephone Purposes.

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*Samples and Estimates on Application*

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### TROLLEY WIRE

**Round Grooved and Figure 8**

If you will agree that one make of trolley wire is able to give longer service than another make—

That one is more economical than another—

Then investigate our trolley wire with a view to cutting your wire costs.



### Weatherproof Wires and Cables

**Star Brand**

Star Brand Wires are made with long service as the most prominent feature.

Because of their ability to render long service they cut wire costs.

Read the words in the cut of the star.

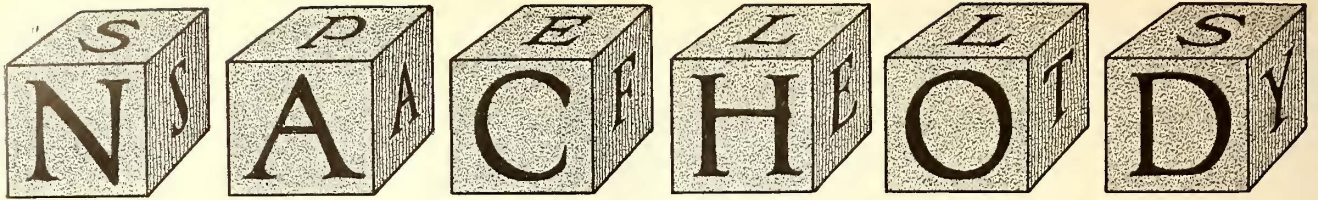
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give high protection at a small ultimate cost. Made for single-track opposing movements, absolute or permissive, and for double-track following movements.

### NACHOD CROSSING BELLS

warn the public of danger from approaching cars, and advertise to the public progressive railway operation.

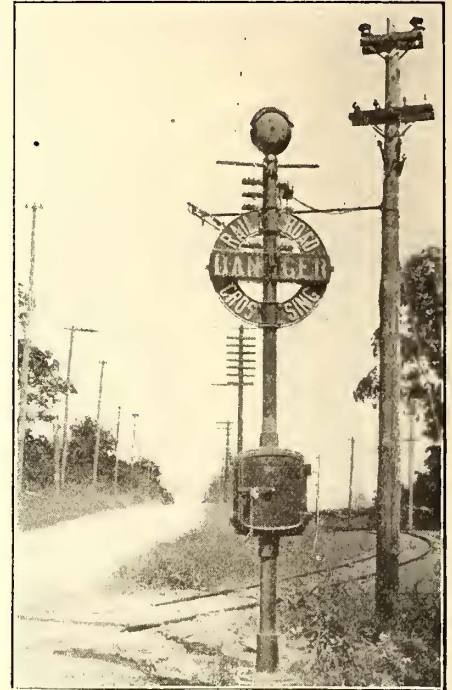
### NACHOD HEADWAY RECORDERS

give an accurate record at the end of the day of the entire car operation at a given point.

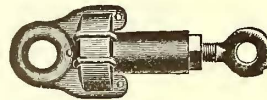
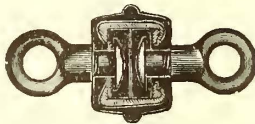
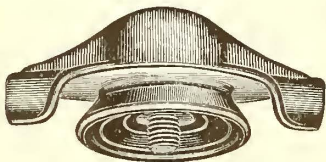
*Better write us for details. For safety's sake—do it now.*

## NACHOD SIGNAL COMPANY, Inc.

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Nachod Bell on Nashville Interurban Railway



## You Can Minimize Overhead Repair Work

and successfully cut maintenance costs if you turn to

## The Macallen Line

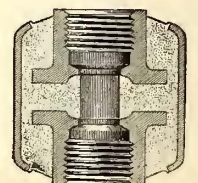
of strain insulators, hangers, splicing ears, crossings, and other overhead material.

They are "specialty" products, designed and built to make "Macallen" the standard on American railways.

It will pay you to write for information and prices.

## The Macallen Insulating Joint

Adopted by principal air brake manufacturers as part of their standard equipment. Also insulates steam pipes, etc. Shell is seamless drawn steel, nipples are machined from steel rod, and insulating material is Macallen Vulcanite Compound, not affected by heat or oil—practically indestructible.



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**A.C. and D.C. Voltmeter**

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# White's

# Porcelain



# Trolley

# Hanger

is more easily installed and more satisfactory in service

The insulator, stud and yoke are separable, yet they assemble as a unit. When the trolley ear is attached and screwed up firmly on the stud, it can be twisted around at right angles to the span wire without loosening the ear on the stud.

The head of the stud is countersunk into insulator so it can't turn after the ear is set in proper alignment.

The insulator is made of durable glazed porcelain. The yoke is galvanized iron, the stud sherardized steel, or bronze bolts can be used instead of steel.

White's Porcelain Hanger is extremely durable, safe and low in cost, and WE CAN SHIP AT ONCE.

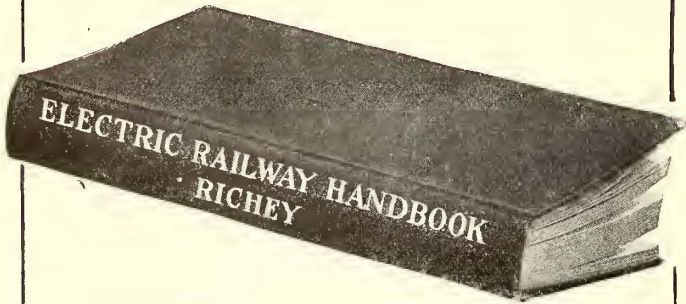
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1122 PINE STREET, ST. LOUIS, MO.

Foreign Representative, Forest City Electrical Services Supply Company, Salford, England.



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The data needed in every phase of electric railway work are given in this compact, pocket size encyclopedia—

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It contains material you've hitherto been obliged to obtain from a dozen or more different sources. Some of the information it gives couldn't be obtained except by going through the files of periodicals.

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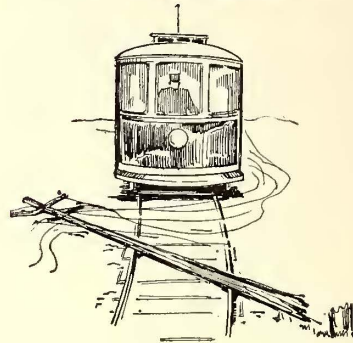
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Rot is one of the mighty forces that is always working to the detriment of the maintenance engineer and the company's earnings. Sometimes it's called corrosion, or electrolysis—but with wood it's plain r-o-t.

## Reeves Wood Preserver

will mitigate the effects of rot in poles, cross-arms, ties, and all kinds of construction timber.

It is applied COLD with a brush (like paint) or by dipping in an open vat. It penetrates like ink into a blotter and checks rot in its incipency. The least it will do is to double the life of wood. The most it will cost is but a trifle compared to the savings it will effect in purchases of new material and the cost of erection.

No, it will not corrode the hardware, wash or sweat out. You can prove it yourself with our test outfit.

Write for it to-day

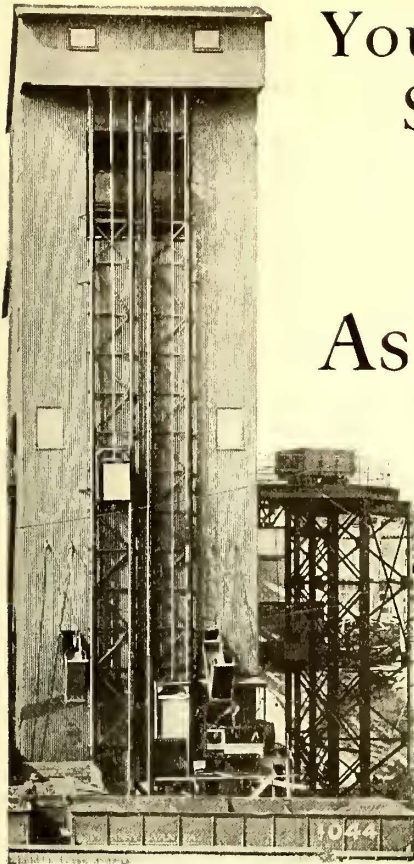


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New Orleans, La.

THE EASY WAY TO PREVENT DECAY





Hunt double skip hoist and cable railway at Mahoning and Shenango Railway and Light Co., Youngstown, Ohio.

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# Hunt Coal and Ash-Handling Equipment

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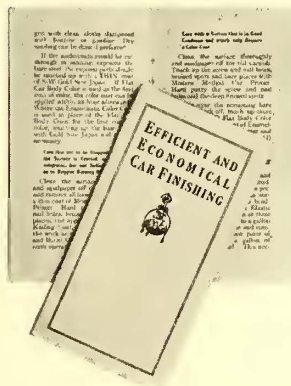
If it's Hunt-designed and Hunt-made, it's right.

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Here is a booklet that furnishes general information regarding The Sherwin-Williams Modern Method Car Painting System. It will acquaint those interested in efficient car painting with the advantages to be derived through its use.

Modern Method Car Painting System eliminates all unnecessary labor and the use of excessive material, and brings about the best results in service, with a minimum expense for labor and material.



## THE SHERWIN-WILLIAMS Co.

### Railway Paints and Varnishes

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Gentlemen:  
Please mail without obligation to me your book which will explain efficient and economical car finishing.

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Telescopic Ram Hydraulic Motor Lift  
10,000 lb. Capacity



# HYDRAULIC TOOLS

## Promote Car Shop Efficiency

This *motor lift* has a telescopic ram with a movement of 37 in. yet it is only 32 in. high when ram is down. It can be moved easily about the floor and can be operated by one man.

Here is shown a *Portable Forging Press* for forging, shaping bending and straightening. It is a self-contained portable type especially designed for shop use for rebushing, force fitting gears, bearings, pins, etc., and for assembling armatures, broaching

and a variety of operations of bending, straightening and pressing. We build a full line of jacks, pit jacks, rail benders, rail bonders, pumps, shears, punches, etc.

Write for catalogs.

### The Watson-Stillman Co.

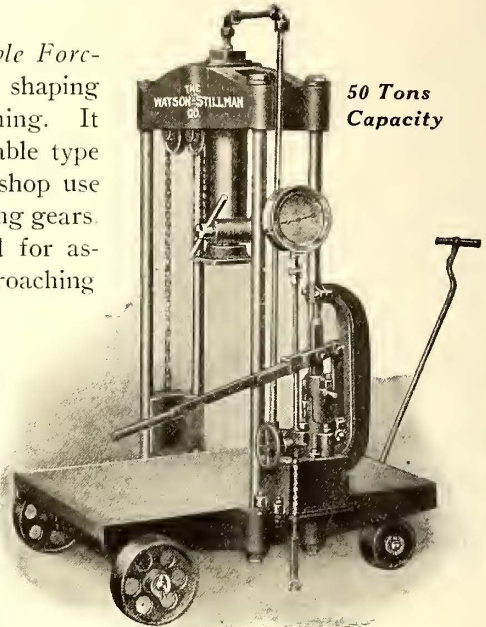
Engineers and Builders of Hydraulic Machinery  
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50 Tons Capacity



**ANTI-PLUVIUS**  
(Trade Mark)  
**Puttyless Skylights**

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The rolling stock and equipment of the Public Service Railway of Newark, N. J., are protected not only from the snows of Winter but the rains of Summer under "Anti-Pluvius" Puttyless Skylights. Property protection is always economical. "Anti-Pluvius" Skylights are self-protective. Materials are permanent, upkeep simple and practically negligible.

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**The G. Drouvé Company, Bridgeport, Conn.**  
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should precede the buying of a chain hoist

# Ford Tribloc CHAIN HOISTS

will meet all of your hoist requirements—they will enable you to handle both light and heavy loads with greater safety and at higher speeds than any other type.

The Ford Tribloc is equipped with the Patented Loop Hand-Chain Guide which prevents gagging of the hand-chain when worked at high speed or an acute angle. It has planetary gearing, steel working parts and drop-forged chains and hooks. It has everything that serves to increase efficiency and make a safer hoist. In fact the Ford Tribloc is so good that we guarantee it for five years.



Before you buy a hoist let us tell you more about the Ford Tribloc.

Have you our Catalog? If not, let us mail you one.

*Ford  
of Philadelphia*

**Ford Chain Block & Manufacturing Company**  
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You owe it to yourself to give these books a chance to show what they can do for you.



They contain all the data—formulas, tables, information—that the railway engineer needs. Much of their material is not available in any other single treatise.

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Packard Varnishes are the best the industry can produce for armatures, field coils, transformer coils, etc.

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Write for Special E. R. J. Varnish Bulletin—it contains valuable data on the use of Insulating Varnishes.

*The Packard*  
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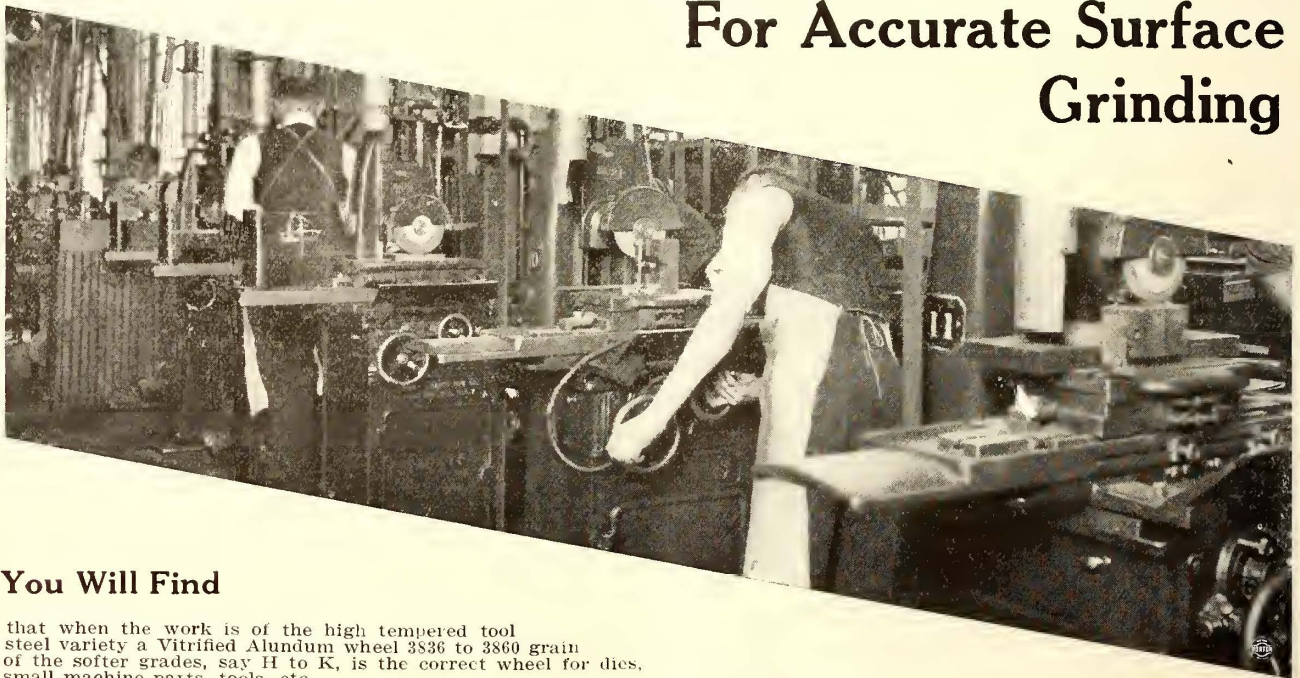
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## For Accurate Surface Grinding



### You Will Find

that when the work is of the high tempered tool steel variety a Vitrified Alundum wheel 3836 to 3860 grain of the softer grades, say H to K, is the correct wheel for dies, small machine parts, tools, etc.

Whether your battery of surface grinding machines is large or small you will discover that careful attention to the choice of the right grinding wheel for each kind of work is of vital importance to the efficiency of each machine. As in the photograph above where a group of surfacing machines are shown, operators are constantly insisting that Alundum wheels are uniformly the best.

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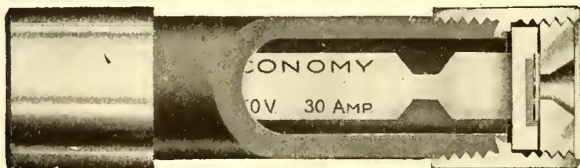


## Protect Cars and Power-plant

Don't trust to your more limited facilities for refilling fuses. As fuse specialists, we furnish reliable and carefully *tested Renewal Links* all ready to insert in

### ECONOMY renewable cartridge FUSES

when they blow. These Links cost but a trifle and assure a complete break in the circuit at the required overload.

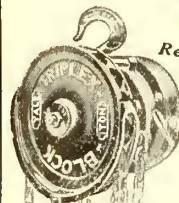
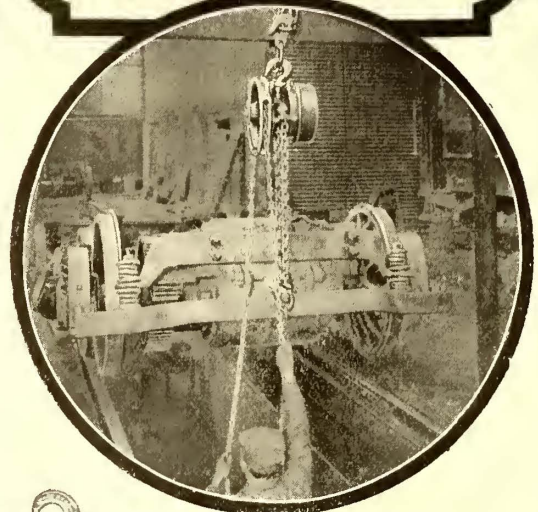


There's no need to use an extra new fuse every time one blows when the *efficient and safe* Economy fuse can be renewed over and over again with our *tested* Renewal Links at a saving of 80% of fuse maintenance expense under old-style, wasteful methods.

Write now for Bulletin No. 17 and our catalog.

**Economy Fuse & Mfg. Co.**  
Kinzie and Orleans St.  
Chicago, Ill.

# YALE



Repair work safe with Yale Hoists

## Yale Hoist Safety

Suspended loads are dangerous. A complete knowledge of the causes of danger—and the remedy—has produced *Yale Safety Hoists*.

Yale Steel Chain is made to meet the need for great strength, uniformity and resistance to shock.

**Yale Steel Chain**  
**Yale Steel Vitals**  
**Yale Overload Test**

These are some of the safety features protecting every user of Yale Hoists.

*For sale by Machinery Supply Houses*

Put your hoisting problems up to us

ASK FOR NEW CATALOG

*For factory locking equipment use a Yale Master-key System. Write us for particulars.*

**The Yale & Towne Mfg. Co.**

9 East 40th Street  
NEW YORK



## When an overload hits the Circuit, something must go

If it's the feeder—it melts. If it's a machine—it's destroyed. If it's a fuse—it blows.

The burning out of a feeder or machine involves a considerable loss, an interruption of service, and a lot of trouble. The blowing of a fuse causes a negligible disturbance—but it saves the feeder and the machine. It is vitally important to use fuses that can be depended upon absolutely to blow when they should.



"Noark" Fuses are famous for this element of dependability.

Experimenting with fuses applied to practical Central Station service is like playing with matches in a powder-mill.

There's no "if" nor "but" connected with "Noark" Fuse service. When the critical overload comes they're on the job.

*Serves more people in more ways than any other Institution of its kind in the world.*



*Branches  
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THE CONTINENT**

**H. W. JOHNS-MANVILLE CO.**  
NEW YORK CITY



*Use*

## DIXON'S GRAPHITE BRUSHES

and keep your motors or generators running silently and at maximum efficiency.

Commutator surfaces improve under the action of these brushes.

Losses by friction are thus minimized; and sparking and chattering are avoided.

Upkeep costs are decreased.

Our electrical service department is at your command.

*Write for  
Graphite Brush Booklet No. 108-M*

Made in JERSEY CITY, N. J., by the

**Joseph Dixon Crucible Company**

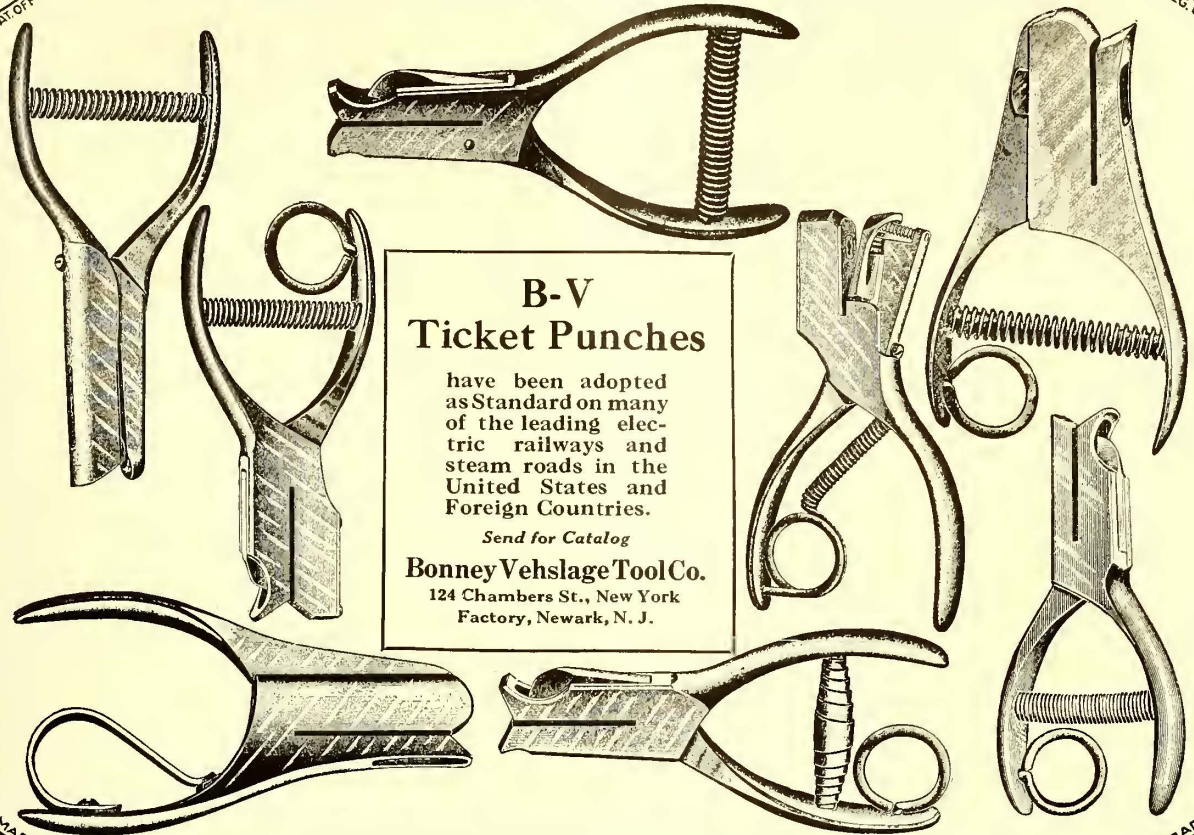


Established 1827



M-28





**B-V  
Ticket Punches**

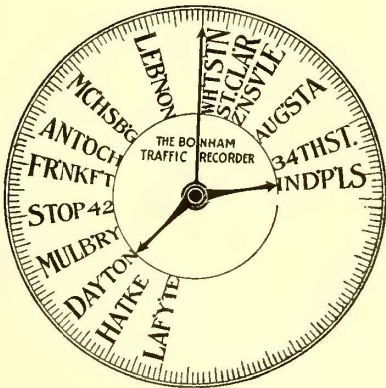
have been adopted  
as Standard on many  
of the leading elec-  
tric railways and  
steam roads in the  
United States and  
Foreign Countries.

*Send for Catalog*

**Bonney Vehslage Tool Co.**  
124 Chambers St., New York  
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# Auditing Expenses are Lower



Write for the Illustrated Book "Earnings Per Passenger Mile."

Because the complete record afforded by the Bonham Traffic Recorder needs no compilation or checking. It is ready to be placed on your company's books.

## BONHAM Traffic Recorders

keep tab on the traffic while on the road. They do away with the need for elaborate computations. When a Public Service Commission calls on you for data as to "Earnings per Passenger Mile," YOU HAVE THE FACTS—if your cars are BONHAM-Equipped.

The Bonham Recorder not only records cash but it keeps tab on passenger-mileage—the unit needed in computing operating costs and earnings.

# THE BONHAM RECORDER CO.

Hamilton, Ohio, U. S. A.





# The Ideal Material For Car-Seating

If you've been accustomed to thinking of leather as the best car-seat covering, remember that the only leather that is within your available price-range is "coated splits," the soft, porous inner layers of the hide. Such leather may look well for a short time, but it soon cracks and peels.

These "coated splits" are certainly too expensive to use when, at a less cost, you can upholster your car seats with FABRIKOID—which will long outwear the coated splits, and will hold its good looks to the end.

Fabrikoid samples will show you the striking difference—write for them.

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Du Pont Building  
Wilmington, Delaware

Wendell & MacDuffie Company  
Railroad Department Representatives  
61 Broadway, New York, N.Y.

# WHY

...ications for this

... of road

New York Municipal Railway

Type of car	Passenger	Door	
Seating capacity	78 to 90	Gears and p	
Weight (car body only)	45,000 lb.	Hand brakes	
Bolster centers, length	47 ft.	Heaters	
Length of body:		Journal boxes	
Over vestibule	66 ft. 2 1/4 in.	Motors, type and num	
Width over sills	9 ft. 9 in.	GE-248	
Over all	10 ft.	Motors, outside or inside	
Height, rail to side sills,	3 ft. 1/2 in.	Inside	
Side sill to top of roof,	9 ft. 1 3/4 in.	Paint	
Body	Metal	Sash fixtures	
Interior trim	Steel and Agasote	Seats, style,	
Headlining	Agasote	Longitudinal	
Roof, type	Compromise	Seating material	
Underframe	Metal	Step treads	
Air brakes	Westinghouse	Trucks, type	
Axles,	Carnegie quenched and tempered	Ventilators	
Bumpers	Hedley anti-climber	Wheels,	
Tables,		Carnegie	
New York Municipal Railway's			
Specification			
Paintings,			
Bronze and			



Because Edwards fixtures are Best and Safest.

Remember to write "Edwards" opposite "Sash Fixtures" in your specifications.

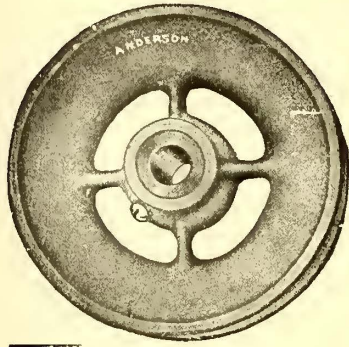
## The O. M. Edwards Co., Inc. Syracuse, N. Y.

Window Fixtures  
Top, Bottom and Side Weather Stripping  
Metal top Casings

Metal Extension Platform Trap Doors  
All-Metal Sash Balances and Shade Rollers  
Railway Devices



# Wire Costs More Than Wheels



On most roads the cost of trolley wire for maintenance work alone averages several times the cost of all the trolley wheels on the system. On one road we know of this ratio is 7 to 1.

One thing, and one only, is the cause of this rapid wear of trolley wire—the abrasive effect of the trolley wheels.

Many of the most progressive roads in this country have found in Anderson Trolley Wheels a highly economical combination of long wheel life and minimum wear of trolley wire. You will, too, after you have tested them. Our nearest office is ready with prices and particulars. Write!

**Albert & J. M. Anderson Mfg. Co.**

289-293 A Street

(Established 1877)

Boston, Mass., U. S. A.



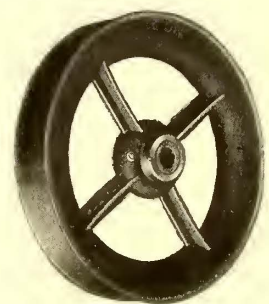
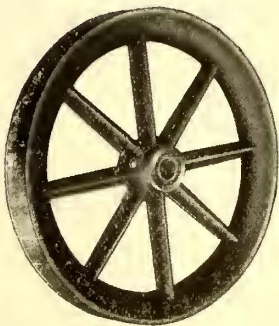
BRANCHES:

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 Chicago, 105 So. Dearborn Street  
 Philadelphia, 429 Real Estate Trust Bldg.  
 London, E. C., 48 Milton Street



# For High Speed Operation

## —Large Diameter Kalamazoo Trolley Wheels



As a solution to arcing and short wheel life on high speed electric railway work, two new Kalamazoo Wheels have been designed.

They are (No. 20) 11½ inches and (No. 21) 10 inches in diameter. An ample increase of width, depth of groove and length of hub insures a well-balanced wheel in each case.

Tests covering considerable mileage at high speeds show that these two new "Kalamazoo's" greatly decrease sparking, while offering longer wheel life. There is more bearing on the wire, with consequent greater contact and current carrying capacity.

The patented Kalamazoo Harps have been enlarged to carry these wheels.

Try several on your lines. Compare their service with that of smaller wheels.

*Write Today.*



**STAR BRASS WORKS**

KALAMAZOO, MICHIGAN



# Note the Oiling Feature



The Hensley trolley wheel is cast in one piece, dispensing with the bushing. The hub bearing will outwear the rim. It is provided with a grease cavity with automatic feed so that the



## Hensley Trolley Wheel Needs Oiling But Twice a Week

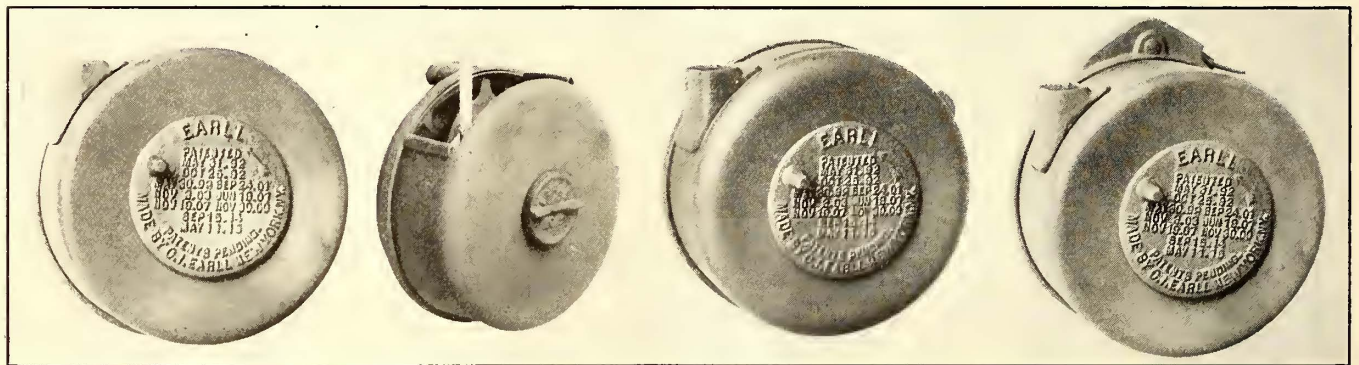
and requires but three seconds' work in doing it. The lubricant is fed to the bearing surface of the hub. The cavity is filled with lubricant through the end of the spindle without either uncapping an orifice or removing the spindle wheel.

# Hensley Trolley Wheels & Harps

are made in a factory devoted exclusively to these particular articles, enabling us to produce a thoroughly efficient product and at reasonable prices.

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The forged steel gears mentioned are cut from

**Carnegie-Slick Rolled Steel Gear Blanks**

Ask any district office for pamphlet—Rolled Steel Gear Blanks and Miscellaneous Circular Sections.

**Carnegie Steel Company**

General Offices: Pittsburgh, Pa.

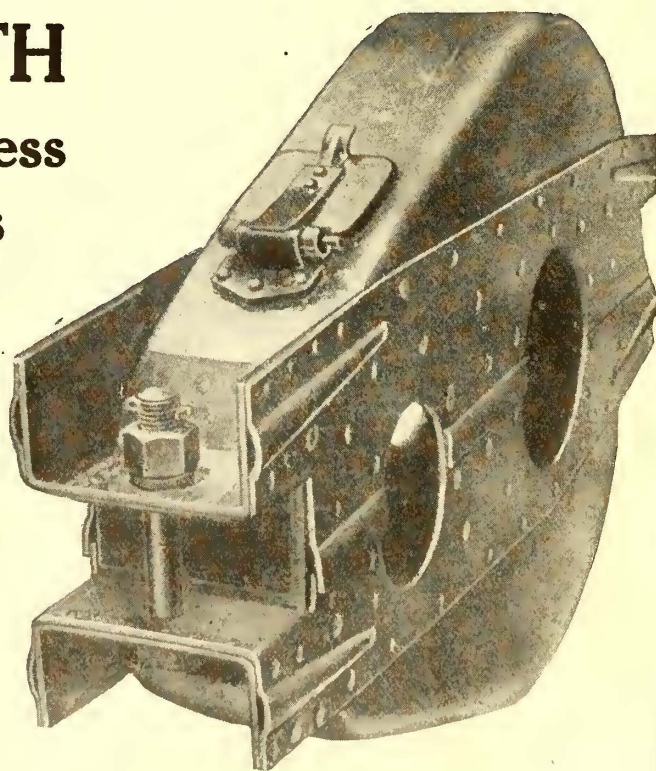
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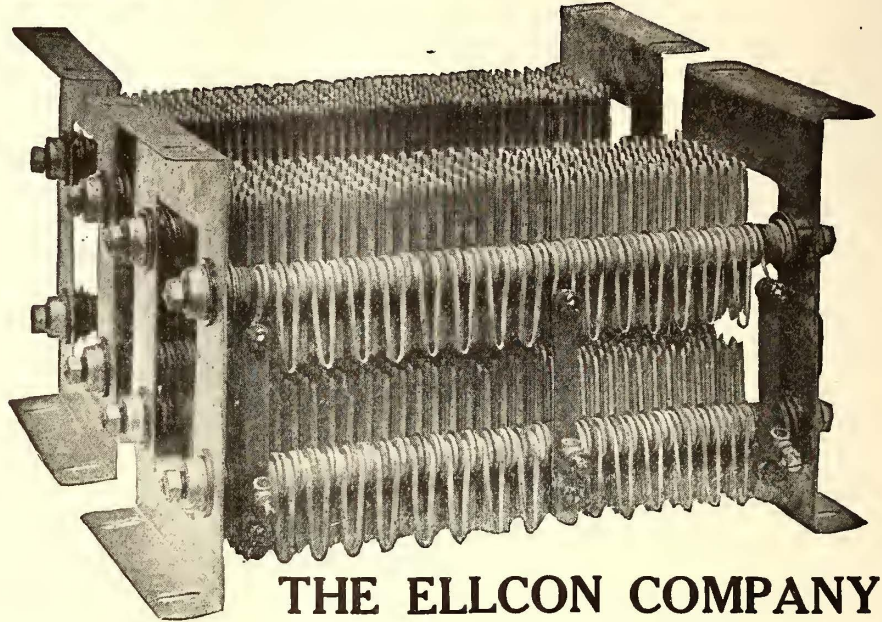


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# FMB Resistors

The *drawn* grids are much lighter than the cast grids used in ordinary resistors. They are never brittle, always uniform in cross-section, never strained by expansion and contraction due to rapid heating and cooling. They resist rust and corrosion better than cast grids.

And there are only about one-twenty-fifth as many joints as in resistors using cast grids. Our data sheet is informative.



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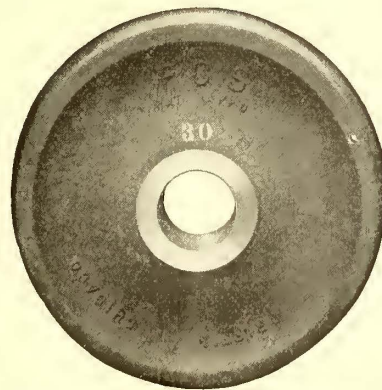
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**GRIFFIN WHEEL COMPANY**

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## The Border Line Between Success and Failure in Electric Railroading

often lies in the length and capacity of your cars.

Cars too big mean lower platform cost but long headways and decreased business.

Cars too short mean high platform cost and short headways, but not enough extra business to warrant their use.

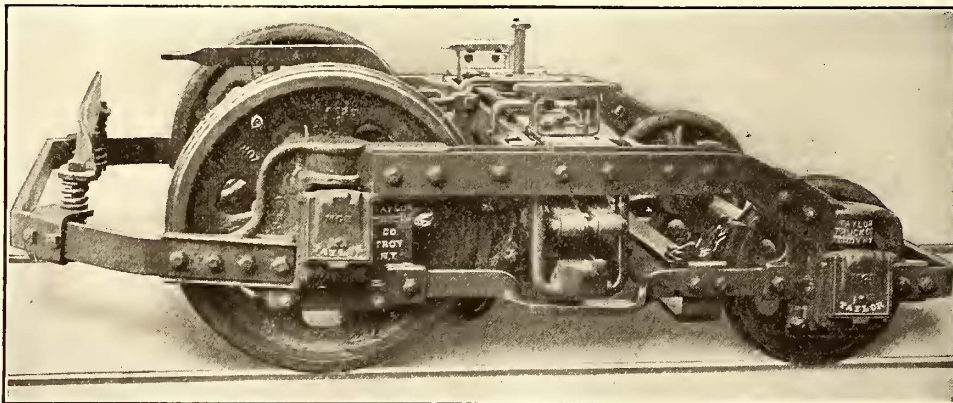
## Philadelphia Radial Trucks Permit the Happy Medium in Car Capacity



for a great many situations. They are longer and easier riding than the rigid single-truck car, and yet are not too big to cause unprofitable service during off-peak hours.

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ABSOLUTELY SAFE  
RIDE LIKE PULLMANS  
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REDUCE WEAR OF MOTORS  
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## TAYLOR ELECTRIC TRUCK CO.

Established 1892

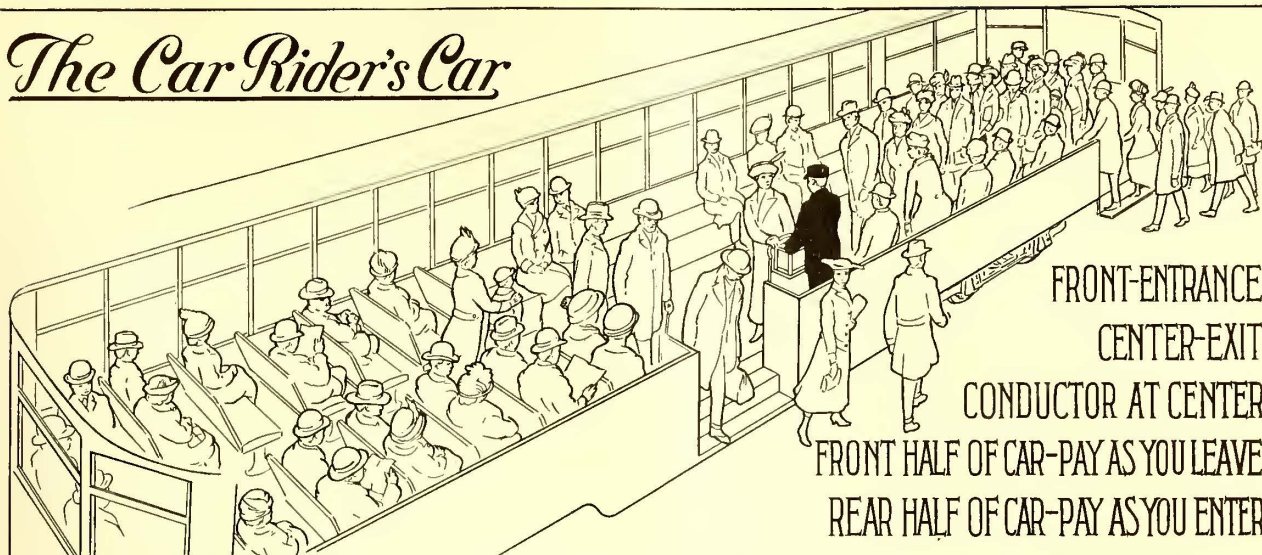
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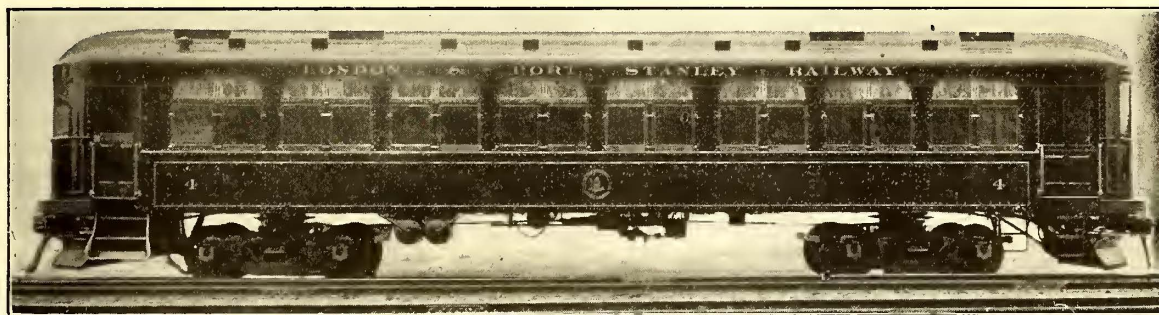
# The Car Rider's Car



**T**HIS picture of a Car Rider's Car—with the roof and part of the side omitted—shows how passengers can flock aboard at a transfer point, because there is no fare collecting at or near the entrance to hold them up. And while passengers are entering at the front others are leaving at the side—there can be no conflicting movement.

The conductor collects fares as passengers pass him at the center of the car either on leaving (from the front section) or on going to the rear. The conductor operates sliding doors at the exit and the motorman operates folding doors and step at the entrance. Very complete information on all particulars will be sent on request.

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one of which is shown above.

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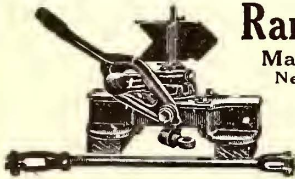
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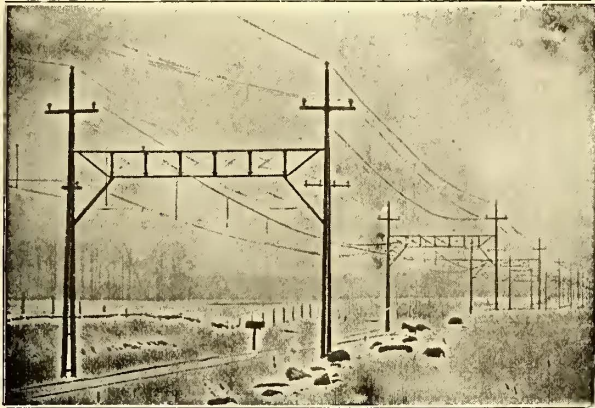
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for all classes of electrical construction and repair  
 work. Write for catalog.

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If you find it necessary to rebuild your interurban overhead construction on account of the decay of your wooden poles, write us and we will give you an estimate as to what permanent reconstruction would cost you.

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Strongest STEEL POLE of like weight in the world.  
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 We have constantly on hand about two thousand tons of steel and can make immediate shipments.  
 A full line of convenient malleable fittings.  
 Our steel pole *TREATISE* tells a big story, ask for it.

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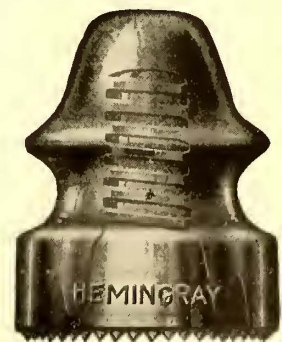
is best secured by a careful selection of the transmission line insulators. It is here that breakdowns are most likely to occur.

### Hemingray Insulators

by reason of their continued use on important transmission lines have demonstrated the soundness of Hemingray design. The teats on the petticoat attract water on the outer and inner surfaces into drops—preventing the creeping of moisture on insulators and pins. The line is complete and the catalog shows it. Have you a copy?

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It is a simple phrase, yet today forms the basis of all permanent and successful business. The above installation was made in the interest of better service.

#### STANDARD Light and Power Cables

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STANDARD service means not only *willingness* but also an exceptional *ability* to supply you with any quantity of electric wires and cables of all kinds and sizes, also cable accessories, etc.

*A request for prices or other information will receive immediate attention. Write today.*

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and other principal cities

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Powder Makers Since 1802

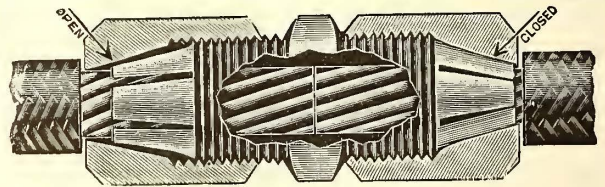
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We want an opportunity to show you how to save from 20 to 50 cents on every bond you install.


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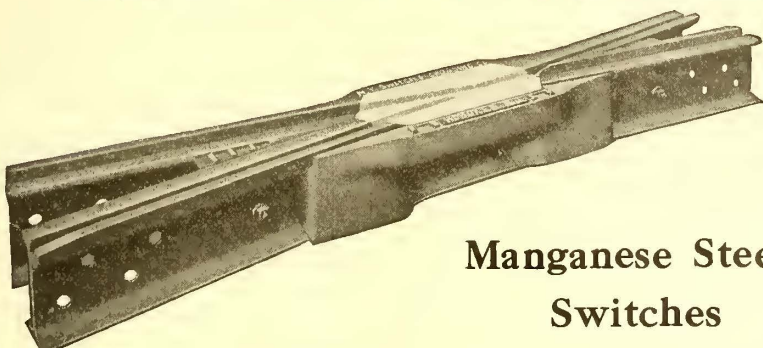
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 are not affected by severe rainstorms—  
 The culverts which we purchased of you in 1908 have given us excellent satisfaction, especially one of the large ones which has had a severe test owing to its peculiar location and to a very heavy rainfall of 3 1/2 inches which came in as many hours. The country people went to see the ruin which they had predicted from such a sudden rainfall only to find that everything was in perfect order. We can cheerfully recommend the use of your material to all railroad builders.  
 —and resist Corrosion  
 because  is used  
 Shipped Set-up or knocked down. Write for Catalog G-3  
**THE CANTON CULVERT & SILO CO.**  
 MANUFACTURERS  
 CANTON, OHIO, U.S.A.

**New York Switch and Crossing Co.**  
 Hoboken, N. J.  
  
**Special Track Work**  
 Manganese Steel and Hard Center Frogs  
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**SPECIAL TRACK WORK**  
 For **ELECTRIC RAILWAYS**  
**THE AMERICAN FROG AND SWITCH CO.**  
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 Tongue Switches, Mates, Frogs, Curves and  
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 100% Rail Joint  
 Makers of Continuous, Weber, Wolhaupter and  
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 Protected by Patents  
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## Continuous Operation of the Power Plant

is a matter of extreme importance to the electric railway man. There must be no failure to supply the current when it is needed.

The constant use of Dearborn Treatment guarantees a high percentage of efficiency from the boilers. Made to suit the water conditions shown by analysis, it keeps the boilers free from scale, so that they steam freely and quickly, all corrosive or pitting action of the water is arrested, and, in fact, the boilers are in condition to yield their full quota of power constantly, while the fuel consumption is greatly reduced.

Send gallon of water for analysis, and let us advise regarding your plant requirements.

**Dearborn Chemical Company**  
McCormick Building, Chicago

## SAFETY

For Protection Always  
But we have made

# TURBOIL

TRADE MARK  
AND



## GAS CYLINDER OIL

The most popular

### POWER-HOUSE WORDS

because they carry

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# WATER TUBE STEAM BOILERS

Steam Superheaters

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Works: BARBERTON, OHIO—BAYONNE, N. J.

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East Chicago, Indiana

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New inventions developed, perfected  
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**RAISES** the possibility  
of efficient stoking  
to a maximum.

Write for catalog "C."

**MURPHY IRON WORKS**  
Detroit, Mich. U.S.A.

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FOR BOILER FEED AND ALL INDUSTRIAL USES

WM. B. SCAIFE & SONS CO.

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are produced according to the specifications laid down by Railway Motor Manufacturers. Popular with manufacturers of motors because always right as to width and thickness of material, breaking strength, yarns, warp ends, and other standard requirements. The prices and material invariably satisfactory.

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**Circuit Breakers**

Best in  
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For  
Heavy Railway Service

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Many emergencies requiring a powerful jack present a difficulty in bringing the jack to bear on the load. The

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saves time, strength and trouble. The many positions to which it is adjustable easily solve perplexing lifting problems. Full details in our catalog. Write for it.



**The Buckeye Jack Mfg. Co.**  
Alliance, Ohio

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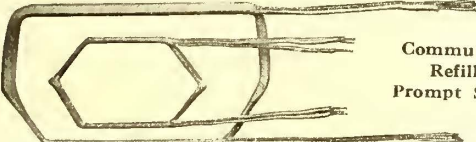
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For Car Houses and Power Houses

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**Insulating Varnishes and Compounds**

HIGHEST GRADE STANDARD OF QUALITY

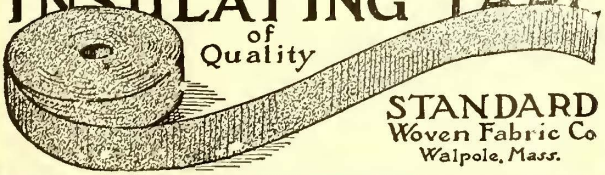
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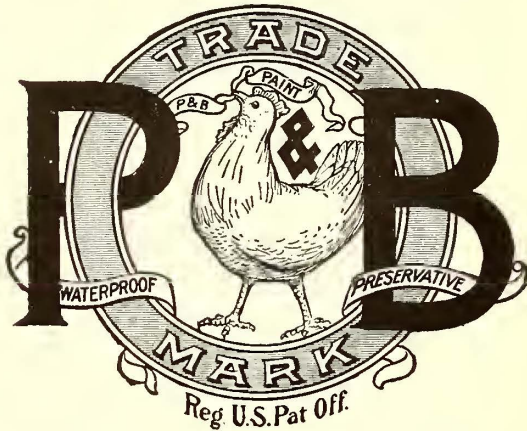


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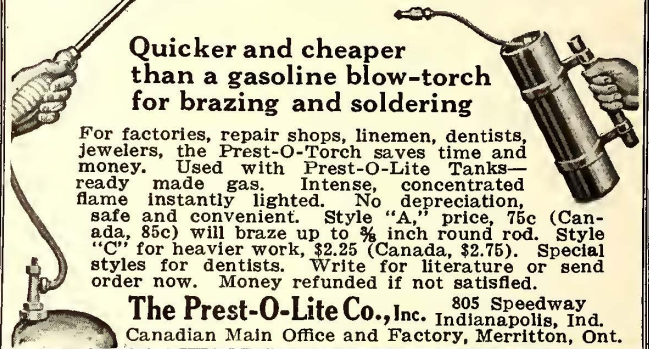
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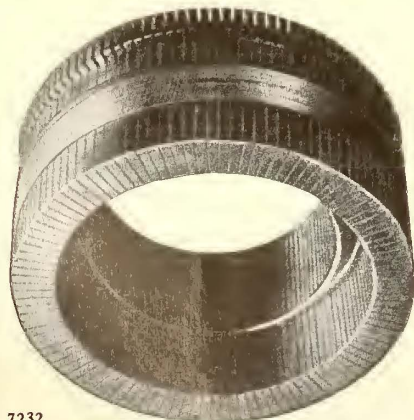
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Command Confidence. Why?**

Because of the dense, high conductivity hard-drawn copper we put into the bars,  
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Because of the Cameron ideal of quality—and the painstaking inspection that guarantees it in every job we turn out.  
Specify CAMERON for commutators, segments or coils.

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*A much abused word that we interpret successfully.*

*We believe that "90% of all orders shipped same day received" is a good definition.*

*Try us on that requisition —NOW.*

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Electrical Headquarters

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## ENCLOSED FUSES

A fuse is a small article when compared with the apparatus it protects, but on its performance depends the safety of this apparatus. The importance of reliable fuses is evident. "Union" fuses will give you good service.



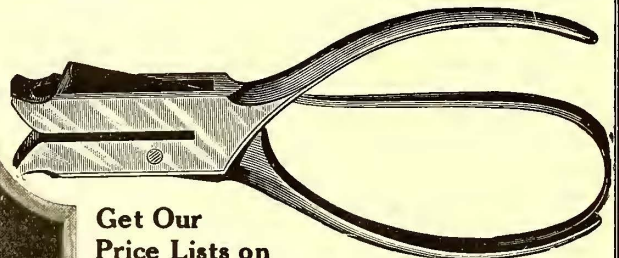
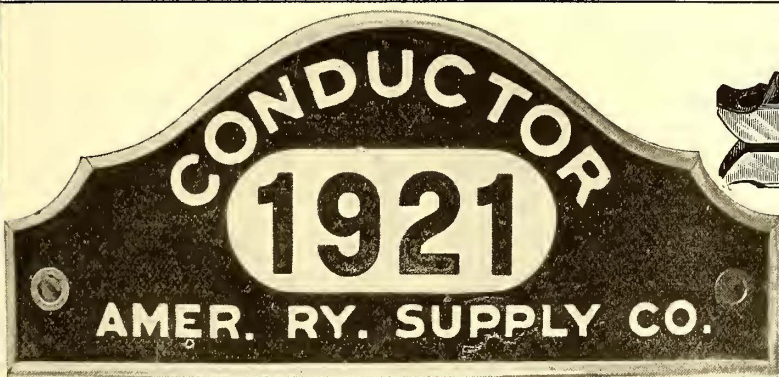
## NEW "UNION" CATALOG

We have just issued our No. 28 catalog, which combines the former Fuse and Box catalogs. It contains much valuable reference information, also complete descriptions of fuses for railway service.

*Write for a copy.*

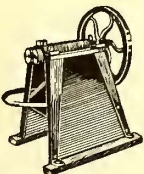


CHICAGO FUSE MFG. CO.  
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Get Our Price Lists on **BADGES** and **PUNCHES**

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Saved from the Ashes as many tickets are, means nickels lost to you. Avoid the risk. Patten Ticket Destroyer is used right in the office under the eyes of trustworthy employees. It mutilates beyond redemption. Scrap sold will pay for the machines. Ask us for Circular J.  
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*Sole Manufacturers*  
"Honeycomb" and "Round Jet" Ventilators for Monitor and Arch Roof Cars, and all classes of buildings; also Electric Thermometer Control of Car Temperatures.  
721 W. FULTON ST. Chicago, Ill. Write for 1328 BROADWAY Catalogue New York, N.Y.

## The Best Shade Rollers for Cars

SPECIAL shade rollers for cars, that will last and give satisfaction for years, and yet cost but little more than the poorest you can buy, are made by the Stewart Hartshorn Co., E. Newark, N. J. This company is by far the largest shade roller manufacturer in the world. It is able to give high quality at lower prices because of the enormous output. Write for catalog, stating wants. You are always protected when you buy shade rollers if they bear the signature

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# McLain No. 25 Headlight

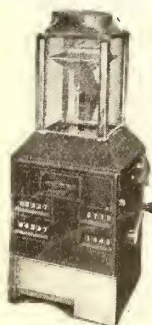
is the lightest-weight headlight made—right in line with the latest practice of reducing weight of cars and car equipment

It is not only light, but strong, weather-proof and a surprisingly powerful illuminator.

Test it in comparison with any other headlight on the market and learn for yourself its points of superiority.

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used in connection with the car register increase receipts \$1.00 per car, per day, counts metal tickets the same as cash thus giving a positive check on all class of fares.

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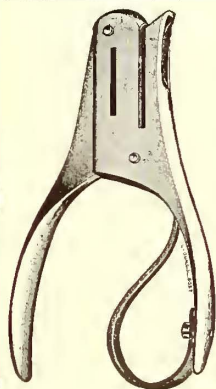
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Cleveland Fare Box Co.

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Our forty years of successful punch making are well demonstrated in the perfection of our product, which is Standard throughout the world.

These punches prove the most efficient, because they operate quickest and easiest, and the most economical because they wear longest.

Let us show you WHY. Punchmakers since '72.

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Eastern Electrical and Export Representatives.



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WRITE FOR THERMOSTATIC CONTROL INFORMATION

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**ELECTRIC HEATERS** Cut Installation and Maintenance Charge.

**VENTILATORS** Also Ventilate in Stormy Weather.

**THERMOSTATS** Save Current.

**ORIGINATED** the use of NON-CORROSIVE Wire for Electric Car Heaters.

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LET US FIGURE ON YOUR NEXT REQUIREMENTS

Gold Car Heating & Lighting Co., 17 Battery Pl., New York

## Use UNIVERSAL ANTI-SLIP METAL TREADS

on your cars and station steps.

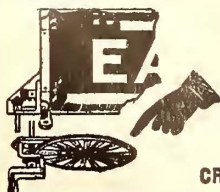
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**MASON SAFETY TREADS**—prevent slipping and thus obviate damage suits.

**KARBOLITH CAR FLOORING**—for steel cars is sanitary, fireproof and light in weight.

**STANWOOD STEPS**—are non-slipping and self-cleaning. Above products are used on all leading Railroads. For details address  
**AMERICAN MASON SAFETY TREAD CO.**  
Main Offices: Lowell, Mass. Branch Offices: Boston, New York City, Chicago, Philadelphia, Kansas City, Cleveland, St. Louis.



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By means of it, conductor or motorman can change sign without leaving platform. All that has to be done is to turn the crank. Better investigate.

CREGHEAD ENGINEERING CO., CINCINNATI, O.

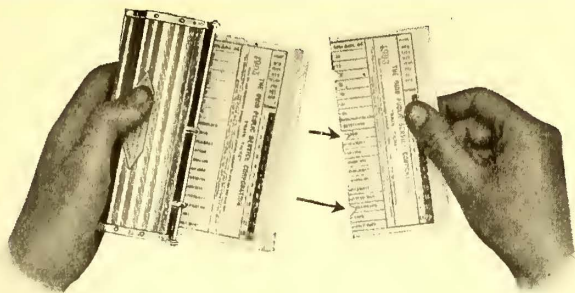
Have you our new

## Trolley Wheel Bulletin

Write for your copy

The Eureka Company North East, Pa.





## No Chance for Deceit or Dispute

Due to hand punching or notching which puzzles the passenger or which can be read different ways.

### Macdonald Ticket Boxes

Produce a passenger's ticket and auditor's stub which tell exactly the same story to the passenger, the conductor and the auditor.

And the stubs are tamperproof, too.

Convince yourself by ordering one box!

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Cleveland, Ohio

The Doors Are Closed—  
Go Ahead!



—And the Motorman Gets It  
—RIGHT

### Consolidated Safety Starting System

When this little light alongside the controller flashes, he is *sure* that all doors have been closed, and that no passenger can be getting on or off when the car is started.

Ask the claim agent—he knows.

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MANY SYSTEMS ARE USING TULC after first making most thorough tests under all conditions. Such tests have shown that it will cut lubrication costs in half.

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Really renewable. Not the kind that waste more time filling than new fuses are worth, but the kind that save 60 to 80 per cent on cost of non-renewable cartridge fuses. The right kind.

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**Sole Manufacturers, Pittsburgh, Pa.**  
Makers of the First Successful Refillable Fuse on the Market.  
Members Society for Electrical Development

## Ventilation—Sanitation—Economy—Safety

All Combined in,

### THE COOPER FORCED VENTILATION HOT AIR HEATER

Patented September 30, 1913. Ask for the full story.

We Also Manufacture Pressed Steel Hot Water Heaters

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Manufacturers of the

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ELECTRIC RAILWAY JOURNAL



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You get more than simply BRAKE SHOES when you use our Product.

You get the advantage of our constant effort to improve our product for your service.

You get the earnest co-operation of our engineers to assist you in getting the full quota of service from each Brake Shoe applied.

Miles of service from the Brake Shoe are more to be desired than pounds of scrap.

All of which means increased efficiency and decreased cost of Brake Maintenance.

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# The Men Who Plan and Execute

owe some of their efficiency to the thought, energy and resourcefulness of manufacturers who supply the means for such achievements.

These men know how important it is for them to keep in touch with the manufacturers.

In the electric railway industry, such men find the easy, certain and thorough way to keep in touch with manufacturers is through the advertising pages of the

## Electric Railway Journal

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## UNION SPRING & MFG. CO.

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For Brake Gear

Hardened  
Steel  
Accurate  
Uniform



also  
LONGWEAR  
BRAKE PINS  
to  
Specifications

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## "FROZEN AIR"

is preventable with denatured alcohol injection into the air brake system.

If you have been encountering serious troubles from this cause, do not permit this winter to go by without testing out our

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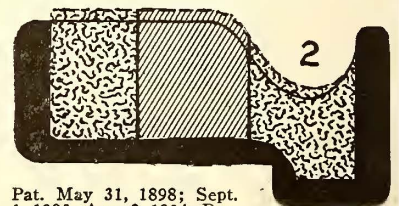
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Eastern Electric Railway Agent  
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## Wheel Condition No. 2

When the Flange and outer portion of tread need truing use this style of



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### Wheel Truing Brake Shoe

You need not keep a crew of men for wheel removal and machines for wheel truing if you use our wheel Truing Shoes.

**Wheel Truing Brake Shoe Co.**  
Detroit Michigan



The engineering departments of these railways made a thorough investigation—then selected

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Low repair costs, constant service and uniform superheat—that's why. It will pay your engineering department to investigate, too.

## POWER SPECIALTY CO.

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QUALITY SHOPS

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WORKS:

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### 400 Kilowatt 60 Cycle Rotary Converter

1—400 KW. Westinghouse, 3 ph., 60 cy., 370 v. A. C., 575 v. D. C., speed 600 revolutions.

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2—200 KW. Westinghouse, 3 ph., 60 cy. rotary converters, 370 v. A. C., 575 v. D. C., 720 rpm., with starting motors, also transformers if desired.

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2—150 KW. Westinghouse 3 phase, 60 cycle rotary converters, 550 volts, 273 amps., 720 r.p.m., complete with 4—100 KW. Westinghouse Scott connected oil insulated transformers, 10,000/9500 volts prim., 430/362 volts secy.

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2—150 KW. General Electric type T. C., 4-150-750, 25 cycle, 3 phase, 575 volt, rotary converters, 750 r.p.m., complete with end play and speed limit device.

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3—185 KVA. Gen. Elec., type A. C., 25 or 60 cycles, 2300 volts primary, 430 volts secondary.

4—125 KW. Westinghouse transformers, single phase, 60 cycles, 15,000 volts primary, 340/360 v. secondary.

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3—75 KW. Westinghouse, oil insulated, 60 cycle, 6600 or 13,200 v. primary, 220 v. secondary.

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2—75 to 90 HP. Westinghouse No. 112 Railway Motors, newly rewound, practically new.

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## ARCHER & BALDWIN

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TELEPHONE 4337-4338 RECTOR

## 86 Ton Electric Locomotive

Built by The General Electric Co.

Rating 808-E-172-4GE94-600 V.

### Dimensions and Weights:

Length inside knuckles.....	35' 2"
Length over cab.....	32' 6"
Height over cab.....	12' 1"
Width over all.....	10' 1"
Total wheel base.....	29' 0"
Rigid wheel base.....	12' 0"
Track gauge.....	4' 8 1/2"
Total weight.....	172,500 lbs.
Weight on drivers.....	117,200 lbs.
Maximum safe speed.....	60 MPH.
Minimum radius curvature.....	150 ft.

### EQUIPMENT:

Four G.E.-94 bipolar gearless motors with type M multiple unit control; combined straight and automatic air brake; two 16" electric headlights; air operated bell; whistle; pneumatic sanders, etc.

### SPEEDS:

Control equipment is arranged for three economical running speeds; slow for switching service, medium for freight service and high speed for fast freight and passenger service.

## MacGovern and Company, Inc.

114 Liberty Street  
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For Issue of That Week

## CARS FOR SALE

OPEN and CLOSED MOTOR and TRAIL

Write for Price and Full Particulars to

**ELECTRIC EQUIPMENT CO.**  
Commonwealth Bldg. Philadelphia, Pa.

## COMPLETE ARMATURES FOR SALE

FOR ALL THE STANDARD STREET RAILWAY MOTORS

GET OUR PRICE WE CAN SAVE YOU MONEY

America's Greatest Repair Works

**CLEVELAND ARMATURE WORKS, Cleveland, O.**

Get Your Wants into the Searchlight



# SEARCHLIGHT SECTION

## Get your Wants into the Searchlight

### ADVERTISING RATES

Under "Positions Wanted," including Salesmen looking for new connections, Evening Work Wanted, etc., undisplayed advertisements cost **three cents a word**, minimum charge 50 cents an insertion, payable in advance.

Under "Positions Vacant," including Agents and Agencies Wanted, Representatives Wanted, Salesmen Wanted, Partners Wanted, Business Opportunities, Employment Agencies, and Miscellaneous For Sale, For Rent, and Want ads; also Auction Notices, Receivers' Sales,

Machinery and Plants For Sale or Wanted, undisplayed advertisements set solid in one paragraph, cost **five cents a word**, minimum charge \$1.50 an insertion.

Machinery advertisements (undisplayed) set with a paragraph for each item, or tabulated, **30 cents a line**, minimum 5 lines.

If replies are in care of any of our offices, allow five words for the address.

All advertisements for bids (Proposals) cost \$2.40 an inch.

### ADVERTISEMENTS IN DISPLAY TYPE

cost as follows for single insertions:

1/8 p. (11 1/2 x 3 3/8 ins.)	\$5.00	1 in. (1 x 2 1/8 ins.)	\$3.00
1/8 p. (2 1/2 x 3 3/8 ins.)	10.00	4 inches (4 x 2 1/8 ins.)	11.60
1/4 p. (5 x 3 3/8 or 2 1/2 x 7 ins.)	20.00	8 inches (8 x 2 1/8 ins.)	22.40
1/2 p. (10 1/2 x 3 3/8 or 5 x 7 ins.)	40.00	15 inches	40.50

For space to be used within one year, to be divided to suit requirements of advertiser, provided some space is used at least once a month following first insertion:

1 page	\$80 a page	18 pages	\$56 a page
3 pages	72 a page	26 pages	52 a page
6 pages	64 a page	32 pages	50 a page
9 pages	62 a page	40 pages	48 a page
12 pages	58 a page	52 pages	45 a page

In replying to advertisements, do NOT enclose original testimonials, or anything that you may want returned. State your qualifications in as concise and neat a manner as you can and enclose COPIES of testimonials. In machinery ads, use a local name or address if possible so that readers can wire direct and get quick replies.

### FOR SALE

#### Armature Coils

3 Sets GE-1200 Railway Motor Armature coils. Catalog No. 18069. Immediate shipment. If interested address Hagerstown & Frederick Ry. Co., Terminal Bldg., Frederick, Md.

#### Immediate Delivery

Boiler feed pump, capacity 75 gal. per minute, against a 500-ft. head at 3200 r.p.m. Dayton Turbine pump, direct connected to Kerr steam turbine. Mesaba Railway Co., Virginia, Minn.

#### No 18. Dornier Trucks

Prefer to sell frames only without wheels or axles at \$50. Good condition. Address U. T. Co. of Indiana, Anderson, Indiana.

#### Stock Taking Time

Now is the time to turn the surplus stock of metals you have on hand into cash. We buy all grades of scrap metals, small lots as well as large lots. Write us today and tell us what you have and we will be pleased to quote you prices. National Metal & Rubber Company, 30-31 India Wharf, Boston, Mass.



#### Armature Coil Taping Machine

Saves Time, Labor and Money

A boy can tape 40 coils for Westinghouse 12A Armature in an hour. Further particulars gladly furnished.

Geo. M. Griswold Machine Co.  
New Haven, Conn.

### For Sale Cheap

## STEEL RAILS

300 tons	68 lb.
650 tons	58 lb.
800 tons	52 lb.
600 tons	40 lb.
400 tons	35 lb.
500 tons	30 lb.
300 tons	20 lb.

Also large quantities of other sections These are practically as good as new and at a fraction of the cost.

Before Buying

LOCOS, CARS, EQUIPMENT, MACHINERY, TANKS, ETC.

see what Zelnicker offers.

## ZELNICKER IN ST. LOUIS

423 First Nat'l Bk., Chicago  
910 Hennen Bldg., New Orleans  
Main Office, 425 Locust St., St. Louis

### FOR SALE

#### Transformers for Sale

Six 350 K.V.A. 60 cycle, Type H single phase General Electric Co. transformers, 2400-2300-2200 volt primary; 200-400 volt secondary. New. These can be Y connected for use with 300 or 600 volt rotaries. Box 1308, Elec. Ry. Jour.

### MISCELLANEOUS WANTS

#### Electric Locomotive Wanted

Des Moines City Railway Company, Des Moines, Iowa, is in the market for one second-hand electric locomotive operating on a standard gauge track 4 ft. 8 1/2 in., 500 volt. Weight from 45 to 55 ton, 4 motors from 100 to 125 H.P. capacity.

#### Motors Wanted

Four G.E. 57 Type H two-turn motors, with or without armature and field coils. Holden & White, 1508 Fisher Bldg., Chicago.

#### Transformers and Rotary Converter

2-100 K. W. or 3-75 K. W., 60 cycle transformers, wound for 33,000 volts on primary side and 370 volts on secondary side. Also one 200 or one 300 K. W., 3 phase, 60 cycle, rotary converter. State make, condition, location and delivery. Elgin & Belvidere Electric Co., 105 S. La Salle St., Chicago, Ill.

## Your Advancement

is largely in your own hands—it is doubtful if any one else is worrying over it

Better positions are constantly being secured through small advertisements in the "Positions Wanted" Columns of *Electric Railway Journal*.

60 cents for 20 words

### POSITIONS WANTED

ACCOUNTANT—Eleven years' experience—Street Railway, Electric Lighting and Gas, both Construction and Maintenance. Married, 30. Best reference from present employer. Desire change about February 1st. Box 1314, Elec. Ry. Jour.

EFFICIENT manager of railway and lighting properties open for engagement. Can put your road on paying basis. Salary, \$6,000. Box 1315, Elec. Ry. Jour.

GENERAL foreman wants position. Married, 35, reliable, experienced. Now assistant general shop foreman for city and interurban road. References. Box 1294, Elec. Ry. Jour., 1570 Old Colony Bldg., Chicago, Ill.

GENERAL manager electric railway and lighting properties open for position. Twenty years' experience handling properties for large banking concern. Box 1236, Elec. Ry. Jour., 935 Real Estate Trust Bldg., Philadelphia, Pa.

SUPERINTENDENT of city and interurban lines, now employed, wishes same position with larger property. Best of reference furnished. Box 1266, Elec. Ry. Jour., 1570 Old Colony Bldg., Chicago, Ill.

YOUNG man, six years in executive offices large Eastern street railway and lighting company. Now law clerk legal department. College graduate; member of bar. Can handle legal and claim work. Good assistant to busy executive. Box 1223, Elec. Ry. Jour., 935 Real Estate Trust Bldg., Philadelphia, Pa.

### POSITIONS VACANT

GENERAL Manager or General Superintendent for electric street railway. Transportation experience especially necessary. Box 1311, Elec. Ry. Jour.

ELECTRICIAN wanted who understands Westinghouse H.L. control and automatic air equipment for large interurban company in Middle West. Good position for first class man. Box 1313, Elec. Ry. Jour., 1570 Old Colony Bldg., Chicago, Ill.

LARGE interurban company wants first class man experienced in care of automatic air equipment. One who understands Westinghouse H.L. control preferred. Location Middle West. Excellent working and living conditions. If you are qualified write us at once. Box 1312, Elec. Ry. Jour., 1570 Old Colony Bldg., Chicago, Ill.

WANTED—Experienced investigator and adjustor to assist Claim Agent on accident work, only those with experience need apply. Good salary and opportunities. Address E. R., Box 2, Station U, N. Y. P. O.



# READY-REFERENCE INDEX

to products manufactured by advertisers in this issue of Electric Railway Journal

More than 300 different products are here listed.

The Alphabetical Index (see eighth page following) gives the page number of each advertisement.

As far as possible advertisements are so arranged that those relating to the same kind of equipment or apparatus will be found together.

This ready-reference index is up to date, changes being made each week.

If you don't find listed in these pages any product of which you desire the name of the maker, write or wire Electric Railway Journal, and we will promptly furnish the information.

- Acetylene Apparatus.** (See Cutting Apparatus, Oxy-Acetylene.)
- Acetylene Service.**  
Davis-Bournonville Co.  
Oxweld Acetylene Co.  
Prest-O-Lite Co., Inc., The.
- Advertising, Street Car.**  
Collier, Inc., Barron G.
- Air Rectifiers.**  
Horne Mfg. Co.  
National Safety Device & Mfg. Co.
- Alloys, Steel & Iron.**  
Titanium Alloy Mfg. Co.
- Alloys, and Bearing Metals.** (See Bearings and Bearing Metals.)
- Amusement Devices.**  
Este Co., The J. D.
- Anchors, Guy.**  
Electric Material Co.  
Electric Service Supplies Co.  
Holden & White.  
Johns-Manville Co., H. W.  
Ohio Brass Co.  
Union Electric Co.  
Western Electric Co.  
Westinghouse Elec. & M. Co.
- Anti-Climbers.**  
Railway Improvement Co.
- Automobiles and Busses.**  
Brill Co., The J. G.  
White Co., The.
- Axle Straighteners.**  
Columbia M. W. & M. I. Co.
- Axles.**  
Bemis Car Truck Co.  
Brill Co., The J. G.  
Carnegie Steel Co.  
Cincinnati Car Co.  
Hadfields, Ltd.  
St. Louis Car Co.  
Standard Steel Works Co.  
Taylor Elec. Truck Co.  
U. S. Metal and Mfg. Co.  
Westinghouse Elec. & M. Co.
- Babbitting Devices.**  
Columbia M. W. & M. I. Co.
- Badges and Buttons.**  
American Railway Supply Co.  
Electric Service Supplies Co.  
International Register Co.  
Western Electric Co.  
Woodman Mfg. & Supply Co., R.
- Bankers and Brokers.**  
Coal & Iron National Bank.  
National City Co.
- Batteries, Dry.**  
Johns-Manville Co., H. W.  
Western Electric Co.
- Batteries, Storage.**  
Electric Storage Battery Co.  
Western Electric Co.
- Bearings and Bearing Metals.**  
Bemis Car Truck Co.  
Columbia M. W. & M. I. Co.  
General Electric Co.  
Kerschner Co., Inc., W. R.  
Long Co., E. G.  
More-Jones Brass & M. Co.  
St. Louis Car Co.  
Taylor Elec. Truck Co.  
Westinghouse Elec. & M. Co.
- Bearings, Center.**  
Baldwin Locomotive Works.  
Holden & White.
- Bearings, Oil-less, Graphite Bronze and Wood.**  
Bound Brook Oil-less Bearing Co.
- Bearings, Roller and Ball.**  
Gurney Ball Bearing Co.  
Hess-Bright Mfg. Co.  
Railway Roller Bearing Co.
- Bearings, Roller Slide.**  
Holden & White.
- Bells and Gongs.**  
Brill Co., The J. G.  
Electric Service Supplies Co.  
St. Louis Car Co.  
Western Electric Co.
- Benders, Rall.**  
Niles-Bement-Pond Co.  
Watson-Stillman Co.  
Western Electric Co.  
Zelnicke Supply Co., W. A.
- Blasting Powder & Equipment.**  
Du Pont de Nemours & Co., E. I.
- Blow Torches for Soldering and Brazing.** (See Cutting Apparatus, Oxy-Acetylene.)
- Blowers.**  
General Electric Co.  
Westinghouse Elec. & M. Co.
- Boiler Cleaning Compounds.**  
Dearborn Chemical Co.  
Johns-Manville Co., H. W.
- Boiler Coverings.**  
Johns-Manville Co., H. W.
- Boiler Graphite.**  
Dixon Crucible Co., Joseph.
- Boilers.**  
Babcock & Wilcox Co.
- Bond Clips.**  
Electric Railway Improve. Co.
- Bond Testers.**  
American Steel & Wire Co.
- Bonding Apparatus.**  
Davis-Bournonville Co.  
Electric Railway Improve. Co.  
Ohio Brass Co.  
Oxweld Acetylene Co.  
Prest-O-Lite Co., Inc., The.
- Bonding Tools.**  
American Steel & Wire Co.  
Electric Railway Improve. Co.  
Electric Service Supplies Co.  
Ohio Brass Co.
- Bonds, Rall.**  
American Steel & Wire Co.  
Electric Material Co.  
Electric Railway Improve. Co.  
Electric Service Supplies Co.  
General Electric Co.  
Johns-Manville Co., H. W.  
Ohio Brass Co.  
Union Electric Co.  
Westinghouse Elec. & M. Co.
- Bonds, Welded.**  
Lincoln Bonding Co.
- Book Publishers.**  
McGraw-Hill Book Co., Inc.
- Boring Tools, Car Wheel.**  
Niles-Bement-Pond Co.
- Braces, Rall.**  
Kilby Frog & Switch Co.  
Steel Car Forge Co.
- Brackets and Cross Arms.** (See also Poles, Ties, Posts, Piling and Lumber.)  
American Bridge Co.  
Bates Expanded Steel Truss Co.  
Creaghead Engrg. Co.  
Electric Ry. Equipment Co.  
Electric Service Supplies Co.  
International Creo. & C. Co.  
Lindsley Bros. Co.  
Ohio Brass Co.  
Union Electric Co.  
Western Electric Co.
- Brake Adjusters.**  
Holden & White.  
Kerschner Co., Inc., W. R.  
Smith-Ward Brake Co.
- Brake Shoes.**  
American Brake S. & Fdy. Co.  
Bemis Car Truck Co.  
Brill Co., The J. G.  
Columbia M. W. & M. I. Co.  
Long Co., E. G.  
Railway Material Co.  
St. Louis Car Co.  
Taylor Elec. Truck Co.  
Wheel Truing Brakeshoe Co.
- Brakes, Brake Systems and Brake Parts.**  
Ackley & Co., G. S.  
Bemis Car Truck Co.  
Brill Co., The J. G.  
Br. Westinghouse E. & M. Co.  
Columbia M. W. & M. I. Co.  
General Electric Co.
- Holden & White.**  
Horne Mfg. Co.  
Long Co., E. G.  
National Brake Co.  
National Safety Device & Mfg. Co.  
St. Louis Car Co.  
Taylor Elec. Truck Co.  
Westinghouse Trac. Brake Co.
- Brazing.** (See Welding.)
- Bridges and Buildings.**  
American Bridge Co.
- Brooms, Track, Steel or Rattan.**  
Patten Co., Paul B.  
Western Electric Co.  
Zelnicke Supply Co., W. A.
- Brushes, Carbon.**  
Dixon Crucible Co., Joseph.  
General Electric Co.  
Jeandron, W. J.  
Morgan Crucible Co.  
Western Electric Co.  
Westinghouse Elec. & M. Co.
- Brush Holders.**  
Anderson Mfg. Co., A. & J. M.
- Bumpers, Car Seat.**  
Electric Service Supplies Co.
- Bunkers, Coal.**  
American Bridge Co.
- Bunting.**  
Boyle & Co., Inc., John.
- Bushings, Case Hardened Manganese.**  
Bemis Car Truck Co.
- Bushings, Fibre.**  
Diamond State Fibre Co.
- Bushings, Graphite & Wooden.**  
Bound Brook Oil-less Bearing Co.
- Buttons.** (See Badges and Buttons.)
- Cables.** (See Wires and Cables.)
- Carbon Brushes.** (See Brushes, Carbon.)
- Car Equipment.** (For Fenders, Heaters, Registers, Wheels, etc., see those Headings.)
- Car Stop, Automatic.**  
Consolidated Car-Heating Co.
- Car Trimmings.** (For Curtains, Doors, Seats, etc., see those Headings.)
- Cars, Dump.**  
Differential Car Co.
- Cars, Passenger, Freight, Express, etc.**  
American Car Co.  
Brill Co., The J. G.  
Cincinnati Car Co.  
Jewett Car Co.  
Kuhlman Car Co., G. C.  
St. Louis Car Co.  
Wason Mfg. Co.  
Witt, Peter.
- Cars, Second Hand.**  
Electric Equipment Co.  
Kerschner Co., Inc., W. R.
- Cars, Self-Propelled.**  
Br. Westinghouse E. & M. Co.  
Electric Storage Battery Co.  
General Electric Co.
- Castings, Brass.**  
Frankel Connector Co.  
More-Jones Brass & M. Co.
- Castings, Composition or Copper.**  
Anderson M. Co., A. & J. M.
- Castings, Gray Iron and Steel.**  
American B. S. & Fdry. Co.  
American Bridge Co.  
American Steel Foundries.  
Bemis Car Truck Co.  
Columbia M. W. & M. I. Co.  
Hadfields, Ltd.  
Long Co., E. G.  
St. Louis Car Co.  
Standard Steel Works Co.  
Union Electric Co.  
Union Spring & Mfg. Co.
- Castings, Malleable and Brass.**  
American Brake S. & Fdry. Co.
- Bemis Car Truck Co.**  
Hadfields, Ltd.  
Long Co., E. G.  
St. Louis Car Co.
- Catchers and Retrievers, Trolley.**  
Earl, C. T.  
Eclipse Railway Supply Co.  
Electric Service Supplies Co.  
Holden & White.  
Kerschner Co., Inc., W. R.  
Long Co., E. G.  
Horne Mfg. Co.  
Ohio Brass Co.  
Trolley Supply Co.  
Union Electric Co.  
Wood Co., C. N.
- Celling, Car.**  
Keyes Products Co.  
Pantasote Co., The.
- Chargers, Storage Battery.**  
General Electric Co.  
Lincoln Electric Co.
- Checks, Employees.**  
American Railway Supply Co.
- Cheese Cloth.**  
Boyle & Co., Inc., John.
- Chemists.**  
Little, Inc., Arthur D.
- Circuit Breakers.**  
Cutter Electrical & Mfg. Co.  
Electric Material Co.  
General Electric Co.  
Western Electric Co.  
Westinghouse Elec. & M. Co.
- Clamps and Connectors, for Wires and Cables.**  
Anderson Mfg. Co., A. & J. M.  
Dossert & Co.  
Electric Service Supplies Co.  
Frankel Connector Co.  
General Electric Co.  
Klein & Sons, M.  
Ohio Brass Co.  
Union Electric Co.  
Western Electric Co.  
Westinghouse Elec. & M. Co.
- Cleaners and Scrapers, Track.** (See also Snow-Plows, Sweepers and Brooms.)  
Brill Co., The J. G.  
Cincinnati Car Co.  
Ohio Brass Co.  
Vandorn & Dutton Co.  
Western Electric Co.
- Cleats, Car Wiring.**  
General Electric Co.
- Clusters and Sockets.**  
General Electric Co.
- Coal and Ash Handling.** (See Conveying and Hoisting Machinery.)
- Coasting Clocks.**  
Railway Improvement Co.
- Coil Banding and Winding Machines.**  
Columbia M. W. & M. I. Co.  
Electric Material Co.  
Electric Service Supplies Co.  
Western Electric Co.
- Coils, Armature and Field.**  
Cleveland Armature Works.  
Coil Mfg. & Repair Co.  
Columbia M. W. & M. I. Co.  
D & W Fuse Co.  
General Electric Co.  
Independent Lamp & Wire Co.  
Westinghouse Elec. & M. Co.
- Coils, Choke and Kicking.**  
Electric Service Supplies Co.  
General Electric Co.  
Westinghouse Elec. & M. Co.
- Coin-Counting Machines.**  
American Railways Equipment Co.  
Electric Service Supplies Co.  
International Register Co.  
Johnson Fare Box Co.
- Commutator Slotters.**  
Electric Service Supplies Co.  
General Electric Co.  
Westinghouse Elec. & M. Co.  
Wood Co., C. N.





## Is YOUR Capital Gathering Cobwebs?

It is if any of it is tied up in old field coils. We can help you put these coils to work again. Send them to us and let us reconstruct them. We remove the old insulation—clean and anneal the copper—then reinsulate it with

## SALAMANDER PURE ASBESTOS

which is, in itself, a guarantee against carbonization due to age and breakdown under overload. We then rewind the wire into new coils having just the same characteristics as the old ones.

It's *better* than selling your old coils—and *cheaper* than buying new ones, for our only charge is for the actual insulation used. Ask us to demonstrate the economy of our method.

**Independent Lamp & Wire Co., Inc.**

Offices: 1737 Broadway, New York      FACTORIES: York, Pa., and Weehawken, N. J.

## U. S. Metal & Mfg. Co.

165 BROADWAY, NEW YORK CITY  
Chicago      Washington, D. C.

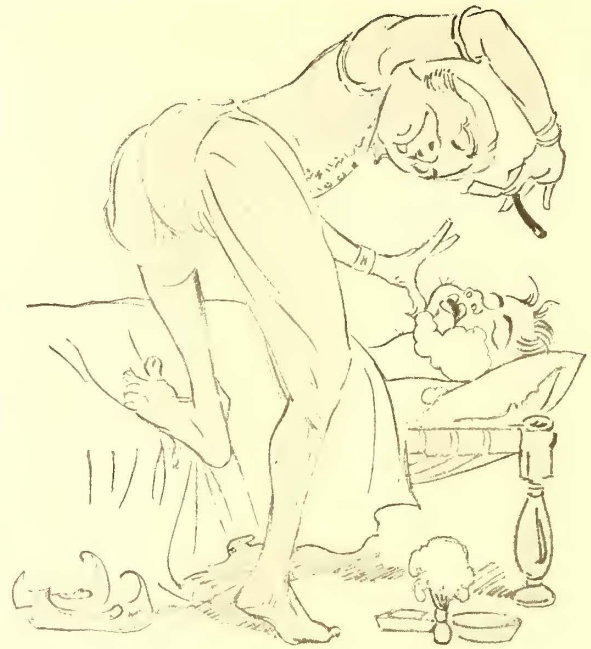
## RAILWAY SUPPLIES

### SELLING AGENTS FOR

- Tool Steel Gears and Pinions
- Johnson Fare Box
- Perry Side Bearings
- Hartman Centering Center Plates
- Wasson Trolley Bases
- Garland Ventilator
- Electric Arc Welders
- High Class Railway Varnishes
- and Enamels

Special Agents for { Tool Steel Gear & Pinion Co.  
Johnson Fare Box Co.  
C. & C. Electric & Mfg. Co.  
Holden & White

General Agents for Anglo-American Varnish Co.  
Eastern Agents for Union Fibre Co.



## Chooree

In Bombay you leave word for Tom to shave you at 8.00 a. m., but you don't have to get up to keep the appointment.

He comes to your room and without the formality of waking you up he wields his trusty and rusty Chooree through the scrape.

You would be surprised to see how many people can sleep right through this tonsorial stunt without knowing what is happening. WE are not surprised because we see so many operators who are able to sleep through the night watch with the brushes on a rotary scraping and chattering like an election night din.

But the boss wakes up when he reviews the brush bills and the commutator repair bills.

We hope the boss reads this during such a waking moment, and that he will pave the way for a real eye-opener in carbon-brush economy by requesting a Morgan brush engineer to prescribe a type of Morganite that will make no more noise than a motion-picture drama on the screen.

Wake-up!



Factory, Brooklyn, N. Y.

### AGENTS:

- Lewis & Roth Co., 1012 Liberty Bldg., Philadelphia
- Electrical Engineering & Mfg. Co.
- First National Bank Bldg., Pittsburgh
- W. L. Rose Equipment Co.
- La Salle Bldg., St. Louis, Mo.
- Herzog Electric & Engineering Co.
- 150 Steuart Street, San Francisco, Cal.



# READY-REFERENCE INDEX

to products manufactured by advertisers in this issue of Electric Railway Journal

- Commutator Truing Devices.**  
General Electric Co.
- Commutators or Parts.**  
Cameron Elec'l Mfg. Co.  
Cleveland Armature Works.  
Coil Mfg. & Repair Co.  
Columbia M. W. & M. I. Co.  
Electric Material Co.  
General Electric Co.  
Long Co., E. G.  
Mica Insulator Co.  
Western Electric Co.  
Westinghouse Elec. & M. Co.
- Compressors, Air.**  
General Electric Co.  
Westinghouse Trac. Brake Co.
- Condensers.**  
General Electric Co.  
Westinghouse Elec. & M. Co.
- Conduit, Flexible.**  
Tubular Woven Fabric Co.  
Western Electric Co.
- Conduits, Underground.**  
Johns-Manville Co., H. W.  
Standard Underground Cable Co.
- Connectors, Solderless.**  
Frankel Connector Co.
- Controller Fingers.**  
Horne Mfg. Co.
- Controller Handles.**  
Horne Mfg. Co.
- Controller Regulators.**  
Electric Service Supplies Co.
- Controllers or Parts.**  
Br. Westinghouse E. & M. Co.  
Columbia M. W. & M. I. Co.  
Electric Service Supplies Co.  
Eureka Co.  
General Electric Co.  
Johns-Manville Co., H. W.  
Kerschner, W. R.  
Westinghouse Elec. & M. Co.
- Controlling Systems.**  
General Electric Co.  
Westinghouse Elec. & M. Co.
- Converters, Rotary.**  
General Electric Co.  
Western Electric Co.  
Westinghouse Elec. & M. Co.
- Conveying and Hoisting Machinery.**  
American Bridge Co.  
Green Eng'g Co.  
Hadfields, Ltd.  
Hunt Co., Inc., C. W.
- Cord, Ball, Trolley, Register, etc.**  
Brill Co., The J. G.  
Electric Material Co.  
Electric Service Supplies Co.  
International Register Co.  
Long Co., E. G.  
Roebbling's Sons Co., John A.  
Samson Cordage Works.  
Trolley Supply Co.  
Union Electric Co.
- Cord Connectors and Couplers.**  
Electric Service Supplies Co.  
Samson Cordage Works.  
Wood Co., C. N.
- Cotton Duck.**  
Boyle & Co., Inc., John.
- Couplers, Car.**  
Brill Co., The J. G.  
Cincinnati Car Co.  
Long Co., E. G.  
Ohio Brass Co.  
Van Dorn Coupler Co.  
Westinghouse Trac. Brake Co.
- Cranes. (See also Hoists.)**  
Niles-Bement-Pond Co.  
Van Dorn & Dutton Co.
- Creosoting. (See Wood Preservatives.)**
- Cross Arms. (See Brackets.)**
- Crossing Foundations.**  
International Steel Tie Co.
- Crossing Signals. (See Signals, Crossing.)**
- Crossinos, Track. (See Track, Special Work.)**
- Culverts.**  
American Rolling Mill Co.  
Bark River B. & Culvert Co.  
California Co. Culvert Co.  
Canton Culvert & Silo Co.  
Coast Culvert & Flume Co.  
Corrugated Culvert Co.  
Delaware Metal Culvert Co.  
Dixie Culvert & Metal Co.
- Hardesty Mfg. Co., R.  
Illinois Corrugated Metal Co.  
Independence Culvert Co.  
Iowa Pure Iron Culvert Co.  
Kentucky Culvert Mfg. Co.  
Lee-Arnett Co.  
Lone Star Culvert Co.  
Lyle Corrugated Culvert Co.  
Michigan Bridge & Pipe Co.  
Montana Culvert Co.  
Nebraska Culvert & Mfg. Co.  
Nevada Metal Mfg. Co.  
New England Metal Cul. Co.  
North East Metal Co.  
Northwestern Sheet & I. Wks.  
O'Neill Co., W. Q.  
Ohio Corrugated Culvert Co.  
Pennsylvania Metal Cul. Co.  
Road Supply & Metal Co.  
Sioux Falls Metal Cul. Co.  
Spencer, J. N.  
Spokane Corr. Cul. Co.  
Tennessee Metal Culvert Co.  
Utah Corr. Culvert & Flume Co.  
Virginia Metal & Culvert Co.  
Western Metal Mfg. Co.  
Wyatt Mfg. Co.
- Curtains and Curtain Fixtures.**  
Brill Co., The J. G.  
Du Pont Fabrikoid Co.  
Edwards Co., The O. M.  
Electric Service Supplies Co.  
Hartshorn Company, Stewart.  
Fantasote Co., The.  
St. Louis Car Co.
- Cutting Apparatus, Oxy-Acetylene.**  
Davis-Bournonville Co.  
Oxweld Acetylene Co.  
Prest-O-Lite Co., The.
- Derailing Devices.**  
Cleveland Frog & Crossing Co.
- Destination Signs.**  
Columbia M. W. & M. I. Co.  
Creaghead Engrg. Co.  
Electric Service Supplies Co.  
Western Electric Co.
- Detective Service.**  
Wisch Service, P. Edward.
- Dispatching Systems.**  
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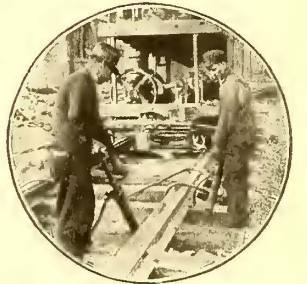
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- Storage Batteries. (See Batteries, Storage.)**
- Straps Car, Sanitary.**  
Holden & White.  
Railway Improvement Co.
- Structural Iron. (See Bridges Also.)**
- Superheaters.**  
Babcock & Wilcox.  
Power Specialty Co.
- Sweepers, Snow. (See Snow-Plows, Sweepers and Brooms.)**
- Switchboard Mats.**  
Western Electric Co.
- Switchstands.**  
Indianapolis Frog & Switch Co.  
Kilby Frog & Switch Co.  
Ramapo Iron Works.
- Switches, Automatic.**  
U. S. Electric Signal Co.  
Western Electric Co.
- Switches, Track. (See Track Special Work.)**
- Switches and Switchboards.**  
Anderson M. Co., A. & J. M.  
Cutter Electrical & Mfg. Co.  
Electric Service Supplies Co.  
General Electric Co.  
Western Electric Co.  
Westinghouse Elec. & M. Co.
- Tampers, Tie.**  
Ingersoll-Rand Co.
- Tapes & Cloth. (See Insulating Cloths, Paper and Tape.)**
- Telephone and Parts.**  
Electric Service Supplies Co.  
Western Electric Co.
- Terminal Cables.**  
Standard Underground Cable Co.
- Testing Clips.**  
Frankel Connector Co.
- Testing, Commercial and Electrical.**  
Electrical Testing Laboratories, Inc.  
Hunt Co., Robert W.
- Testing Instruments. (See Instruments, Electrical, Measuring, Testing.)**
- Terminals.**  
Frankel Connector Co.
- Thermostats.**  
Consolidated Car-Heating Co.  
Gold Car Heating & Lighting Co.  
Railway Utility Co.  
Smith Heater Co., Peter.
- Ticket Boxes.**  
Macdonald Ticket & Ticket Box Co.
- Ticket Choppers & Destroyers.**  
Electric Service Supplies Co.  
Patten Co., Paul B.
- Tickets & Transfers.**  
American Railway Supply Co.
- Ties & Tie Rods, Steel.**  
American Bridge Co.  
Carnegie Steel Co.  
International Steel Tie Co.
- Ties, Wood. (See Poles, Ties, etc.)**
- Tools, Track and Miscellaneous.**  
American Steel & Wire Co.  
Columbia M. W. & M. I. Co.  
Electric Service Supplies Co.
- Johns-Manville Co., H. W.**  
Klein & Sons, M.  
Railway Track-work Co.  
Union Electric Co.
- Torches, Acetylene. (See Cutting Apparatus, Oxy-Acetylene.)**
- Towers & Transmission Structures.**  
American Bridge Co.  
Archbold-Brady Co.  
Bates Expanded Steel Truss Co.  
Westinghouse Elec. & M. Co.
- Tower Wagons & Automobiles.**  
McCardell & Co., J. R.  
White Co., The.
- Track, Special Work.**  
American Frog & Switch Co.  
Cleveland Frog & Crossing Co.  
Columbia M. W. & M. I. Co.  
Indianapolis Switch & Frog Co.  
Kilby Frog & Switch Co.  
New York S. & Cross. Co.  
Ramapo Iron Works.
- Transfers. (See Tickets.)**
- Transfer Issuing Machines.**  
Ohmer Fare Register Co.
- Transfer Tables.**  
American Bridge Co.  
Archbold-Brady Co.
- Transformers.**  
General Electric Co.  
Packard Electric Co.  
Western Electric Co.  
Westinghouse Elec. & M. Co.
- Trap Doors.**  
Edwards Co., The O. M.
- Treads, Safety, Stair Car Step.**  
American Mason Safety T. Co.  
Electric Material Co.  
Universal Safety Tread Co.
- Trolley Bases.**  
Anderson M. Co., A. & J. M.  
Electric Service Supplies Co.  
General Electric Co.  
Holden & White.  
Horne Mfg. Co.  
More-Jones Brass & M. Co.  
Nuttall Co., R. D.  
Ohio Brass Co.  
Trolley Supply Co.  
Union Electric Co.
- Trolley Bases, Retrieving.**  
Ackley & Co., G. S.  
Holden & White.
- Trolley Shoes.**  
Holden & White.  
Miller Trolley Shoe Co.
- Trolley Switches.**  
Railway Material Co., The.
- Trolleys and Trolley Systems.**  
Ford Chain Block & Mfg. Co.
- Trucks, Car.**  
American Steel Foundries.  
Baldwin Locomotive Works.  
Bemis Car Truck Co.  
Brill Co., The J. G.  
Cincinnati Car Co.  
Long Co., E. G.  
Philadelphia Holding Co.  
St. Louis Car Co.  
Taylor Elec. Truck Co.
- Turbines, Steam.**  
General Electric Co.  
Western Electric Co.  
Westinghouse Elec. & M. Co.
- Valves.**  
Edwards Co., The O. M.  
Ohio Brass Co.
- Varnishes. (See Paints, etc.)**
- Ventilators, Building.**  
Drouve Co., The G.
- Ventilators, Car.**  
Brill Co., The J. G.  
Cincinnati Car Co.  
Holden & White.  
Railway Utility Co.  
St. Louis Car Co.
- Vestibules, Portable.**  
Brill Co., The J. G.
- Volt Meter. (See Instruments.)**
- Washers.**  
Bound Brook Oil-less Bearing Co.  
Diamond State Fibre Co.
- Waste Boxes.**  
Electric Material Co.
- Water Softening and Purifying Systems.**  
Scaife & Sons Co., Wm. B.
- Welders, Electric Arc.**  
Lincoln Electric Co.
- Welders, Portable, Electric.**  
Indianapolis Switch & Frog Co.
- Welding Processes and Apparatus.**  
Davis-Bournonville Co.  
Electric Railway Improve. Co.  
General Electric Co.  
Goldschmidt Thermit Co.  
Lincoln Electric Co.  
Oxweld Acetylene Co.  
Prest-O-Lite Co., Inc., The.  
U. S. Metal & Mfg. Co.  
Westinghouse Elec. & M. Co.
- Window Operators.**  
Drouve Co., The G.
- Wheel Grinders.**  
Wheel Truing Brake Shoe Co.
- Wheel Guards. (See Fenders and Wheel Guards.)**
- Wheels, Car, Cast Iron.**  
American Steel & Wire Co.  
Association of Mfrs. of Chilled Car Wheels.  
Bemis Car Truck Co.  
Griffin Wheel Co.  
Long Co., E. G.
- Wheels, Car. (Steel and Steel Tired.)**  
American Steel Foundries.  
Bemis Car Truck Co.  
Carnegie Steel Co.  
Standard Steel Works Co.
- Wheels, Trolley.**  
Anderson M. Co., A. & J. M.  
Bayonet Trolley Harp Co.  
Bound Brook Oil-less Bearing Co.  
Columbia M. W. & M. I. Co.  
Electric Material Co.  
Electric Service Supplies Co.  
Eureka Co.  
General Electric Co.  
Hensley Trolley & Mfg. Co.  
Holden & White.  
Johns-Manville Co., H. W.  
Long Co., E. G.  
More-Jones Brass & M. Co.  
Nuttall Co., R. D.  
Star Brass Works.  
Union Electric Co.
- Whistles, Air.**  
General Electric Co.  
Ohio Brass Co.
- Winding Machines. (See Coil Banding and Winding Machines.)**
- Wire Rope.**  
American Steel & Wire Co.  
Roebling's Sons Co., John A.
- Wires and Cables.**  
Aluminum Co. of America.  
American Electrical Works.  
American Steel & Wire Co.  
Bridgeport Brass Co.  
D & W Fuse Co.  
Electric Material Co.  
General Electric Co.  
Kerite Insulated Wire & Cable Co.  
Okonite Co.  
Packard Electric Co.  
Page Woven Wire & Fence Co.  
Roebling's Sons Co., John A.  
Standard Underground Cable Co.  
Western Electric Co.  
Westinghouse Elec. & M. Co.
- Wood Preservatives.**  
Barrett Co., The.  
Internat'l Creos. & Con. Co.  
Lindsay Bros. Co.  
Reeves Co., The.  
Sherwin-Williams Co.  
Valentine-Clark Co.



## THESE FAMOUS LORD SPECIALTIES

Horne Double Acting Brakes  
Giant Geared Brakes  
Differential Staffless Brakes  
Sterling Safety Brakes  
Sterling Trolley Bases  
Sterling Sand Boxes  
Q. P. Trolley Catchers  
Lord Screenless Air Cleaners for Compressors  
Sterling Ticket Punches  
Hydrogrounds and Lightning Arresters  
Soldered Rail Bonds  
Fenders and Wheelguards  
Controller Fingers  
Friction and Rubber Tape

HAVE BEEN ACQUIRED BY THE  
HORNE MANUFACTURING COMPANY

50 COURT ST.

BROOKLYN, N. Y.

The ever-increasing favor which the products of the Lord Manufacturing Company have enjoyed during the last few years has necessitated a reorganization to assure

### STILL BETTER MANUFACTURING AND SALES FACILITIES

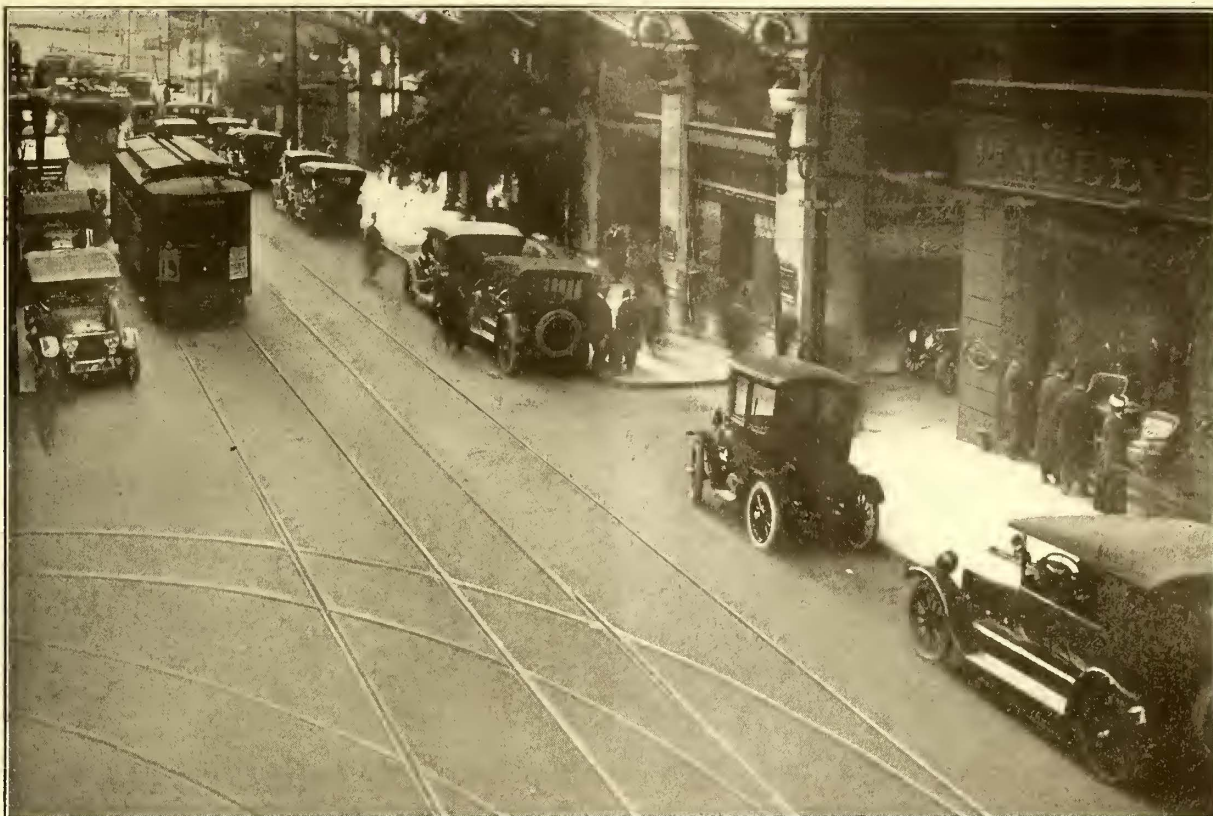
With this end in view, the Lord Manufacturing Company has been acquired by the Horne Manufacturing Company. Mr. L. W. Horne will serve as general manager of the Horne Manufacturing Company, thereby assuring you that past business relations will be continued under more favorable auspices than ever.

Your valued inquiries and orders will receive careful and prompt attention.









View Showing Intersection of Fifth Avenue Along Penn Avenue

# TITANIUM

## at Progressive Pittsburgh

The Pittsburgh Railways Company purchased about 1,000 tons of Titanium-treated rail in 1915 and about 3,000 tons in 1916. The rail used is Association Standard "B," 7-in. and 9-in. girder.

All recent Pittsburgh orders have specified Titanium treatment.

Titanium-treated rail is the choice of the largest and best-managed electric railways in the United States.

### TITANIUM ALLOY MANUFACTURING COMPANY

Operating Under Rossi Patents

Processes and Products Patented

General Office and Works:  
Niagara Falls, N. Y.



Pittsburgh Office: Oliver Building  
Chicago Office: Peoples Gas Building

New York Office: 15 Wall Street

**AGENTS:**

Pacific Coast: ECCLES & SMITH CO., Los Angeles, San Francisco, Portland

Great Britain and Europe: T. ROWLANDS & CO., Sheffield, England





## Railway Roller Bearings Now Ordered for Forty Low-Level Cars Third Avenue Railway System

More than a year ago the Third Avenue Railway System, New York, began ordering small lots of Railway Roller Bearings for the journals of its famous low-level cars which are run on radial axle trucks.

Evidently, these Railway Roller Bearings gave satisfaction for at this writing the railway has in use or on order a total of forty sets of Railway Roller Bearings.

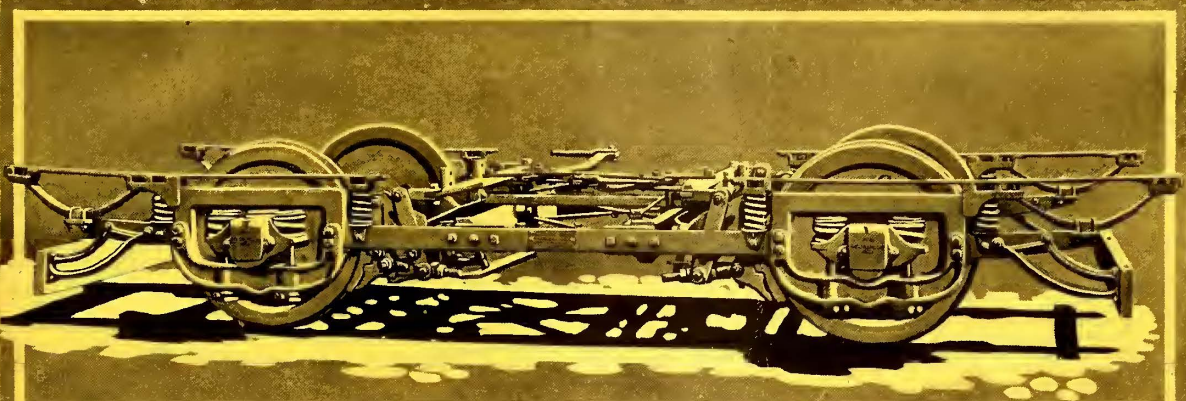
A trial of Railway Roller Bearings will convince you, too.



### The Railway Roller Bearing Co.

Syracuse, N. Y.





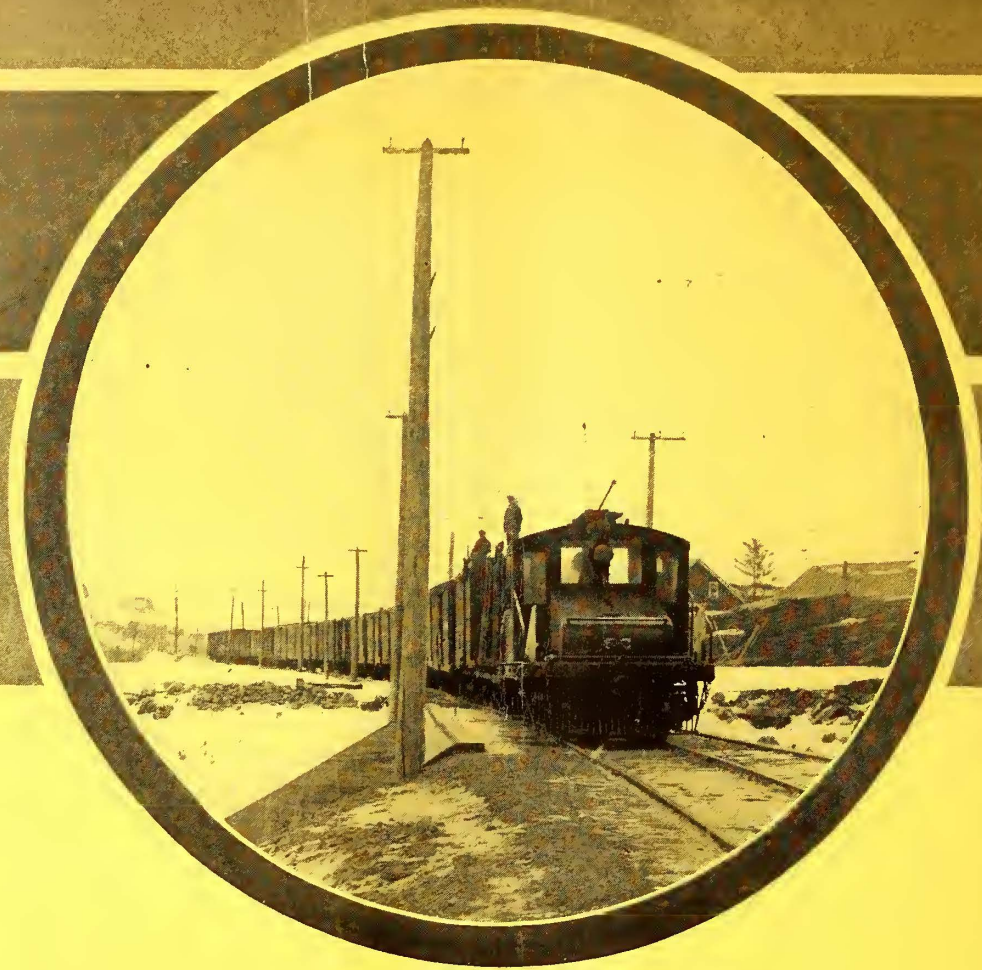
“RADIAX” TRUCK

**W**HERE there is a need for a carbody too long for mounting on a rigid-axle single truck—more than 21 feet over the corner posts—and not long enough to make it necessary to carry it on pivotal trucks—less than 28 feet—the Radiax exactly meets the situation. The truck is in operation on forty-three different railway systems, of which number eleven have ordered second lots and three have ordered them a third time.

THE J. G. BRILL COMPANY,  
 AMERICAN CAR COMPANY,  
 G. C. KUHLMAN CAR COMPANY,  
 WASON MFG. COMPANY,

PHILADELPHIA, PA.  
 ST. LOUIS, MO.  
 CLEVELAND, OHIO  
 SPRINGFIELD, MASS.





## Reliability Characterizes G-E Locomotive Freight Service

This 40-ton 1200-volt direct-current locomotive of the Aroostook Valley Railroad [is fitted with four G-E 205, 75 hp. motors, Sprague General Electric Type M multiple unit control and CP-29 compressors with combined straight and automatic air brakes

This all-General Electric equipment has made more than

**100,000 Miles Without One Electrical Failure.**

### General Electric Company

General Office  
Schenectady, N. Y.

Sales Offices  
in all large cities

