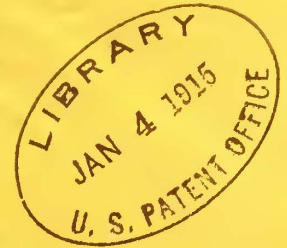


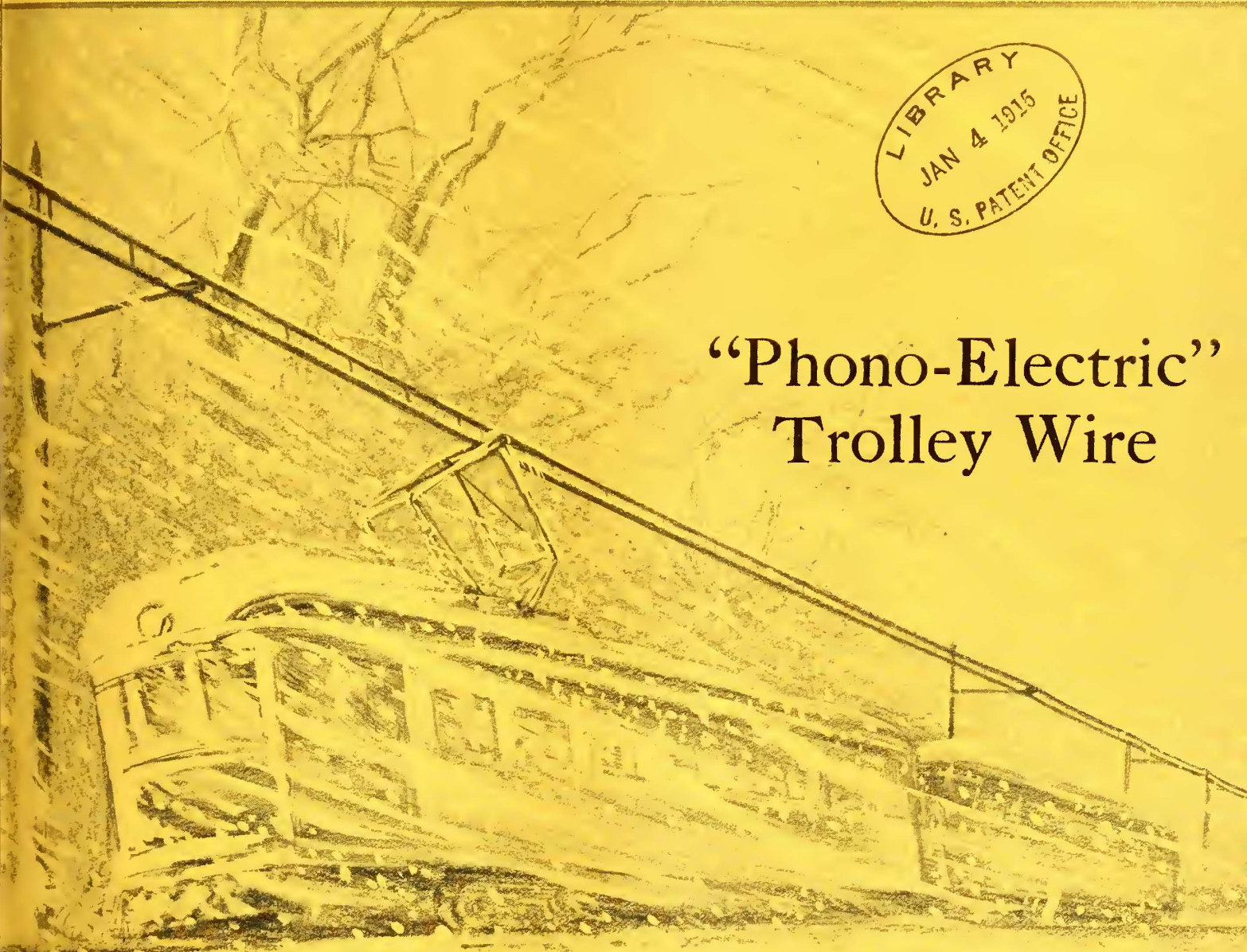
# ELECTRIC RAILWAY JOURNAL

Volume 45  
Number 1  
Jan. 2, 1915

McGraw  
Publishing  
Co., Inc.



## “Phono-Electric” Trolley Wire



## “Phono-Electric”

A dependable Trolley Wire of  
Long Service Life—“It’s Tough”

Made by

BRIDGEPORT BRASS COMPANY  
BRIDGEPORT, CONN.





# Happy New Year!

## Make A Resolution For 1915

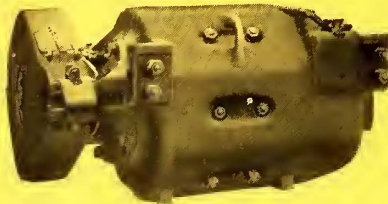
to thoroughly analyse the operating conditions of your rolling stock.



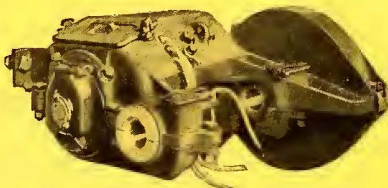
No. 532, Box Frame, 40 hp.  
Weight 2325 lbs., complete.



No. 632-B, Split Frame, 40 hp.  
Weight 2375 lbs., complete.



No. 306, Box Frame, 50 hp.  
Weight 2630 lbs., complete.



No. 323-A, Split Frame, 33 hp.  
Weight 1890 lbs., complete.

**Reliable Service** is your company's greatest asset.

**Economical Service** is your own greatest asset.

Obsolete equipment is not economical.

The splendid line of Westinghouse Railway Motors covers every class of service. The use of Westinghouse Motors insures

**Maximum Reliability and Economy in Operation.**

**Westinghouse Electric & Manufacturing Co.**

Sales Offices in all  
Large American Cities



East Pittsburgh  
Pennsylvania



# Electric Railway Journal

New York, January 2, 1915

Volume XLV No. 1

## Contents

Pages 1 to 82

### Editorial Comment on the Events in 1914 1

Discussions of the conditions which confront the various branches of the electric railway industry at the beginning of the new year, including résumés of the progress made during the past twelvemonth, along both business and technical lines.

ELECTRIC RAILWAY JOURNAL, JAN. 2, 1915. 26 cols.

### New Electric Railway Track Built in 1914 14

Reports received from the different railway companies in the United States and Canada show a new mileage of 946.38 constructed during the past year.

ELECTRIC RAILWAY JOURNAL, JAN. 2, 1915. 4 cols.

### Electric Rolling Stock Ordered in 1914 16

A tabulation showing the number, type, car-body length and character of construction of all cars built during the year compiled from official returns made by the railway companies.

ELECTRIC RAILWAY JOURNAL, JAN. 2, 1915. 7 cols.

### "Public-Be-Pleased" Policy in Practice 20

Some operating problems that affect the public attitude. A review of current electric railway practice in such matters as courtesy of platform men, complaint bureaus, public referendums, handling lost articles, way stations and shelters and the like.

ELECTRIC RAILWAY JOURNAL, JAN. 2, 1915. 28 cols. III.

### The "Safety First" Movement 34

How electric railways have worked to reduce accidents. A review of the work done from the inception of the "Safety First" slogan, and a description of the practices of different properties to maintain interest in the subject.

ELECTRIC RAILWAY JOURNAL, JAN. 2, 1915. 26 cols. III.

### Glasgow Railway Men as Soldiers 47

More than 1700 out of a total of 6100 employees are now in military service. Glasgow drained dry of free briar pipes for the warriors.

ELECTRIC RAILWAY JOURNAL, JAN. 2, 1915. 4¼ cols. III.

### The Salt Lake & Utah Railroad 54

A 1500-volt d.c. interurban railway running between Salt Lake City and Provo, a distance of 48.5 miles. The line was built to develop good agricultural territory. Seven trains a day are operated each way, exclusive of freight. The arch-roof combination cars for high-speed train service are described in detail.

ELECTRIC RAILWAY JOURNAL, JAN. 2, 1915. 4 cols. III.

### Communications 57

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ELECTRIC RAILWAY JOURNAL, JAN. 2, 1915. 3½ cols.

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ELECTRIC RAILWAY JOURNAL, JAN. 2, 1915. 6 cols.

### Equipment and Its Maintenance 62

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ELECTRIC RAILWAY JOURNAL, JAN. 2, 1915. 14 cols. III.

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JAMES H. MCGRAW, President.

J. T. DE MOTT, Treasurer.

H. W. BLAKE, Editor.

## McGraw Publishing Company, Inc.

CHICAGO, 1570 Old Colony Bldg. PHILADELPHIA, Real Estate Trust Bldg. 239 West 39th St., New York City SAN FRANCISCO, 502 Rialto Bldg. LONDON, 10 Norfolk St., Strand.

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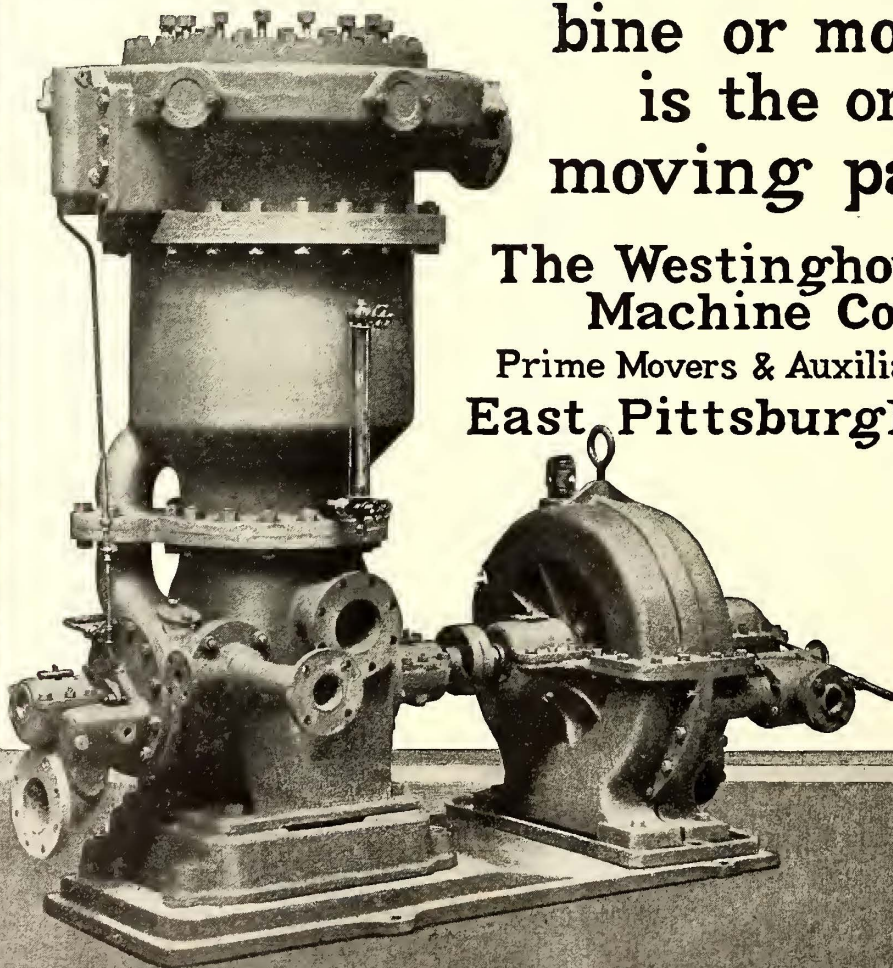
# Condensers

The same high vacuum is maintained in a Westinghouse Leblanc Condenser after years of operation – because there are no rubbing surfaces to wear. A single rotating element, direct connected to tur-

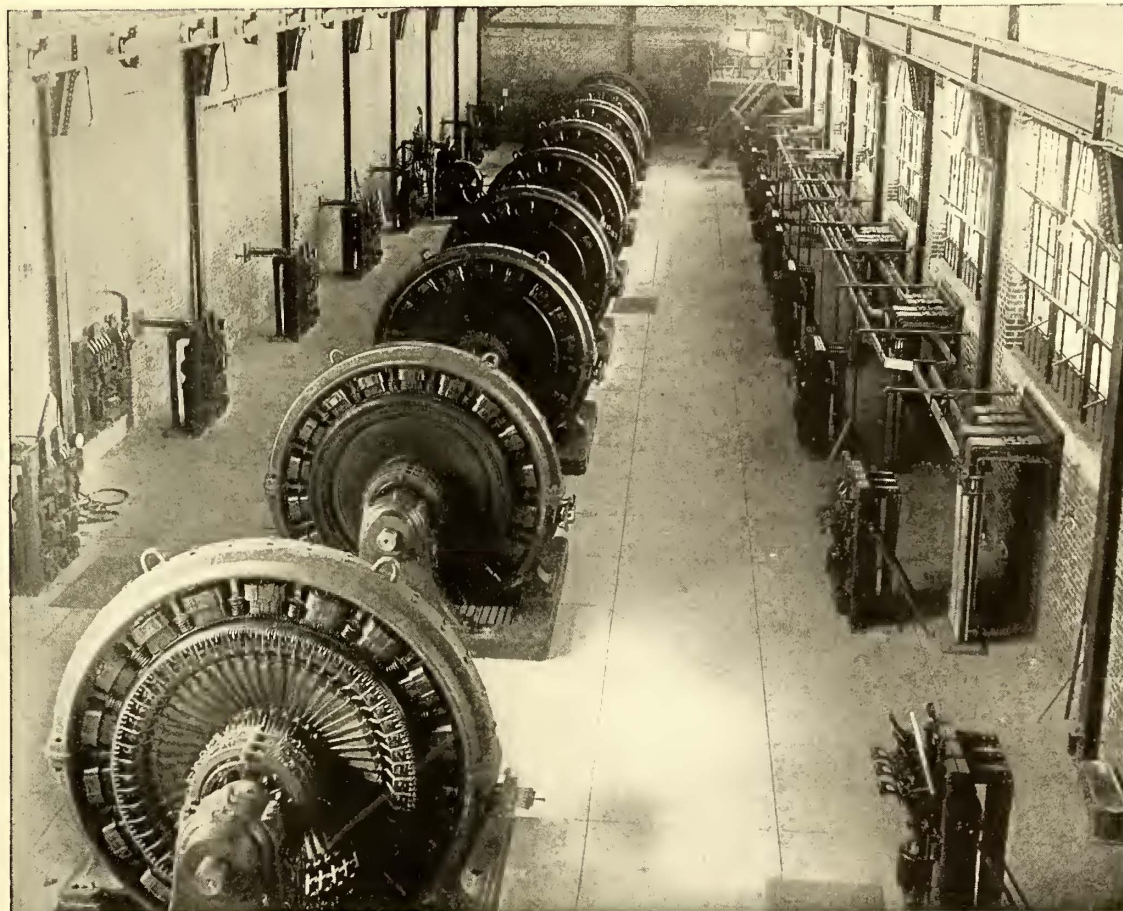
bine or motor, is the only moving part.

The Westinghouse  
Machine Co.

Prime Movers & Auxiliaries  
East Pittsburgh, Pa.







2500 Kw., 500 Volt, 60 Cycle Westinghouse Rotary Converters

**The largest 60 cycle Rotary Converter Substation in the world, containing nine of the largest 60 cycle Rotary Converters ever built.**

This substation is fed from a 66,000 volt, 70 mile transmission line of the Tennessee Power Company of Maryville, Tenn. The successful operation of these units has again justified the application of Westinghouse 60 cycle Rotary Converters on long transmission lines for the conversion of alternating current to direct current for both railway and industrial uses.

**Westinghouse Electric & Manufacturing Co.**

**East Pittsburgh, Pa.**

Atlanta, Ga.  
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Detroit, Mich.  
 \*El Paso, Tex.  
 \*Houston, Tex.  
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 Los Angeles, Cal.  
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 Minneapolis, Minn.  
 New Orleans, La.

New York, N. Y.  
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 Philadelphia, Pa.  
 Pittsburgh, Pa.  
 Portland, Ore.  
 Rochester, N. Y.  
 St. Louis, Mo.  
 Salt Lake City, Utah

San Francisco, Cal.  
 Seattle, Wash.  
 Syracuse, N. Y.  
 Toledo, Ohio  
 Washington, D. C.  
 \*W. E. & M. Co.  
 of Texas

Member Society for Electrical Development—"DO IT ELECTRICALLY"



# RESOLVED

(A Good New Year's Resolution for any Railroad Man)

---

SINCE ADEQUATE CONTROL OF ELECTRIC CARS AND TRAINS WHILE IN MOTION IS THE VERY FIRST AND FOREMOST REQUIREMENT ONCE A ROAD IS BUILT AND EQUIPPED; AND

SINCE "ADEQUATE CONTROL" MEANS A HIGHER DEGREE OF ECONOMY IN OPERATION, LARGER TRAFFIC CAPACITY, AND BETTER NET EARNINGS; THEREFORE BE IT

RESOLVED, THAT I WILL, DURING THE YEAR 1915 AND THEREAFTER, MAKE A MORE THOROUGH STUDY OF AIR BRAKE POSSIBILITIES ON MY PARTICULAR ROAD; AND THAT I WILL DO MY UTMOST TO REALIZE THE POTENTIAL EARNING CAPACITY OF THE AIR BRAKE AS A CAR AND TRAIN CONTROLLING SYSTEM.

---

*Suggested by the*

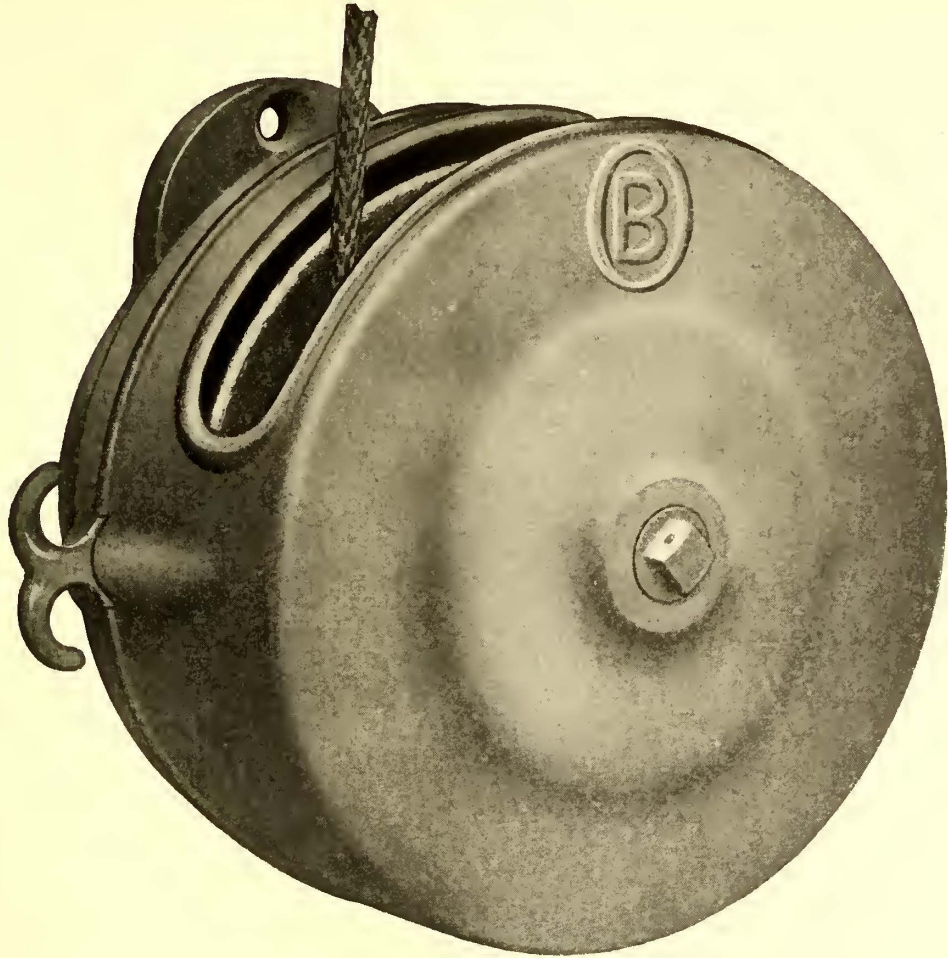
**Westinghouse Traction Brake Company**

*Works: Wilmerding, Pennsylvania*

PITTSBURGH: Westinghouse Building  
CHICAGO: Railway Exchange Building

NEW YORK: City Investing Building  
ST. LOUIS: Security Building





## New O-B Trolley Retriever

Dependable Service—Few Repairs

Simplified design and rugged construction account for the very satisfactory performance of this Retriever in service.

It acts quickly when the trolley jumps and is easily reset by the conductor. Requires little, if any, attention at other times.

Repair bills are small where O-B Retrievers are used.

*Let us send a Retriever for free trial on your road*

### The Ohio Brass Company, Mansfield, Ohio.

30 Church St., New York. 306 Fourth Ave., Pittsburgh. 343 So. Dearborn St., Chicago.  
Holabird-Reynolds Co., San Francisco, and R. D. Holabird, Los Angeles, California, Agents



## PUBLISHER'S PAGE

# The Semi-Annual Index

Last week's issue, the final number of Volume 44, was accompanied by a semi-annual index which is noteworthy both in regard to the care with which it has been compiled and the manner of its presentation.

Each entry in the index has passed through the hands of a professional indexer to insure standardization in classification and presentation, and has, besides, been examined by a member of the editorial staff, to insure technical accuracy.

The period covered by the index is printed at the top of each page, for the convenience of readers who keep their indexes in a separate binder. A glance at the top of the page immediately shows the volume to which it refers.

Further, at the head of the index, are the page numbers in each issue embraced by the volume. Therefore readers who do not bind their volumes can readily turn to the issue which contains any given article in the index.

Finally, at the top of the page containing the table of contents of the issue with which the index is published, there is printed a notice of assistance to the binder or the casual reader. It states that the index is bound in this number. This is done because some papers mail the index as a loose insert with the last issue of the year and some publish it with a later number. It involves a great deal of additional labor and expense to mail the index with the last number of the volume, but we mail it at the same time and bind it in and thus insure its delivery to every subscriber.

Inasmuch as the reference value of a technical journal depends very largely on the effectiveness with which it is indexed and upon the convenience with which the index may be found and used, it is believed that the Electric Railway Journal's index is a material aid in making the publication of permanent value to the industry.

**Make the Most of It**





E. R. J.

## Insulation Cannot Be Tested Properly

with the laboratory means at the command of electric railways. New coverings of the same superficial appearance may show almost the same number of megohms in an electrical test but this fact is no criterion as to their comparative merits under a searching analysis of chemical and physical properties.

### *You cannot afford to trust to chance*

the quality of the material that insulates your motor equipment, car and feeder distribution wiring, or the few but vitally important wires on which the proper operation of your signals depend. Defective insulation in these instances means frequent motor breakdowns, car fires from short-circuits, costly leaks from feeders to ground, and, worst of all, a possible collision because of a signal indication falsely set by stray currents.

Place yourself in position to  
order just what you want and get what you want

first, by having our insulation specialists draw up for you various sets of specifications to meet your voltage, current, service and other conditions; second, by arranging to have our insulation specialists test the products which the manufacturers submit to meet your specifications.

Our thorough, all-around insulation tests are often of a character that would involve prohibitive expense and doubtful results if imitated in a railway laboratory. On the other hand, the frequent use of the same costly machinery for many clients, combined with an ever-increasing fund of testing experience, makes it possible for us to offer this highly-skilled service at acceptable terms.

Let us work with *you* for securing the maximum efficiency in all branches of mechanical endeavor, operation, and the purchase and utilization of materials.



**ARTHUR D. LITTLE, Inc.**

*Chemists and Engineers*

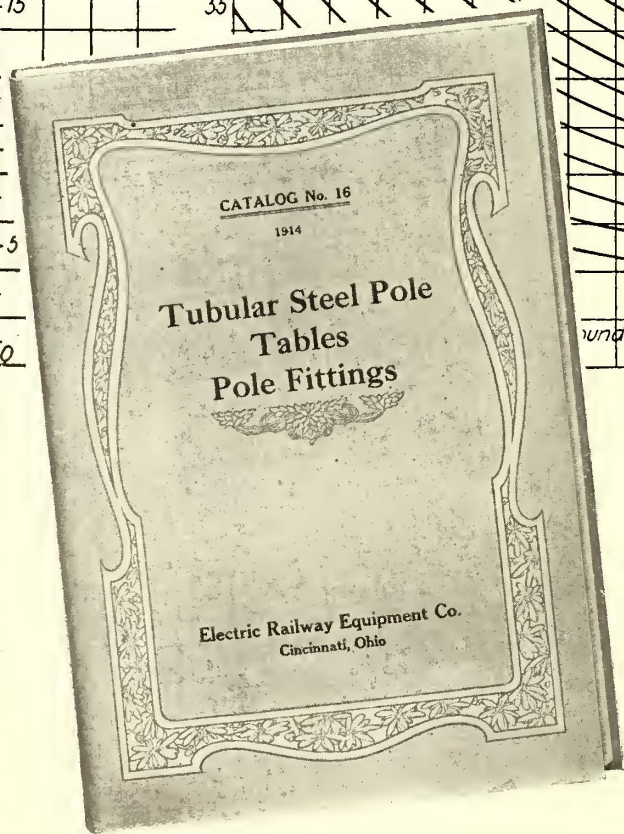
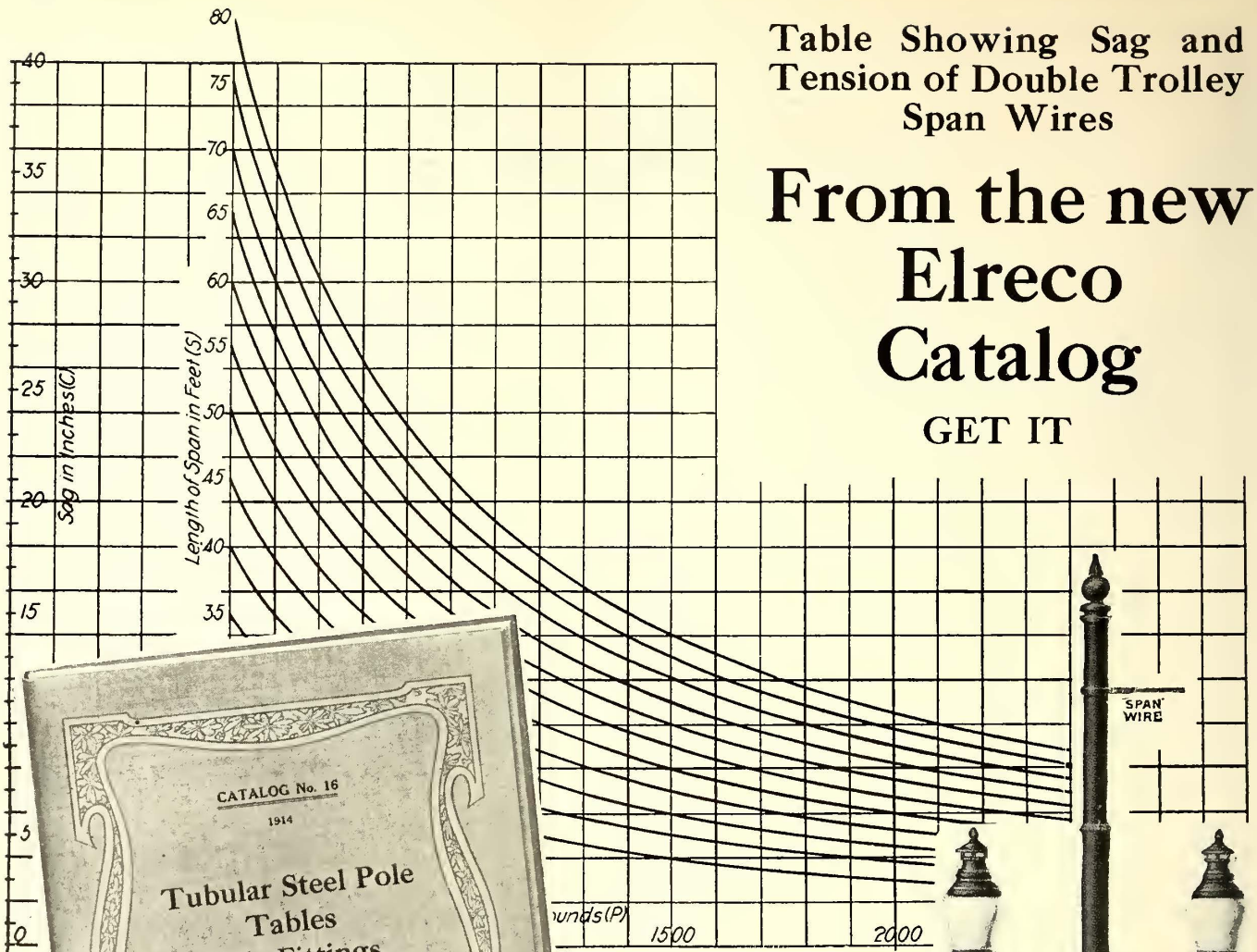
93 Broad Street, Boston, Mass.





**Table Showing Sag and Tension of Double Trolley Span Wires**

**From the new  
Elreco  
Catalog  
GET IT**



Much valuable data bearing on pole line construction for electric railways has been carefully compiled by this company and assembled in the form of ready reference tables.

These tables, embodied in our new Catalog No. 16, we offer to our many friends in the electric railway field. The information contained in this new catalog may be relied on as the last word in modern practice.

This latter phrase may justly apply to the special features in pole construction and accessories, presented in our very complete line of Tubular Steel Poles and pole fittings. A complete list of the latter together with illustrations is included in the catalog.

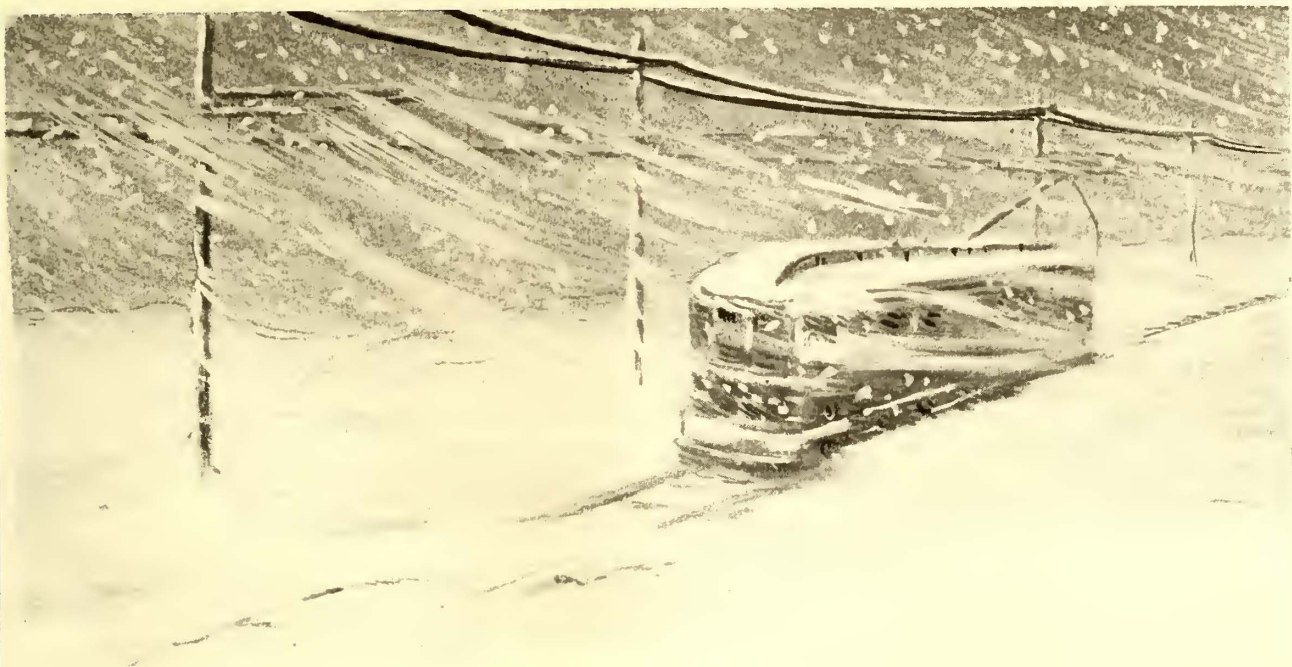
Send for a copy. You will keep it at your elbow.



**Electric Railway Equipment Co.  
Cincinnati, Ohio**

New York, 30 Church St.





## When Winter Grips Your Feed Wires

When poles burdened to near the limit with heavy copper feed wires fall under the added weight of sleet and ice—and traffic is tied up—it's a good time to remember

that there is a remedy.

Half the weight of feed wires can be eliminated—with equal conductivity and strength retained—by the use of

## Aluminum Railway Feeders

Constant growing demand for this practical conductor is evidence of its value. Owing to decreased weight, it is possible to increase the span, making a big reduction in the number of poles required on long lines. Reducing the number of poles,

pins and insulators decreases leakage. Joints are easily, quickly and economically made.

You will be interested in the 25-page booklet "Aluminum for Electrical Conductors." Sent free on request.

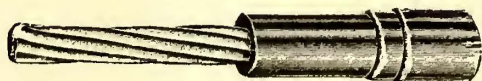
## Aluminum Company of America Pittsburgh, Pa.

NEW YORK  
99 John St.

BOSTON  
131 State St.

CHICAGO  
Old Colony Bldg.

SAN FRANCISCO  
Monadnock Bldg. (Pierson, Roeding & Co.)






**“Victor”**  
**At Panama**

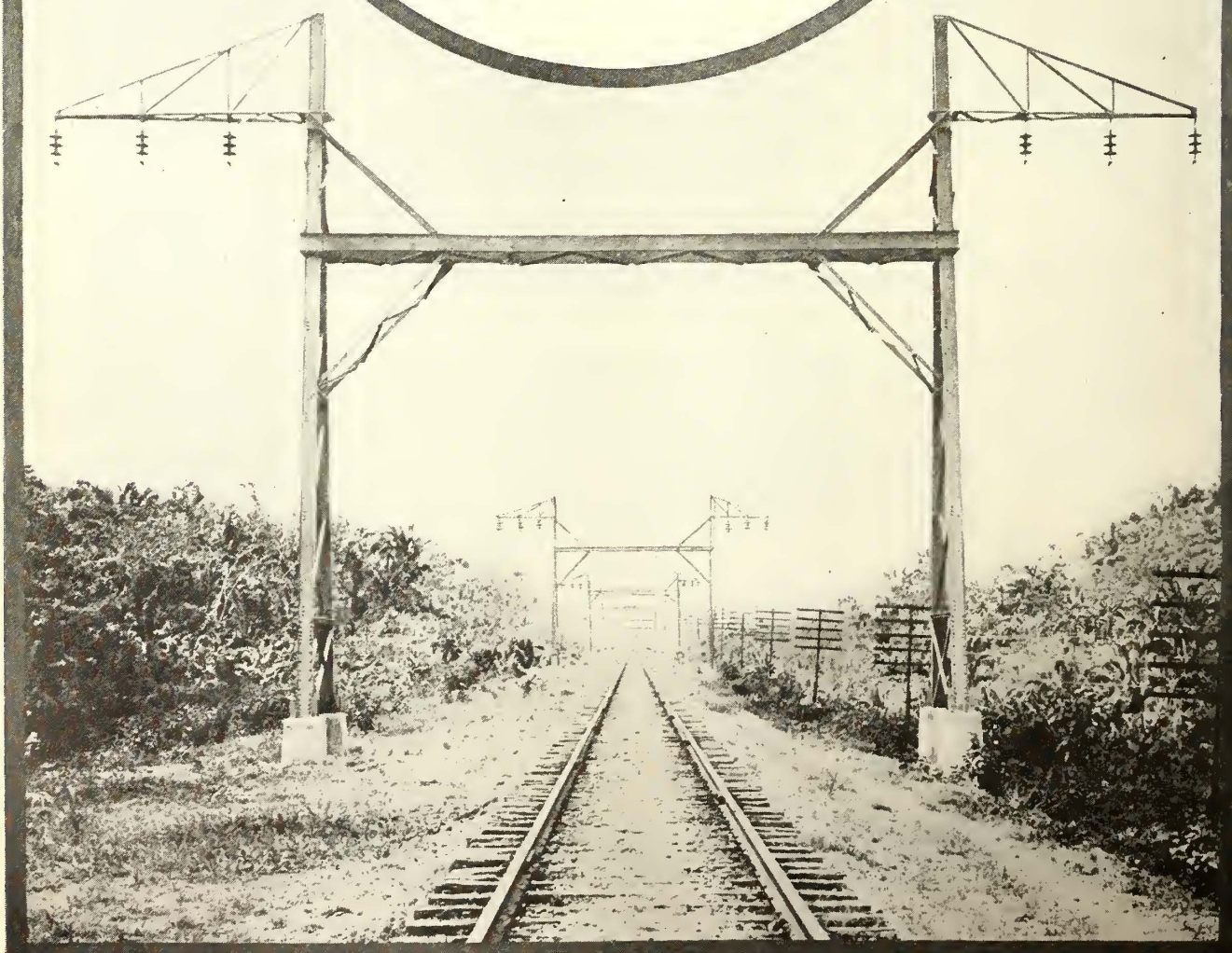
The U. S. Government takes no chances. Government choice is safe. Therefore it is worth noting that

**“Victor” Insulators**  
**Safeguard the Line**

here as they do on important railway and transmission lines the world over. Choose “Victor” Insulators to safeguard your service. Read “The Insulator Book” to post yourself on the reasons. It's yours for a word.

**Locke Insulator Mfg. Co.**

 **Victor, N. Y.**





# The Reason Why Cabot's Conservo Wood Preservative Has Been Adopted by Buyers Who Think

Conservo is not a copy of any other preservative. It is a scientific attempt to meet as fully as possible the actual requirements of wood preservation, in the light of the most intelligent present knowledge of the subject, irrespective of claims, prejudices or reverence for ancient things. The following analysis shows the character of Conservo and how completely it covers the three cardinal principles of wood preservation:

- Penetrating Power**—It actually goes into the wood. (No wood preservative can *preserve* unless it *penetrates*.)
- Sterilizing Power**—It destroys bacteria and sterilizes the wood.
- Permanence**—It is non-volatile, insoluble, and forms permanent asphaltic bases in the wood.

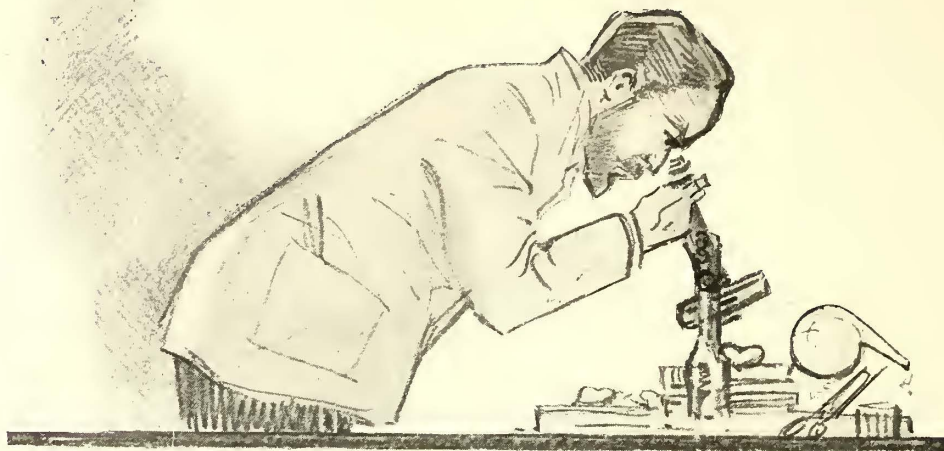
## Analysis of Conservo:

- Specific Gravity** . . . . . 1.06 to 1.1 → Showing that Conservo is heavier than Water.
- Flash Point** . . . . . 125° C } → Showing that it is inflammable and safe. It diminishes
- Burning Point** . . . . . 150° C } the inflammability of wood.
- Distillation** . . . . . 0-205° C 1.0% → Showing that Conservo is not only *limpid enough to penetrate the wood, but is also heavy enough to stay in*, even its
- 205-235° 2.78% lightest fraction being so non-volatile that it will not evaporate out unless exposed to a heat equal to about twice the
- 235-300° 33.13% boiling point of water.
- 300-360° 41.31%
- Showing that there is no waste (tarry sludge or residue) in Conservo.
- Balance in retort—Liquid** → Showing that there is no waste (tarry sludge or residue) in Conservo.
- Phenols or Tar Acids** . . . . . 7 to 10% → Showing that Conservo has the right amount of the right quality of Tar Acids to (1) increase its penetrating power by combining with the Lignin of the wood, (2) to destroy the bacteria that produce decay and thus thoroughly sterilize the wood, and (3) to form the asphaltic bases in the wood that makes the results permanent. Most preservatives have little or no Tar Acids, but some have added them since Conservo has demonstrated their value. (See Journal Ind. & Eng. Chemistry, Vol. 4, No. 4.)
- Viscosity (Engler Viscosimeter)** 142@16° C → Showing further the limpid, penetrating quality of Conservo. Viscosity is that "cold molasses" quality that prevents the heavy carbolineums and other similar preservatives from penetrating. They are so "thick" (from two to five times as viscous as Conservo) that they remain on the surface—until washed off by the first rains.
- 80@35° C
- Ash on Ignition** . . . . . .003% → Further proving that there is no foreign or waste matter in Conservo.

Price 40c per gallon f. o. b. Boston

**Samuel Cabot, Inc., Manufacturing Chemists, Boston**  
NEW YORK CHICAGO





## Fixing Up Hearts

Dr. Carrel of the Rockefeller Institute Medical Research has announced that we can soon expect to have our faulty hearts repaired with knife, scissors and needle.

Yet tradition says you'll die if the heart is touched—and no doubt the "family physician" says the same thing.

But the **specialist** accomplishes it successfully.

There's almost no limit to the progress possible under specialized intelligently-directed study.

That is why with us brush engineering is an inseparable part of brush making and selling.

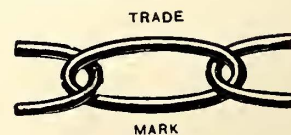
It is a specialized service to assure the right prescription of **Morganite** or **Battersea** brushes.

**Proper** commutation is **sometimes** the result of a happy choice of brushes—it is **always** the reflection of sound engineering.

### THE MORGAN CRUCIBLE CO., LTD.

**Factory**  
**Brooklyn, N. Y.**

**120 LIBERTY STREET**  
**NEW YORK CITY**



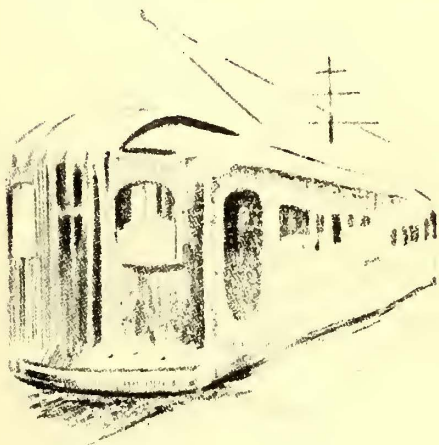
LEWIS-ROTH CO.,  
312 Denckla Bldg., Philadelphia

} Agents

{ ELECTRICAL ENGINEERING & MFG. CO.  
First National Bank Building, Pittsburgh



# Utility Electric Thermometer Control Automatically Regulates the Heating Current Consumed in your Cars

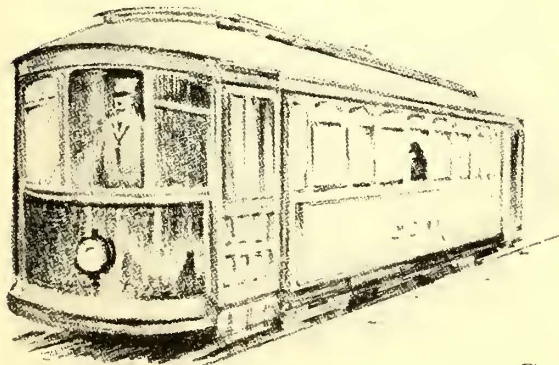


## A Guardian for your Heating Current

It's a "sleepless brain and tireless hand" that automatically regulates the heating current consumed in your cars.

A faithful automaton which knows but one instruction—to open the switch when the temperature in the car rises to a fixed-upon point, closing it when the temperature drops below this point.

It maintains the desired temperature in your cars at *all times*, regardless of weather changes or extreme variations in the traffic load.

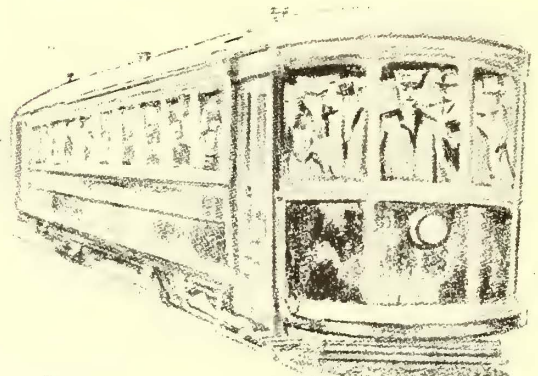


## Saves 70% of Otherwise Wasted Heating Current

It automatically maintains pre-determined temperature with minimum consumption of current.

It takes advantage of the heat radiated from the passengers' bodies in a well-filled car, with a corresponding saving in heating current.

It means a reduced heating load at the very time when the power load is the greatest. Investigate it for your road.



Positive Mercury  
Contact, Permanent  
Setting Unaffected by Vibration

Adopted by Chicago Surface Lines

**Railway Utility Co., Chicago, Ill.**



# Statistics

mean little or nothing to you, unless you ANALYZE them. We present for your inspection the following analysis of statistics of all noted Steam Railroad accidents from July 1st, 1908, to January 31st, 1913. Note the large percentage of accidents which occurred under the following four heads: Open Switch, Disregard of Semaphore Signal at Danger, Head-on Collisions Due to Neglect of Orders by Train Crews, and by Operators.

The Simmen System offers a COMPLETE signal system. You cannot over-run a Simmen Signal, because you run with it. Do you know about it? If not, why not investigate it NOW?

## Analysis of Causes of All Noted Steam Railroad Accidents, from July 1, 1908, to January 31, 1913

Cause of Accident	No. of Accidents	Percentage of Total
<b>Preventable by a complete signal system:</b>		
Open switch.....	38	10.5
Disregard of semaphore signal at danger.....	46	12.8
Disregard of caution signal under permissive movement	6	1.7
Head-on collisions due to neglect of orders by train crew	97	26.9
Head-on collisions due to neglect of orders by operator	48	13.4
Head-on collisions due to error in order by dispatcher..	14	3.8
Rear-end collisions due to flagman (no signal system)..	38	10.5
Collisions due to excessive speed.....	15	4.1
Side-swiping accidents, cars not in clear at sidings....	0	0.0
Derailments—due to broken rail.....	19	5.3
Derailments—due to excessive speed.....	29	8.1
Dead engineer.....	1	0.2
Broken train.....	0	0.0
Unknown causes (estimated).....	10	2.7
Total .....	361	100.0
<b>Not preventable by any signal system:</b>		
Unknown causes (estimated).....	29	
Derailments—due to bad track.....	49	
Failure of air.....	24	
Miscellaneous—not preventable by any signal system....	49	
Defective rolling stock.....	44	
Total.....	195	

**Accidents preventable by a complete signal system, 361; 64.8 per cent.**  
**Accidents not preventable by any signal system, 195; 35.2 per cent.**

—Extract from ELECTRIC RAILWAY JOURNAL, March 22, 1913.

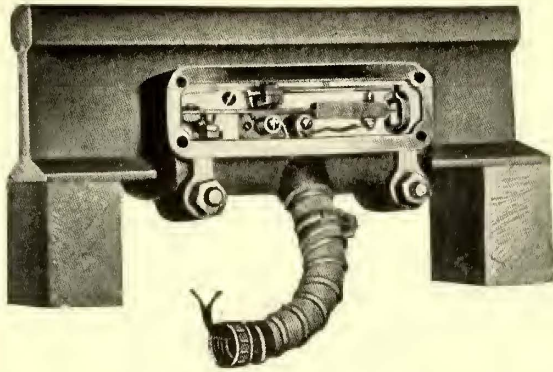
## THE SIMMEN SYSTEM

P. J. Simmen, Buffalo

THE NORTHEY-SIMMEN SIGNAL CO., Ltd.  
TORONTO

SIMMEN AUTOMATIC RAILWAY SIGNAL CO.  
BUFFALO





# Its Heart is Sound

## PROTECTIVE Highway Xing Signal

**It always operates.**

Ice, snow or torrential downpour cannot tie up this signal, unless the track itself is carried away—for the heart of the Protective Highway Crossing Signal is the simple, positive vibrator attached to the rail. The tremble of the rail under the approach of the train sets this releasing mechanism in motion and the bell and light give warning until another vibrator in front of the crossing signal shuts them off. There is nothing to interfere with other track circuits—no need for insulating rails—the Protective Highway Crossing Signal operates independently of your other signal apparatus.

This is the modern crossing guard—

it supplants the expensive flagman and the ineffective warning signboard. It puts you "in the clear" on claims. Proven in service on such roads as the Pennsylvania, the Denver & Rio Grande, the Colorado & Southern, the Missouri Pacific, the West Jersey & Sea Shore, the Petaluma & Santa Rosa, etc.

Here is what one official wrote after the Protective Highway Crossing Signal had been in his service over a year:

"Your signals at two crossings are both working splendidly and giving entire satisfaction." That is just one quotation from our ample evidence. Let us send you the descriptive catalog "I-C."



Typical Crossing Protection on the Petaluma & Santa Rosa Ry., Santa Rosa, Cal.

### The Protective Signal Mfg. Co., Denver, Colorado

WILLIAM R. GARTON, GENERAL SALES MANAGER, 299 BROADWAY, NEW YORK, N Y

W. R. Garton Co., 11-17 So. Desplains St., Chicago. The Allen General Supplies, Ltd., 205 Yonge St., Toronto. John S. Black Co., 908 Hennen Bldg., New Orleans. Benton C. Moss, 501 East 16th St., Kansas City.





# Your Own Electric Railway Journal

**T**HESSE are the advantages of being a personal subscriber for the Journal: You receive your own copy of the paper each week. You have it to read when you want it and as long as you want it. You can keep your own file of the paper for reference.

If you are **not** a regular subscriber, you probably see the Journal from time to time. **But**, are there not times—and many of them—when you want to read the latest issue and some one else has it? Are there not many other times when you want to refer to an article in a back number but cannot find that number?

**For less than 6 cents a week** you can be a personal subscriber—you can get all the news of the field while it is still fresh and valuable—you can have a constantly growing library of your own on all branches of electric rail-roading.

You will never miss the subscription price, but you will miss a lot of things if you do not get the Journal.

*Better send your order to-day  
before it is forgotten*

COUPON

Name .....

Position and Company .....

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Electric Railway Journal, 239 W. 39th St., New York, N. Y.



# Which Form of Newspaper Comment Do You Prefer for Your Road?

THIS ————— OR ————— THIS

**BLOCK-SIGNALS FOR TROLLEYS.**  
 The erection of a block signalling system on the Blue Hill Avenue section of the Elevated, in Dorchester, where the stiff grade and long run have been the occasion of accidents at times of untoward weather and treacherous condition of the rails, is a hint of what should be done voluntarily on other electric lines where similar conditions exist. In fact, with the frequency of train units on electric lines, it is as important that every single track line should be equipped with an adequate signal system, as that such precautions should be required on steam roads.

**WRONG ORDER CAUSED WRECK**  
 \_\_\_\_\_, July 11.—That conflicting orders giving two trains the right of way over the same track at the same time caused the wreck of July 4 at \_\_\_\_\_, was admitted by the coroner's inquest today by \_\_\_\_\_, train dispatcher for the \_\_\_\_\_ Railway at \_\_\_\_\_.

STUDENT COLLEGE TRAINING

This refers to installation of U.S. Electric Signals

## Which Serves to Promote Traffic?

The question may seem elementary but nevertheless it has a heap of meaning.

It may seem elementary also to state that the wreck referred to in the newspaper clipping has placed the road under many times the cost of a complete installation of United States Electric Signals which **prevent** wrong orders.

You have probably given this many **thoughts**—let us provide the way for **action**.

We are ready to furnish a few blocks of U. S. Electric Signals for your worst locations and to leave them there until you are firmly convinced that they produce **profit**, over and above safe operation.

Write us for details of our proposition.

Let us co-operate with you in placing your property on an absolutely safe basis.

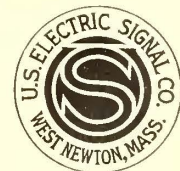
## United States Electric Signal Company

West Newton, Massachusetts



Foreign Representatives:

Quilliam Brothers, Cleggs Court, Chapel Street, Salford, England





# An Event



## WANTED! 8,000 Circulation

Wanted—to place in the hands of every subscriber to the Electric Railway Journal—every reader, if possible—this Book on Transmission Structures which we have just issued.

It is an unusual publication. It is a perfect example of the printer's art; the illustrations are brought out in every detail by the new *Rotogravure Process*; and the data in it are complete and authoritative.

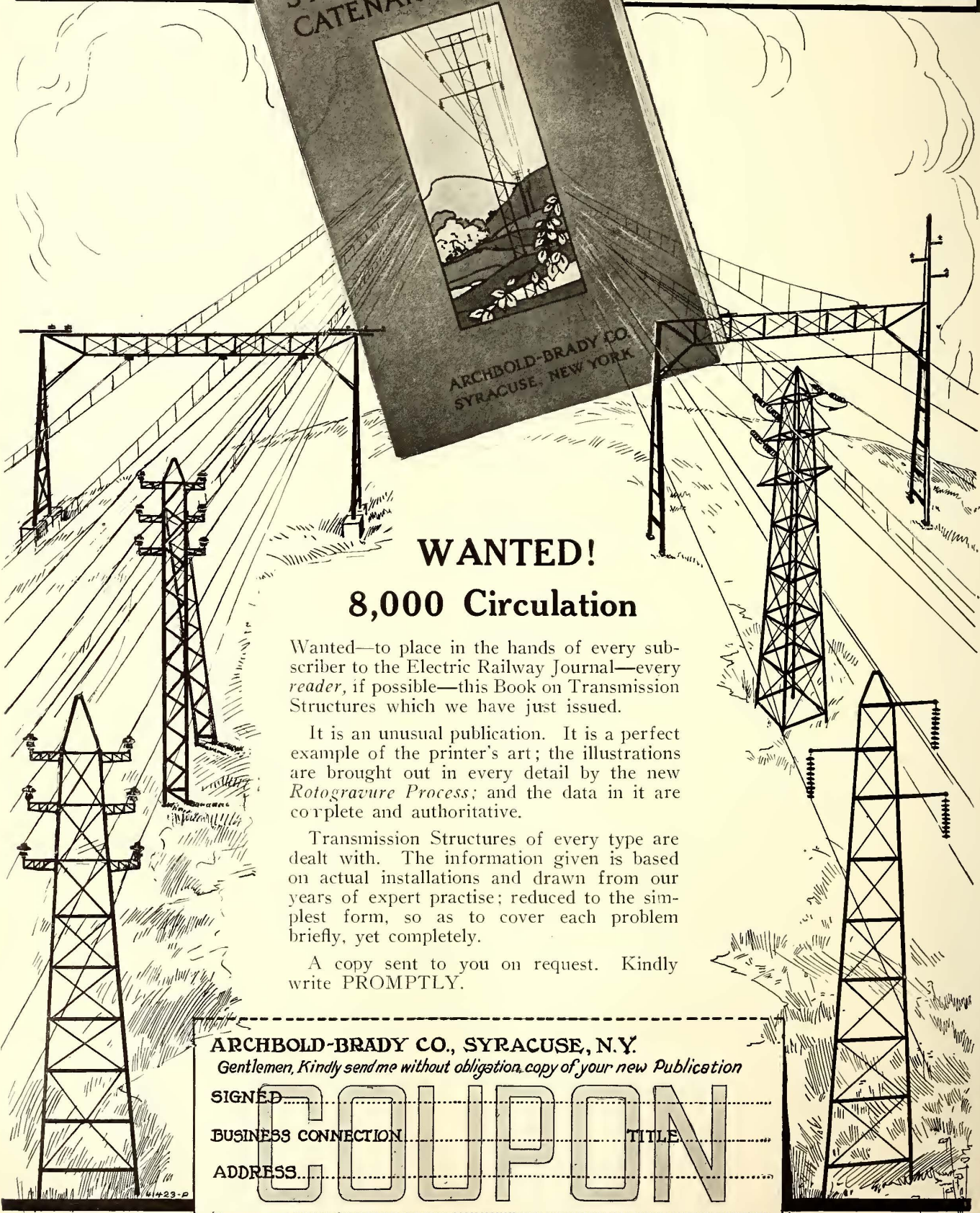
Transmission Structures of every type are dealt with. The information given is based on actual installations and drawn from our years of expert practise; reduced to the simplest form, so as to cover each problem briefly, yet completely.

A copy sent to you on request. Kindly write PROMPTLY.

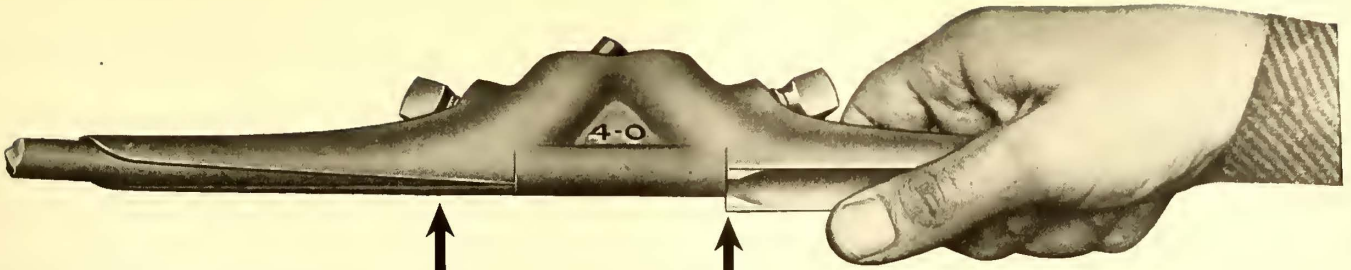
**ARCHBOLD-BRADY CO., SYRACUSE, N.Y.**  
*Gentlemen, Kindly send me without obligation, copy of your new Publication*

SIGNED.....  
 BUSINESS CONNECTION..... TITLE.....  
 ADDRESS.....

# COUPON







See the ↑  
Smooth Under-Run

↑ It's Due to  
these Lugs

A smooth under-run—that's the trouble-saving requirement that looms large in the minds of electric railway men wise in overhead maintenance lore. So when we designed the

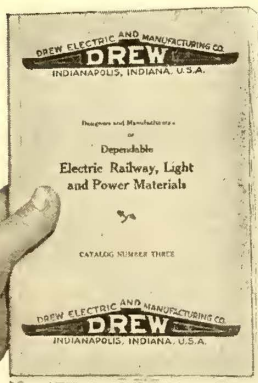
# Samson Splicer

we put in those little lugs that are cast on the inside of the lips so that when the wire is clinched by the taper of the lips the notch made by the bend of the wire is smoothly filled up, preserving the arc-less under-run. A trial will show that we are well justified in calling the Samson Splicer *arc-less*. Make the trial. Write.

# 300 Roads use the Drew Safety Mirror

The most common sort of car accident is a step accident. Car starts too soon—passengers still getting on or off—conductor confused—pressed by a dozen demands on his attention.

If the motorman could clearly and easily see whether the steps are clear or not no step accidents could occur. But in order to be able to do that he would need eyes in the back of his head—or else be operating a car equipped with the DREW SAFETY MIRROR. A glance at the illustration shows you how clearly the motorman sees the step without turning his head. A slight expense for Drew Safety Mirrors is saving many roads a big percentage of claims. Write for list and details.



There's a lot of mighty good information, [data, tables, mathematical rules, etc., in this Catalog

in addition to 150 pages of live, snappy illustrations, descriptions and prices of practically "anything and everything" in electric railway trolley and line construction materials, equipment and supplies.

WRITE FOR IT

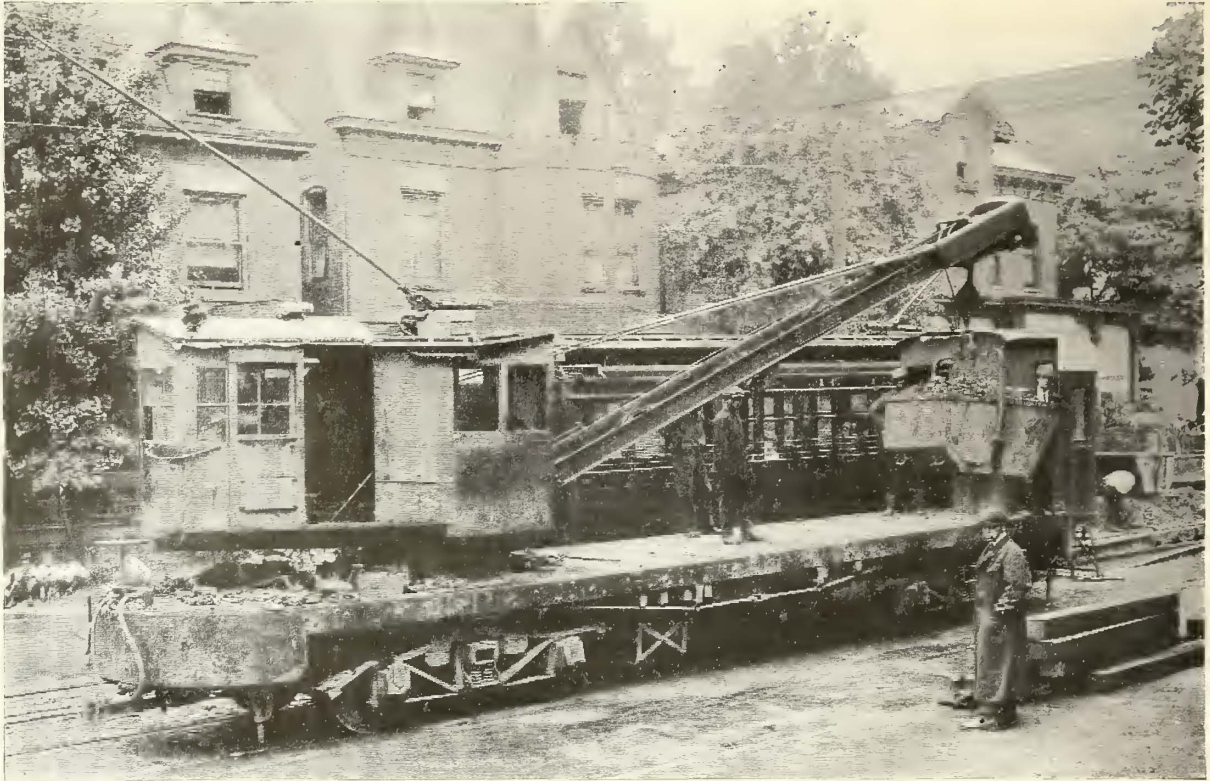
Mailed to any address postpaid on request.

**DREW ELECTRIC & MFG. COMPANY**

814 Traction Building

Indianapolis, Ind.





## Reduce Your Maintenance Forces Put a BROWNHOIST at Work

Did you ever calculate how much saving a Brownhoist Work-Car Crane would make on your roadway and construction costs? Ask the companies who are using the Brownhoist Crane.

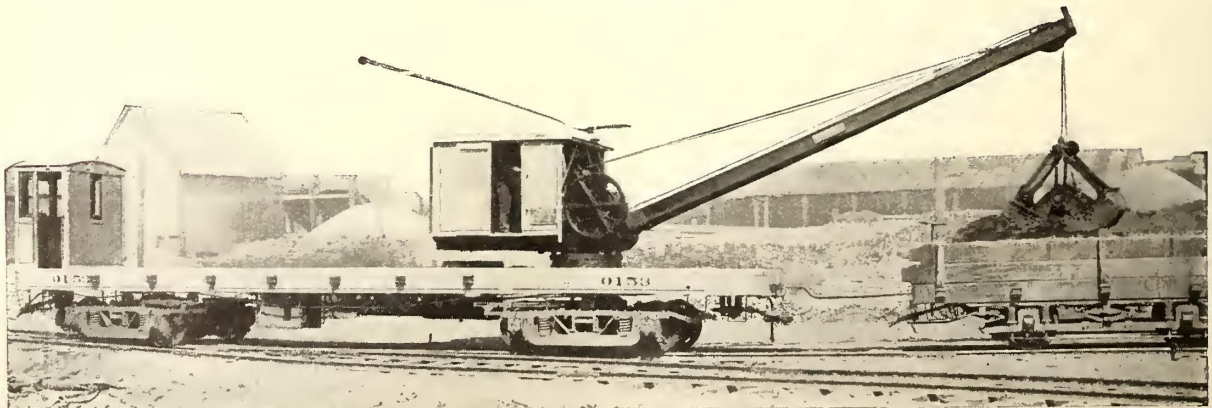
The upper picture shows the Pittsburg Railway Co. Crane fitted with a hook block for handling dump buckets, rails, ties, cross-overs, poles, timbers and other construction material.

The Cleveland Railway Co. has two of these Brownhoist Cranes. The one below, which is shown with the grab bucket, has proven economical in handling sand, gravel, crushed stone, cinders, coal, etc.

And the Brownhoist WORK-CAR CRANE handles its own work trains, being self-propelling.

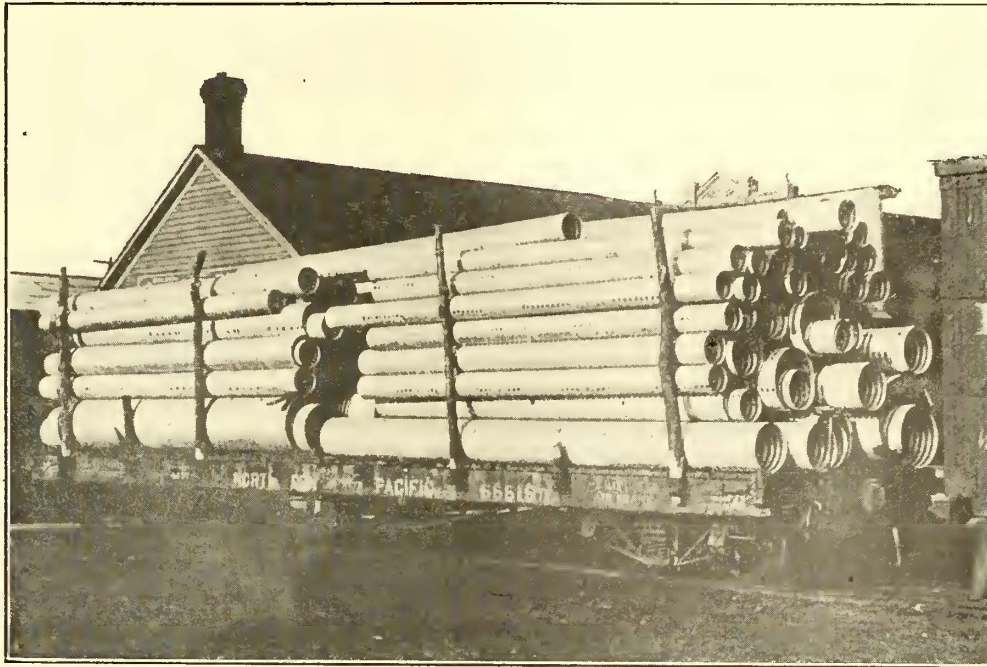
Send for catalogue "I." which shows how and where some of these cranes are used.

**The Brown Hoisting Machinery Company**  
Cleveland, Ohio





# Quick Culvert Shipments are Our Specialty 8 Inches to 84 Inches—Any Size—Anywhere—Quick!



## “ARMCO” CULVERTS

When freshets and washouts demand quick repairs on your right of way—when emergency demands the quickest and easiest method of draining your roadbed—the first thought of the progressive electric railway man is “Armco” American Ingot Iron Culverts. He knows that corrugated metal culverts are as easy to install as they are cheap to maintain and enduring in service. And he knows that “ARMCO” CULVERTS are always available *quick*—no matter where he is located.

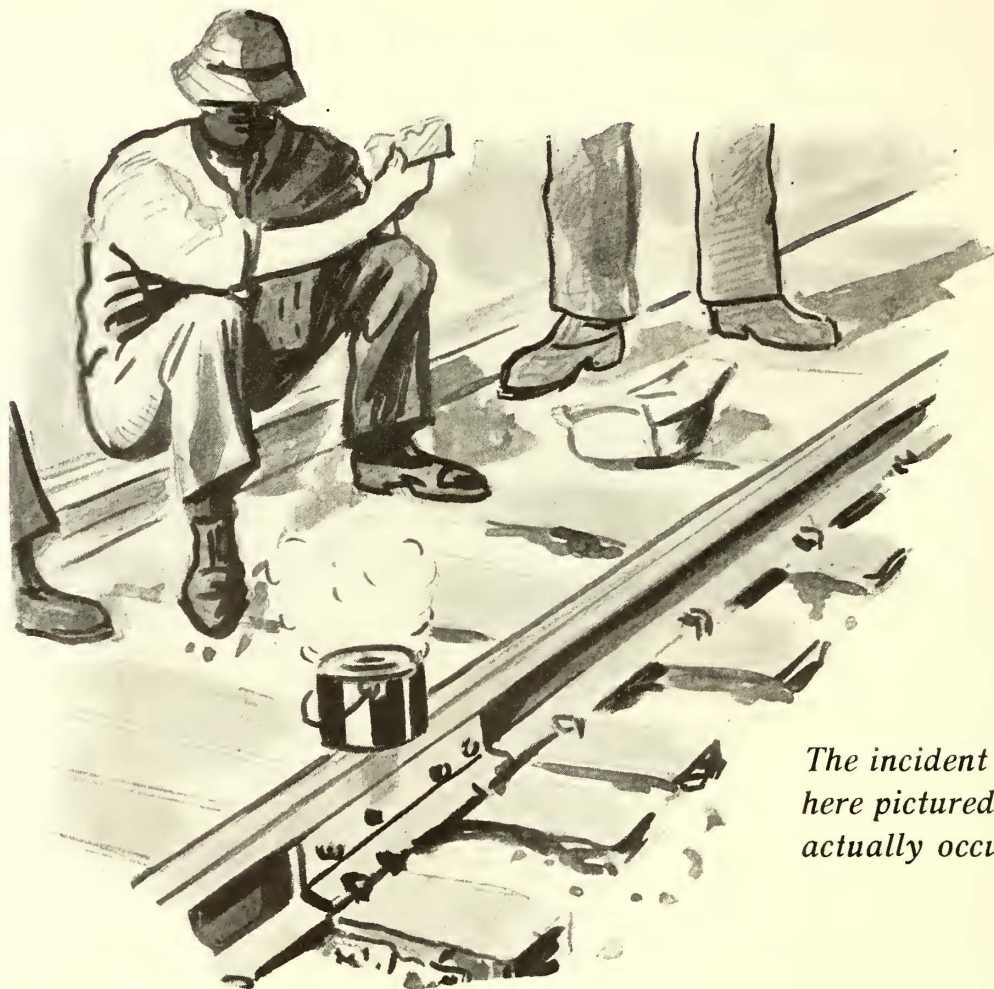


*For full information on Armco Culverts, Siphons, Flumes, Bridge Flooring, Sheets, Roofing and Formed Products, write the nearest manufacturer.*

- |   |  |   |   |
|---|--|---|---|
| <b>Arkansas, Little Rock</b><br>Dixie Culvert & Metal Co.             | <b>Kansas, Topeka</b><br>The Road Supply & Metal Co.           | <b>Nebraska, Wahoo</b><br>Nebraska Culvert & Mfg. Co.                                   | <b>Pennsylvania, Warren</b><br>Pennsylvania Metal Culvert Co.     |
| <b>California, Los Angeles</b><br>California Corrugated Culvert Co.   | <b>Kentucky, Louisville</b><br>Kentucky Culvert Co.            | <b>Nevada, Reno</b><br>Nevada Metal Mfg. Co.  | <b>South Dakota, Sioux Falls</b><br>Sioux Falls Metal Culvert Co. |
| <b>California, West Berkeley</b><br>California Corrugated Culvert Co. | <b>Louisiana, New Orleans</b><br>Dixie Culvert & Metal Co.     | <b>New Hampshire, Nashua</b><br>North-East Metal Culvert Co.                            | <b>Tennessee, Nashville</b><br>Tennessee Metal Culvert Co.        |
| <b>Colorado, Denver</b><br>R. Hardesty Mfg. Co.                       | <b>Maryland, Havre de Grace</b><br>Spencer, J. N.              | <b>New Jersey, Flemington</b><br>Pennsylvania Metal Culvert Co.                         | <b>Texas, Dallas</b><br>Atlas Metal Works                         |
| <b>Delaware, Clayton</b><br>Delaware Metal Culvert Co.                | <b>Massachusetts, Palmer</b><br>New England Metal Culvert Co.  | <b>New York, Auburn</b><br>Pennsylvania Metal Culvert Co.                               | <b>Texas, El Paso</b><br>Western Metal Mfg. Co.                   |
| <b>Florida, Jacksonville</b><br>Dixie Culvert & Metal Co.             | <b>Michigan, Bark River</b><br>Bark River Bridge & Culvert Co. | <b>North Carolina, Greensboro</b><br>Dixie Culvert & Metal Co.                          | <b>Texas, Honston</b><br>Lone Star Culvert Co.                    |
| <b>Georgia, Atlanta</b><br>Dixie Culvert & Metal Co.                  | <b>Michigan, Lansing</b><br>Michigan Bridge & Pipe Co.         | <b>North Dakota, Wahpeton</b><br>Northwestern Sheet & Iron Works                        | <b>Utah, Woods Cross</b><br>Utah Culvert Co.                      |
| <b>Illinois, Bloomington</b><br>Illinois Corrugated Metal Co.         | <b>Minnesota, Minneapolis</b><br>Lyle Corrugated Culvert Co.   | <b>Ohio, Middletown</b><br>American Rolling Mill Co.<br>The Ohio Corrugated Culvert Co. | <b>Virginia, Roanoke</b><br>Virginia Metal Culvert Co.            |
| <b>Indiana, Crawfordsville</b><br>W. Q. O'Neal Co.                    | <b>Minnesota, Lyle</b><br>Lyle Corrugated Culvert Co.          | <b>Oklahoma, Shawnee</b><br>Dixie Culvert & Metal Co.                                   | <b>Washington, Spokane</b><br>Spokane Cor. Culvert & Tank Co.     |
| <b>Iowa, Des Moines</b><br>Iowa Pure Iron Culvert Co.                 | <b>Missouri, Moberly</b><br>Corrugated Culvert Co.             | <b>Oregon, Portland</b><br>Coast Culvert & Flume Co.                                    | <b>Wisconsin, Eau Claire</b><br>Bark River Bridge & Culvert Co.   |
| <b>Iowa, Independence</b><br>Independence Culvert Co.                 | <b>Montana, Missoula</b><br>Montana Culvert Co.                |   |   |
| 71557   | <b>Nebraska, Lincoln</b><br>Lee-Arnett Co.                     |   |   |



# The Track Gang Used to Heat their coffee on the Rail Joints



*The incident here pictured actually occurred*

## This is an Impossibility where "Electric Welded Rail Bonds" are used

This road was running only a few cars and they had hard work to keep those cars in action.

They were wasting current—wasting time—wasting money.

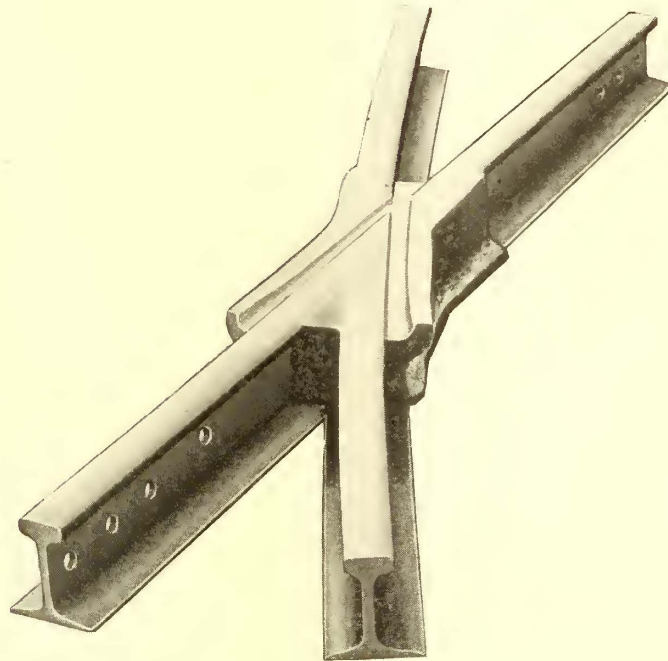
You too are losing out if your rail joints cause current to leak away from the return circuit. Stop the losses and double-cross claims for electrolysis by putting on Electric Welded Rail Bonds.

The economic reasons why you should are interesting. Let us send you them.

## The Electric Railway Improvement Co.

CLEVELAND, OHIO

# A Serviceable and Economical Type of Frog



**T**HE above cut illustrates our cast steel bound type of frog, in which open hearth steel is used to bind the rails together, making an integral structure of the whole piece.

We have recently concluded a series of experiments, with the result that we are now ready to offer you Street Railway Men a frog which in comparison with the manganese insert type has many advantages. Of first importance is the fact that with our special treatment the whole structure becomes a homogeneous casting of a better quality than the rail itself, and which we are ready to show you will, under average service conditions, last as long as the manganese insert type. It is a source of no maintenance expense whatever, as there are no parts to break or become loose. And last, but not least, we can sell it for 20% less.

We recommend this type of frog construction, together with our solid manganese switch pieces for maximum service at minimum cost.

Write us for further details and a proposition on your requirements.

**The Falk Company**  
**Milwaukee**

NEW YORK CITY—Wendell & MacDuffie Co.

LOS ANGELES—Alphonso A. Wigmore

SEATTLE—Parrott & Co.

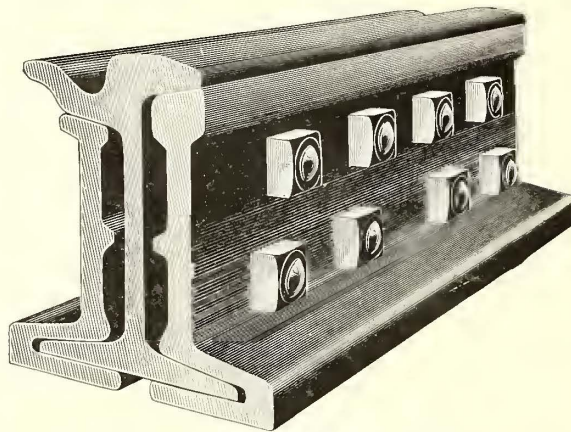


# The Rail Joint Company

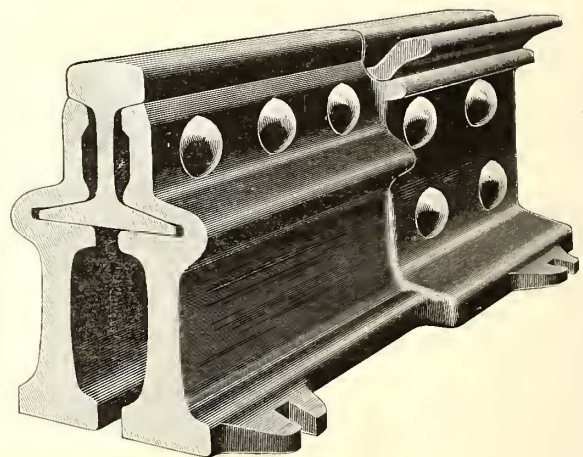
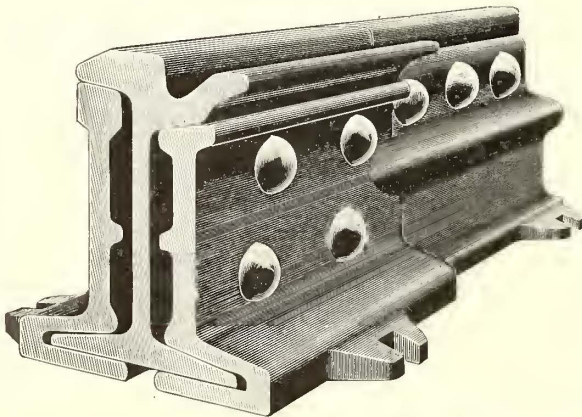
## 185 Madison Avenue

### New York

Makers of Base-Supported and One Hundred Per Cent. Rail Joints for Standard Girder, and Special Rail Sections. Also Joints for Frogs and Switches; Insulated Rail Joints and Step or Compromise Rail Joints. Patented in United States and Canada.

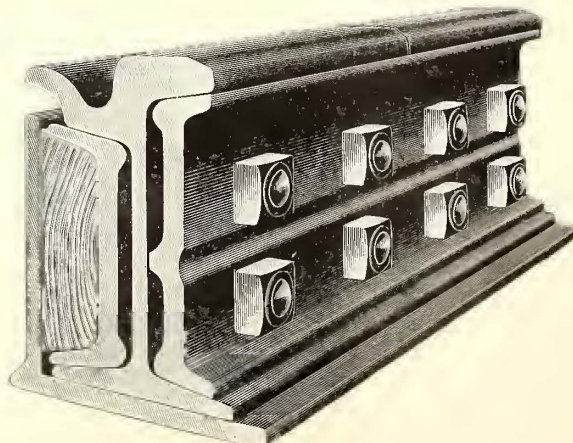


CONTINUOUS GIRDER RAIL JOINT



CONTINUOUS COMPROMISE RAIL JOINT

ROLLED  
FROM  
BEST QUALITY  
STEEL



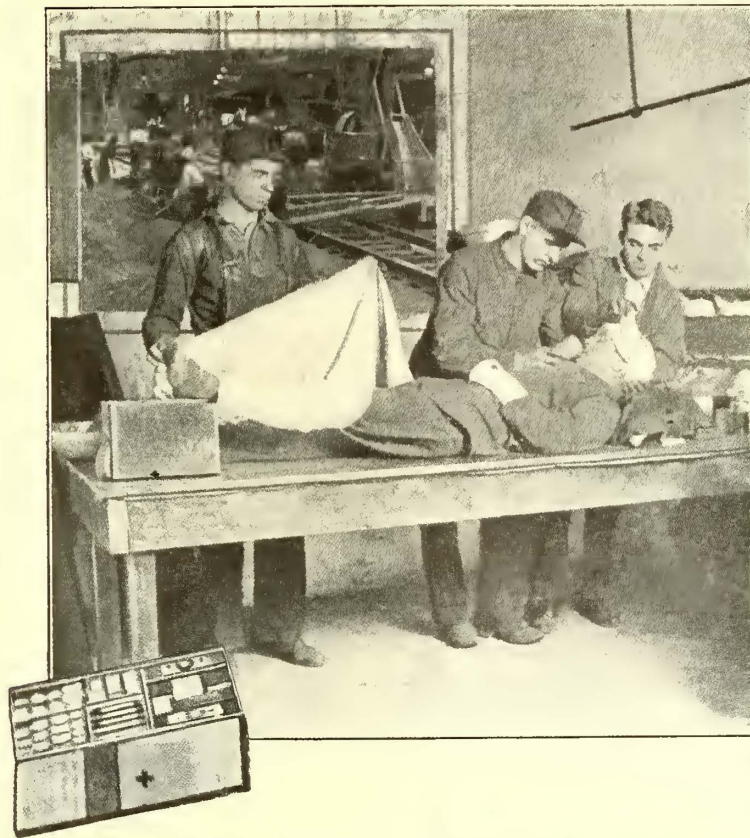
WEBER GIRDER RAIL JOINT

#### AGENCIES

Boston, Mass.	India Bldg.
Chicago, Ill.	Ry. Exchange Bldg.
Denver, Colo.	Equitable Bldg.
Philadelphia, Pa.	Pennsylvania Bldg.
Pittsburgh, Pa.	Oliver Bldg.
Portland, Ore.	Willcox Bldg.
St. Louis, Mo.	Commonwealth Trust Bldg.
Troy, N. Y.	Burden Avenue
Montreal, Canada.	Board of Trade Bldg.
London, E. C., England.	36 New Broad St.



# They're bound to happen—

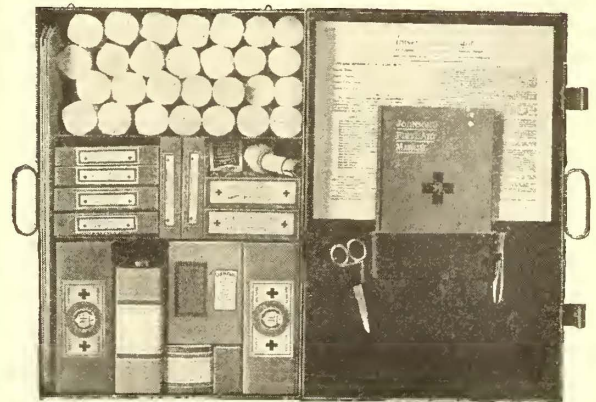


And when they do, the promptness with which proper temporary treatment and relief are given frequently determines the gravity of the case—*always*, the attitude of the persons injured toward the company. Avert many damage claims, minimize many others by having

## Johnson's First Aid Cabinet No. 1

on hand for instant service when the accident occurs. Provision is made for the treatment of fractures, sprains, bruises, burns, wounds and all external injuries.

Don't let the injury develop serious complications. Don't let your employees become resentful and antagonistic. Order the cabinet today and be prepared for the emergency.



(METAL CABINET)

Size 20 x 13 x 3 1/2 inches.

Complies with the laws of the different states including California

**Price \$6.00**

f. o. b.  
New Brunswick  
N. J.

**Johnson & Johnson,**  
NEW BRUNSWICK, NEW JERSEY, U. S. A.

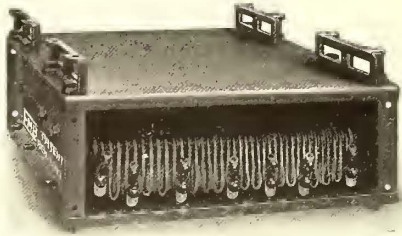
Dept. 27.

8573

**TEAR HERE**  
Johnson & Johnson, Dept. 27,  
New Brunswick, N. J.  
Send to.....  
Address.....  
One Johnson's First  
Aid Cabinet No. 1  
for which I will  
pay \$6.00



# Make this Resolution Now



For suspension below platform or car body  
Type BP

Constructed to fit present hangers

## EMB

**Unbreakable**  
**Rustproof**  
**Resistance**

To put a trial  
equipment of  
EMB resistances  
on ONE car  
just to prove that:

- 1 They will not break in shipment or in service.
- 2 They are rustproof and therefore do not pit or lose in cross-section.
- 3 Being jointless, the contact points are therefore reduced.
- 4 Weighing less than cast grids, they cut car weight.
- 5 Method of making assures absolutely uniform cross-section, thereby preventing local fusing.
- 6 Terminals being an integral part and not inserted—joints are still further eliminated.
- 7 Being indestructible, the resistances will last as long as the car—and without repairs.
- 8 Considering the above facts, they will cost you much less than any other form of grid.

Get that trial set now—send us data for making up.

## THE ELLCON COMPANY

50 Church Street, New York





# 11.2 Power Reduction

## 20% Accident Reduction

On Entire Third Avenue Railways System

1100 Surface Cars Equipped

Recent contracts for Coasting Recorders:

Boston Elevated:

Complete Equipment Elevated  
Lines,

Cambridge Subway, Surface Lines,  
East Boston Tunnel.

Empire United Railways, Syracuse.

San Antonio Traction Co., San An-  
tonio, Texas.

W. J. & Seashore R. R., Camden, N. J.

Coasting Recorders will reduce the power consumption more than  $7\frac{1}{2}\%$  on any railroad in this country. Why not try them on yours?

## Railway Improvement Company

A. J. Pizzini, Vice Pres.

W. O. Wade, Chf. Engr.

61 Broadway, New York

Chicago

Los Angeles

London





## This Equipment Saves Its Own Cost Every Four Months—And Vastly Improves Operating Conditions

It eliminates maintenance cost, reduces current consumption and limits replacements to a small sum.

This is an established fact on some of the most prominent electric and steam railways in this country.

Officials of these roads have made an investment which nets them 300 to 400 per cent profit annually.

An Iowa property with 100 cars saves the five-cent fares of 150,700 passengers per year.

Hundreds of progressive railway men, seeing their old headlights surpassed by "Golden Glow" have realized the economy thus made possible and have wondered why they waited so long.

Hundreds have acted immediately. Practically all new cars therefore have "Golden Glow" equipment.

And yet our shipments for cars already in service have been far in excess. "Golden Glow" is saving real money for railways everywhere.



### Headlights

Every week's delay in ordering "Golden Glow" headlights means lost money for your line. One Wisconsin official wrote "Please ship at once—we figure a saving of \$25 per week with the new headlights, on our 17 cars."

The cost of one accident would pay for "Golden Glow" equipment. A Western Claim Agent wrote his General Manager: "From the point of

safety we recommend the installation of 'Golden Glow' headlights." There has never been an accident to a car so provided, because of lack of light.

Do it today—don't continue to use wasteful, inefficient headlights. We have representatives everywhere willing to show "Golden Glow" headlights to you.

Companies using these lamps will substantiate our assertions.

#### Sales Offices in

New York, Baltimore, Toronto, Pittsburgh, Cleveland, Detroit, Indianapolis, Chicago, St. Louis, St. Paul, Denver, Salt Lake City, Vancouver, Portland, San Francisco, Los Angeles, Sanford, England, Milan, Italy.

#### Send For Illustrated Catalogue

**The ESTERLINE Co.**

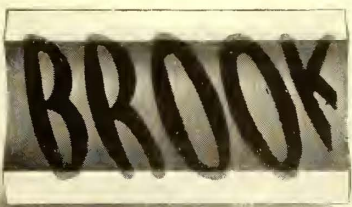
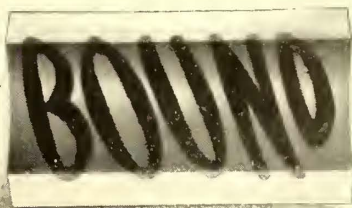
219 East South Street  
Indianapolis, Indiana

#### Lamps for

Electric cars—City, Suburban, Interurban, Storage Battery, Gasoline - Motor, Construction. Locomotives — Steam, Electric, Gasoline. Searchlights—Emergency wagons, Marine use.

# FOR 1915-

we have resolved, not only to continue bending every effort toward the **making** of bushings that will yield in trolley wheel service the utmost in efficiency and economy, but also we have resolved to **protect** our customers in the purchase of our bushings. Therefore, from now on



TRADE  
**“BOUND BROOK”**  
 MARK  
**BUSHINGS**

of new design  
 will assure you

maximum bushing efficiency  
 from every bushing purchased

All “Bound Brook” Bushings of  $\frac{1}{2} \times \frac{7}{8} \times 1\frac{1}{2}$ ” size are now made with the graphite inserts so arranged in the inner surface of the bushings that the words “BOUND BROOK” are clearly spelled by the graphite lines. This feature will be incorporated in all other sizes of genuine “Bound Brook” Bushings as soon as existing supply is exhausted.

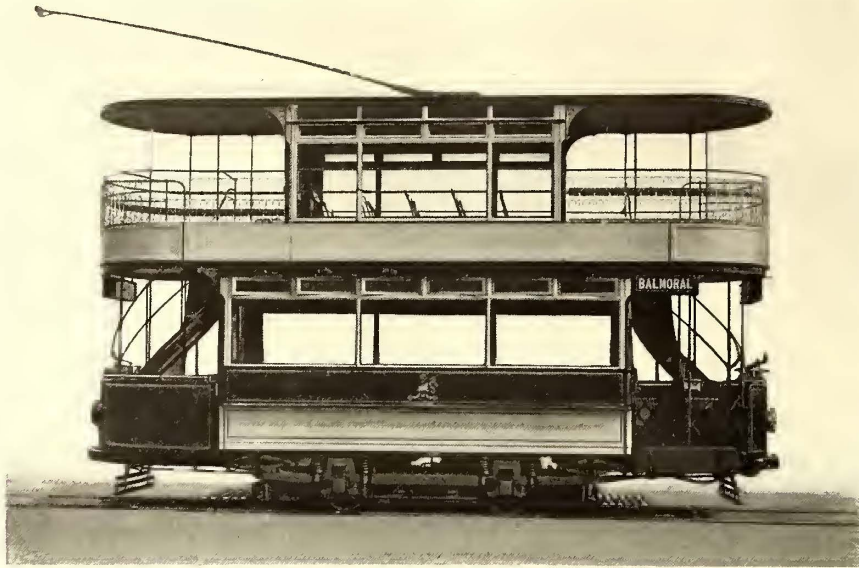
Should you have occasion to doubt the genuineness of any bushings purporting to be “Bound Brook,” have one or more of them sawn in lengthwise halves. If the inner surface of the halves do not bear the words “BOUND BROOK” in the manner illustrated above, the bushings are **not** genuine. Insist on getting the **genuine** “BOUND BROOK” BUSHINGS—the bushings of ultimate efficiency. Write for additional data.

All genuine “Oil-less Bearings” have always been made at Bound Brook, N. J., in United States of America.

**Graphite Lubricating Co.**  
 Main and John Sts., Bound Brook, N. J.

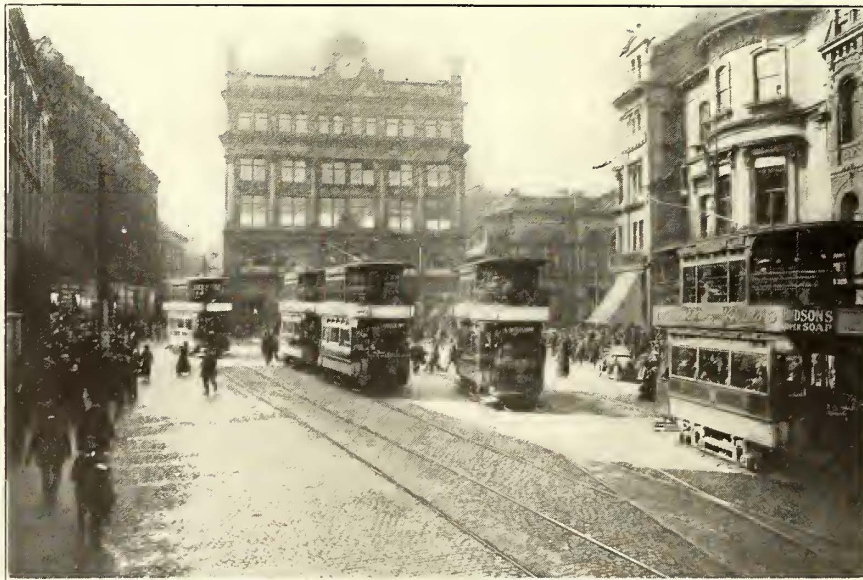


# H-B Life Guards in Belfast, Ireland



Belfast Standard Double Deck Car. Note H-B Life Guards

Modern electric railway systems in every quarter of the globe are turning to H-B Life Guards as the one means of combining rapid surface transit with safety to the man in the street. Write for data.



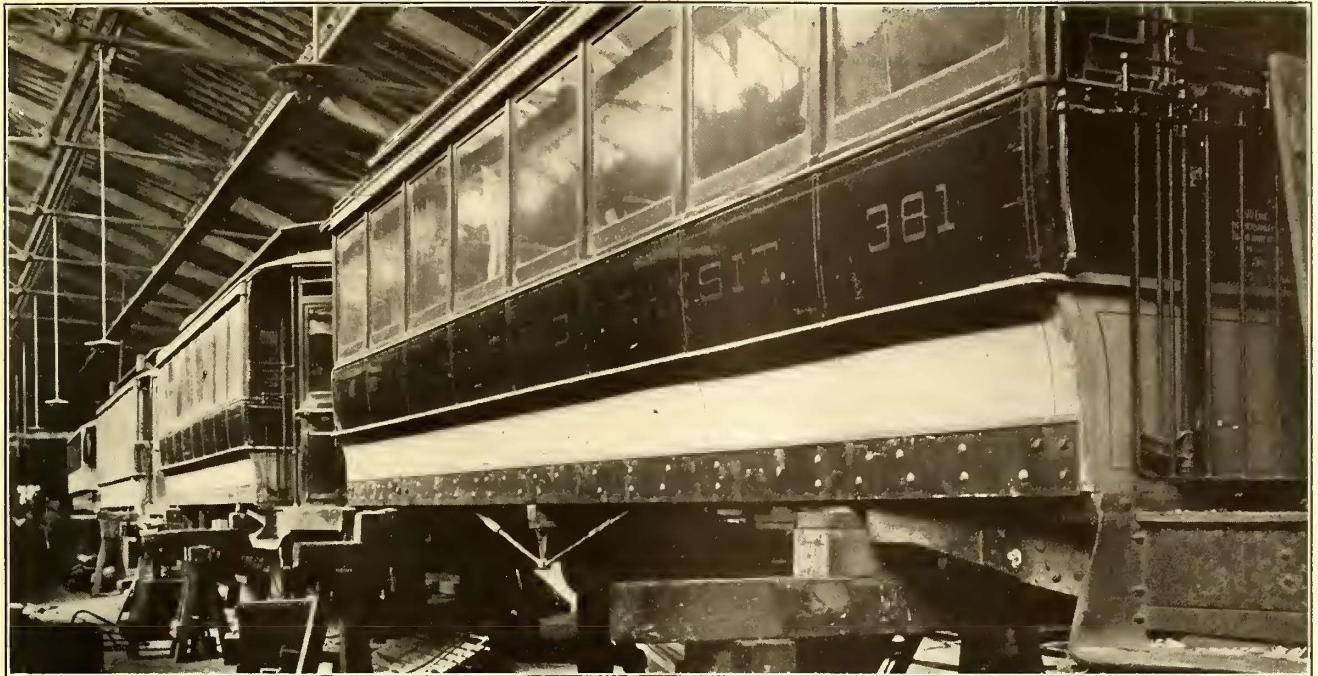
Castle Place, Belfast, Ireland. Note H-B Life Guards on Cars

**The Consolidated Car Fender Co., Providence, R. I.**

*Manufacturers of The Providence Fender and H-B Life Guard*

**Wendell & MacDuffie Co., 61 Broadway, New York**

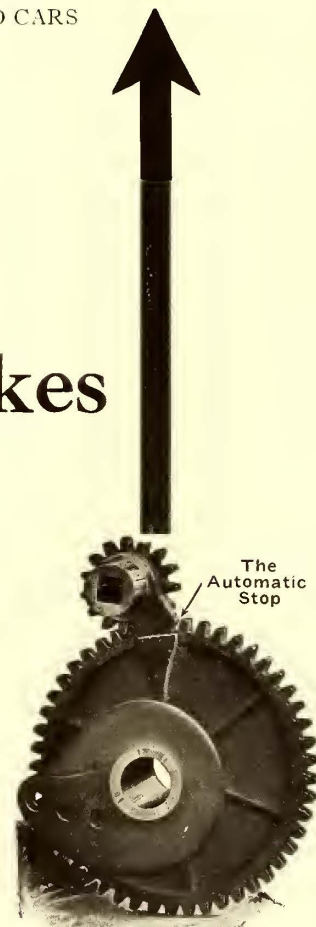
General Sales Agents



B. R. T. CAR RECONSTRUCTION—VIEW OF SEVERAL RECONSTRUCTED CARS

# Modernizing the Cars! —with Peacock Improved Brakes

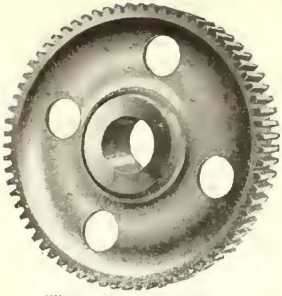
The Brooklyn Rapid Transit Company modernized 1600 cars. 1612 sets of Peacock Improved Brakes contributed. By reason of improved equipment, the inspection period has been raised from every 600 miles to every 1000 miles. Modernize. Bulletin 5 points the way. Write for your copy.



## NATIONAL BRAKE CO.

888-890 Ellicott Square, Buffalo, N.Y.





## St. Louis Orders Grade M

One thousand gears and four thousand pinions of the Grade M variety have just been ordered by the United Railways Company of St. Louis. This company is one of those that have decided to standardize with Grade M, and their latest order is for material to replace other grades of gearing to be retired during 1915.

In the past two years over 15,000 railway motors in this country have been equipped with Grade M gearing. No complaints have been made as to the performance of these gears and we have heard of but a single instance of a broken tooth.

As a result of extended tests fifteen important electric railway systems in this country and Canada have adopted the Grade M as standard, while many other representative roads have placed large orders.

Investigate Grade M—the “More miles per dollar” gear.

# 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  
Dayton, Ohio  
Denver, Colo.  
Des Moines, Iowa  
Detroit, Mich.  
(Office of Agent)  
Duluth, Minn.  
Elmira, N. Y.  
Erie, Pa.  
Fort Wayne, Ind.  
Indianapolis, Ind.  
Jacksonville, Fla.

**General Office: Schenectady, N.Y.**

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Kansas City, Mo.  
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Memphis, Tenn.  
Milwaukee, Wis.  
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Nashville, Tenn.  
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Niagara Falls, N. Y.  
Omaha, Neb.  
Philadelphia, Pa.  
Pittsburg, Pa.  
Portland, Ore.  
Providence, R. I.  
Richmond, Va.  
Rochester, N. Y.

St. Louis, Mo.  
Salt Lake City, Utah  
San Francisco, Cal.  
Schenectady, N. Y.  
Seattle, Wash.  
Spokane, Wash.  
Springfield, Mass.  
Syracuse, N. Y.  
Toledo, Ohio  
Washington, D. C.  
Youngstown, Ohio

For Texas, Oklahoma and Arizona business refer to Southwest General Electric Company (formerly Hobson Electric Co.), Dallas, El Paso, Houston and Oklahoma City. For Canadian business refer to Canadian General Electric Company, Ltd., Toronto, Ont.



Style "B" A.C. Automatic Block Signals at Turn-out on Louisville & Northern Railway & Lighting Co. The TDB System.

The TDB System of signaling fulfills all the requirements of electric railway single track operation. It provides head-on protection and at the same time permits two trains to move in the same direction, each protected by a separate signal between turn-outs.

# The Union Switch & Signal Co.

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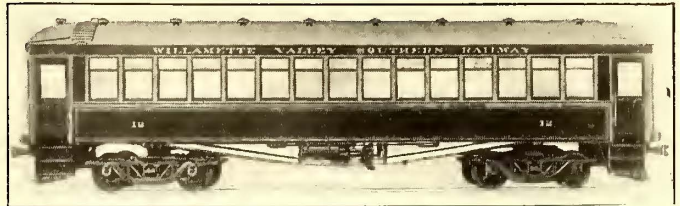
PHILADELPHIA PA. POWER STATIONS GAS WORKS  
HYDRAULIC DEVELOPMENTS ELECTRIC RAILWAYS



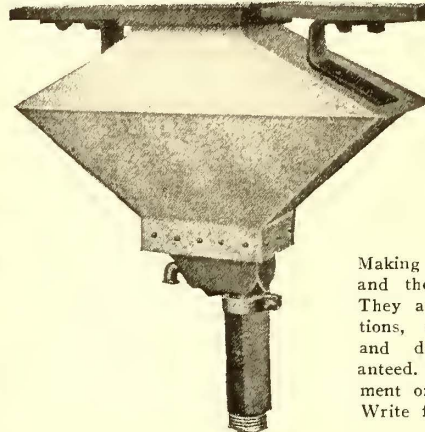
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Conserves Power—Promotes Coasting  
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Making good wherever used and thousands are in use. They are built to specifications, and their efficiency and durability are guaranteed. Complete equipment or any part furnished. Write for details.

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EVERY WEEK

The For Sale pages are a weekly "Bargain Sale"—the biggest to be found anywhere, because the JOURNAL publishes more ads of this kind than can be found in any other paper in its field.

Every issue contains offers of equipment and machinery that are real bargains. It is a habit counting for economy to look over the For Sale pages every week whether or not you intend to buy anything at the moment. This keeps you in touch with what is available—and where—when you must buy.

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Altogether the Want and For Sale pages of the ELECTRIC RAILWAY JOURNAL form an "Opportunity Department" that hardly anybody in the electric railway field can pass by without losing money.

Tell us Your Wants and let us help you

**ELECTRIC RAILWAY JOURNAL**  
239 WEST 39th STREET NEW YORK

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A quarter of a century in business.  
A. L. DRUMMOND, Gen. Mgr., Ex-Chief U. S. Secret Service  
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Inside Work                      Strike Breaking  
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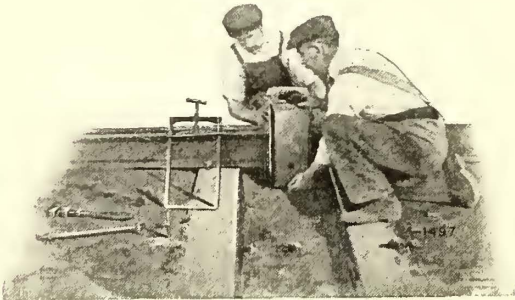
**IT IS A PAYING INVESTMENT**  
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**ROOSEVELT & THOMPSON**  
ENGINEERS  
Report, Investigate, Appraise, Manage Electric Railway,  
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71 Broadway,                      New York

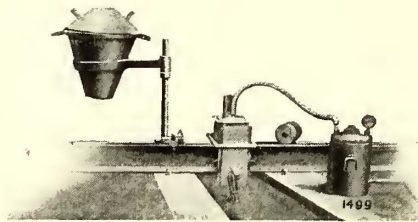




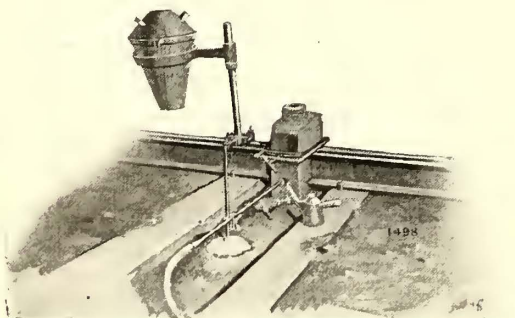
Applying Asbestos and Molasses Strips to Rails Previous to Adjusting Mold



Adjusting Two Part Mold to Rails



Final Luting Process  
Blowing Powdered Fire-clay into Mold



Preheating Rail Ends, Heating Thermit Additions and Baking Mold in One Operation



Finished Thermit Fully Welded Insert Rail Joint

## These Simple Operations Eliminate All Joints from the Track

You Can Do the Work Yourself.  
We Furnish All Materials and Give Necessary Instructions.

During the past year we have devoted a great deal of attention to simplifying the methods used in welding rails by the Thermit insert process, so as to make it possible for street railway companies to do the welding themselves, thus putting everything in their own hands and enabling them to do the work wherever they please, whether they have one joint or several thousand to weld. This we have succeeded in doing by the perfection of special apparatus for ramming the molds, luting them where they come in contact with the rails and in other ways so simplifying the process that anyone can make the welds if our instructions are carefully followed.

The first cost of necessary materials and apparatus is very low, considering the fact that with them you obtain a fully welded rail joint giving 100 per cent. electric conductivity, and breakages so negligible that they cannot be figured in percentages at all.

This fully welded joint should not be confused with other so-called welded rail joints on the market, as they are only partially welded and none of them obliterate the joint itself. The *Thermit insert joint*, however, comprises the welding of the entire rail section so that rails welded by this method are made continuous, with all joints eliminated.

The improvements referred to above have resulted in not only simplifying the process but in reducing the cost of the joint to a considerable extent, and if you would like to obtain further particulars, write for our Pamphlet No. 3932, which tells the whole story.

Before considering any new construction work for the year 1915, get the information given in our pamphlet.



### Goldschmidt Thermit Co.

WILLIAM C. CUNTZ, General Manager

90 WEST STREET, NEW YORK

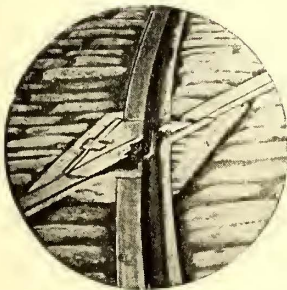
329-333 Folsom St., San Francisco 103 Richmond St., W., Toronto, Ont  
7300 So. Chicago Ave., Chicago



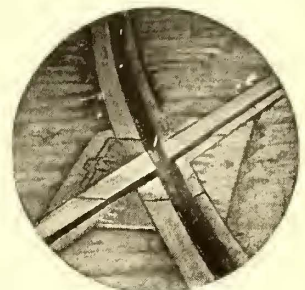
# Your Road May Not Have Received a 5% RATE INCREASE

*—BUT How About Receiving a 50% to 90% REFUND  
From 1915's Maintenance?*

HERE'S HOW:



BEFORE



AFTER

## The INDIANAPOLIS Portable Electric Welder

**URNS 50% to 90% OF THE MAINTENANCE EXPENSE BACK  
INTO THE REVENUE**

Be your own Commerce Commission. Grant your road a 50 to 90% bonus based on your present maintenance expenditures, by cutting them down correspondingly in 1915. The Indianapolis Portable Electric Welder and its companion the GRINDER will do it for you. It is saving electric railways all over the country thousands of dollars annually by reclaiming track and special work

and car equipment of all kinds as well as cutting in halves the cost of rail joining and cheapening and quickening shop operations tremendously.

Start TODAY to lay the foundation for increased dividends this year.

### You Don't Have to Secure An Appropriation

as these outfits are furnished on a basis of paying for themselves and out of your maintenance fund thru the actual saving effected. See previous issues of Journal for further possibilities.

Indianapolis Manganese Track Work stands pre-eminently for the greatest operating value and the UTMOST in FINAL ECONOMY. It represents not only the highest type of construction, but the most advanced engineering designs based on standard practice and special requirements.

*Manufacturers of only Highest Grade  
Manganese and Built-up Special Work*

Write us and We Will Show You New Economies

**Indianapolis Switch & Frog Co.**  
SPRINGFIELD, OHIO





64 regular electric cars and 18 regular steam trains have passed over this crossing daily for 25 months without showing any wear on the substructure. The crossing is still in excellent condition, while heretofore it was necessary to replace the crossing every 24 months.

## Steel Foundations for Grade Crossings

are no longer an experiment. They are a demonstrated, economical success. After being subjected to the hardest kind of traffic for more than two years, the steel foundations of the crossing shown in the illustration herewith are found intact in every respect. Not even a bolt was loosened during the two years' service; not a particle of wear was noticeable on the steel longitudinals which carry the rails at the crossing; not a clip was sheared; not an inch of "creeping" was noticeable, and what is more important, the steel

crossing itself had withstood the service during this period of twenty-five months with but little wear and is now pronounced fit for safe operation for four years more. This is notable in view of the fact that up to the time the International Steel Foundation was installed at this crossing the life of the crossing seldom exceeded two years. And this illustration is only one of many installations in all parts of the United States that are making good.

## International Steel Crossing Foundations

show tremendous savings in the annual cost of installation and maintenance of tracks. They will give your crossings from two to three times the life that wood foundations give and still be in first class condition for carrying new crossing installations. Through increasing by years the life of the crossing they automatically reduce the crossing cost and at the same time reduce the maintenance cost.

The design of this crossing foundation is a development of the International twin steel tie for paved street

construction which we have been marketing successfully for the past seven years.

Many of these ties and many of these steel crossing foundations are now in use at many of the most important intersection points of leading steam and electric railways in all parts of the country. Both are conceded by engineers who know, to be the last word in safe, sane and substantial construction.

The foundations are made for any desired angle.

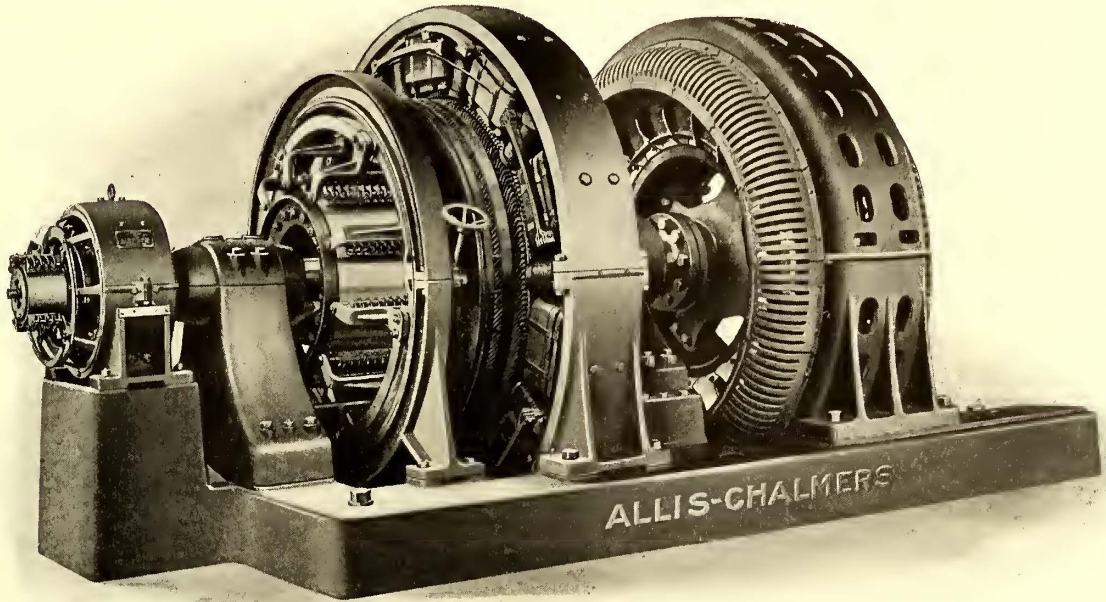
Write for list of users and further details.

**International Steel Tie Co., Cleveland, Ohio**



# If you use Motor Generators

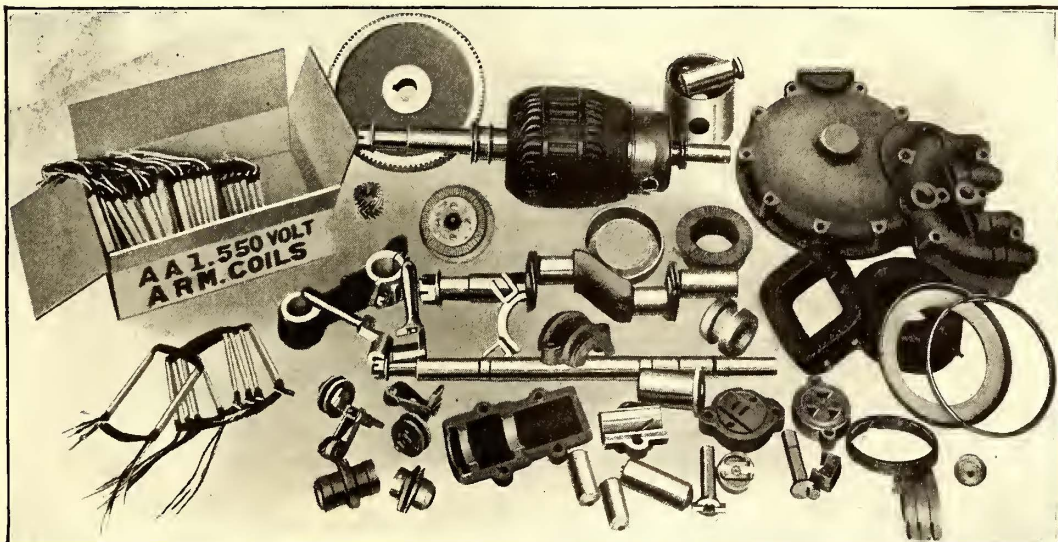
You will be interested in Bulletin 1090



1500 K. W. Railway Set 600 Volts Direct Current, 13000 Volts 60 Cycles Alternating Current

## If you use Repair Parts for Christensen Air Brake Equipments

It will pay you to consider our contract proposition covering your requirements for 1915. We have built Christensen air brake equipments complete for years and can give quick and satisfactory service in furnishing repair parts for *all* equipments of this type. Much care has been taken to improve the *quality* of these repairs, and the price is right.



## Allis-Chalmers Manufacturing Company Milwaukee, Wis.

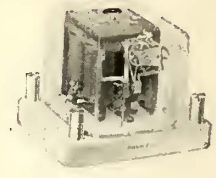
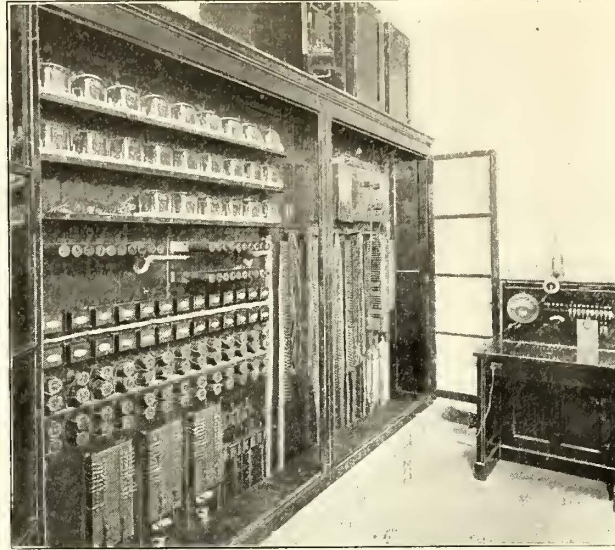
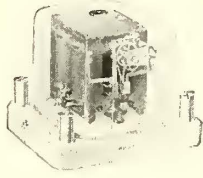
For all Canadian business refer to Canadian Allis-Chalmers, Ltd., Toronto, Ont., Can.

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 American Trading Co.  
 Representatives in China, Japan, South America and Philippine Islands





Apparatus Terminal Room  
of the  
New York, Westchester & Boston Railroad  
showing  
Western Electric selector and testing equipment

# Western Electric Selector and Telephone Equipment

has proved-in on the dispatching divisions of the majority of the railroads using the telephone for the dispatching of trains.

It has proved-in because it is:

- (1) Correctly designed.
- (2) Thoroughly tested.
- (3) Absolutely reliable.
- (4) Economical to operate.

It will prove-in on your lines. Write us for further information.

SAVE TIME AND FREIGHT™

**Western Electric Company**

Manufacturers of the 8,000,000 "Bell" Telephones

New York	Atlanta	Chicago	Kansas City	San Francisco	Montreal	London
Buffalo	Richmond	Milwaukee	Omaha	Oakland	Toronto	Paris
Philadelphia	Savannah	Indianapolis	Oklahoma City	Los Angeles	Winnipeg	Berlin
Boston	New Orleans	Detroit	Denver	Salt Lake City	Calgary	Antwerp
Pittsburgh	Houston	Cincinnati	Minneapolis	Seattle	Vancouver	Milan
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TELEPHONE OUR NEAREST HOUSE™

**Western Electric Company**

Manufacturers of the 8,000,000 "Bell" Telephones

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Pittsburgh	Houston	Cincinnati	Minneapolis	Seattle	Vancouver	Milan
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EQUIPMENT FOR EVERY ELECTRICAL NEED

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NEW YORK

SAFETY

DO-IT ELECTRICAL-IST™



# THE COLLIER SERVICE

## WHY YOU SHOULD PLACE YOUR CAR ADVERTISING ON A PERMANENT BASIS

Suppose you accept an Attractive Offer for your advertising space from a Novice, a Beginner without business connections in the Car Advertising Field.

Because of the Present Established Value of car advertising space, he may make an Apparently Successful Showing for a brief period with local advertisers. But with what Eventual Result?

YOU LOSE in the First Place because of the Impaired Appearance of Your Cars.

The ADVERTISER LOSES because his cards lack that Human Appeal which Produces Results.

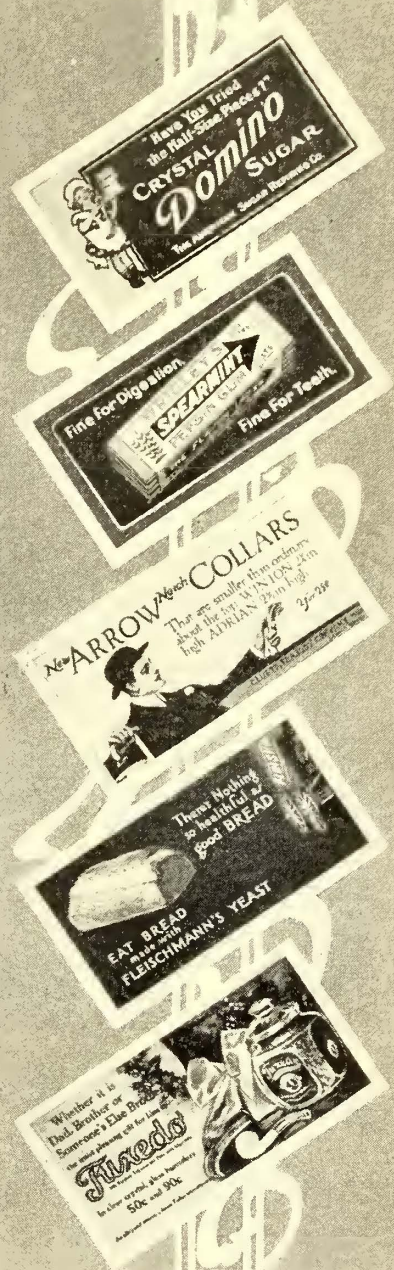
The NOVICE LOSES because he has Not Made Good with the Advertiser.

YOU LOSE AGAIN because the Novice has possessed neither the Fundamental Knowledge nor the Facilities essential to a Successful Profitable Advertising Business.

YOU LOSE A THIRD TIME because the Value of the Space has Depreciated. It takes a Substantial Advertising Company years to build up what a Novice destroys in a few months.

*Barron G. Collier*  
INCORPORATED

Flatiron Building  
NEW YORK



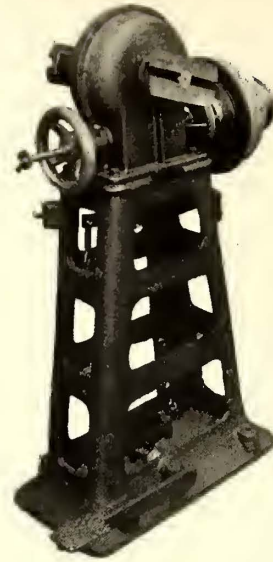


## For Speedy Coil Production

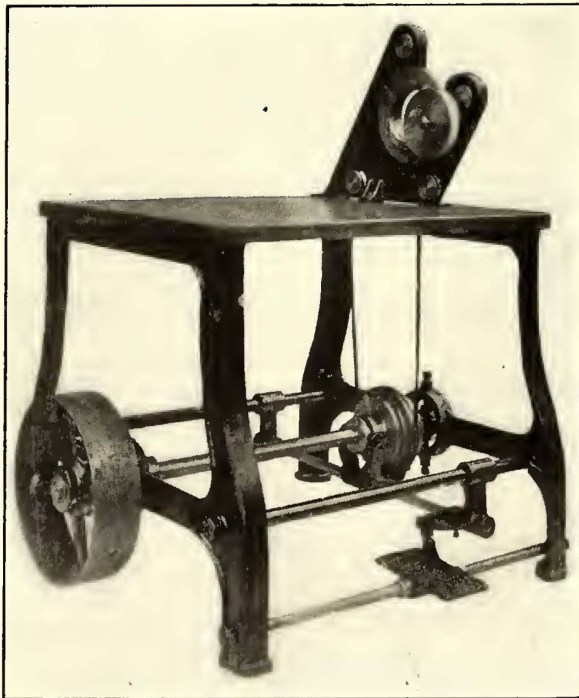
—for the reduction of shop costs to minimum  
—make sure that your *machines* are as efficient as your *men*.

## Columbia Coil Winding Machines

by their superior efficiency are in many cases making up for the deficiencies of the men operating them. But consider how much better your *good* men could do if furnished with these latest perfected winding machines. Columbia machines not only insure swifter winding but *better* winding too. We'll send you a Bulletin that tells *why*.



Columbia Field Coil Winding Machine



**It is just as Important to Tape Your Coils Tightly as it is to do it Swiftly**

Your coils must be taped *tightly*, if they are to be taped *rightly*. Besides, it uses less tape. You will learn how *tight* taping and *swift* taping may be best combined if you investigate the

## Columbia Coil Taping Machine

Do yourself the justice of looking into the merits of this machine. And while you are looking over Columbia Coil Winding and Columbia Coil Taping machines, it would pay you to take a glance at some of the many other Columbia Products.

**Our other Columbia Specialties mean other Economies  
Better get some of these Bulletins:**

Axle Straighteners.  
Bearings for Armatures and Axles.  
Armature Stands, Armature Buggies.  
Car Hoists, Car Replacers.  
Brake Appliances, Handles, Forgings for Rigging, etc.  
Babbitting Moulds, Lathe Chucks.  
Banding and Heading Machines.

Coil Winding Machines for Field and Armature Coils.  
Coils for Armatures and Fields.  
Coil Taping Machines for Armature Leads.  
Rolls for Flattening Leads of Armature Coils.  
Car Trimmings, Car Signs—Day and Night.

Commutators, Controller—Handles, Door Locks.  
Gear Cases—All Steel and M. I., Pit Jacks.  
Grid Resistances, Signal or Target Switches.  
Pinion Pullers, Trolley Poles—Steel.  
Trolley Wheels, Tension Stands.  
Track Special Work, N. W. Cartridge Fuses.

**Columbia Machine Works & Malleable Iron Co.**

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

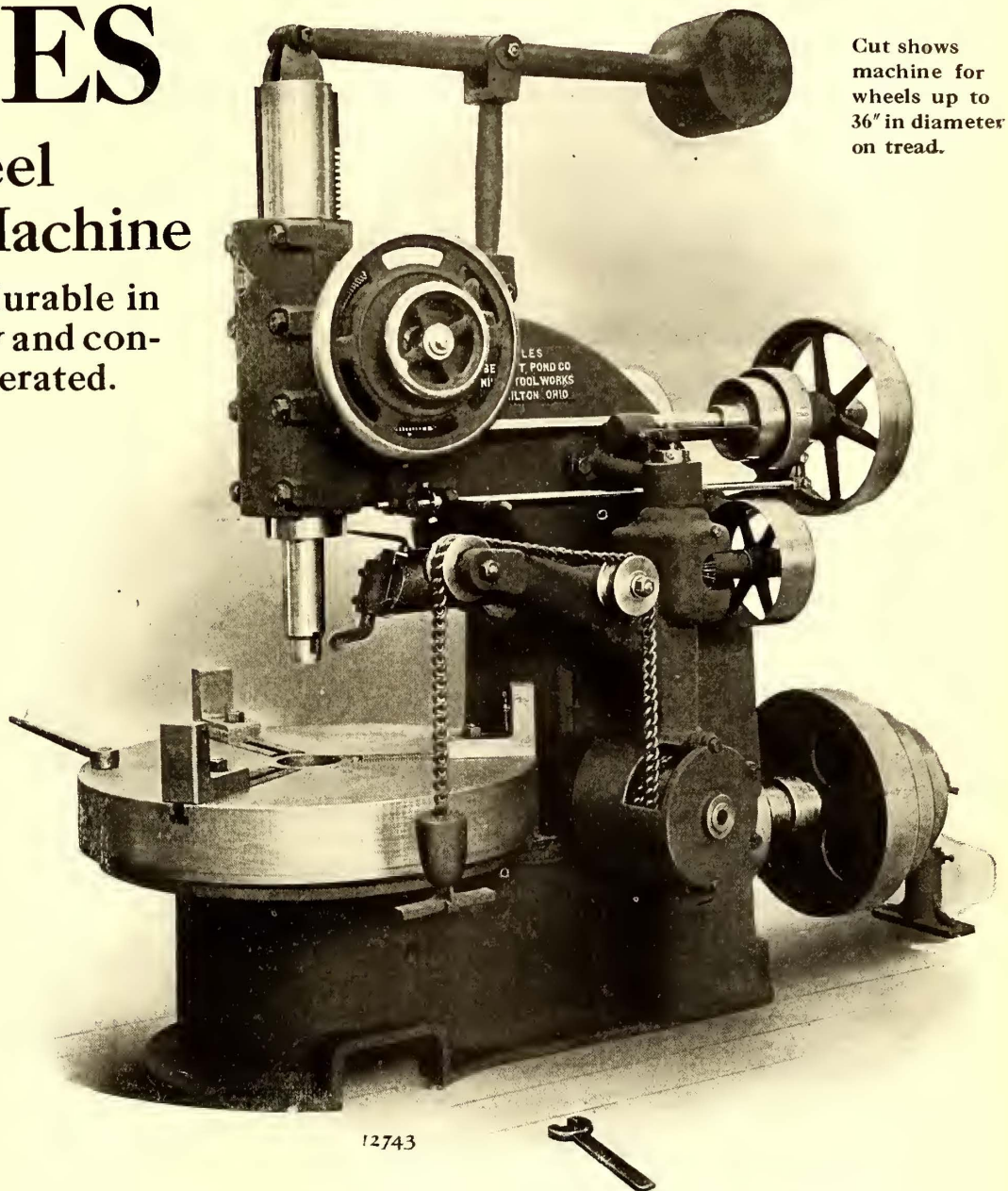


# For Street Railway Wheels

## NILES

### Car Wheel Boring Machine

Simple and durable in design; easily and conveniently operated.



Cut shows machine for wheels up to 36" in diameter on tread.

Table is fitted with three-jaw, self-centering, universal chuck operated by the single motion of a cam lever, which gives sufficient movement for firmly gripping the wheel. This chuck has proven very efficient in service, being quick operating and positive in action.

Power feed is engaged and changed from roughing to finishing by conveniently located handwheel and lever.

Rapid hand traverse of spindle is by large handwheel. Quick-acting power crane of drum type is attached to machine for handling wheels to and from table.

If required, hub facing attachment can be furnished as shown on machine in illustration.

Machine can also be furnished driven by d.c. variable speed motor or by a.c. motor thru speed box.

*Write for Illustrated Circulars*

**NILES-BEMENT-POND CO.**

111 BROADWAY, NEW YORK

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Pittsburgh

Birmingham, Ala.

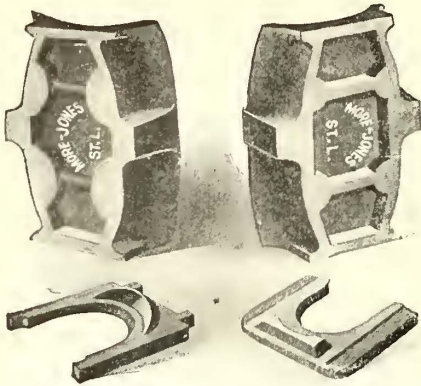
Philadelphia

Chicago

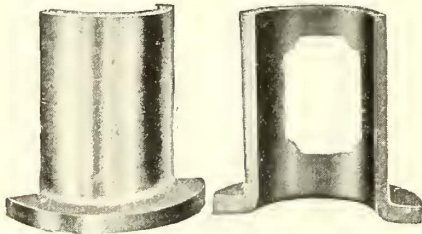
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London

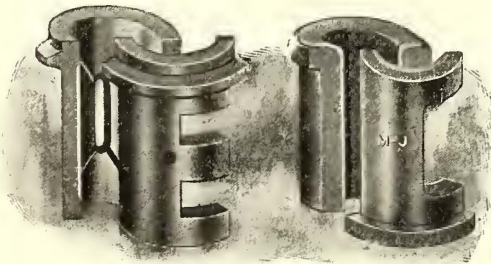




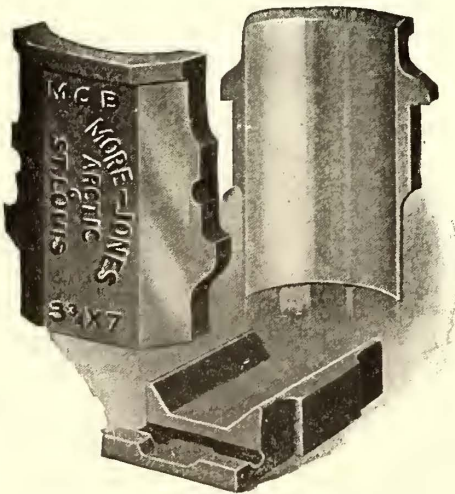
Journal Bearings and Check Plates (Special Type) for trucks of various makes and sizes. They are made of our No. 36 Bronze, the right material for long wear and hard service, without heating or cracking.



Tiger Bronze Axle Bearings possess superior anti-frictional qualities as proven by the very low rate of wear on both bearings and axles.



Tiger Bronze Armature Bearings with thin Babbitt lining insure maximum service at minimum cost.



Arctic Bearings made by our patented chill process in metallic molds. They are stronger and wear much longer than ordinary cast brasses.

# Rolling Stock Main Due **MORE-- SER**

The economies produced for electric railways by the More-Jones *service* have been due to two things:

1st:—To the careful co-operation of the roads with which we have dealt, in giving us the opportunity to meet their special needs in trolley wheels and bearing specialties.

2nd:—To the careful study by chemical and metallurgical experts in developing products for each individual case.

We can meet your special needs because we are organized thoroughly to study, investigate and fulfill the requirements of each special condition.

Every factor of importance contributing toward the maximum in operating efficiency is employed in

## More-Jones Bra

St. Louis



# tenance Economies to -JONES VICE

the production of More-Jones products, namely:

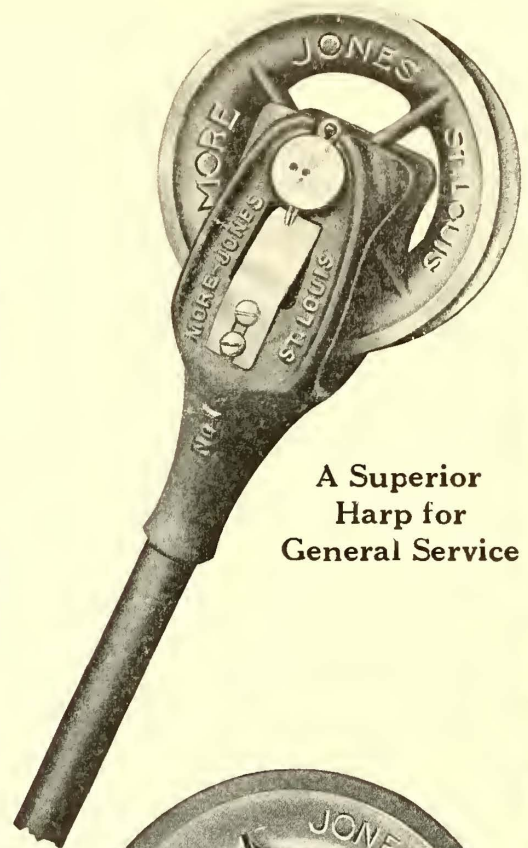
Safety and dependability under all service conditions—proper adaptability—the finest grade metals—all refined and alloyed to the highest degree of practical utility—the most advanced methods of manufacture, including specially constructed molding machines which obviate the necessity of “rapped molds.”

These are the qualities which have made More-Jones products pre-eminent, and nowhere more so than on railways where selection is based on comparative and competitive tests.

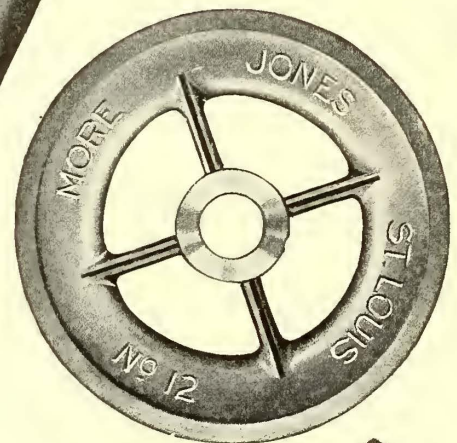
The proof of More-Jones products is always in the service. Try them on your road this year and see if the result is not a most gratifying surprise.

**ss & Metal Co.**

**Missouri**



**A Superior  
Harp for  
General Service**



**Made in 48 Styles  
and Sizes to  
Fit All Harps**



**High Melting  
Point—Greatest  
Resistance to  
Crushing Strain**

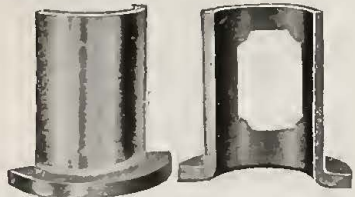








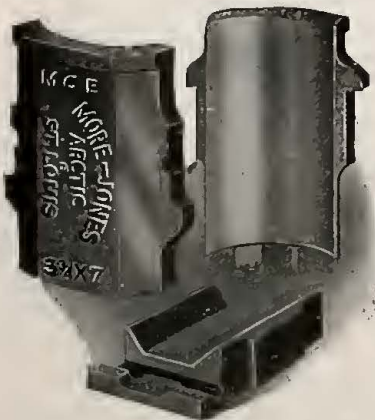
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Tiger Bronze Axle Bearings possess superior anti-frictional qualities as proven by the very low rate of wear on both bearings and axles.



Tiger Bronze Armature Bearings with thin Rabbit lining insure maximum service at minimum cost.



Arctic Bearings made by our patented chill process in metallic molds. They are stronger and wear much longer than ordinary cast brasses.

Rolling Stock Main  
Due

# MORE-SER

The economies produced for electric railways by the More-Jones service have been due to two things:

1st:—To the careful co-operation of the roads with which we have dealt, in giving us the opportunity to meet their special needs in trolley wheels and bearing specialties.

2nd:—To the careful study by chemical and metallurgical experts in developing products for each individual case.

We can meet your special needs because we are organized thoroughly to study, investigate and fulfill the requirements of each special condition.

Every factor of importance contributing toward the maximum in operating efficiency is employed in

## More-Jones Bra

St. Louis

tenance Economies  
to

# -JONES VICE

the production of More-Jones products, namely:

Safety and dependability under all service conditions—proper adaptability—the finest grade metals—all refined and alloyed to the highest degree of practical utility—the most advanced methods of manufacture, including specially constructed molding machines which obviate the necessity of “rapped molds.”

These are the qualities which have made More-Jones products pre-eminent, and nowhere more so than on railways where selection is based on comparative and competitive tests.

The proof of More-Jones products is always in the service. Try them on your road this year and see if the result is not a most gratifying surprise.

## ss & Metal Co.

Missouri



A Superior Harp for General Service

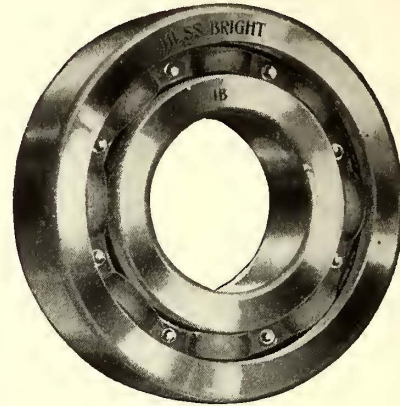


Made in 48 Styles and Sizes to Fit All Harps

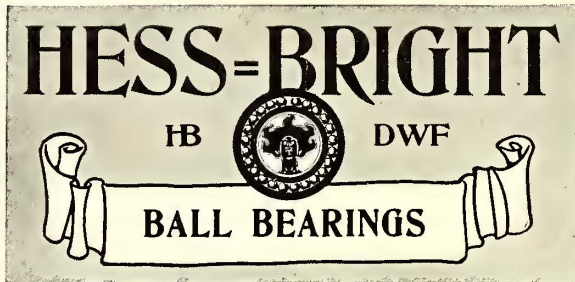


High Melting Point—Greatest Resistance to Crushing Strain





The Economical  
Improvement on  
the Plain Journal Bearing

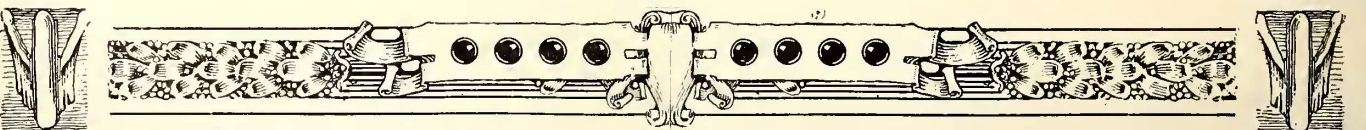


The maintenance and lubrication expense connected with plain journals have opened the field for a more economical bearing. The Hess-Bright bearing, by reason of its superior durability and ability to operate over long periods without attention, is the logical answer to the demand.

**THE HESS-BRIGHT MANUFACTURING CO.**

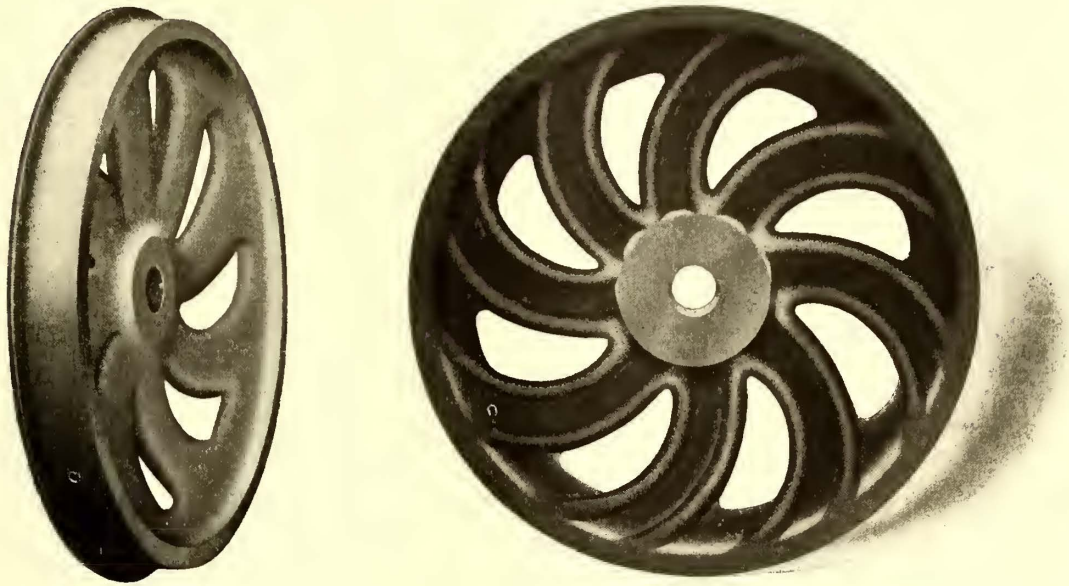
FRONT ST. AND ERIE AVE., PHILADELPHIA, PA.

3938





# Chilled Iron Street Car Wheels



The reason that Chilled Iron Car Wheels are standard under all kinds of freight cars is because their continuous use for 64 years has demonstrated their superiority.

Chilled Iron Wheels for STREET CAR SERVICE are superior to other types of wheels because Chilled Iron harmonizes with the parts with which it comes in contact, such as brake-shoe and rail.

The wear on the rail and power consumption can be conservatively stated as being 10% greater when other types than chilled iron car wheels are used, and if Street Railways will keep a record of the saving in this respect, it will be found that the saving will more than offset the initial cost of Chilled Iron Car Wheels.

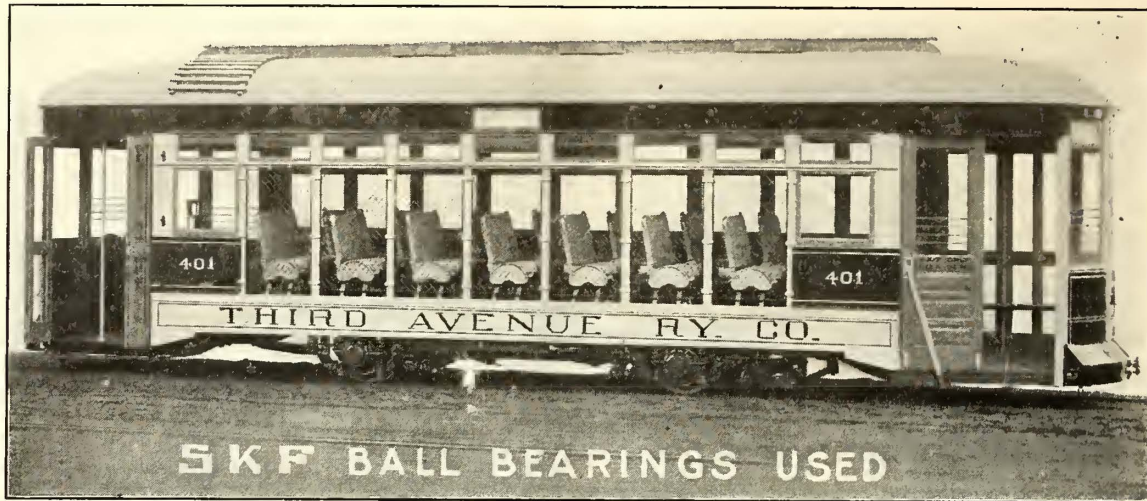
There are running today over 25,000,000 Chilled Iron Wheels under freight cars, passenger cars, engine tenders, **street cars** and private car lines.

**Association of Manufacturers of Chilled Car Wheels**

**1214 McCormick Building, Chicago**

**Representing forty-eight wheel foundries throughout the United States and Canada.  
Capacity, 20,000 Chilled Iron Wheels per day.**





## SKF Ball Bearings

### Demonstrating Efficiency in Severe Metropolitan Service

For over 4 years S.K.F. Ball Bearings have been demonstrating their efficiency on the axles and motors of the Third Avenue Railway Company's Storage Battery cars.

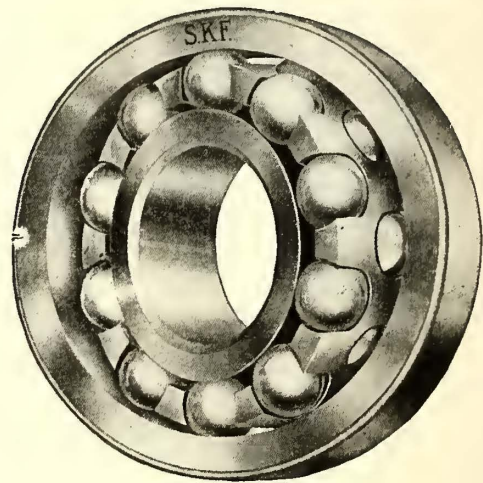
So excellent were the results—so considerable the savings effected in bearing maintenance and operating costs that the company decided to specify S.K.F. Bearings for its 25 new Step-less cars, one of which is illustrated above.

The following four features, individual to S.K.F. Ball Bearings, are largely responsible for the superior efficiency and money-saving advantages of these bearings under the severe service condition of the heavy New York traffic. Study these points:

- (a) Double row of balls—virtually two bearings in one.
- (b) Self-alignment to allow for inaccuracies in machining the boxes.
- (c) Ball cage or retainer made in a single piece—no bolts, screws or rivets to work loose and jam the balls.
- (d) Balls and races made of Swedish steel, uniform in hardness throughout, accurately finished.

The S.K.F. Engineering Dept. is at your service.

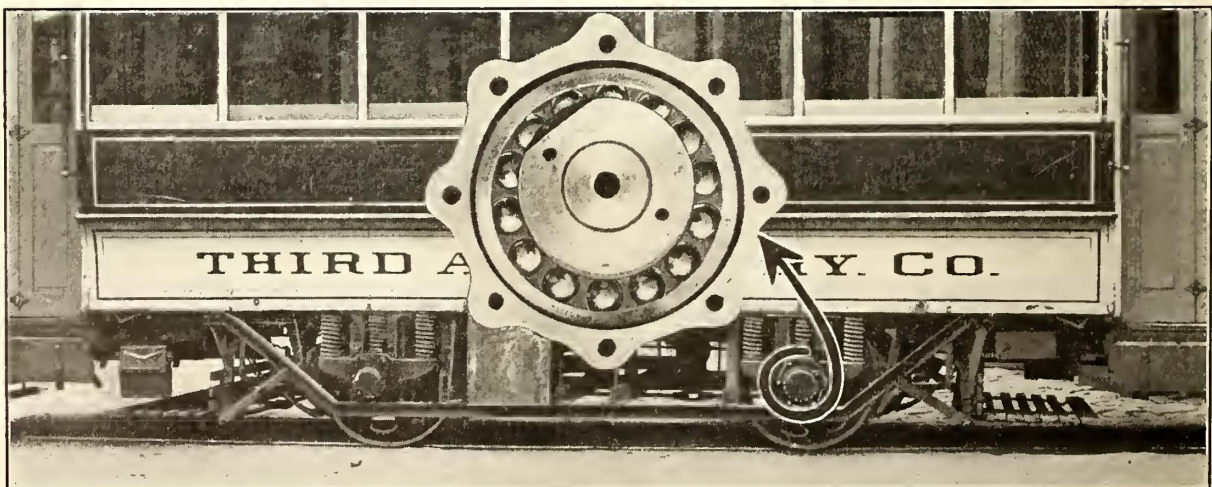
Send for Bulletin No. 20.



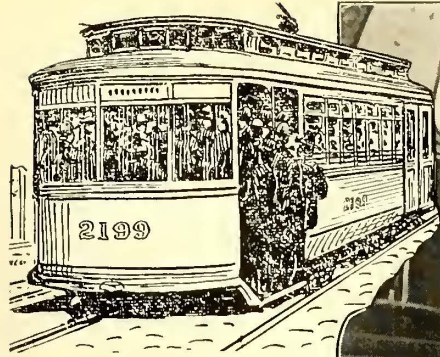
Type of Bearing Used on Above Car—Deflected Position

## SKF BALL BEARING CO.

50 Church Street  
New York City







# Foul Air?

*Yes, aplenty! Winter and Summer. Winter even with the most vigorous ventilating precautions. Summer, too, because in many instances the doors must be kept closed and the floors get dirty and smelly.*

*And FOUL AIR; because even with ventilation the air in a crowded car becomes filled with body odors.*

## The Solution of the Problem is The Odorless Disinfectant

Trade  Mark

## The Odorless Disinfectant

You may have the finest kind of ventilation in your cars but if there are obnoxious body odors emanating from a crowd of passengers, the air is going to be vitiated and smell so—in fact, it is often *foul*. That means, notwithstanding your best efforts, you are confronted with “kicks” and “ordinances” and newspaper attacks and what not.

You need tolerate this condition no longer. We have the solution for you in “O D” (Odorless Disinfectant).

It acts at once, purifying and deodorizing the air, killing floating typhoid, diphtheria and pus bacteria and sweetening and sterilizing

whatever it comes in contact with.

Requires but a few ounces of “O D” liquid to the gallon of water to make a disinfecting scrubbing solution for floors, seats, straps, toilets, etc., etc.

Its germicidal or germ-killing qualities and its value as a preventive of contagion is proven by tests and reports of eminent bacteriological experts.

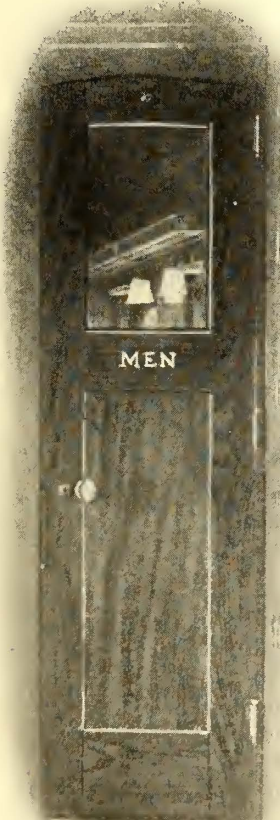
Put up in quantities from two-gallon size to 5-barrel lots. We can cite you the best of references and indorsements.

Send us trial order. Prices on request.

**GARDNER & COMPANY**

Joliet, Ill.

*The Problem of the Interurban Car*

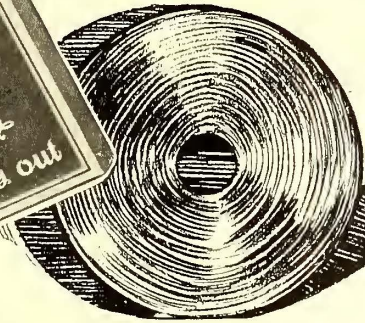
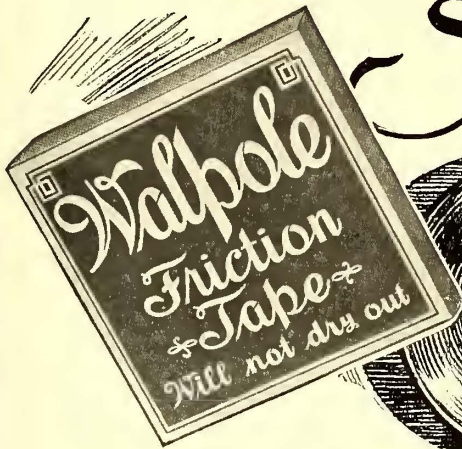








# It's Tough Stuff!

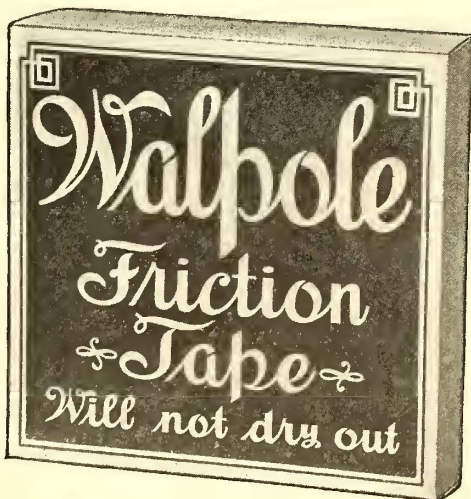


## Walpole Friction Tape

"Gimme half a dozen rolls o' tape, please," says the wireman to the storekeeper. And off he goes with the six rolls of WALPOLE FRICTION TAPE.

Next, you see him on the job taping up a splice. 'Round and 'round the joint goes the roll. Supple fingers, sinewy wrist, brawny forearm swell and strain as he pulls the tape tautly over the conductor. "Th' tighter yuh tape it, th' better th' joint y' know," says he, and forthwith the corded wrist adds still another ounce of strain to the fast-clenched tape.

"Tough stuff, this Walpole," says the wireman, reaching for another roll. "I've used it ever since I was a helper an' it ain't so easy to break as some I've used. Sticks closer'n a brother, too, an' stays put. Never knew it to dry out an' it stan's all kinds of weather. I've worked for this railway company for five years an' we've stuck to the Walpole an' Neponset line pretty close all the time. Th' purchasing agent told me we have a standing order for it—deliveries every so often—an' so have lots of other electric railways. It's tough stuff all right.



Write for our booklet,  
"What About Tape?"

**Walpole Tire & Rubber Co.**

Massachusetts Chemical Co.'s  
Products

WALPOLE, MASS.

Pioneers in Insulation Engineering



# Stop Worrying

The Ohmer System of fare protection relieves the manager of many worries. He knows that the very best thing is being done. He knows that every factor of the problem has been analyzed, and that he is getting the best services of his men, mentally and morally as well as physically, and he can devote his energies to other important phases of his business.

An electric railway manager usually has plenty to worry about. He often feels that somehow or other his fare collecting system is not quite right. However, he is loth to make radical changes. The inertia of accustomed methods blocks his progress. He feels that a big investment is necessary if his fare protection method is changed.

In adopting the Ohmer System you risk nothing. You make no investment. The maintenance costs you nothing. We make the investment. The maintenance expense is ours. You simply pay for our services, and the amount you pay is absurdly small compared with the benefits received.

We should be glad to learn from you just what your particular difficulties may be. Whether you finally decide to become our clients or not, we shall be glad to give you the benefit of our experience.

**Ohmer Fare Register Co.**  
Dayton, Ohio



# STATISTICS

have great weight in swaying the judgment of competent minds.

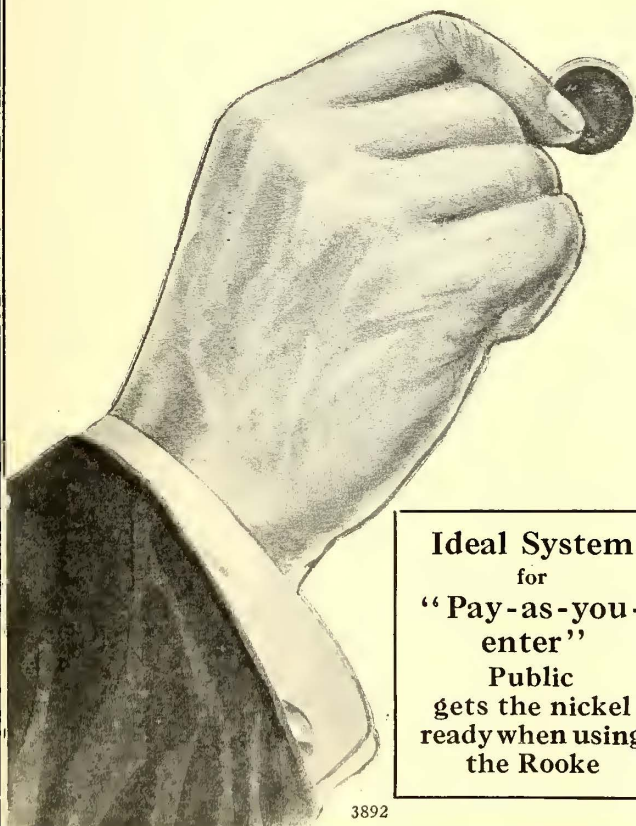
Almost invariably they show the trend of practice.

In no case is this better illustrated than in fare collecting and accounting.

It is for this reason that we desire to place in the hands of every operating man



## Statistics to Show that the Rooke Automatic Register



**Ideal System**  
for  
**"Pay-as-you-enter"**  
Public  
gets the nickel  
ready when using  
the Rooke

- cannot be beaten, in any sense of the word.
- absolutely eliminates collection or registration of fares in bunches.
- solves and prevents manipulation of transfers or tickets against cash.
- absolutely eliminates once and for all the problem of registration or non-registration of transfers.
- removes the necessity of depending upon the bookkeeping ability of conductor for correct turn-in.
- simplifies the act of payment by the passenger and utilizes this act to cause **instant** registration and classification of fares.
- enables you to **standardize on a collecting system to cover every type of car** you operate. Perhaps you are fully aware of these features—if you are not, then the statistics we have for you are vital.

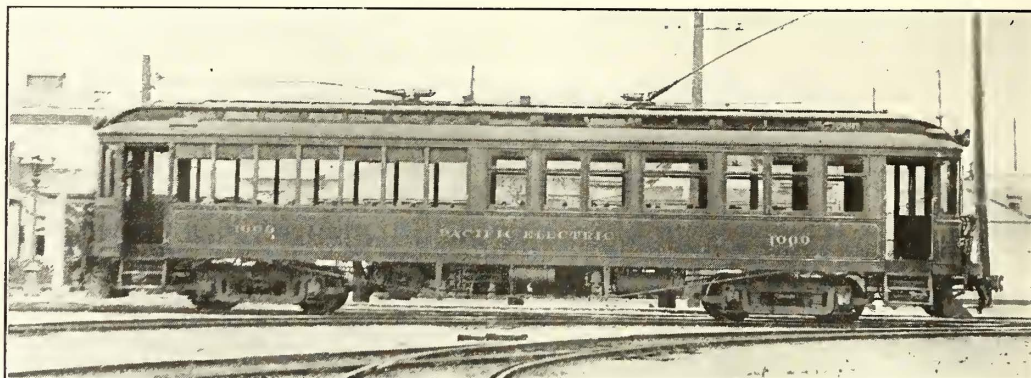
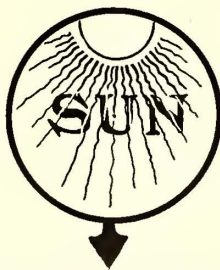
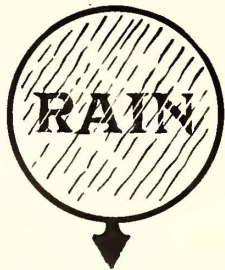
Just ask us to send you a full report on how this method of fare collection has for years handled annual receipts of roads collecting from \$5,000,000.00 downward, on *all* types of cars.

**Rooke Automatic Register Co.**

Providence, Rhode Island



# Protection against



Bayonne Car Roofing on Car of Pacific Electric Railway, Los Angeles, Cal.

with

**BAYONNE  
CAR  
ROOFING**

26" to 120" wide

A specially prepared canvas, treated in such a way as to render it absolutely WATERPROOF in addition to PRESERVING the cloth.

A roof covering that defies the destructive elements of rain, sun, snow and age.

It lasts longer than ordinary duck, painted, because paint coming in contact with cotton duck burns the fibre and, as ordinary painting applies only a surface coating, it cracks and peels off. BAYONNE Car Roofing LASTS.

For over 8 years BAYONNE Car Roofing has been giving satisfaction. It is used on many of the largest steam and electric roads, which have adopted it after severe tests.

SPECIFY it for your new cars—USE it when remodelling.

We will be glad to send you a sample book and to quote prices. When writing, please specify Price List J-40.

## John Boyle & Co., Inc.

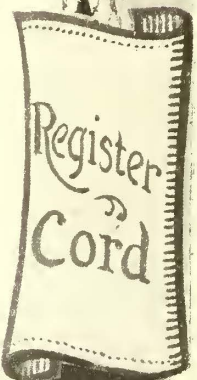
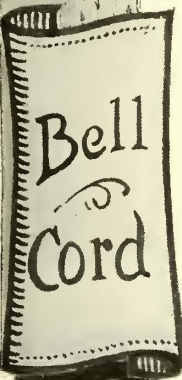
112-114 Duane Street New York City 70-72 Reade Street  
Wide Cotton Duck

Largest Stock and assortment in United States  
Also headquarters for Cheesecloth and Bunting





# SPOT TROLLEY CORD



It's hard braided and smooth finished and thoroughly waterproofed. That makes it resist abrasion and decay.

Its smoothness and uniformity make it essential for use with trolley retrievers.

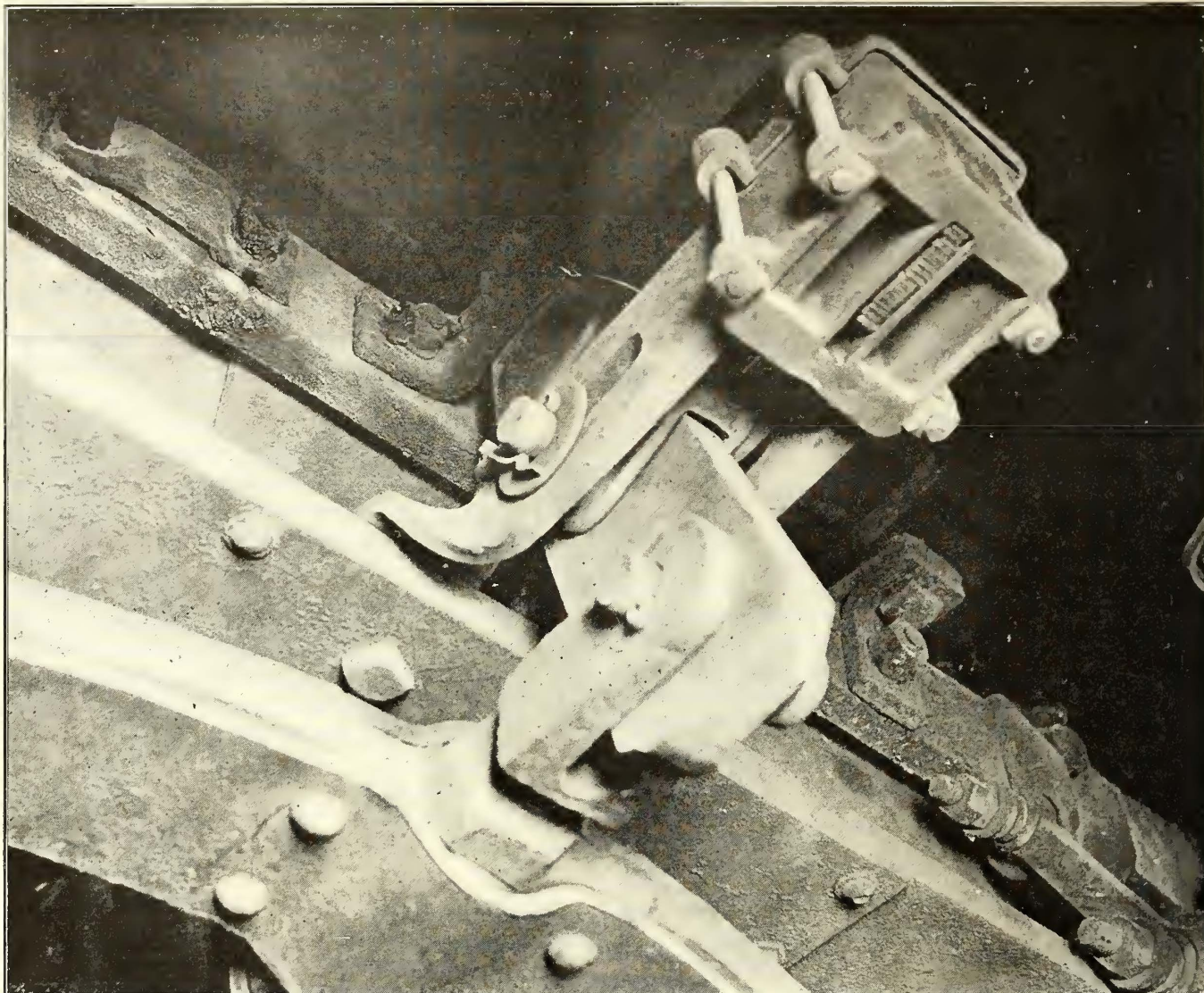
Samson Bell and Register Cord are equally effective in giving low cost service.

Samples and prices are awaiting your request.

**SAMSON CORDAGE WORKS**  
BOSTON, MASS.







# Watch It Work!

## S. W. B. Automatic Shim Slack Adjuster

When a high-grade car is finished off with the S. W. B. Shim Slack Adjuster that is the end of your brake rigging adjustments until the brake shoes are worn out. The S. W. B. automatically takes care of brake-shoe clearance and wear on the rigging.

This means: Shoes last longer—saving shoes and mechanics' time. Brakes are sure to act quickly—no excessive slack to take up. Cars "handle" all alike—motormen always know

where to "find their brakes." Increased life of brake rigging—due to shorter brake travel.

Look at the cut and see how positive the action of the S. W. B. As slack occurs the metal shims drop into place under the fulcrum of the brake lever, maintaining the correct gap between brake shoe and wheel.

It always acts.

*Write for the full data.*

**The Sauvage-Ward Brake Co., Inc.**  
Whitehall Bldg., New York



# "Look for the Gray Shell"



## Get Samples

*for both cars and plants and prove to yourself that 80 per cent per year may be saved in fuse maintenance.*



## ECONOMY renewable cartridge FUSES

Do you throw away a fuse when it has blown? Doesn't this look like a useless waste? We can tell you of one great industrial concern in this country that has used about \$16,000 worth of Economy Fuses to date, for the reason that 80 per cent per year was saved in fuse maintenance, yet not a single safety factor was sacrificed.

Think it over, write for samples, test them yourself.

*Samples are gladly furnished to anyone interested in plant and car efficiency, safety and economy of maintenance and operation. Ask for Catalog 2. Use the Coupon.*

## ECONOMY FUSE & MFG. CO.

**Kinzie and Orleans Streets  
CHICAGO**

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

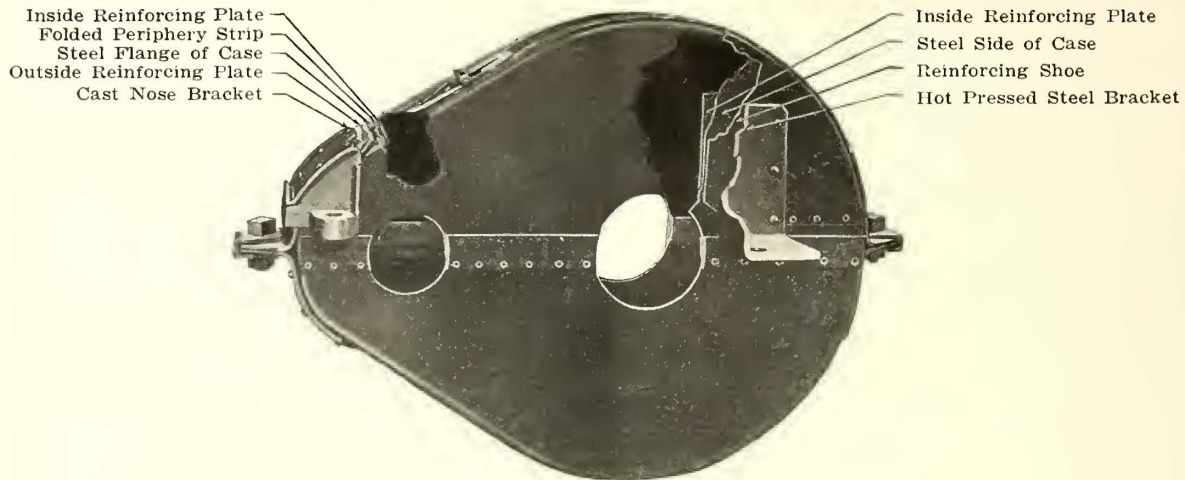
Please send Catalog 2, list of users and samples for.....amps  
.....volts.

.....

.....

.....





## *The Reinforcing Given Keystone Steel Gear Cases Is Further Assurance of Satisfactory Service and Long Life*

Take the G.E.-57 side suspended case as a pertinent example. Note the solid, rugged, cast nose bracket, and the hot pressed steel side brackets.

Side brackets are of  $\frac{3}{8}$  inch steel, securely riveted to the case. These rivets pass through four thicknesses of metal—the bracket itself, the shoe folded clear over the case from side to side and welded to it, the steel of the case itself, and a reinforcing sheet of steel on the inside. These rivets pass through  $\frac{3}{4}$  inch of metal at this bracket.

Can you imagine one of these brackets tearing off with this construction? And especially when you consider the tremendously increased strength given this part of the case through the use of the steel shoe?

Then take the nose bracket. Securely riveted to the case through **six thicknesses of metal**, itself a rugged casting amply reinforced and ribbed—a construction here that will stand up under the most severe conditions ever met in service.

Then the many other valuable features you get in Keystone Cases—their high grade steel, their riveting and electrical spot welding, their being made exactly alike through the use of dies, jigs and templets—all mean better gear case service for you at less expense.

We don't merely claim all this—we guarantee it!

Put your gear case troubles up to us now and let us prescribe the cure.

## **ELECTRIC SERVICE SUPPLIES Co.**

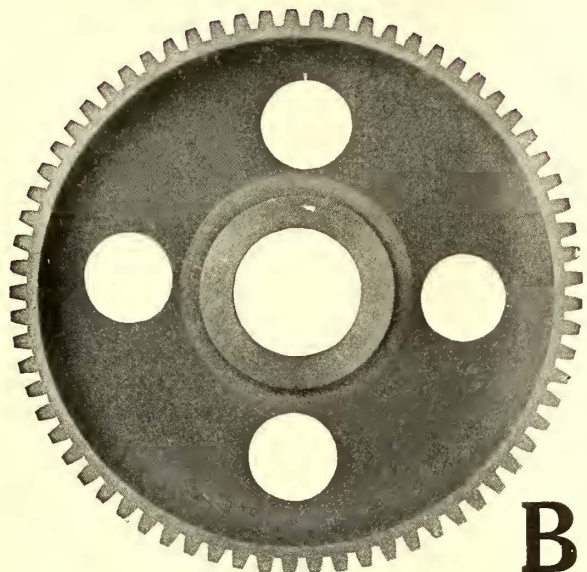
*Manufacturer of Railway Material and Electrical Supplies*

PHILADELPHIA  
17th and Cambria Sts.

NEW YORK  
Hudson Terminal

CHICAGO  
417 So. Dearborn St.





## BP Gearing

BP Gears and Pinions are the result of years of research and the perfecting of this material provides an economical as well as an efficient gearing.

The high surface hardness combined with great strength and refinement of structure results in gear mileage which will approximate the life of the average railway axle, while the relatively low cost assures more economy ultimately than any other grade of gearing now on the market.

Address Dept. E

# Nuttall

## Pittsburgh

*Made in U. S. A.*





20-TON GASOLINE LOCOMOTIVE

## Internal Combustion Locomotive Co., Inc.

Equitable Building

WILMINGTON

DELAWARE

Manufacturers

# Railway and Railroad Gasoline Locomotives

## Something New in Transportation

Sizes: 5 to 50 tons                      5 to 50 miles per hour  
 3 speeds forward                          3 speeds reverse  
 Single and double-end truck.      Single and double-end control  
 Generates its own light.      Heats its own train

## Cuts Interurban Construction Cost 50%

**IDEAL POWER**—The ideal power for surface, subway and elevated lines:  
 Also for local and terminal service. No smoke. No cinders: Westing-  
 house Brakes.

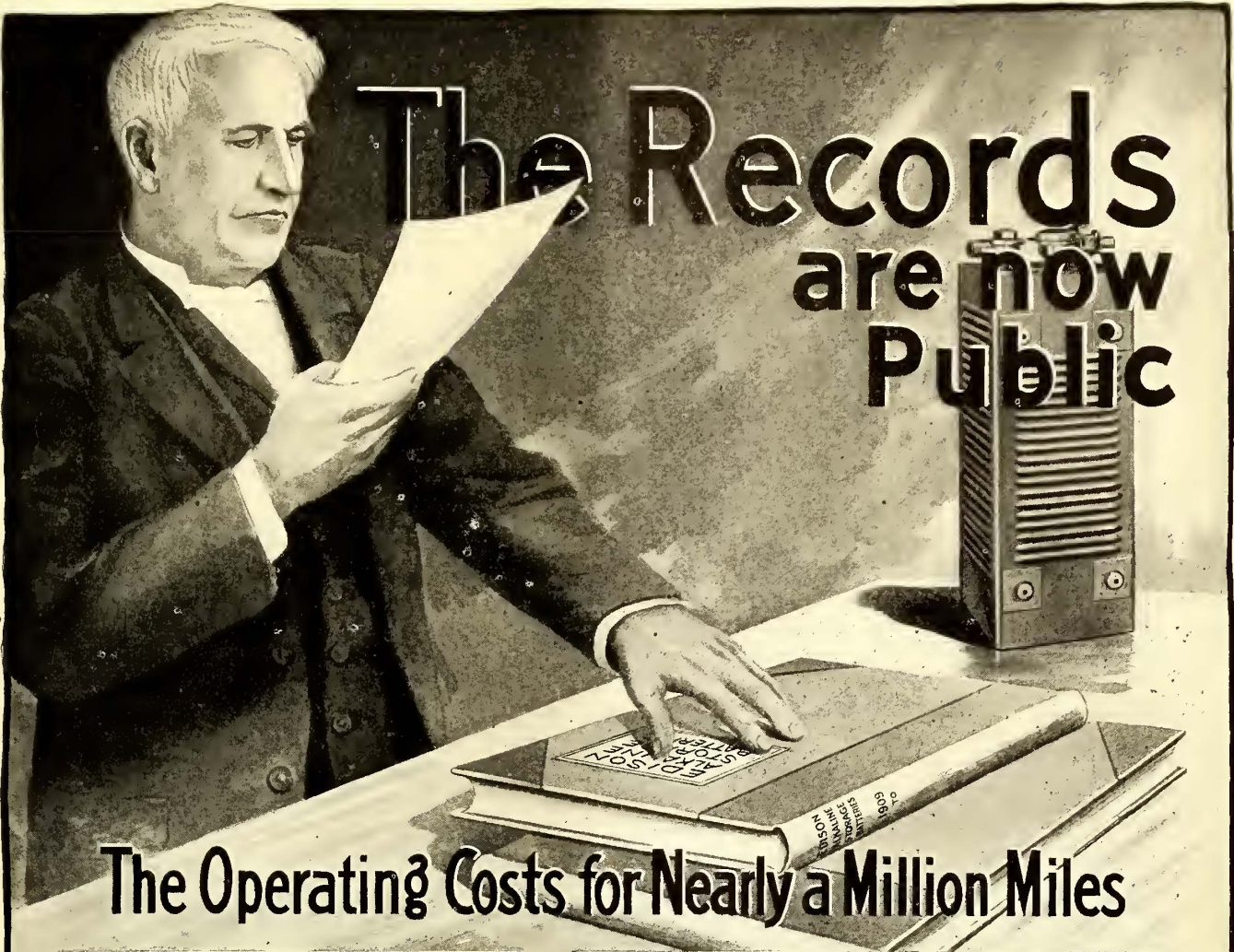
**FUEL**—Gasoline—Ozoline—Oil or Distillates.

**OPERATION**—A One-Man Pneumatic Operation.

**LOW COST**—Per train mile cost of two coaches, 10 cents. Biggest and best  
 transportation proposition of this century. Investigate our claims.

**I. C. L. Co., J. W. MCKAY, General Manager**





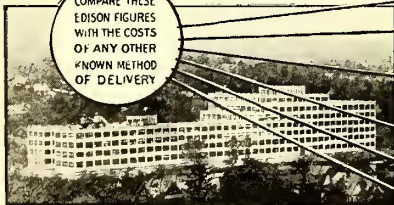
# The Records are now Public

## The Operating Costs for Nearly a Million Miles

**I** CLAIMED that the New Alkaline Storage Battery would make the Electric Vehicle the cheapest means of Street Transportation, but I had only my private tests to satisfy me. Today thousands of Edison Batteries in thousands of Trucks and Delivery Wagons are making Operating Records that are easily investigated by all. After the four or five years of hard service that many of these vehicles have had, is it possible to deny that my claim is proved?

Thomas A. Edison

HERE IS ONE RECORD - A REPORT - ON 22 FIVE-YEAR OLD EDISON BATTERIES



The Edison Storage Battery Plant at Orange, N. J., was completed by the city in the Edison Photograph, taken on December 5th.

Write for Bulletins on the Edison Train Lighting and Signaling Storage Batteries and the Edison System of Satisfactory Inter-urban Car Lighting.

**Edison Storage Battery Company**  
Orange, New Jersey

Distributors in: New York, Chicago, Boston, Cleveland, Washington, San Francisco, Los Angeles, Portland, Oregon, Seattle

### ADAMS EXPRESS COMPANY

242 WEST 47TH STREET

MOTOR VEHICLE DEPARTMENT  
GEORGE STEVENS  
SUPERINTENDENT

New York, December 7th 1914

Edison Storage Battery Company,  
Orange, N. J.

Attention of  
R. A. Bachman,  
V. P. & Genl. Ingr.

Gentlemen -

Thank you for consenting to extend from five to six years the conditions of your guarantee regarding renewal of positive plates.

The average operating cost per battery per month of the twenty-two trucks at Indianapolis, equipped with Edison Batteries in November 1909 and averaging about 680 miles per month, is as follows:-

YEAR	BATTERY MAINTENANCE (Refilling, new solution, watering, cleaning, all repairs, inspection, etc.)		CURRENT (Purchased by meter)	TOTAL
	Material	Labor		
1910	\$3.47	\$4.10	\$10.05	\$17.62
1911	3.41	4.10	8.93	16.44
1912	3.41	4.10	9.90	17.41
1913	2.86	4.10	8.17	15.13
1914 (to Oct. 31)	3.11	4.10	9.50	16.17

The average total operating cost per battery per month has, therefore, been \$16.55 for a period of five years. In this time the average mileage per truck was about 40,000, which reduces the operating cost to \$.02½ per mile. The batteries are still in service.

Yours very truly

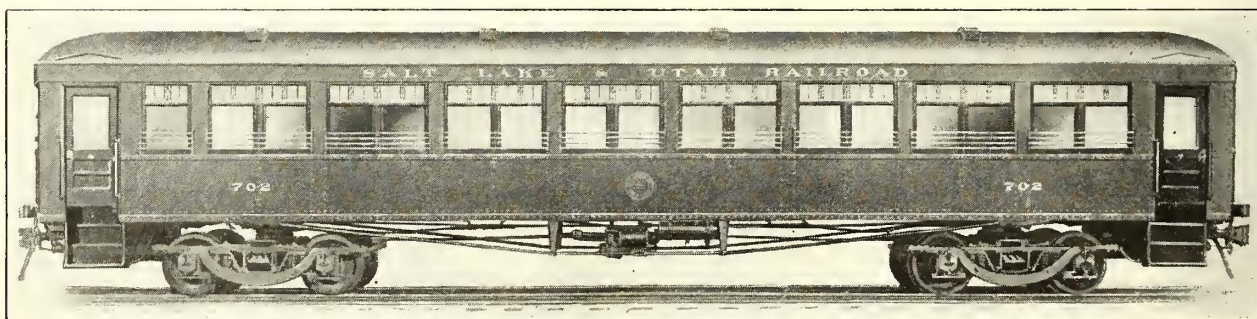
*Geo. Stevens*  
Superintendent

GS:HHW



# WHY Niles Steel Cars

are made of standard commercial shapes and plates. *Because* interurban orders usually are small, probably averaging fewer than 10 cars. Local conditions and operating policies vary so widely that very seldom are duplicate cars made for different roads or owners. Pressings or forgings from special dies must be charged to a few cars and in emergencies car owners must depend on the manufacturer for repair parts. Pressed steel channels are of same thickness at neutral points as at points of stresses. In rolled steel channels the metal is scientifically placed for stresses and thin at neutral points. Standard shapes are carried in stock in warehouses. Repair parts for Niles Steel Cars can be obtained without delay and replacements made by your own blacksmith or machinist in less time than it would take to learn that your special dies had gone to the scrap heap and parts could not be replaced.



Steel Trailer. Length 60' 7½", Width 9' 6". Speed 60 M. P. H., Seating 66, Weight 27¼ tons

*Why* all joints in Niles Steel Cars are hot riveted with steel angles on gussets.

*Because* these joints are easily separable for repairs without mutilating or destroying the adjoining parts and can be rebuilt with ordinary tools in any small railway shop. These advantages do not apply to welded joints.

*Why* round head rivets are used and no attempt made to conceal the heads in Niles Steel Cars.

*Because* they make stronger joints for thin steel sheets than countersunk heads, can be more easily removed and do not cause the paint to drop out over rivet heads.

*Because* the public wants and appreciates steel cars and the exposed rivet heads advertise the fact that you are giving them steel cars different in appearance from the smoothly finished wooden car.

*Consider* these points, look at the Niles Steel Car shown above and insist on this construction, even if it does cost a little more. It is lighter, stronger and more economically maintained.

## Niles Car & Mfg. Co.

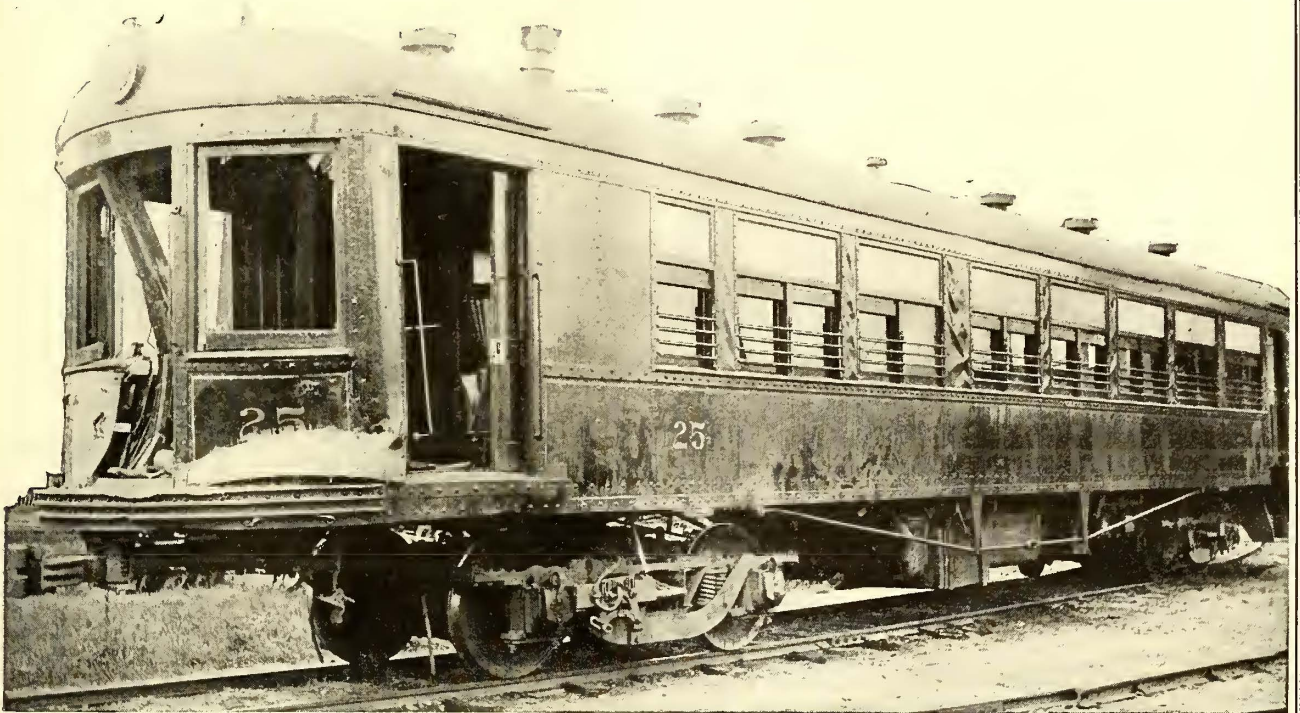
Niles, Ohio



# SAFETY FIRST

*A Collision  
—The Result*

Running at full speed (60 miles an hour) Coach No. 25 ran smack into Traction Engine stalled on the tracks. What happened is most convincingly told in the accompanying illustrations.



**THE COACH.** Not a Passenger Injured. Damage to Coach Infinitesimal.



**THE ENGINE.**

Most gratifying to the Designer and to the Builder of the 61-ft. Steel Coach.

**SAFETY FIRST**

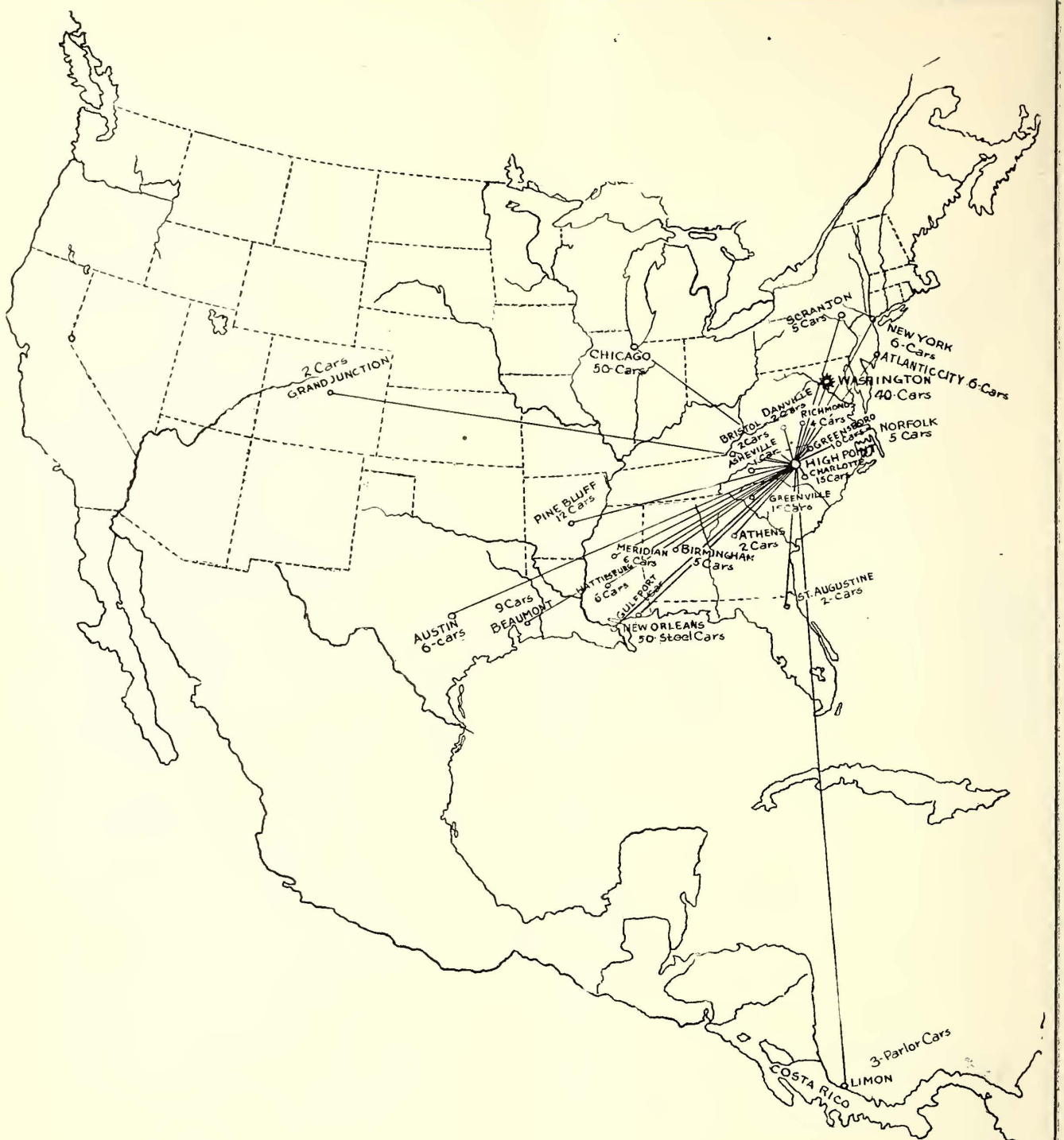
## ST. LOUIS CAR COMPANY, St. Louis

Electric and Steam Railway Coaches, Steel Cars, Trucks and Journal Bearings,  
Curtains, Seats, Rattan, Bronze Trimmings, Miscellaneous Car Supplies.

Eastern Representative:  
WENDELL & MACDUFFIE CO.  
61 Broadway, NEW YORK

Pacific Coast Representative:  
GUS KOCH  
797 Monadnock Bldg., SAN FRANCISCO





OUR Third Anniversary; we have reached the greatest railway centers in America and have our product operating in eighteen different states. If you are not a customer, let us on our next anniversary have your town on our map with both your patrons and yourselves pleased.

**SOUTHERN CAR COMPANY**  
High Point, N. C.





# 1

**The first obligation of public utilities engaged in transportation is service to the public. The first essential of service is safety.**

*—From Code of Principles  
Adopted by A. E. R. A.*

The greatest aid to passenger safety developed for the benefit of the electric railway industry during the last decade is the

## Prepayment Car

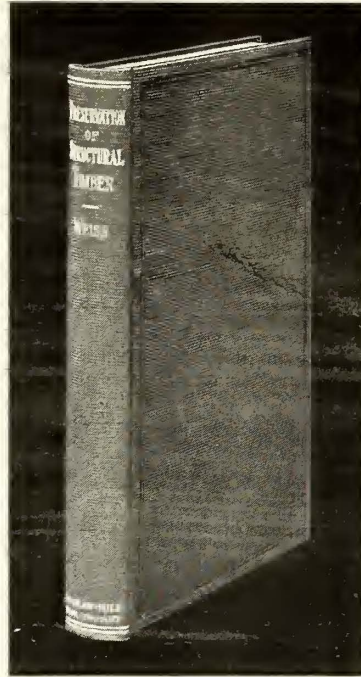
It has made boarding and alighting accidents a thing of the past on hundreds of roads. It has saved thousands of lives, prevented tens of thousands of injuries and conserved millions of dollars which otherwise would have been paid out in litigation and damages.

If the development of the Prepayment car patents had accomplished nothing more than this, it would still merit the whole-hearted endorsement of the entire electric railway fraternity.

**PREPAYMENT CAR SALES COMPANY**



## Now Ready



Delivered to your desk for free examination.

No advance remittance is required.

312 pages, 6 x 9, fully illustrated.

\$3.00 (12/6) net, post-paid.

A broad, yet thorough treatment of the wood preservation industry.

It contains valuable data on the preservation of cross ties, poles, cross arms, posts, paving blocks, timber, etc., etc.

# THE PRESERVATION OF STRUCTURAL TIMBER

By HOWARD F. WEISS

Director, Forest Products Laboratory, U. S. Forest Service; Honorary Member, American Wood Preservers' Association.

In all the extensive literature of the wood preservation industry this is the first book to cover systematically the subject in its broad aspect. It gives a complete survey of the entire industry.

Mr. Weiss, as Director of the Forest Products Laboratory, U. S. Forest Service, has had at his command the very best of material. This material, together with data obtained during his years of personal contact with the development of the industry, forms the nucleus of this book.

Among the special features are:

- Records on the life and durability of timbers.
- Process for prolonging life of cross ties.
- Process for prolonging life of poles.
- Process for prolonging life of paving blocks.
- List of manufacturers of wood preservatives and wood preserving plants.

#### CHAPTER HEADINGS:

- I. Introduction.
- II. Factors which cause the deterioration of structural timber.
- III. Effect of the structure of wood upon its injection with preservatives.
- IV. Preparation of timber for preservative treatment.
- V. Processes used in protecting wood from decay.
- VI. Preservatives used in protecting wood from decay.
- VII. Construction and operation of wood preserving plants.
- VIII. Prolonging the life of cross ties from decay and abrasion.
- IX. Prolonging the life of poles from decay and insects.
- X. Prolonging the life of fence posts from decay.
- XI. Prolonging the life of piling and boats from decay and marine borers.
- XII. Prolonging the life of mine timbers.
- XIII. Prolonging the life of paving blocks.
- XIV. Prolonging the life of shingles.
- XV. Prolonging the life of lumber and logs.
- XVI. Protection of timber from fire.
- XVII. Protection of wood from minor destructive agents.
- XVIII. Strength and electrolysis of treated timber.
- XIX. Use of substitutes for treated timber.
- XX. Appendices.

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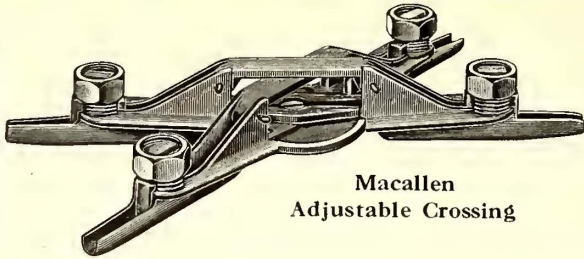
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F. D. Lawrence Electric Co., Cincinnati, O.

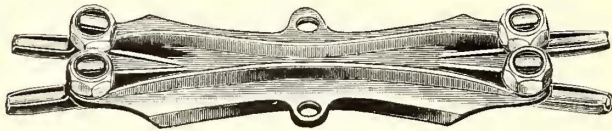
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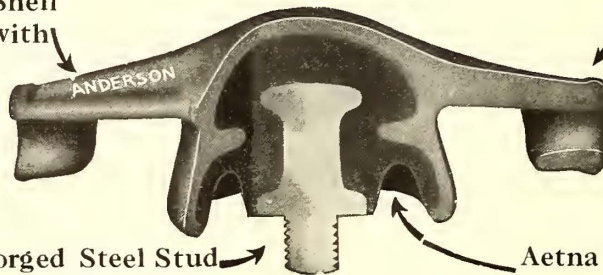
The Macallen Company  
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Malleable Iron Shell  
Great Strength with  
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There's an extra margin of strength that can be *counted* on in Anderson overhead specialties. Take the above suspension for instance; consider its malleable iron shell that minimizes weight yet gives extra strength.  
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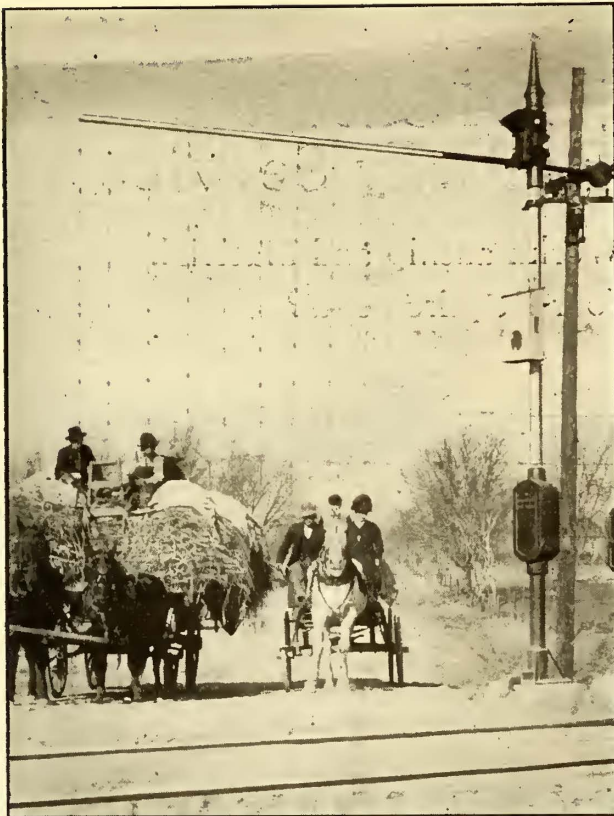


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*On Comes the Traveller!*  
*On Comes the Train!*  
**An Accident!**

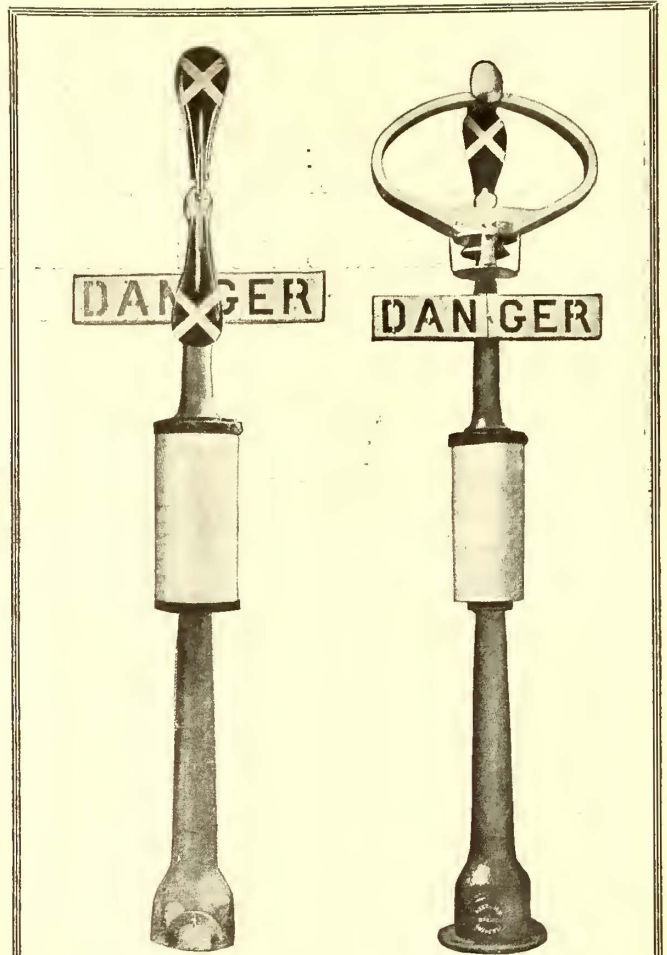
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**NO—there's a  
COOK AUTOMATIC  
SIGNAL GATE  
Guarding the Crossing**

Let the train come—down goes that moving arm—down goes the barrier—loud rings the warning bell. And in the night, when the bell might annoy, the brilliant red light gleams its danger signal—the illuminated semaphore and barrier shine out in relief against the dark. Safety is assured—if your crossings are guarded by the Cook Signal Gate. Get complete details.

**The Cook Railway Signal Co.**  
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**BOTH** these Signals  
**WAVE** their Warning!  
One of them also  
**SOUNDS** it like a Locomotive!  
**BOTH** give  
Red Flashing Light  
Warnings at Night!

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Whatever your traffic requirement, it can be met successfully by one or the other of these signals, and with maximum certainty and safety and minimum installation and maintenance cost.

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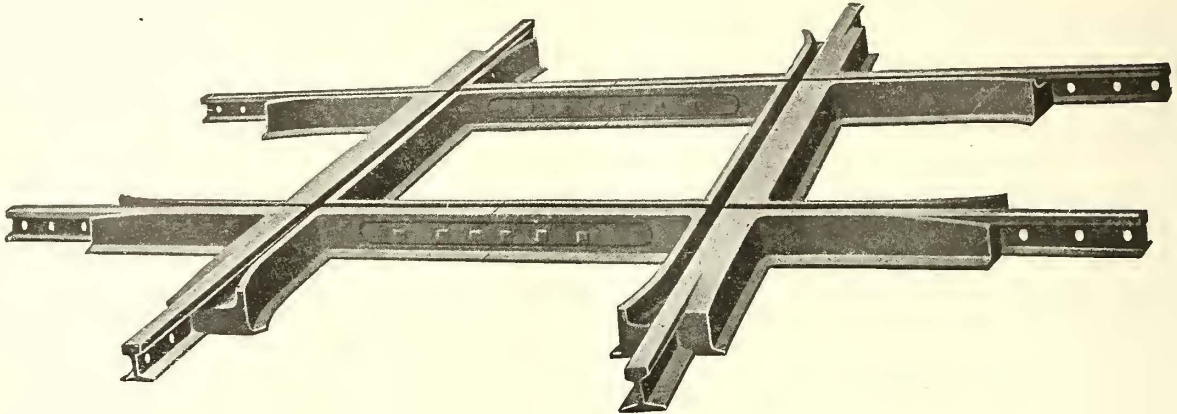
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Products of the Highest Grade Workmanship and Material.  
May we Estimate on Your Requirements?



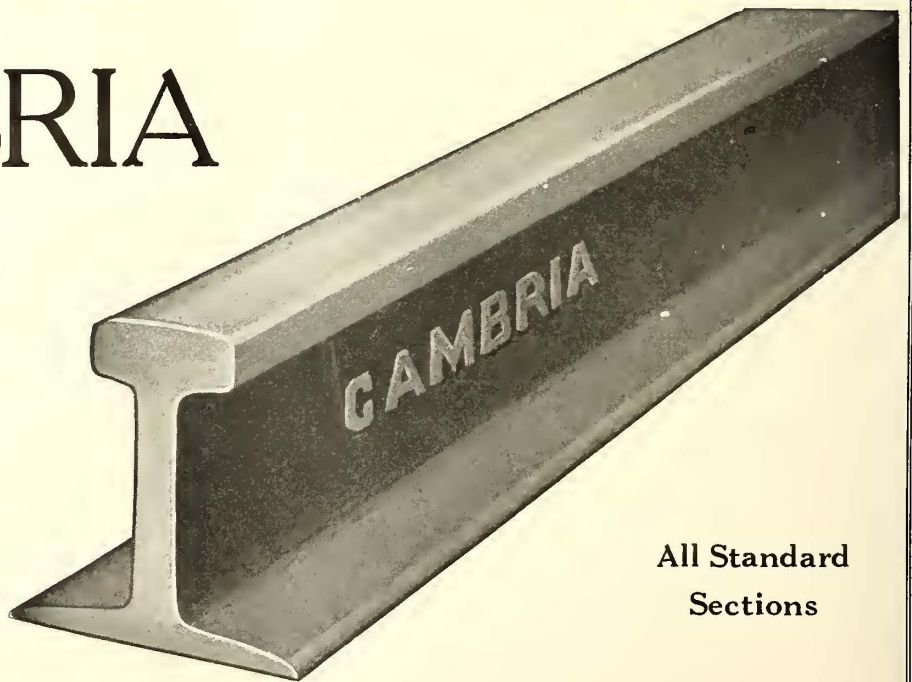
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Sales Offices: Atlanta, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Detroit, New York, Philadelphia,  
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# SCALE

Removed and Prevented

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And Pitting Stopped

# FEED PUMP

Made to Run Better

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Very truly yours,

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Engineer.

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The Pioneer

# Boiler Graphite

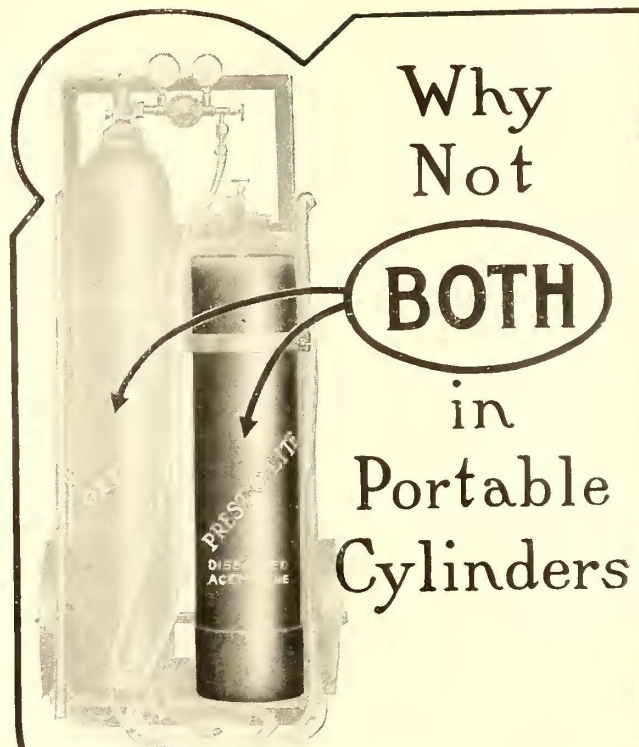
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Send for "Graphite For The Boiler," No. 108

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## A Complete Oxy-Acetylene Welding Plant That Is Truly Portable

The use of Prest-O-Lite Dissolved Acetylene with any make of Oxy-Acetylene welding or cutting apparatus provides large advantages in portability, economy, simplicity and highest efficiency. Effects important savings of time, labor, and material in railway operation where sudden breakdowns of machinery and equipment are likely to occur at critical times. The complete welding plant is rushed to the spot and the repair made instantly without delays, dismantling or costly replacements.

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are sent from our factory with absolutely true capacity printed on the label. Owing to the fact that they operate without an arc, the cartridge remains undamaged and can be refilled a number of times.

"Noark" Fuses outnumber all others in sales—because they are absolutely reliable. Their reputation has been built by years of perfect service.

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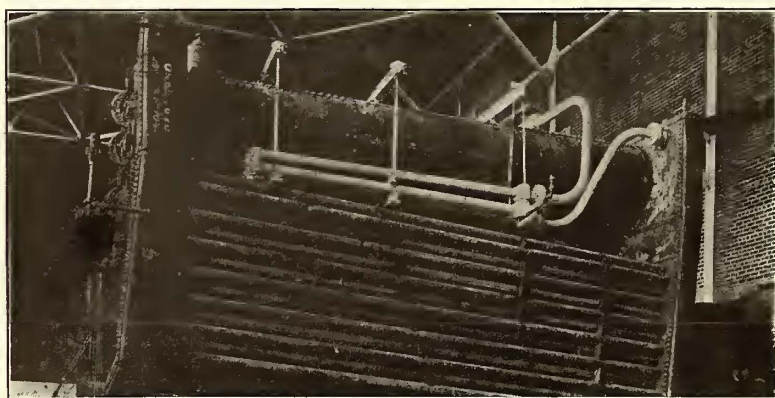
"DO IT ELECTRICALLY"

2962



# Foster Patent Superheaters

## In United States Navy Service



Foster Superheater combined with Edge Moor water tube boilers at Mare Island Navy Yard, San Francisco  
The U. S. navy yards at New York, Philadelphia, Boston, Washington, San Francisco, Puget Sound, Norfolk, Charleston, Indian Head and Pearl Harbor are also equipped with Foster Superheaters.

Why does the United States Navy use *superheat*? Why did the Navy Department adopt FOSTER Superheaters? Because *superheat* means *more* efficiency to the power plant. And FOSTER Superheaters mean *MOST* efficiency to the power plant.

Nothing goes into the service of the Navy without first passing the most rigid tests. Nothing *stays* in the Navy service that doesn't make good up to the maximum degree of efficiency. Foster Superheaters *made good*—in one installation after another.

Foster Superheaters have made good for the last twelve years. They are making good in powerhouses from coast to coast. They save coal, increase turbine and engine output, cut down wear and tear on turbine blades and engine cylinders. Write for details. Find out *why* and *how* Foster Superheaters save money. Get the facts.

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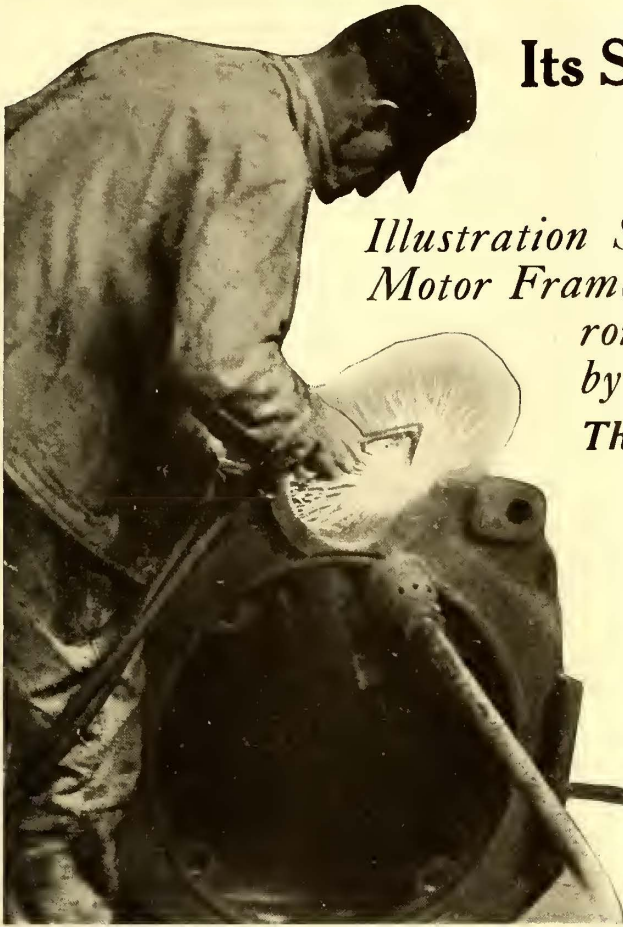
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## Its Savings in Shop or Field

Very Soon Pay For It!

*Illustration Shows Repairs Being Made to Motor Frame in Wheaton Shops of the Aurora, Elgin & Chicago Railroad, by means of*

### The **OXWELD** Process

If you could appreciate as we do and as do the hundreds of users all over this country, the large savings being accomplished through oxy-acetylene welding, you would not delay longer in equipping your shops with an Oxweld Outfit.

In every comparative test of importance conducted up to this time, Oxweld equipment has performed a given amount of work with a saving of 20 to 60 per cent in gas consumption.

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because the parts are simple and few; all working parts are made of steel—in fact Ford was first to substitute steel parts for cast iron in planetary gear hoists; all the gears are covered by an independent dust-proof steel case and it lowers smoothly and rapidly and holds the load securely.

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All Chains and Hooks used on Ford Triblocs are made from carefully selected steel stock and are subject to the most rigid inspection and test before they are attached to a hoist.

They are illustrated and described in our booklet which covers our entire line and gives prices. A copy is yours for the asking.

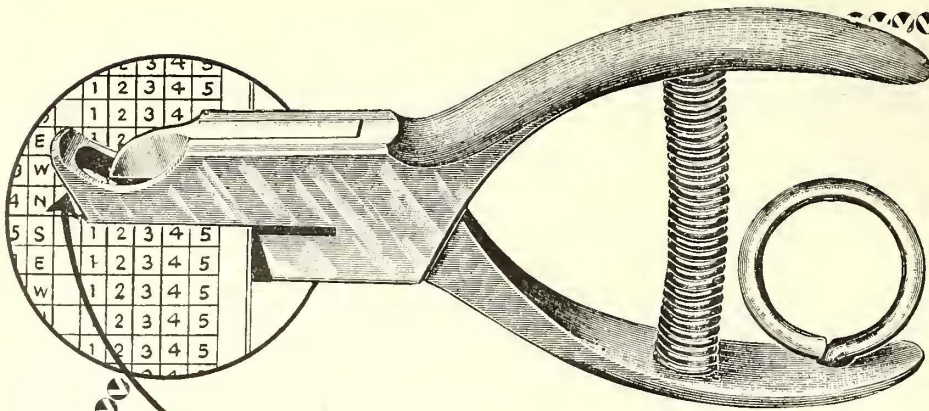
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**FORD CHAIN BLOCK & MFG. CO.**

142 OXFORD STREET

PHILADELPHIA, PA.





# B-V Visible Punches

## Standard Open Sight Punch Quick and Accurate

The conductor can see *through* the punch, enabling him to punch the correct spot with speed and precision. This is a great advantage, especially on lines where traffic is heavy, promoting better service in behalf of both

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The tool steel dies in B-V Punches insure long service and economy. They cost no more than the ordinary kind. Send for prices and catalog.

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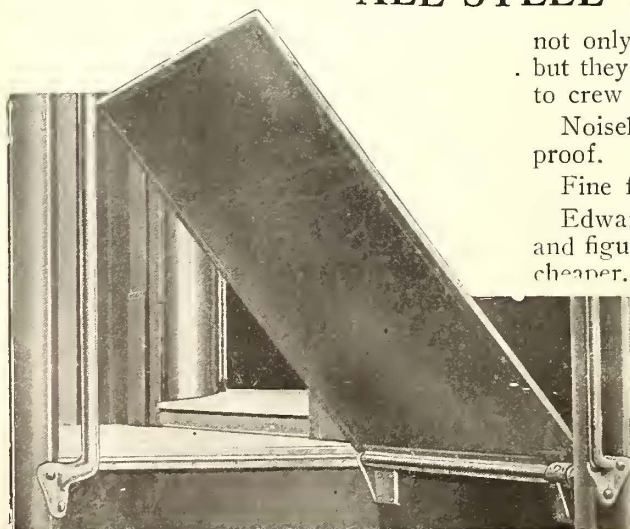
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## Warped doors mean impaired service

Now is the time to take measures to forestall the ravages of winter on your traffic schedules. Use equipment on your cars that isn't affected by snow and sleet and you've taken a big step toward uninterrupted schedules.

# EDWARDS

## ALL STEEL TRAP DOORS



not only are much stronger and more durable than wood, but they don't warp, swell and stick—causing inconvenience to crew and passengers, alike.

Noiseless and positive in action and virtually trouble-proof.

Fine for interurban service.

Edwards Doors mean year in, year out satisfaction—and figuring on the fixtures necessary with wood doors, are cheaper.

Get the catalogs.

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Window Fixtures  
All Metal Sash Balances  
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Metal Extension Platform Trap Doors  
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**I**T has been truly said that "the alloy which may be best for use in Trolley Wheel service may be far from being the best for bearing use" and this is why the

# KALAMAZOO Trolley Wheels



are so satisfactory, the rims of which are made of a soft but tough metal having long life without injury to the wire, and the bushing of *bearing* metal, a combination impossible in a one-part wheel.

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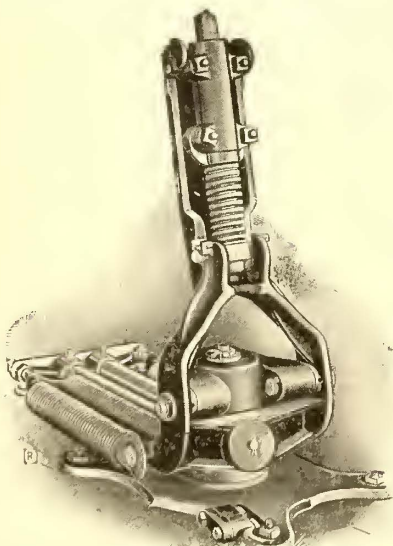
## THE STAR BRASS WORKS

Kalamazoo, Mich.

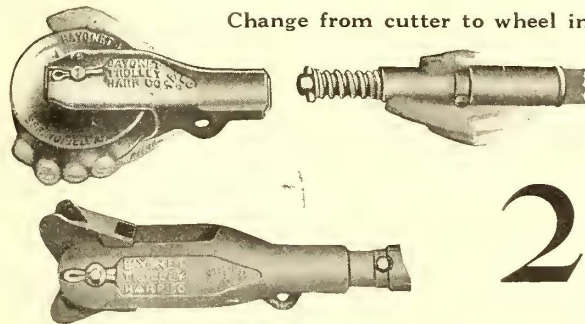
### DON'T BURN UP WHEELS IN SLEET STORMS

Remove them entirely from the pole by using the Bayonet Harp, and replace with the Bayonet Sleet Cutter, reducing pole-end weight, increasing pressure necessary to crush and scrape the ice clean from wire. Saves wheels, costs half as much, and lasts twice as long and has double the efficiency of any other cutter made. Never comes off in service, nor tears down overhead.

**Bayonet Anti-Friction Base has all wearing parts bushed. Self-Lubricating. Non-Breakable. Poles Changed in One Minute.**



Change from cutter to wheel in 20 seconds.



**25c**

No rusty nuts to unscrew, no hunting the monkey wrench to take off that damaged trolley pole. No tools. Just your hands. No special tools or hammers necessary to change a trolley wheel. No patching up or lubricating trolley on top of car. Do this at the work bench where it can be done right. Wheels running in Bayonet Harps give a third more mileage and if they are Bayonet wheels you will get double your present mileage. Bayonet stands for efficiency and economy. We give you better service and more improvements for your money than anyone. *Sold subject to approval. Satisfaction or no money.*

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Springfield, Ohio, U. S. A.

WILLIAM R. GARTON, Sales Engr., Eastern Representative, 299 Broadway, New York



... covering seems unattainable. Steel conduit was being used more widely but, on no account should it be used for the length of cable from the trolley or conductor base to the lightning arrester and from the lightning arrester to ground owing to the impedance which it would offer to a discharge of lightning. This length should be protected by fireproofed and watertight hard-wood or fiber molding.

*Specification for Light Carbon-Steel Wheels*

**We suggest**  
for car wiring

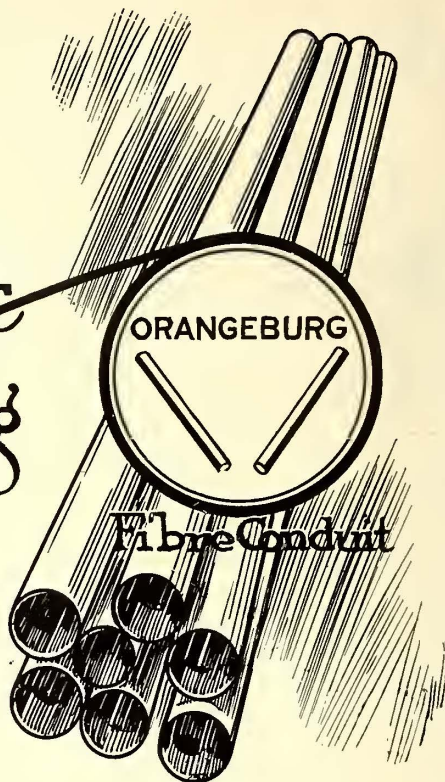
ORANGEBURG Fibre Conduit is admitted to be the **Lightest**. Striking proof of its **Insulation** Resistance in Report of Electrical Testing Laboratories, in our catalog "R"

**The Fibre Conduit Company**

Orangeburg, N. Y.

New York  
Boston

Chicago  
San Francisco

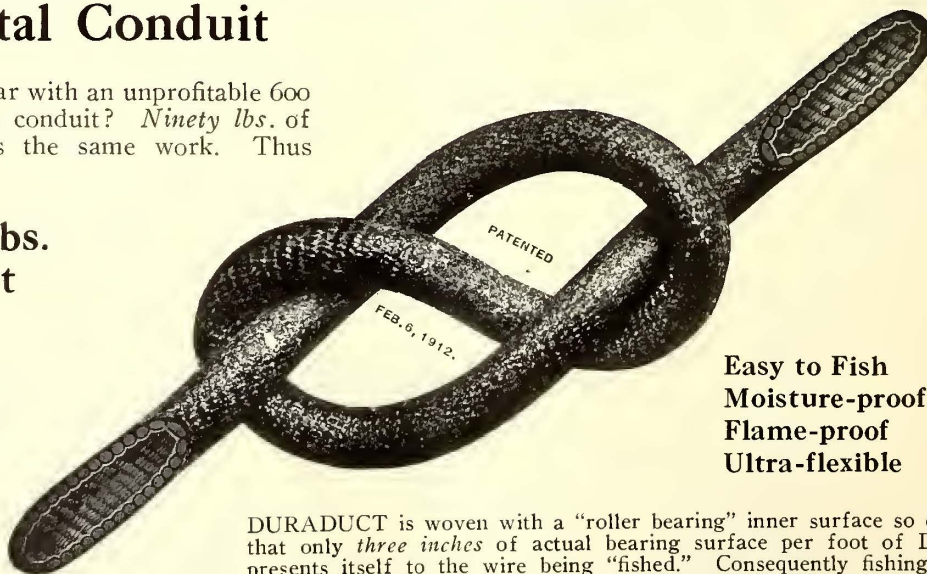


41400

**DURADUCT Weighs 85% Less than Rigid Metal Conduit**

Why burden your car with an unprofitable 600 lb. load of metallic conduit? *Ninety lbs.* of DURADUCT does the same work. Thus DURADUCT

**Saves 500 lbs. Dead Weight per Car**



**Easy to Fish  
Moisture-proof  
Flame-proof  
Ultra-flexible**

DURADUCT is woven with a "roller bearing" inner surface so designed that only *three inches* of actual bearing surface per foot of Duraduct presents itself to the wire being "fished." Consequently fishing is easy when Duraduct is used. And the extreme flexibility of the Duraduct itself renders its installation far less costly than that of rigid metallic conduit. An *examination* of Duraduct will prove to you its superior advantages for your work. Let us send you a sample. All you need do is *mail the coupon*.

Mail the Coupon

**Tubular Woven Fabric Co., Mfrs., Pawtucket, R. I.**

A. Hall Berry, General Sales Agent, 97 Warren St., N. Y.

Mail this coupon for sample of DURADUCT

Name .....

Street .....

City .....

State .....

Please send the above a sample of Duraduct with details of same.

71845-P



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FARE REGISTERS  
TROLLEY RETRIEVERS  
TROLLEY CATCHERS  
TROLLEY WHEELS

## THE NEW HAVEN TROLLEY SUPPLY COMPANY

NEW HAVEN, CONN.

MANUFACTURERS OF FARE REGISTERS AND RAILWAY SUPPLIES

### Valdosta Lighting Company

Valdosta, Georgia

August 21st, 1914.

W. S. SAGER  
GENERAL MANAGER

Pyrene Manufacturing Company,  
1358 Broadway, N. Y.

Gentlemen:

We have used your Pyrene fire extinguisher with the greatest of satisfaction. On three different occasions we have extinguished a 2300 volt fire. One being on a 650 K.W. Westinghouse person turbine pulling a 450 ampere load. With the aid of your extinguisher we were able to hold the fire in check until we were able to get another machine on the line, which required about fifteen minutes. On another occasion, we had a 2300 volt, 150 K.W., synchronous, pulling a street car system, the insulation of which broke down and caught fire. With the aid of your extinguisher we were able to extinguish the fire and run the machine the balance of the night without having to change over to another machine. On another occasion, we had trouble on our arc circuit (2300-volt). The engineer accidentally pulled the wrong plug, creating a 36 ampere arc across the terminals, and with the aid of Pyrene, we were enabled to break this arc and repair our troubles without cutting out the other arc circuits.

Very truly yours, *John W. Grant*

Superintendent, Valdosta Lighting Company.

C/S  
5  
678

## Be Sure to Read this Letter

No more conclusive evidence of the value of Pyrene could be desired than is contained in the accompanying letter.

## It Gives Convincing Proof of the Arc-Killing Efficiency of

*Pyrene*  
TRADE MARK

Saving machines and equipment worth many thousands of dollars, and killing arcs of thousands of volts, is the everyday work of Pyrene.

Is your plant Pyrene-protected? Write.

## Pyrene Manufacturing Company

1358 Broadway, N. Y.

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Alton	Charleston, W. Va.	Fargo, N. D.	Phoenix
Anderson, S. C.	Chicago	Jacksonville	Pittsburgh
Atlanta	Cincinnati	Louisville	Richmond
Baltimore	Cleveland	Memphis	St. Louis
Birmingham	Dayton	Milwaukee	St. Paul
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Buffalo			York, Neb.

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# “Standard” Wheels make good Cars better



The above express car used in freight service by the New Bedford & Onset Street Railway weighs fully equipped 57,000 pounds. Loaded, the total

weight carried on the wheels runs up as high as 89,000 pounds. It is equipped with “Standard” No. 1085 Rolled Steel Wheels.



“THE ‘STANDARD’ BRAND ON YOUR MATERIAL IS AN ASSURANCE OF EVENTUAL ECONOMY”



Tires,  
Axles,  
Springs,  
Forgings,  
Gear Blanks,  
Rolled Steel Wheels  
18371

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Rings,  
Castings,  
Roll Shells,  
Pipe Flanges,  
Steel Tired Wheels



“Still  
the  
Best”

# Time

and

## Le Carbone Brushes

Time is still the unerring standard by which to judge carbon brushes. It isn't the cost per brush—it's the cost PER YEAR OF BRUSH SERVICE. This is the cost that figures in favor of Le Carbone Brushes. They are the cheapest you can afford to buy. They always have been. They always will be. Their quality is uniform. Start the new year by using Le Carbone Brushes.



1900  
1901  
1902  
1903  
1904  
1905  
1906  
1907  
1908  
1909  
1910  
1911  
1912  
1913  
1914  
1915

**W. J. JEANDRON**  
172 Fulton Street  
NEW YORK CITY





## This Index Prevents Destination Display Errors

Many a passenger has been subjected to an irksome wait because the car he should have taken passed him with an incorrect destination display. Had a proper **destination index** been provided even the dullest motorman or conductor could make no such annoying error. That's one strong reason why you need

## THE CREAGHEAD DAY AND NIGHT CAR SIGN

But the **index** is not the only advantage of the Creaghead. The handy crank arrangement means quick change of display—no time is lost. And the Creaghead never sticks—always works easily and freely, yet keeps the display tight and taut at all times. Lettering is always kept clean and legible—it shines out clear and distinct night and day. An illegible sign is worse than none. To insure good sign service inquire about the Creaghead. Write now.

Creaghead Engineering Co.  
Cincinnati, Ohio



## Quadruple Protection

—four operating movements—every one **positive** in action—is the multiple safeguard that saves life and limb to the public and dollars and cents to the electric railway that adopts

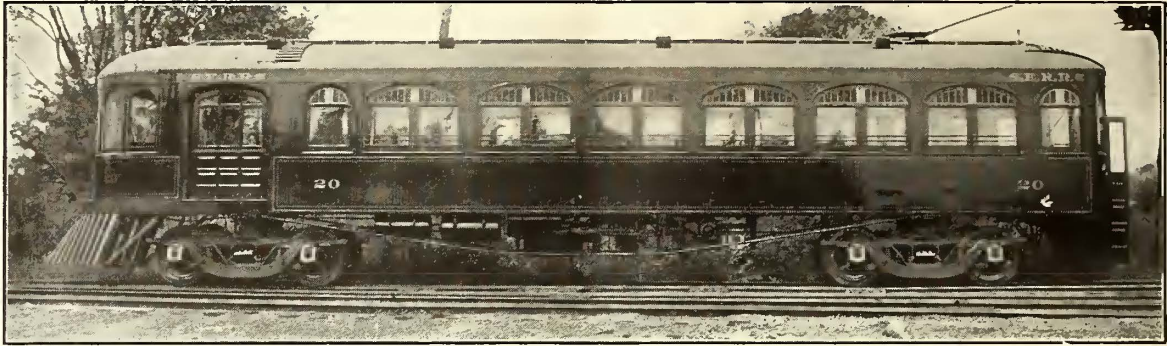
## PARMENTER FENDERS

Parmenter Fenders not only scoop up man, woman or child with automatic precision, but also provide perfect protection against the shock of collision and the dangerous rebound following.

Write for details of the 1914 model with the yielding and locking apron.

Parmenter Fender & Wheel Guard Co.  
89 State St., Boston, Mass.





## New End-Entrance Car built for the Stark Electric Railroad

The novel idea of placing the door-location at the end of the above car to facilitate prepayment renders this example of Jewett construction of special interest. Let us furnish estimates on *your* specifications.

**The Jewett Car Company**  
Newark, Ohio

71698

No Play on  
End Thrust  
Discs



No Leakage  
of Oil

**Easily Cared for by  
an Ordinary Mechanic**

Rollway bearings have established their ability to make heavy savings in power, lubrication and maintenance costs.

They have been developed mechanically until they now squarely meet every demand of railway operators.

The elimination of play on the end thrust discs and the making of an absolutely oil-tight case have gone far to improve an already good service. The maintenance of Rollway bearings can now be entrusted to the care of an ordinary mechanic. Write us for facts and figures on Rollway service.

**Railway Roller Bearing Co.,**

**Syracuse, N. Y.**



**Over 10,000 "PV"  
Valves in use**

**The Best Proof**  
of the high efficiency of

*National*

**"PV" Brake Valves**

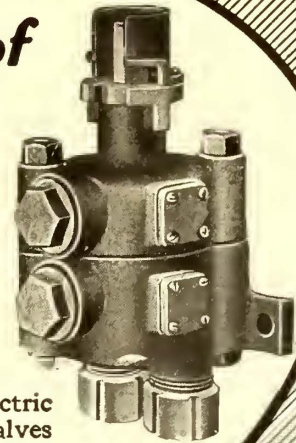
can be found in their general adoption by many of the largest electric traction companies. They are so far superior to all other types of valves that during the short time they have been on the market we have already filled orders for

**Over Ten Thousand**

Have you sent in your order yet? If your cars are not yet equipped with these valves, better write now for Bulletin E388—it tells all about them; OR send us a trial order for one and test it out under your own particular service conditions.

**National Brake & Electric Co.**

Works at Milwaukee, Wis.

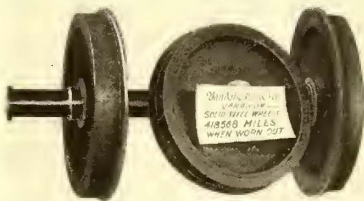


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Chicago. . . . .827 Railway Exchange  
St. Louis. . . . .318 Security Building  
Pittsburgh. . . . .Ninth and Penn Avenue  
London, England. . . . .14 Great Smith Street

**VANADIUM WHEELS**

**Averaged 383,190 Miles**



This is the record to date of 16 Carnegie vanadium rolled steel tender wheels in service on the Vandalia Railroad. They were applied in 1909 to 7500 gallon tenders running in passenger service.

Mileage per 1/16 in. diameter wear plus turning has averaged 6790 miles.

In comparison, carbon rolled steel wheels in the same service averaged 2427 miles per 1/16 in. wear and turning.

For interurban roads in Michigan, the average mileage per 1/16 in. diameter wear and turning of carbon rolled steel wheels is, according to records, 2673 miles.

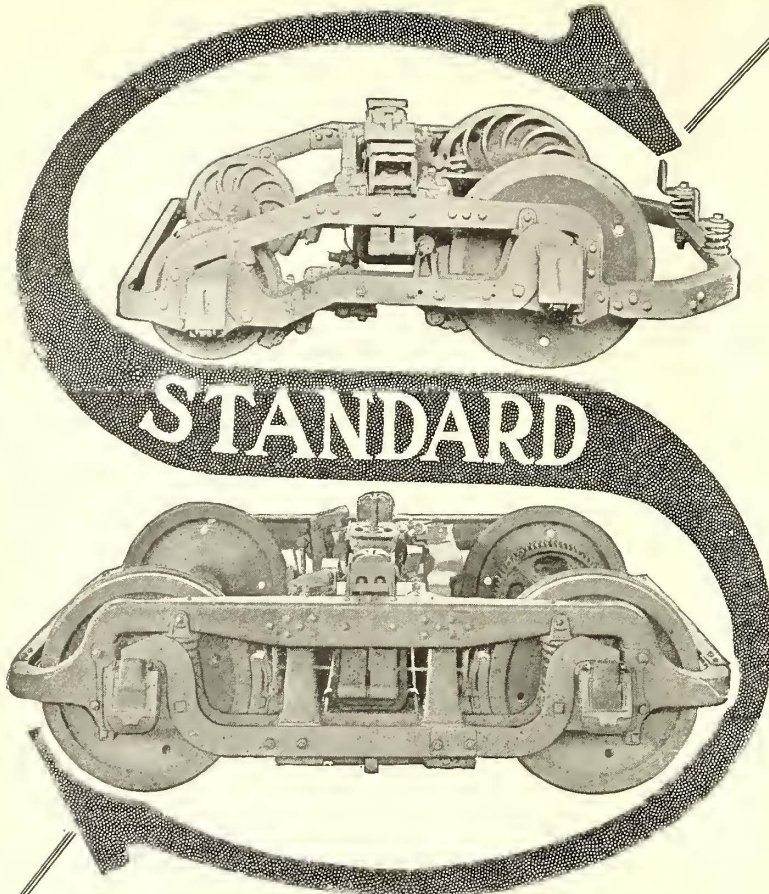
These comparisons are striking proof of the superior wearing qualities of vanadium wheels. Consider them for your traction service.

Let us send you further information.

**AMERICAN VANADIUM COMPANY**

343 Vanadium Building, Pittsburgh





## Standard Trucks for Every Service

THIS STANDARD O-36 SINGLE MOTOR DOUBLE TRUCK meets the demand for a "Light Weight" Maximum Traction Double Truck. It weighs 4500 pounds (per truck) with one-wear steel wheels. The brake shoes are carried on the equalizer bars. Holes in the levers and brake rigging are steel-thimbled and the bolts are case-hardened. Journals are carefully machined and burnished. It will carry safely car bodies weighing from 16,000 to 22,000 pounds; maximum load at king pins of 36,000 lbs. These trucks are in service in New York, Jacksonville, Springfield, Worcester, Savannah, Newark, Washington, Dayton, Houston and Jackson, Michigan. THIS IS THE LIGHTEST WEIGHT TRUCK OF THIS TYPE MANUFACTURED. Also made 45,000 capacity—the O-45 truck.

THE STANDARD C-50-P "LIGHT WEIGHT PRESSED FRAME" DOUBLE TRUCK meets the demand for a Safe and Durable Light Weight, "Suburban" Inside Hung Motor, Double Truck. The Side Frames, End Frames and Transoms are pressed from sheet steel plates into Channel-shaped sections, which form gives the lightest practicable weight of metal for the required strength. The Brake Rigging is Solid Forged Steel, same as on all of our trucks. Steel thimbles and case-hardened bolts are used on all wearing parts. These trucks are in service in Pittsburgh, Newark, Indianapolis, Mansfield, Pittsfield, Springfield and Worcester.

**STANDARD MOTOR TRUCK COMPANY, Frick Bldg., PITTSBURGH, PENN.**

Pacific Coast Agents: Eccles & Smith Co., Inc. Offices, San Francisco, Cal.; Los Angeles, Cal.; Portland, Ore.

New York Office: 170 Broadway. Works: New Castle, Pa.

Chicago Office: Fisher Building

## "Taylor-Made" Trucks

Simplicity of Construction—Low Cost of Maintenance—Ease of Riding

The new cars of the United Traction Co., Albany, N. Y., are mounted on TAYLOR IMPROVED S. B. DOUBLE TRUCKS.

We SPECIALIZE on TRUCKS, and build them RIGHT for YOUR Service requirements. Write us for quotations, portfolio of Truck Photos and data.

We also manufacture T. M. C. Steel Tired Wheels and TAYLOR-MADE Elliptic and Coil Springs for all makes of trucks.

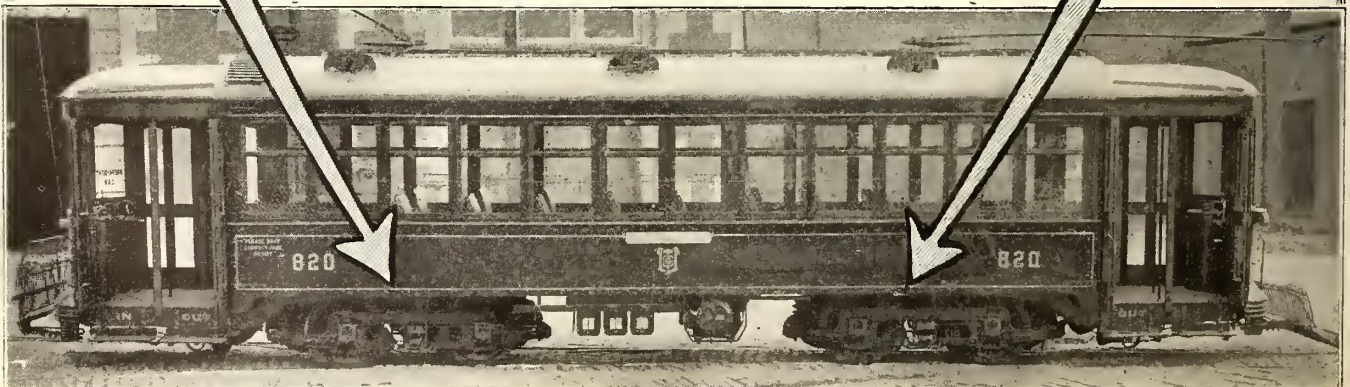
## Taylor Electric Truck Co.

Established 1892

Main Office and Works:  
TROY, N. Y.

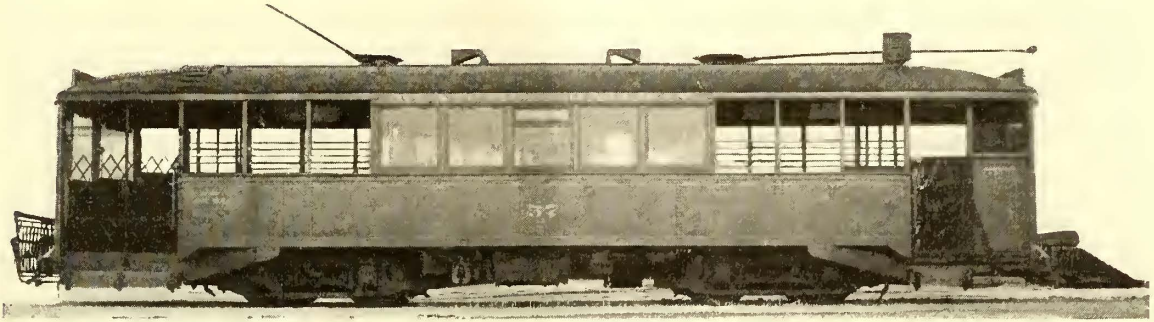
CHICAGO OFFICE:  
First National Bank Bldg.

7585





## The Municipal Railway System of San Francisco USES BALDWIN TRUCKS



Class "L-plate" trucks have been placed under 125 city service cars, as illustrated above.

WHY?—Safety First. Third, Simple Construction.  
Second, Economical Maintenance. Fourth, Noiseless Operation.

### THE BALDWIN LOCOMOTIVE WORKS

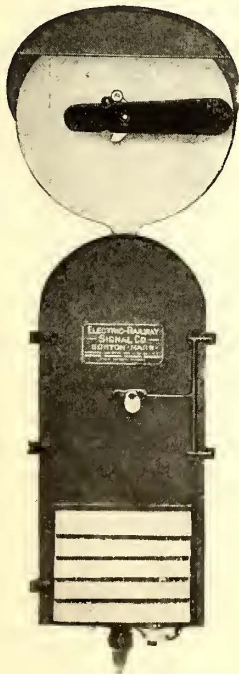
Philadelphia, Pa.

REPRESENTED BY

Charles Riddell, 625 Railway Exchange, Chicago, Ill.  
C. H. Peterson, 1610 Wright Building, St. Louis, Mo.  
F. W. Weston, 50 Church Street, New York, N. Y.

George F. Jones, 407 Travelers Building, Richmond, Va.  
A. Wm. Hinger, 722 Spalding Building, Portland, Ore.  
Williams, Dimond & Co., 310 Sansome St., San Francisco, Cal.  
J. A. Hanna, Niles, Ohio.

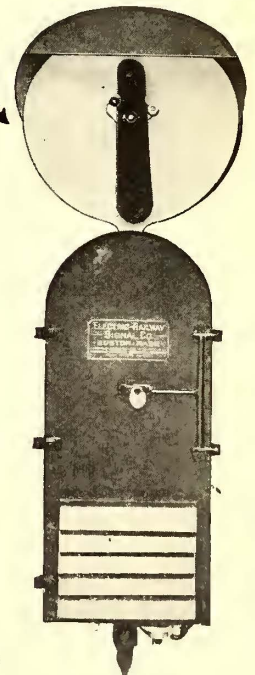
## The Vividly Red Semaphore against the White Background Arrests Attention



Decades of service in the steam railway field first soundly established the semaphore signal as the positive and most surely effective means of signaling. For years this principle has held good. In

### Chapman Automatic Signals

semaphore indications are used—illuminated semaphore at night. The highly developed Chapman mechanism assures minimum maintenance with absolute reliability in operation. The vividly red semaphore arm sharply outlined against the white background arrests attention. This means SAFETY.

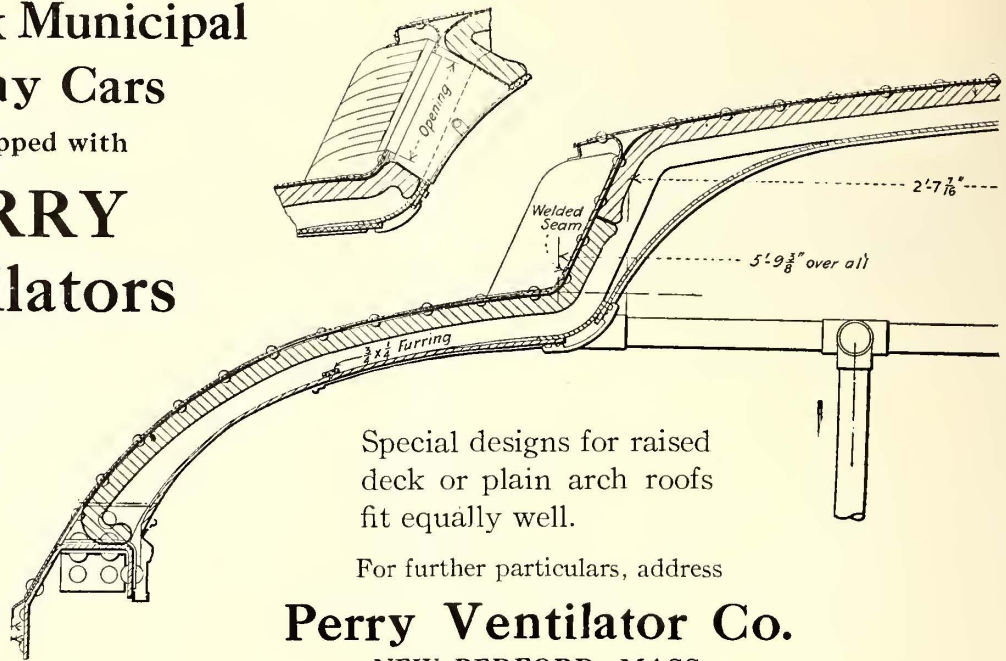


**CHARLES N. WOOD CO., 79 Milk St., Boston, Mass.**



# The Last Word in Car Construction

## New York Municipal Subway Cars are equipped with **PERRY Ventilators**



Note— The Ventilators are virtually a part of the roof.

Special designs for raised deck or plain arch roofs fit equally well.

For further particulars, address

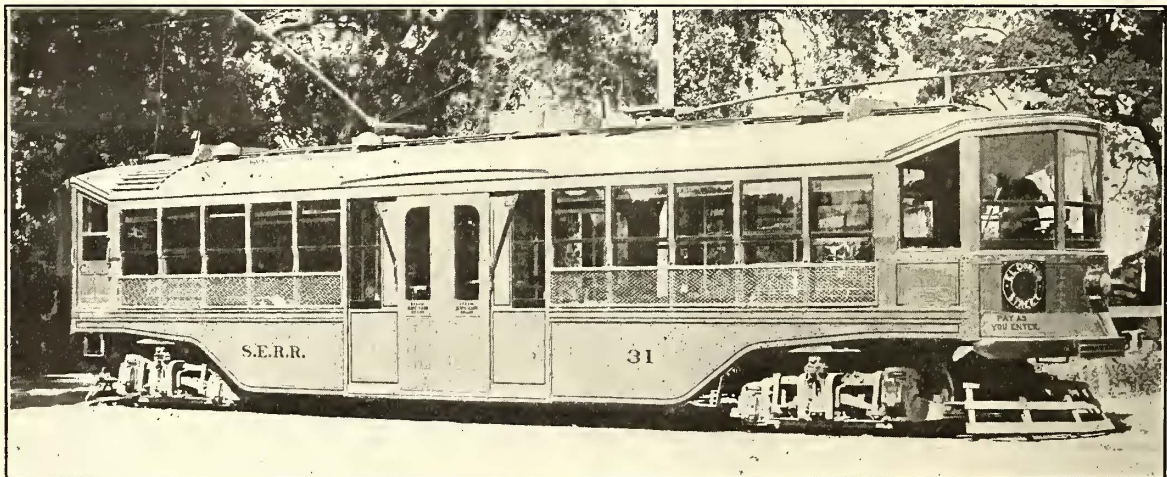
### Perry Ventilator Co.

NEW BEDFORD, MASS.

Sales Manager:

F. C. Stowell, 200 Devonshire St., Boston, Mass.

9631



## Where VENTILATION Counts

—the "Globe" is used

The new cars of the Stockton (Cal.) Electric Railroad have been featured as one of the noteworthy productions of 1914. Ventilation has been carefully provided for. Motors are of the ventilated type and the

car itself is provided with the utmost in ventilation—"Globe" Ventilators. The best service calls for the specification of "Globe" Ventilators. Write for data.

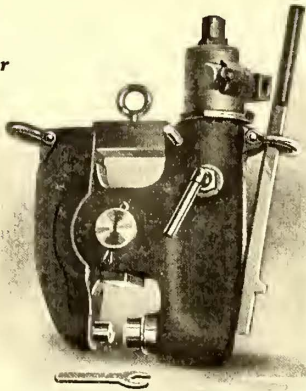
### Globe Ventilator Co., Troy, N. Y.

3928



# HYDRAULIC TOOLS FOR TRACK MAINTENANCE

*Hydraulic  
Rail Bond  
Compressor*



*35 Tons  
Capacity*

Here are shown two of our line of tools for track use; built to withstand the rough handling of unskilled labor.

Designed to meet the demands of metropolitan railway service where speed and rapid adjustment are essential features, this compressor has been found to more than satisfy its many users.

It can be set, the bond made and the compressor removed in 1½ minutes; but one compression is required to make an accurate bond.

### RAILBENDERS

Our line of railbenders is large, covering all types, hand operated or power.

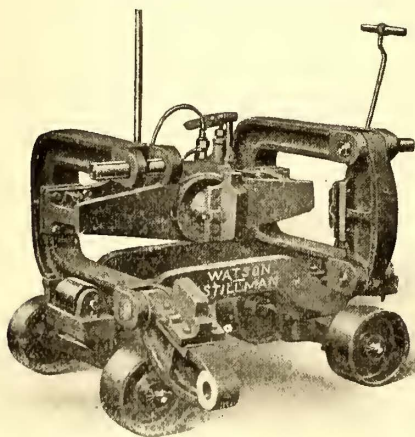
The tool shown below is an improvement over similar forms, being stronger and equipped with formed bending blocks. The yoke swings back for the rail to be inserted sideways.

The ram can be thrown out against the work or withdrawn by rack and pinion and there is easy accessibility of working parts.

Other labor saving hydraulic tools of our manufacture, are punches, railbenders, shaft straighteners, jacks, motor lifts, forcing presses, etc.

Write for catalogs.

*Portable Rail Bender*



## The Watson-Stillman Co.

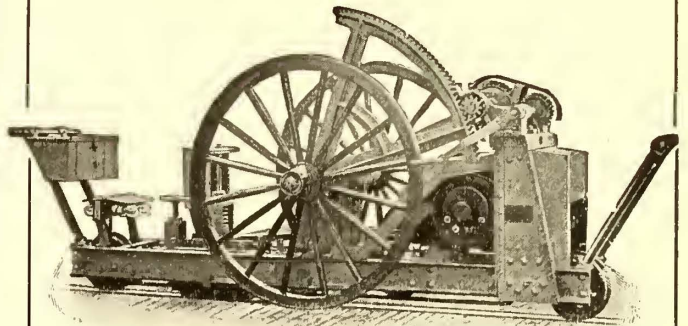
Engineers and Builders of Hydraulic Machinery



46 Church St., New York

Chicago, McCormick Bldg.  
Philadelphia, The Bourse.

273



## Doomed Rails Restored

by the

# Reciprocating Track Grinder

The Third Avenue Railway, New York, had a stretch of corrugated track that was ready for renewal. Instead of **renewing** it they put a Reciprocating Grinder to work and **restored** it.

The fact that they have since added another Reciprocating Grinder to the M. of W. Dept. indicates the value this representative road places upon the Reciprocating Grinder.

Remember, the Third Avenue road operates through unusually congested quarters—so the quick de-rail feature makes this grinder ideal for such conditions.

The planing action smooths out the high spots—trues up joints—and the **machine** does all the work, doesn't need a skilled operator.

Write for the Reciprocating proposition.

## Railway Track-work Co. Heed Building, Philadelphia

9633





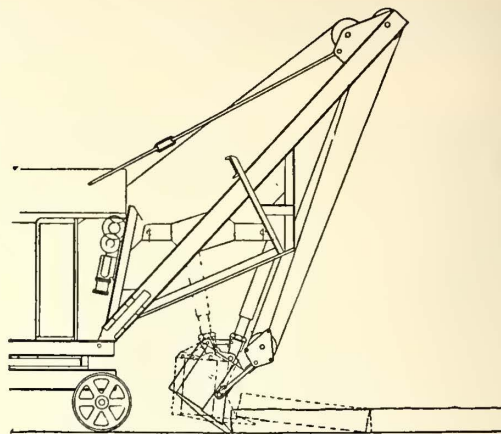
### Here Is The Thew's Work

Shallow cuts—removal of old macadam for track laying—grading work in close quarters—tearing up old track, etc.—these are your problems. The Thew is designed especially for such work. *The horizontal crowding motion of The Thew cuts clean and true to grade—does the work quickly and cheaply.*

Used on old macadam or concrete foundations, the *crowding motion is reversed to apply a powerful prying motion.*

*The Full Circle Swing of The Thew enables it to work in close quarters without stopping traffic.*

Write for Catalogue "F" and list of Electric Railways using Thews.



### Here Is How The Thew Does It

## The Thew Automatic Shovel Co., Lorain, Ohio

# THE CINCINNATI CAR COMPANY

WORKS:

WINTON PLACE  
CINCINNATI, OHIO

## A Quarter-Century of Service and Still in Use

We're proud of that record—we're proud that those old cars—originally built for horse-car service and now converted into "electrics"—should bear the Jones name. It's

## A "Jones-Built" Car Service Record

Those were cars that were well and truly built and well and truly have they served. It is ideals like these—lived up to today by this company—that makes the words "Jones-Built" a certificate of service—of value—of sterling merit. Write.

**J. M. Jones' Sons Company**

*Builders of Cars for Electric Railways Exclusively*

Established 1839

Incorporated 1911

Watervliet, N. Y.

71717



There's no leak proof ring but the **LEAK-PROOF Ring**—insist

# Don't Overlook the Air Compressor when Striving for Operating Economy

Do you know how much leakage the ordinary segmented packing ring in your air compressor is responsible for? How much pressure is wasted—time, power, motor wear going for nothing?

If you want proof—try



**PISTON HEAD PACKING RINGS**

Made by McQuay-Norris Mfg. Co.

and see the difference.

A test by a leading air compressor manufacturer demonstrated that the use of **LEAK-PROOF** Packing Rings produced 90 lbs. pressure from zero in two-thirds of the time required by segmented packing rings—and with check valve removed held the pressure 33 1/3 per cent longer.

## The Reason

The **LEAK-PROOF** Packing Ring although a two-piece ring is practically one solid unit. The two sections are concentric, interlocking, with opposing centers of expansion which gives equal and sustained bearing on the cylinder wall throughout the whole circumference of the ring. There are no springs to break or fail as happens in the segmented ring—no gaps, no loosely fitting segments whereby pressure may escape—no friction at corners to wear the cylinder out of round. The **LEAK-PROOF** Ring possesses lasting elasticity and, because of the angle-iron principle on which each section is constructed, the maximum of strength.

The chart of the Test will be gladly sent you upon request and a set of **LEAK-PROOF** rings. You can verify the results for yourself.

*Sold by all up-to-date dealers, garages,  
repair shops and marine stores*

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**McQuay-Norris Manufacturing Co., Dep't L**  
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Washington St.
- San Francisco—164 Hansford Bldg.
- Los Angeles—224 Central Bldg.
- Dallas—1509 Commerce St.

Look for the name **LEAK-PROOF** stamped on the Ring

“And it is our present intention to equip the balance of our cars with the Fonger Fender.”

*Phoenix Railway Co., of Arizona*

## The above excerpt is from a letter indorsing **The FONGER Tip-Tilting Automatic Fender**



“The Fender that Picks them Up instead of Crushing them Under”

Read this extract from the letter  
and then Send Us the Coupon

“Its remarkable safety feature, the automatic, revolving tripping-shield indicates to us that we will be saved from many personal damage suits, while its simplicity, steel construction and general durability almost eliminate maintenance cost.

“The fact that the entire fender can be swung back under the car quickly and easily from the vestibule is very convenient and promises much in avoiding damage to the fender by collisions. We are highly satisfied with the operation and convenience of the fender, for it works perfectly and can be handled at all times with the greatest ease.

“We feel confident that for safety, convenience and economy it is far superior to any other fender we have seen, and it is our present intention to equip the balance of our cars with the Fonger Fender.

“We beg to remain yours very truly,  
“Phoenix Railway Company of Arizona,  
(Signed) B. H. Mitchell, Manager.”

**Fonger Fender Co.**  
3852 Cottage Grove Ave., Chicago

You may send one set of your Fenders  
to our Car Barns addressed to Master  
Mechanic for Service Test.

(It is understood there is to be no charge unless we  
keep Fenders)

Name of Railway.....

Address.....



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THE LINDSLEY BROTHERS COMPANY

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*Barrett's* Will Cut Your Wood  
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LIQUID  
**Creosote Oil**

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# TREATED

**POLES, CROSS ARMS, TIES,  
TIMBERS, PAVING BLOCKS.**  
CAPACITY 100,000,000 FEET B. M. PER ANNUM  
SEND FOR PAMPHLET

**INTERNATIONAL CREOSOTING & CONSTRUCTION CO.**  
Address all communications to Office, Galveston, Texas  
Works: Beaumont, Texas      Texarkana, Texas

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### Overhead and Third Rail Insulation

FREE FROM Contraction, Expansion, Moisture, Absorption, Surface Leakage, Varied Dielectric Strength, Mechanical Imperfection, Unnecessary Parts. Will stand 225° F. without softening and Impervious to Acids.

Caps and Cones—Round Top Hangers—Globe Strains—Suspension Bolts—Feed Wire Insulators—Arc Lamp Hangers—Third Rail Insulators.

**SHAW LIGHTNING ARRESTERS**  
Standard for 20 Years

**Newark Engineering Mfg. Company**  
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GEO. E. AUSTIN CO., Sales Managers  
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**"NATIONAL" Tubular Steel Poles**  
for Telegraph, Telephone  
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Write for literature

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LETTENEY IS LASTING

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A Carbolineum of  
Highest Quality.

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Carloads or less  
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**FEDERAL SIGNAL CO.**

Manufacturers } for { Automatic } either { A. C.  
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No Interlocking Switches Are Safe Without  
Federal Switch Guards

MAIN OFFICE and WORKS      -      ALBANY, N. Y.  
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**Street Railway Signal  
Co., Inc.**  
PHILADELPHIA, PA.

The first signal having official  
A. E. R. A. aspects.



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Pittsburgh, Pa.

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**BRACH  
AUTOMATIC  
FLAGMAN**

comprises a visible (swinging effect) light and audible (locomotive type) bell.

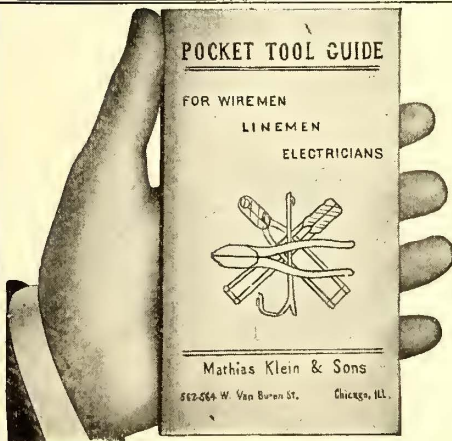
Built on most advanced engineering lines.

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IT IS A SMALL ABRIDGED BOOKLET ILLUSTRATING

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You should have a copy of this booklet and also of our general catalog, and thus be in a position to

**ORDER BY TELEGRAPH**  
Any Desired Tool Equipment

Linemen and electrical workers and construction men will find this little booklet extremely handy with its descriptive matter, illustrations and prices all clearly set forth.

Incidentally, in specifying Klein Tools you are getting tools backed by the name and reputation of fifty years of manufacturing experience and equitable business dealings.

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**An Assurance of Uninterrupted Service**

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?



No. 72—10000 Volts

**Hemingray Glass Company**

Established 1848 }  
Incorporated 1870 } Covington, Ky.

Factories - - MUNCIE, INDIANA

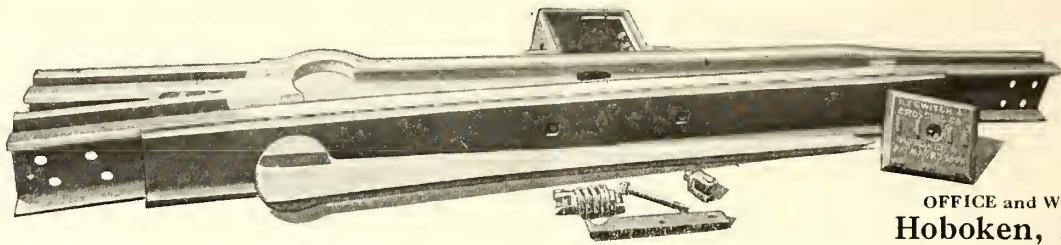


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# Quality Manganese Special Work Frogs and Switches

Our Facilities Permit Handling Large and Difficult Orders in Quick Time



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**NEW YORK SWITCH AND CROSSING CO.**

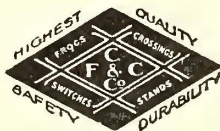
## WHARTON SPECIAL TRACK WORK

TRACK WORK  
OF  
**TISCO**  
MANGANESE  
STEEL

OF EVERY DESCRIPTION  
FOR ALL CLASSES OF SERVICE

**W.M. WHARTON JR. & CO.**  
INCORPORATED  
PHILADELPHIA PA.      JENKINTOWN PA.

**HIGHEST QUALITY**  
TRACK SPECIAL WORK



**WE MAKE THIS GRADE ONLY**

**CLEVELAND FROG & CROSSING CO**  
CLEVELAND, OHIO

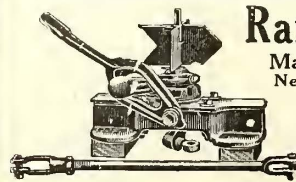


The "Superior Rail Joint" combines all the best features of suspended and supported Joints. Made of Rolled Cast Steel or Malleable Iron.

**MANGANESE STEEL TRACK WORK**  
FROGS—CROSSING—SWITCHES, &c.



**St. Louis Steel Foundry, 1560 Kienlen St. St. Louis, Mo.**  
Owned and operated by Curtis & Co. Mfg. Co., St. Louis. 2



**Ramapo Iron Works**

Main Office, Hillburn, N. Y.  
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Automatic Switch Stands,  
T-Rail Special Work,  
Manganese Construction,  
Crossings, Switches, Etc.

SPECIAL TRACK WORK  
FOR ELECTRIC RAILWAYS  
**THE AMERICAN FROG AND SWITCH CO.**  
HAMILTON, OHIO



**Universal Hangers**  
WITH THE REVOLVING STUD

Get the angle with the Trolley instantly. Lock the ear so it cannot work loose. Use any length ear with solid head.

Ask for sample.

**THE W. R. GARTON COMPANY, CHICAGO**





**For the Big Fill**

you want culvert PERMANENCY.

it's wasteful expense to have to replace a metal Culvert that has sagged, settled or corroded out.

**ACME (NESTABLE)**

**Corrugated NO-CO-RO Metal Culverts**

do NOT sag or settle when properly installed. Witness this 48", 120 foot long "ACME" under this 37 ft. bank on an Iowa Electric Interurban Railway. "In excellent condition," writes the superintendent, after years of service. This installation is only one from hundreds we can show. Actual service is what counts. "ACMES" are the culverts of real service! And Catalog G-3 tells their story. Tells about their NO-CO-RO Metal and their NESTABILITY. Do you KNOW?

**THE CANTON CULVERT & SILO CO.**  
MANUFACTURERS  
CANTON, OHIO, U.S.A.

# Crown Rail Bonds

## Pin Driven

Designed for use underneath splice bars, where they are protected, and attached to webs of rails. Satisfactory for every requirement of severe service. Widely used and adopted by

The New York Central and Hudson River Railroad.  
New York, New Haven and Hartford Railroad.  
Pennsylvania Lines.  
Southern Pacific Railroad  
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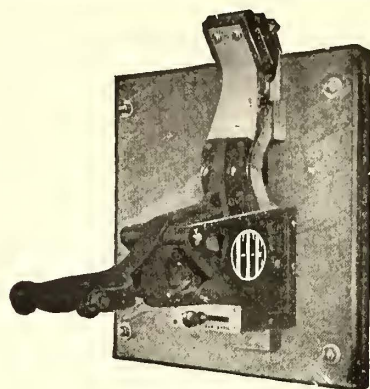
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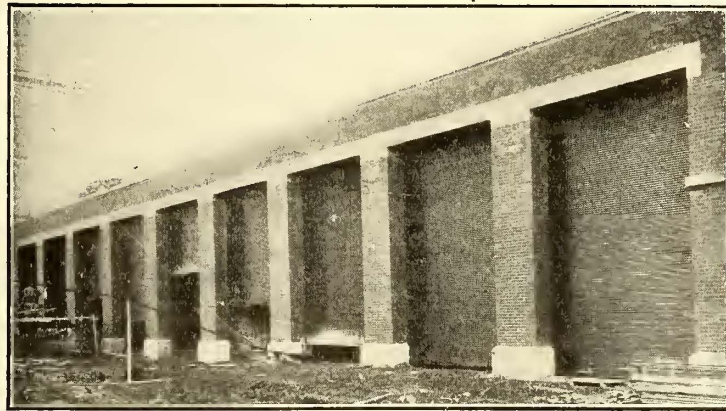
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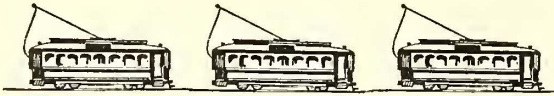
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**Magnet Wire**

**Saves this Trouble and Expense**

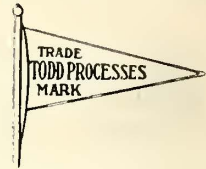
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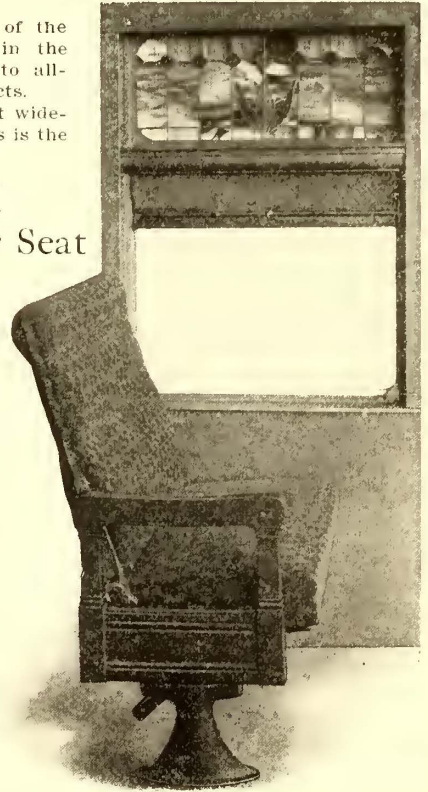
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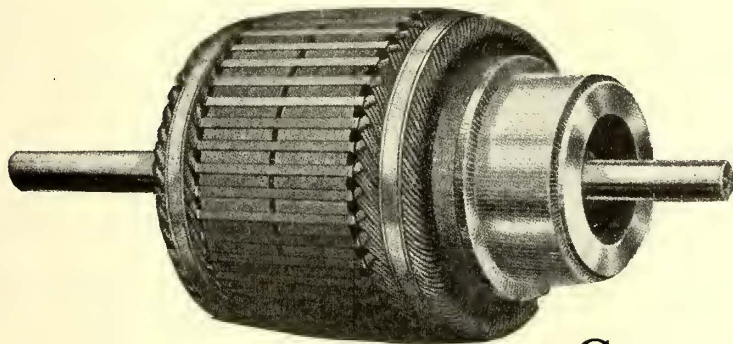


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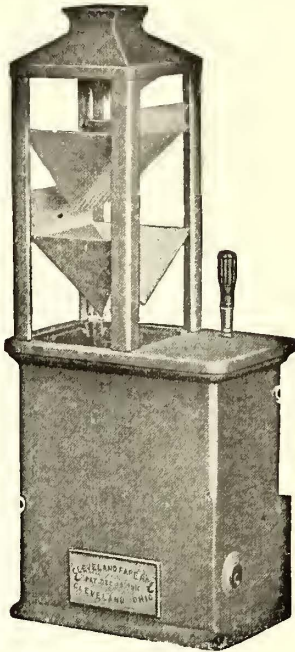


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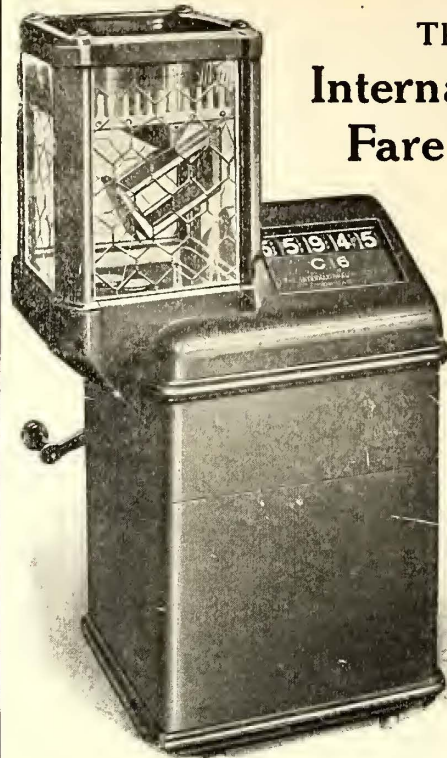
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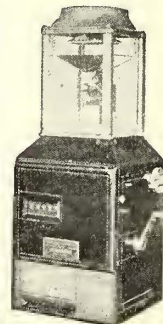
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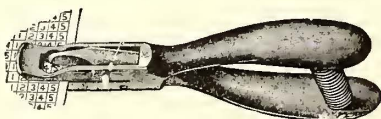
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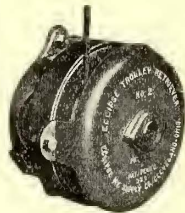
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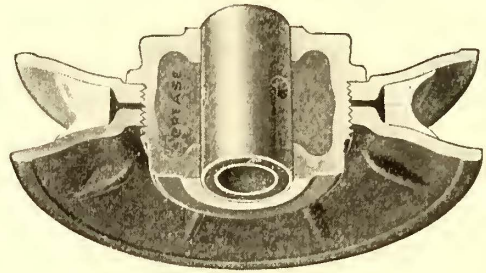
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The lubricant comes inside the wheel when you buy it, and lasts as long as the contact metal. As the contact metal gives double the mileage compared to most—this self-lubricating feature affords a substantial saving.

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Proceed in Safety.  
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Four Stackpole Brushes that have made enviable records in railway motor work

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You can't get bed-rock costs without the Type G.

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for seven years  
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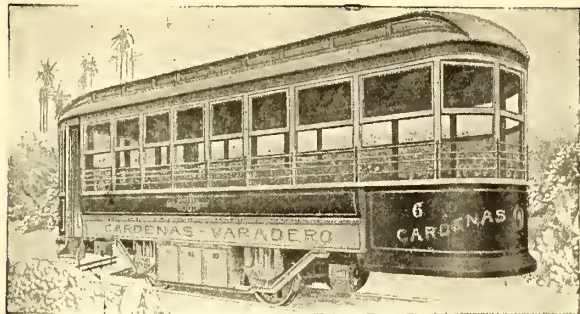
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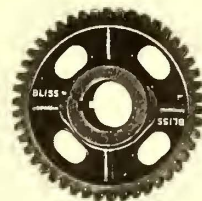
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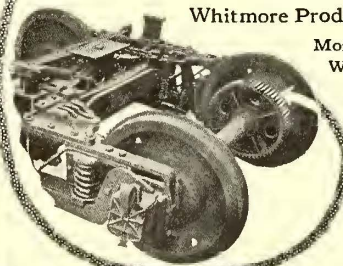
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No. 239 Regular

The Improved  
No. 239  
Buckeye Jacks  
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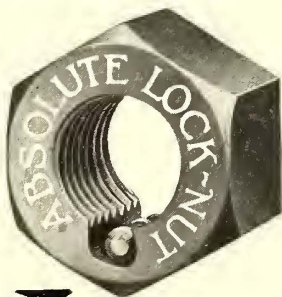
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***This Automatic Locking  
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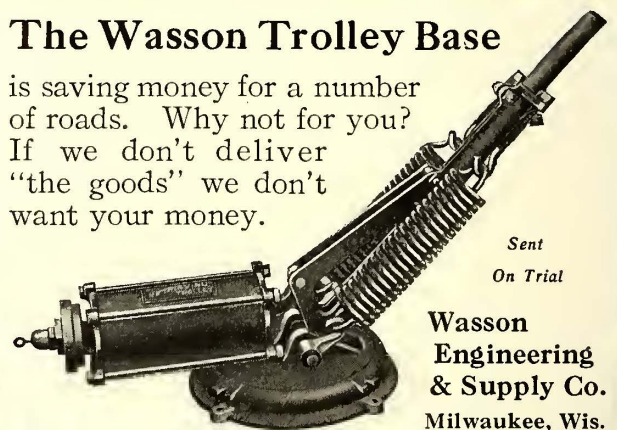
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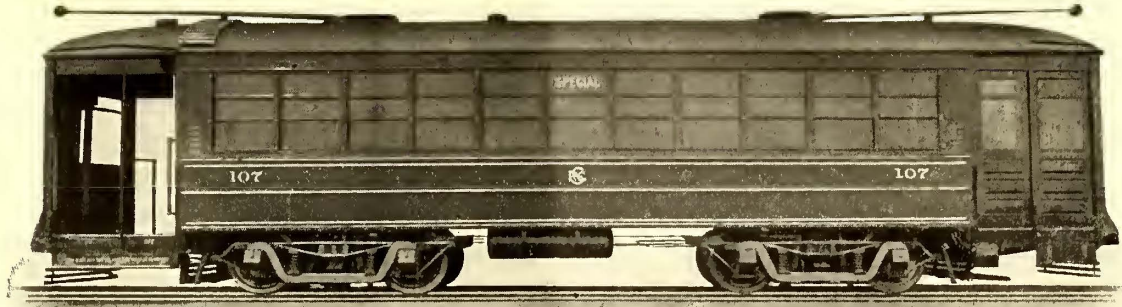


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in the Highly Important Essential—COST.

Send us your inquiry for whatever you have in contemplation, and we shall be pleased to place at your disposal an advisory and co-operative service the decided value of which has been acknowledged by hosts of our clients.

The McGuire-Cummings' method of building cars is:

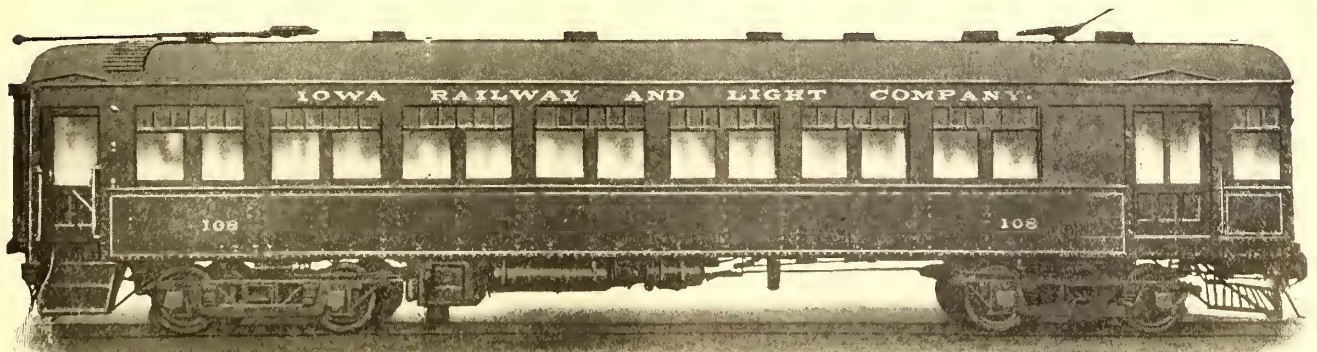
1st: To carefully analyze the traffic conditions and problems to be met, and to then

design the cars to fully suit the individual requirements in each case.

2nd: To produce only well built cars of substantial construction, based on the most advanced engineering practice—cars which will render maximum of service at a minimum of cost.

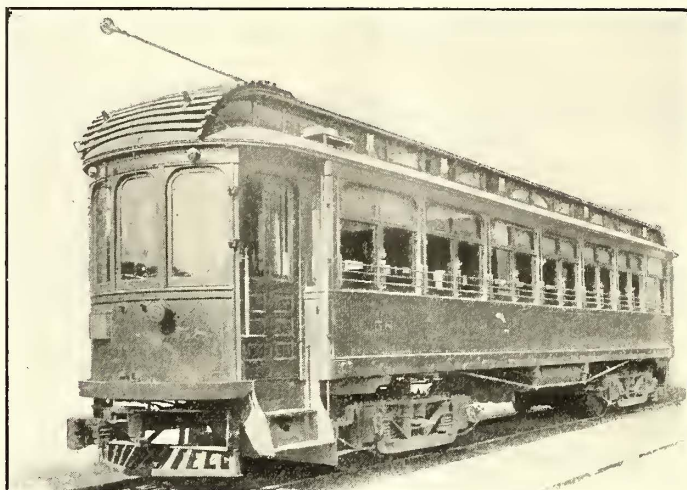
You may find it decidedly profitable to confer with us relative to your 1915 requirements.

**McGuire-Cummings Mfg. Company,** General Offices: Harris Trust Bldg. **Chicago**  
Builders of City and Interurban Cars and Trucks





# FOR SALE



## 10-Combination Interurban Cars-10

Builder, Kuhlman  
 Length over corner posts, 42'  
 Length overall, 50'  
 Width at sill, 8' 1"  
 Width overall, 8' 3"  
 Fenders, Pilots  
 Sand Boxes, Air

Heaters, Electric  
 Air Brakes, Westinghouse  
 Seats, Walkover, in leather and plush  
 Seating Capacity, 56  
 Headlights, Crouse-Hinds, arc  
 Trolley Catchers, Earll  
 Draw Bars, Ohio Brass Co. M.C.B.

### TRUCKS

Builder, Baldwin, M.C.B.  
 Wheel Diameter, 37"  
 Wheel Type, Rolled Steel  
 Wheel Tread, 3"

Wheel Flange,  $\frac{7}{8}$ "  
 Wheel Base, 7'  
 Axle Diameter,  $5\frac{1}{2}$ "  
 Journal,  $4\frac{1}{4} \times 8$ "

### ELECTRICAL EQUIPMENT

Motors, 4 West., 76 and 121  
 Capacity, 75 and 80 H.P.

Control, Type M. and L. 4  
 Circuit Breakers, two

Above cars have smoking compartments, of which four are equipped with straight air and six with combined A.M.M. straight and automatic air for train operation.

For further particulars, apply to

## W. R. KERSCHNER CO., Inc.

Hudson Terminal Building, Room 1882, 50 Church St., New York



# SEARCHLIGHT SECTION

## 150 K.W. Motor Generator Set

1—220 H.P., 3 phase, 60 cycle, 2080 volt, 514 R.P.M., General Electric induction motor, direct coupled to 150 K.W. General Electric, 550 volt, CLB, compound wound generator. Instant shipment.

## Booster Set

**Generator**—West'gh'se 70 K.W., 350 volt, 200 amp. series wound.  
**Motor**—West'gh'se 105 H.P., 575 volt, 950 R.P.M., type "SA" shunt wound.

Complete with coupling and panel.

## 60 Cycle, Rotary Converters

2—General Electric 1000 K.W., 600 v., 360 R.P.M., type "HC," comp. wound, 6 phase. Complete with air cooled 2300 v. trans., reactances and panels.  
2—General Electric 500 K.W., 575 volt, 600 R.P.M., type "HC," comp. wound, 6 phase. Complete with air cooled trans., 2300 v. reactances and panels.

**ARCHER & BALDWIN, 114 Liberty Street**

SEND FOR CATALOG—JUST OUT  
ENGINES—BOILERS—MOTORS—CONDENSERS—ETC.

1—300 K.W. Westinghouse, 600 volt D.C., 370 volt A.C., 600 R.P.M. with oil cooled G.E. trans. 11,000 v. primary  
1—200 K.W. Westinghouse, 600 volt D.C., 370 volt A.C., 720 R.P.M. Also following transformers:  
3—125 K.W. G.E. 2400 volts prim., 370 volts sec.  
6—75 K.W. Ft. Wayne, 10,000-9000-185-370 v.  
3—175 K.W. Stanley, 10,000-2300 volts.

## 25 Cycle, Rotary Converters

1—500 K.W. General Electric, 3 phase, 25 cycle, 600 volt D.C., 370 volt A.C., 375 R.P.M.  
2—300 K.W. Genl. Elect., 3 ph., 25 cycle, 750 R.P.M., 600 volts.  
1—250 K.W. Genl. Elect., 3 ph., 25 cycle, 500 R.P.M., 600 volts.  
Can also furnish transformers—all voltages.

## Railway Car Equipment

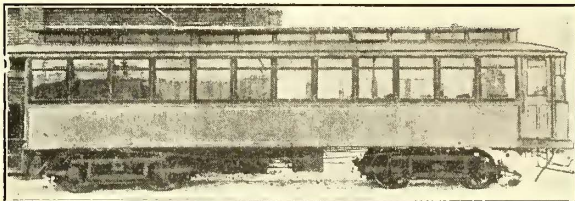
8—West. 112 Motors, 75 H.P., newly rewound.  
5—Type M, Single End Control for 4 motors, 75 H.P. ea.  
2—K. 14 controllers.

ROOM 302  
'Phone Rector 4337-4338-4339

New York

## HAROLD R. WILSON MACHINERY CO.

423 Pine Street, St. Louis Cars of All Kinds  
By Far the Best 2nd Hand Cars Ever Offered



### Will Alter to Suit—Overhaul and Repaint

6 complete motor cars like above cut, in perfect condition; each 42 feet 6 inches long; seat 50; 4 motors; complete equipment. Extremely low price to move quickly. Write for our new list.

AC & DC UNITS—MOTORS—ROTARIES—ENGINES—BOILERS

## MACGOVERN AND COMPANY, INC.

FRANK MACGOVERN, Pres. & Gen. Mgr.  
114 LIBERTY STREET NEW YORK CITY  
'Phone, 3375-3376 Rector

## 60 CYCLE ROTARY CONVERTERS

2—1000 KW. Gen. Elec., type HC, 6 phase, 360 RPM., form P, 600 volts DC. with AB-BI Transformers, 2300 V. primary; also switchboard panels and instruments.  
2— 500 KW. Gen. Elec., type HC, form P, 6 phase, 12 pole, 600 RPM., 575 volts DC., with AB-BI Transformers, 2300 V. primary; also switchboard panels with instruments.

IMMEDIATE DELIVERY.

THIS IS OF NECESSITY ONLY A PARTIAL LIST—SEND FOR CATALOG

## FOR SALE

Two Snow Plows: One Sprinkler: Cars, Motors, Rails, Generators. Everything for Track, Rolling Stock, Power Plant bought and sold. Send us your requirements.

Write for our Lists and Catalogs.

**Railway & Power Equipment Co.**

Charles F. Johnson P. O. Box 155 Ellicott Sq., Buffalo, N. Y.

## CARS FOR SALE

OPEN and CLOSED  
MOTOR and TRAIL

Write for Price and Full Particulars to

**ELECTRIC EQUIPMENT CO.**

Commonwealth Bldg. Philadelphia, Pa.

### POSITIONS WANTED

ELECTRICAL engineer and superintendent, technical graduate, with 15 years' practical experience, engineering, construction and operation; railway, lighting and power systems. Now with large company, desires change. All references. Box 609, Elec. Ry. Jour.

ENGINEER with technical training and broad experience in electric railway problems whose experience includes two years in electrical engineering work with operating companies and eight years with commissions with special duties relating to equipment designs and supervisions and questions of operating accounting; valuations and inventories, desires a position as an assistant to president or general manager. Box 643, Elec. Ry. Jour.

CONNECTION as salesman or representative wanted. Well known in steam and electric fields. Strong, broad experience in rolling stock and equipment work. Box 647, Elec. Ry. Jour.

HIGH-GRADE manager of railroad and public utility properties, open for engagement. Desire to change on account of climate. Box 522, Elec. Ry. Jour.

### POSITIONS VACANT

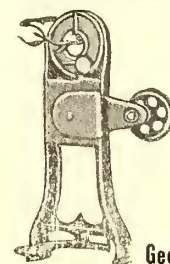
POWER plant superintendent wanted, practical engineer, with experience in operating mechanical stokers, induced draft fans, condensers, turbines, and rotary converters, 2300 volt lighting, and 600 volt D. C. railway apparatus. Permanent position with growing plant. Box 646, Elec. Ry. Jour.

Get Your Wants  
into the  
Searchlight

### FOR SALE

## POLES AND PILING

NEW CYPRESS. PRICES LOW.



### 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.



# READY-REFERENCE INDEX

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

Over 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 Service.**  
Prest-O-Lite Co., Inc., The.
- Advertising, Street Car.**  
Collier, Barron G., Inc.
- Alloys and Bearing Metals.**  
(See Bearings and Bearing Metals.)
- Alloys, Steel and Iron.**  
American Vanadium Co.  
Titanium Alloy Mfg. Co.
- Anchors, Guy.**  
Garton Co., W. R.  
Johns-Manville Co., H. W.  
Ohio Brass Co.  
Western Electric Co.  
Westinghouse Elec. & M. Co.
- Anti-Climbers.**  
Railway Improvement Co.
- Automobiles and Busses.**  
Brill Co., The J. G.
- Axle Straighteners.**  
Columbia M. W. & M. I. Co.
- Axles—Car Wheel.**  
Bemis Car Truck Co.  
Brill Co., The J. G.  
Cambria Steel Co.  
Cincinnati Car Co.  
Hadfield's, Ltd.  
McGuire-Cummings Mfg. Co.  
National Tube Co.  
Niles Car & Mfg. Co.  
St. Louis Car Co.  
Standard Motor Truck Co.  
Standard Steel Works Co.  
Taylor Elec. Truck Co.  
Westinghouse Elec. & M. Co.
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American Gen'l Eng'g Co.  
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International Register Co.  
Western Electric Co.  
Woodman Mfg. & Sup. Co., R.
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Halsey & Co., N. W.
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Johns-Manville Co., H. W.  
Protective Signal Mfg. Co.  
Stackpole Carbon Co.  
Western Electric Co.
- Batteries, Storage.**  
Edison Storage Battery Co.  
Electric Storage Battery Co.  
Gould Storage Battery Co.  
Western Electric Co.
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More-Jones Brass & M. Co.  
Post & Co., E. L.  
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Taylor Elec. Truck Co.  
Westinghouse Elec. & M. Co.
- Bearings, Center.**  
Baldwin Loco. Works.
- Bearings, Oilless, Graphite & Bronze & Wooden.**  
Graphite Lubricating Co.
- Bearings, Roller & Ball.**  
Hess-Bright Mfg. Co.  
Railway Roller Bearing Co.  
S K F Ball Bearing Co.
- Bells and Gongs.**  
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Trolley Supply Co.  
Western Electric Co.
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Jeffrey Mfg. Co.
- Beiting.**  
Jeffrey Mfg. Co.
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Niles-Bement-Pond Co.
- Watson-Stillman Co.**  
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Zelnicker Sup. Co., W. A.
- Blowers.**  
General Electric Co.  
Westinghouse Elec. & Mfg. Co.
- Blow Torches for Soldering and Brazing.**  
Prest-O-Lite Co., Inc., The.
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Buckeye Engine Co.
- Boilers.**  
Babcock & Wilcox Co.
- Boiler Cleaning Compounds.**  
Dearborn Chemical Co.  
Johns-Manville Co., H. W.
- Boiler Coverings.**  
Johns-Manville Co., H. W.
- Boiler Tubes.**  
National Tube Co.
- Bond Testers.**  
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- Bonding Apparatus.**  
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- Bonding Tools.**  
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Elec. Service Supplies Co.  
Ohio Brass Co.  
Prest-O-Lite Co., Inc., The.
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Electric Service Supplies Co.  
Electric Ry. Equipment Co.  
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McGraw-Hill Book Co., Inc.
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- Braces, Rail.**  
Kilby Frog & Switch Co.  
Weir Frog Co.
- Brackets and Cross Arms. (See also Poles, Ties, Posts, etc.)**  
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Craghead Engineering Co.  
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Electric Service Supplies Co.  
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Jeandron, W. J.  
Morgan Crucible Co.  
Speer Carbon Co.  
Stackpole Carbon Co.  
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- Bunting.**  
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Graphite Lubricating Co.
- Bushings, Rubber.**  
Imperial Rubber 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 Trimmings. (For Curtains, Registers, Doors, Seats, etc.—See those headings.)**
- Cars, Passenger, Freight, Express, etc.**  
American Car Co.  
Brill Co., The J. G.  
Cambria Steel Co.  
Cincinnati Car Co.  
Jewett Car Co.  
Jones' Sons Co., J. M.  
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McGuire-Cummings Mfg. Co.  
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Southern Car Co.  
United Electric Car Co.  
Wason Mfg. Co.
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Gould Storage Battery Co.  
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Cincinnati Car Co.  
McGuire-Cummings Mfg. Co.  
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### Standard for Rapid and Low Cost Welding, Cutting and Drilling

Davis-Bournonville oxy-acetylene welding and cutting outfits in either portable or stationary types cover every possible requirement. Our devices include many automatic machines that are effecting remarkable savings in cutting and welding costs. Write for complete information.



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**Davis-Bournonville Co.**

General Offices,  
Jersey City, N. J.

Chicago Office,  
Monadnock Block

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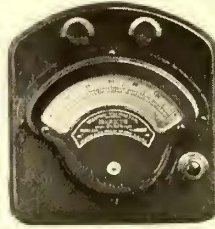
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# Weston

**Miniature  
Precision Instruments**

**PORTABLE**

**MODEL 280, Single  
Range Portable  
Voltmeter**  
(One-quarter Size.)



**Volt-Meters, Millivoltmeters,  
Volt-Ammeters, Ammeters,  
Mil-Ammeters**

are supplied in single, double and triple ranges, the Triple Range Volt-Ammeter comprising six instruments in one. This group also includes BATTERY TESTERS.

**SWITCHBOARD**

**Voltmeters, Volt-Ammeters, Ammeters, Mil-**



**Model 267, Switch-  
board Ammeter.**  
(One-quarter Size.)

**Ammeters**  
This new line of instruments represents the finest development of small size pivoted moving coil, permanent magnet type of instruments.

They embody characteristics which have made the well-known Weston Standard famous throughout the world. They are accurate,

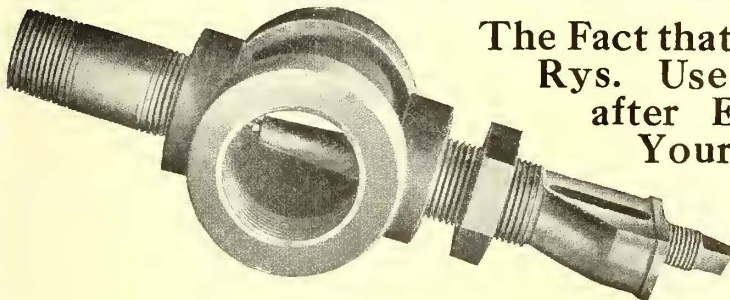
dead beat and extremely sensitive.

They may be left continuously in circuit at full load and are shielded against external electrical and magnetic influences. They are substantially constructed and have the longest scale ever provided in instruments of similar size.

The prices are surprisingly low for instruments of such quality. The several models and ranges offer a selection from over 300 different combinations. They are listed in BULLETIN NO. 8, WHICH WILL BE MAILED UPON REQUEST.

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New York	St. Louis	Detroit	Richmond	Winnipeg
Chicago	Denver	Cleveland	Toronto	Vancouver
Philadelphia	San Francisco	Buffalo	Montreal	Berlin
Boston		Atlanta		London



## The Fact that Brooklyn R. T and Chicago Rys. Use Wyoming Vacuum Sanders after Exhaustive Service Tests is Your Assurance of Great Savings

Tests on many lines show an actual saving of  $\frac{1}{2}$  to  $\frac{3}{4}$  of sand used by other makes. Always operative, the Wyoming saves slipping, tire and truck wear, also power. Keeps pipes clear in winter. Can be applied to any box, either inside or out. We will send you a pair for service tests free of charge, freight prepaid.

Send to-day for samples, prices and catalogs

**RAILWAY & TRACTION SUPPLY CO.**  
Rector Bldg., Chicago, Ill.

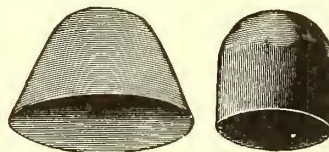
### COMPLETE ARMATURES FOR SALE

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.**



### CAR SEAT BUMPERS

VARIOUS SHAPES

**Elastic Tip Co.**

370 Atlantic Ave.  
BOSTON, MASS.

When writing to Advertisers in this publication you will confer a favor on both publisher and advertiser by mentioning the Electric Railway Journal

## BEMIS TRUX

We solicit your inquiries for Car Trucks,  
Wheels and Axles, Bearings, Springs,  
Gearing, Castings and Special Machinery.

**BEMIS CAR TRUCK CO. Springfield, Mass.**



# READY-REFERENCE INDEX

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

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General Electric Co.
- Commutators or Parts.**  
American Gen'l Eng'g Co.  
Cameron Electrical Mfg. Co.  
Cleveland Armature Wks.  
Columbia M. W. & M. I. Co.  
Garton Co., W. R.  
General Electric Co.  
Long Co., E. G.  
Mica Insulator Co.  
Western Electric Co.  
Westinghouse Elec. & M. Co.
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Curtis & Co. Mfg. Co.  
General Electric Co.  
National Brake & Elec. Co.  
Westinghouse Trac. B. Co.
- Condensers.**  
Allis-Chalmers Mfg. Co.  
General Electric Co.  
Westinghouse Machine Co.
- Conduits.**  
Fibre Conduit Co.  
Johns-Manville Co., H. W.  
Standard Underground Cable Co.  
Western Electric Co.
- Conduits, Flexible.**  
Tubular Woven Fabric Co.
- Controller Regulators.**  
Electric Service Supplies Co.
- Controllers or Parts.**  
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American Gen'l Eng'g Co.  
\*Br. Westinghouse Elec. & Mfg. Co.  
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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.**  
Allis-Chalmers Mfg. Co.  
General Electric Co.  
Western Electric Co.  
Westinghouse Elec. & M. Co.
- Conveying and Hoisting Machinery.**  
American Bridge Co.  
Brown Hoisting Mch'y. Co.  
Chisholm-Moore Mfg. Co.  
Green Eng. Co.  
Hadfield's, Ltd.  
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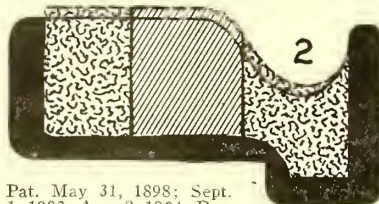
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# READY-REFERENCE INDEX

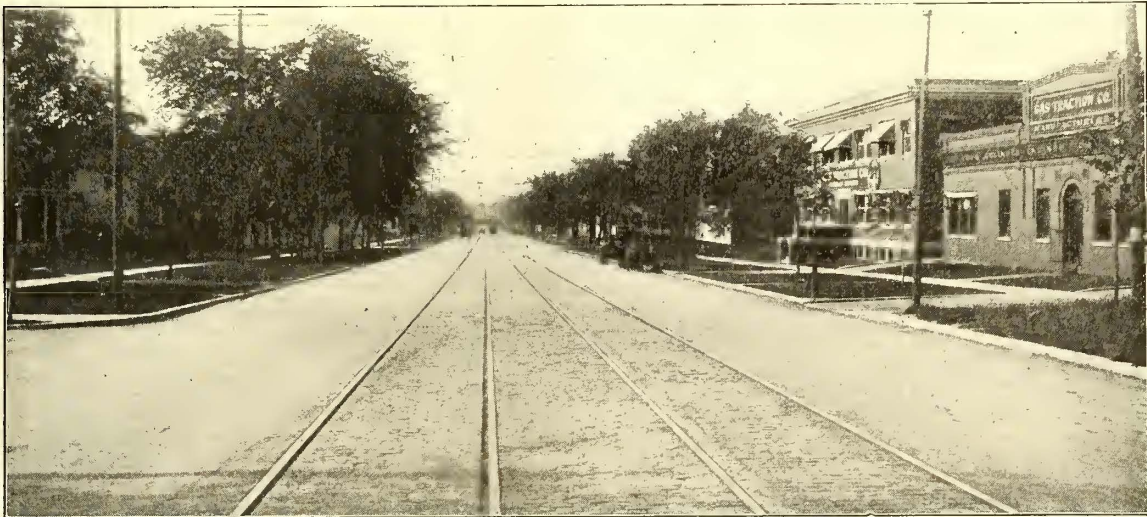
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# Barrett's PAVING PITCH



University Avenue S. E., Minneapolis, Minn. Creosote Blocks filled with Barrett's Paving Pitch.

## A Million Yards Pitch Filled

MINNEAPOLIS has been using creosoted wood pavement ever since 1902, and now has 1,000,000 square yards of it; in fact, this city is now probably the largest user of wood block pavements in the country. In all this enormous area the filler for joints is Barrett's Paving Pitch.

Mr. Ellis R. Dutton, the Assistant City Engineer, writes on February 28th, 1914: "We have used Barrett's Paving Pitch for filler for creosoted wood blocks ever since we have constructed this class of paving (i. e., since 1902) and we have found this material to be the most satisfactory in every way that we have used. We have tried different kinds of fillers, but the Paving Pitch seems to meet the requirements for

which a filler is used better than any other kind, and we have been entirely satisfied with its use."

The expansion problem in wood block paving is ordinarily even more vexatious than in brick. Pitch makes "every joint an expansion joint," and thus supplies the necessary element of elasticity in the pavement. Climatic changes set up no stress in a pitch-filled pavement. The curbs, manholes and crossings are never pushed out of position on a hot day; each block expands by itself, without affecting its neighbors. Being wholly waterproof, Barrett's Paving Pitch has additional value when used with wood block paving, because it protects the blocks from water at the sides and base.

*Illustrated booklet free on request.*

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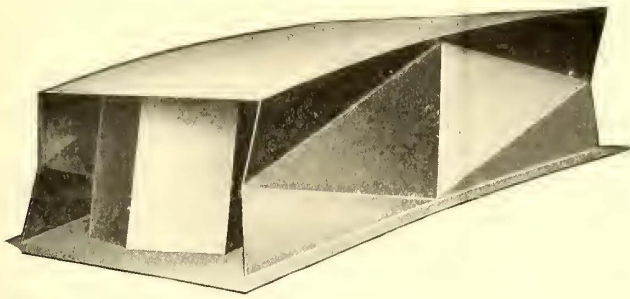
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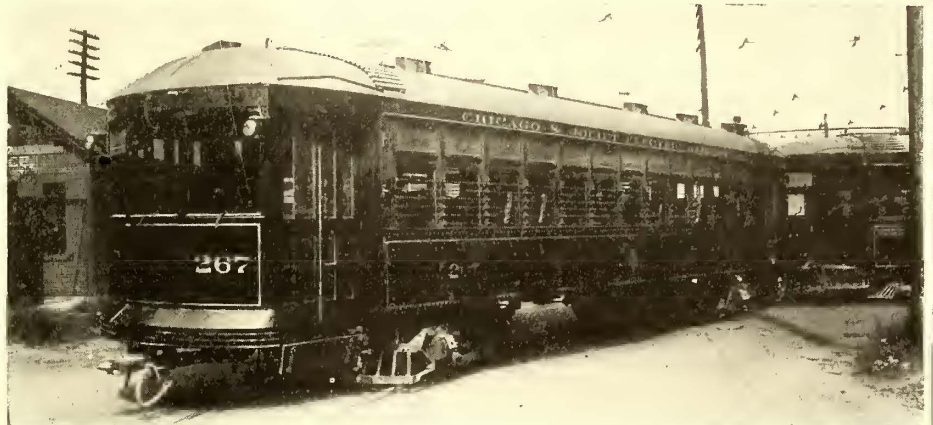
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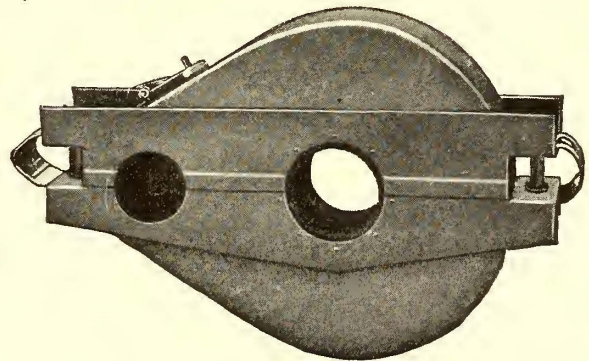
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*For Arch or Monitor Roof Cars*



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If you examine your gear cases that fail you already know that it is a fact that rivets will not stand vibration, and that brackets must be of the best design and construction to prevent shearing. For these reasons it was necessary in the past for dissatisfied companies using built-up, riveted sheet steel cases to go back to the malleable iron type. Today this course is unnecessary and needlessly expensive on account of the high cost of maintenance due to excessive weight.



W. H. 101-68-306-310 *et al.*

The Chillingworth Seamless Drawn Steel Gear Case is designed to obviate all rivet and bracket troubles and is fifty per cent. lighter than malleable iron cases. It has stood the test and the price is attractive.

**Thayer & Company, Inc., Trinity Building, New York City**

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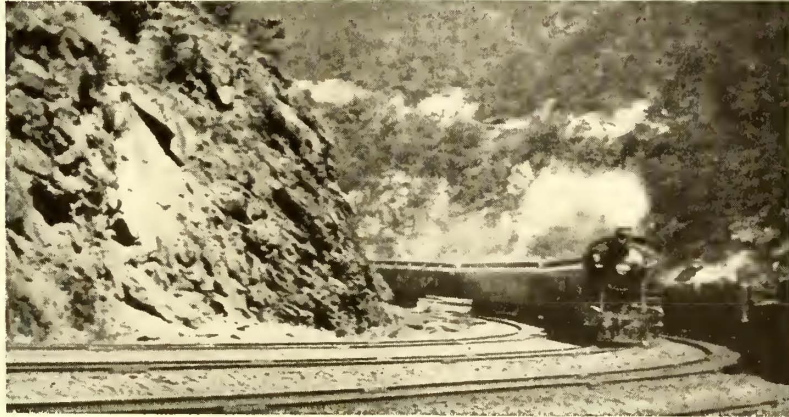




# TITANIUM IN RAIL STEEL

No. 11

## Effect on Rail Life



A Rail must either Wear badly or Break to necessitate its removal from track.

It has been proven by service tests, chemical analyses, physical tests, etc., that a Titanium-treated rail will outwear a plain rail because of its superior cleanness and freedom from excessive segregation.

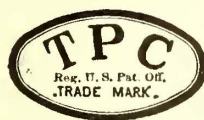
These same qualities will make the rail more ductile, less brittle and hence the breakage will be less in a treated than in a plain rail—numerous physical and service tests have demonstrated this fact beyond dispute.

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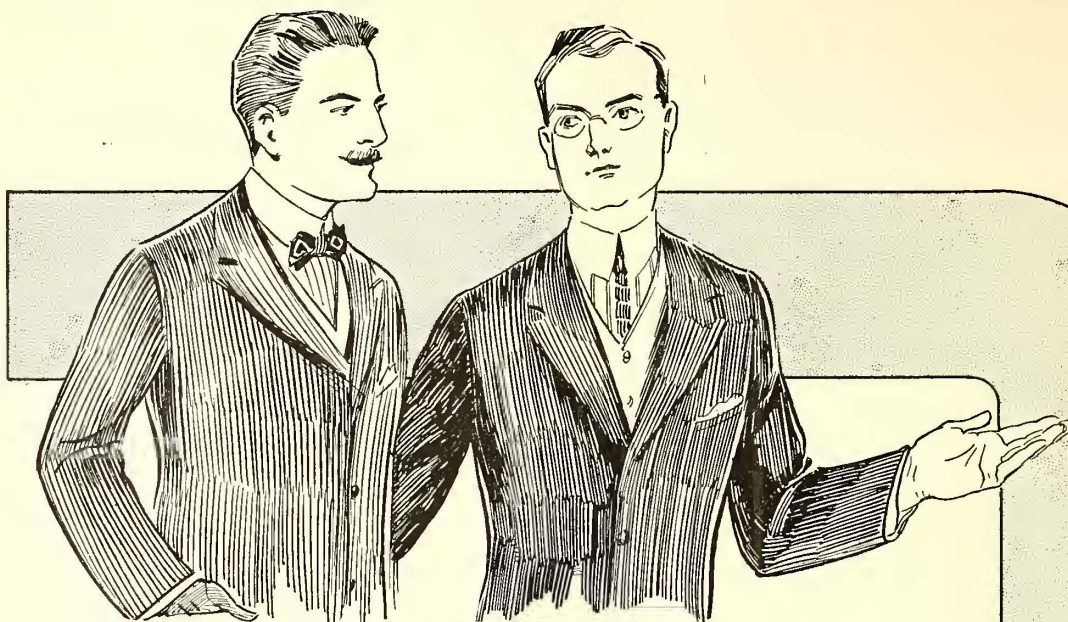
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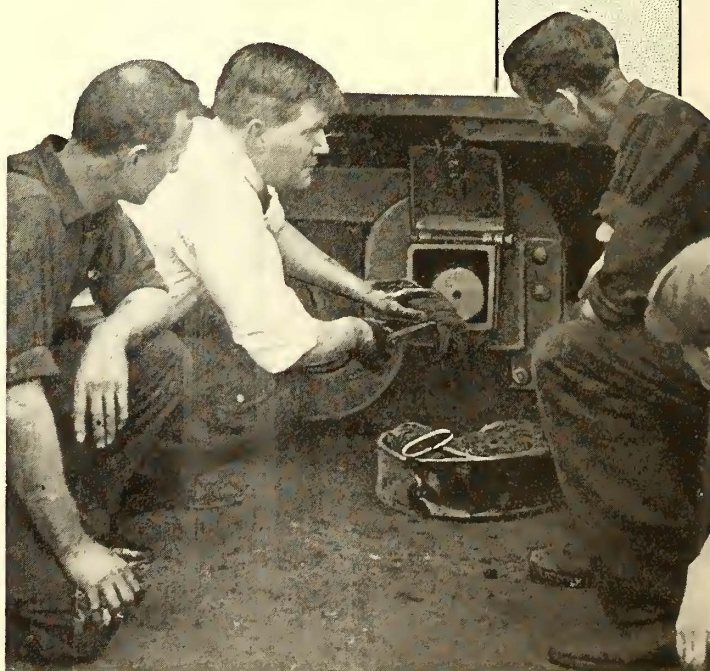
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**Signal Oil Co.**  
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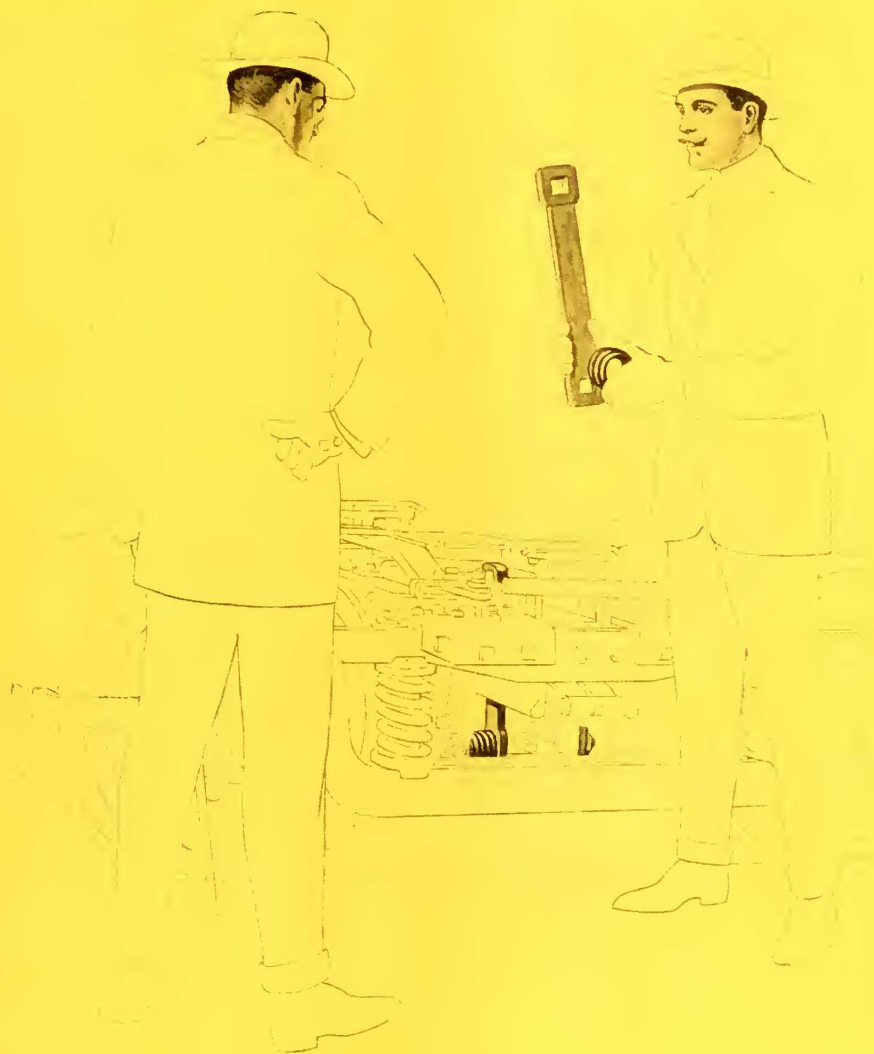


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THIS is the bolster swing link with its spring which, being kept in compression between washers at the lower end of the link, gives the proper frictional dampening effect preventing too much side swaying. The ordinary swing link arrangement used in high speed trucks gives too much freedom to the side motion and is responsible for the swaying motion of the car body that is quite common. This is a standard feature of the Brill 27-M.C.B. Truck and is patented in this country and abroad.

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Over a million horse-power of this type of motor is now giving highly satisfactory service on city, interurban and heavy traction roads.

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The new cars of the Stockton (California) Electric Railroad are equipped with the G-E 201 ventilated railway motors and K control.

# General Electric Company