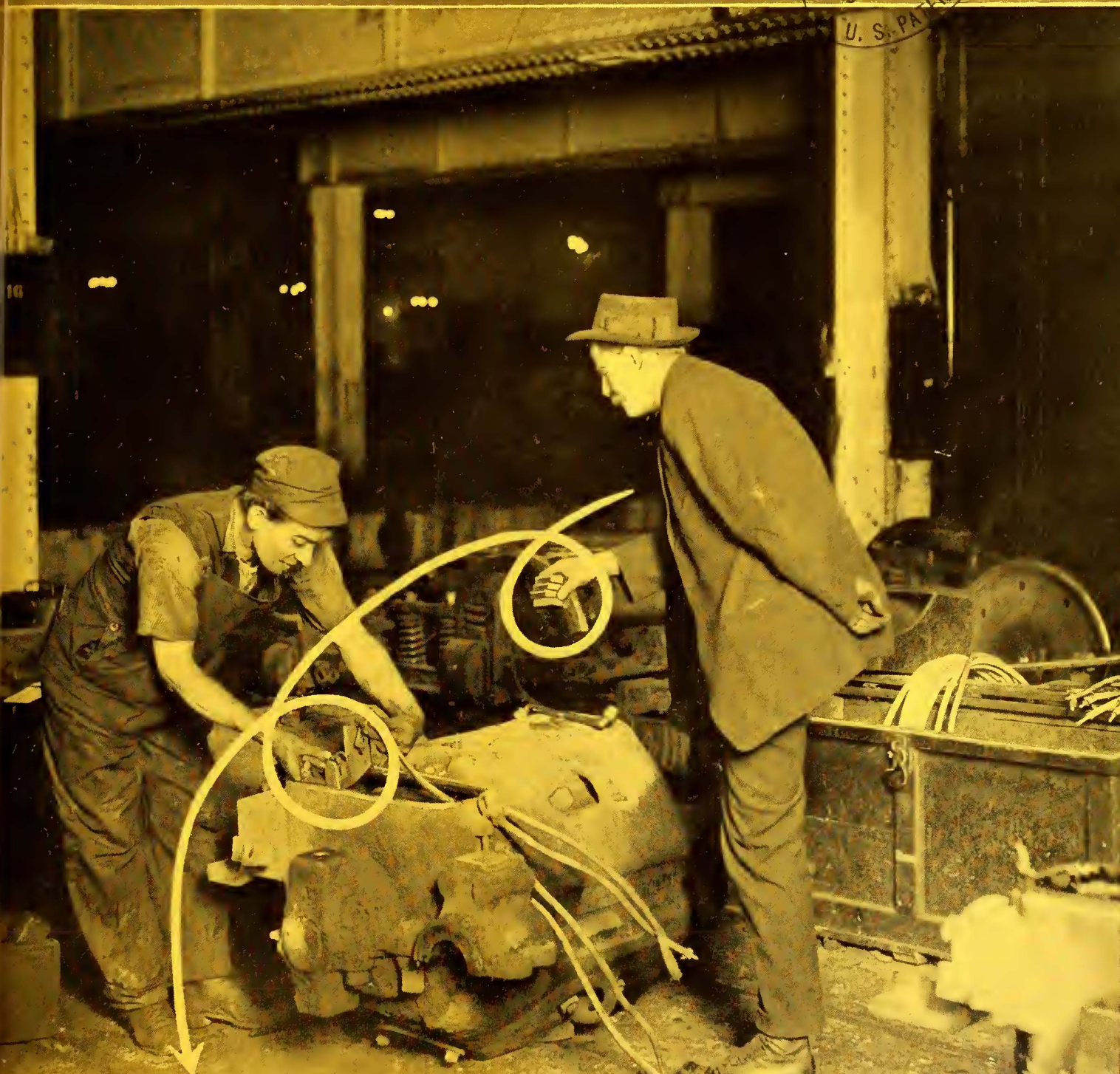


ELECTRIC RAILWAY JOURNAL

Volume 45
Number 26
June 26, 1915

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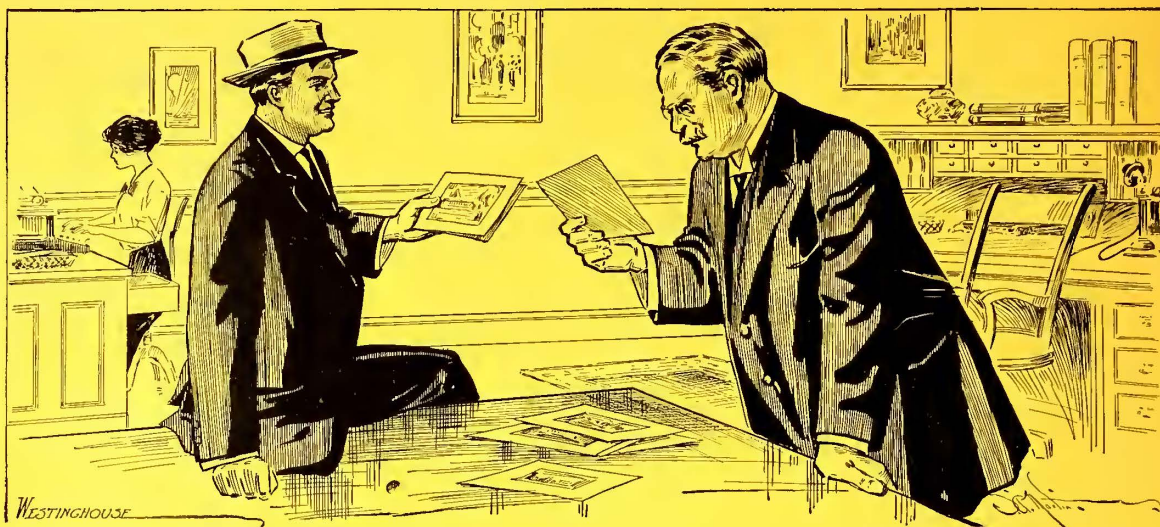


Foreman—"These Nungesser brushes are sure good brushes."

Master Mechanic—"Yes, that's why we made them standard on our road."

Note—(Similar conversations have taken place on some of the best roads in the country. Will you let us show you?)

The Nungesser Carbon and Battery Co.
Cleveland, Ohio



Standards

“JOE,” said the General Manager to the Superintendent, “I have been looking over the advertisements put out by the Westinghouse Company on their standard line of motors, and it appears to me to be a pretty good idea for them to take this step so that we will all know what standard motors are available.”

“It surely is a step in the right direction,” answered Joe. “When the No. 101-B, No. 93-A-2, No. 112, line of motors were standard we all knew pretty well which motor to figure on using, but on account of the many improvements that have been introduced of late, and the number of changes that have been made, everybody has lost track of what is standard, and I think the Westinghouse people are doing the right thing in showing in a very attractive way the standard motors that are now available. I have looked over the line pretty carefully and, in establishing these new standards, I cannot find a thing they left out, and all of us railway men will certainly welcome the idea that we can now look forward to standard railway motors for a reasonable period.”

Westinghouse Electric & Manufacturing Co.

Sales Offices in all
Large American Cities



East Pittsburgh
Pennsylvania

Electric Railway Journal

New York, June 26, 1915

Volume XLV No. 26

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

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Circulation of this issue 8000 copies.

FRICTION

(Its relation to efficient brake control
of moving trains)

FRICTION IS A RETARDING FORCE IN SOCIETY, POLITICS, BUSINESS AND RELIGION.

BUT FRICTION REPRESENTS A CURIOUS PARADOX IN THE VARIOUS FIELDS OF ENGINEERING AND MECHANICS. IT IS AT ONCE ESSENTIAL TO EFFICIENCY AND OPPOSED TO IT. PRACTICALLY ALL APPLICATIONS OF POWER DEPEND FINALLY UPON FRICTION; ALSO ALL POWER APPLICATIONS ARE SUBJECT TO SERIOUS LOSSES DUE TO FRICTION.

A RAILROAD TRAIN IS PECULIAR IN THAT WHILE ACCELERATION—THE HAULING CAPACITY OR TRACTIVE EFFORT OF THE LOCOMOTIVE—DEPENDS FUNDAMENTALLY UPON FRICTION—(WHEEL—RAIL); DECELERATION—BRAKE CONTROL OF ALL TRAIN MOVEMENT—ALSO DEPENDS FUNDAMENTALLY UPON FRICTION (WHEEL—SHOE).

ON THE ONE HAND WE HAVE HEAVY TRAINS AT HIGH SPEEDS REPRESENTING UNBELIEVABLE TOTALS OF FOOT TONS OF ENERGY; ON THE OTHER HAND WE HAVE, TO CONTROL THIS MOVING MASS, THE FRICTION OF A FEW SQUARE INCHES OF BRAKE SHOE IN CONTACT WITH A ROTATING WHEEL.

BRAKE SHOE FRICTION AND TRAIN RETARDATION RESULTING THEREFROM VARY WITH LEVERAGE, PRESSURE, TEMPERATURE, DURATION OF CONTACT, LOCATION OF BRAKE SHOE ON WHEEL, BRAKE MECHANISM DESIGN INVOLVING ABILITY TO ALTERNATE AND GRADUATE BRAKING POWER ON THE TRAIN, AND A HUNDRED OTHER FACTORS WHICH ENTER INTO THIS MOST COMPLEX AND INVOLVED BRANCH OF AIR BRAKE ENGINEERING.

AIR BRAKE ENGINEERING IS MAINLY CONCERNED WITH THE FLEXIBLE, RELIABLE AND EFFECTIVE APPLICATION OF FRICTION TO PROPERLY CONTROL ALL TRAFFIC MOVEMENT BY RAIL.

Suggested by the

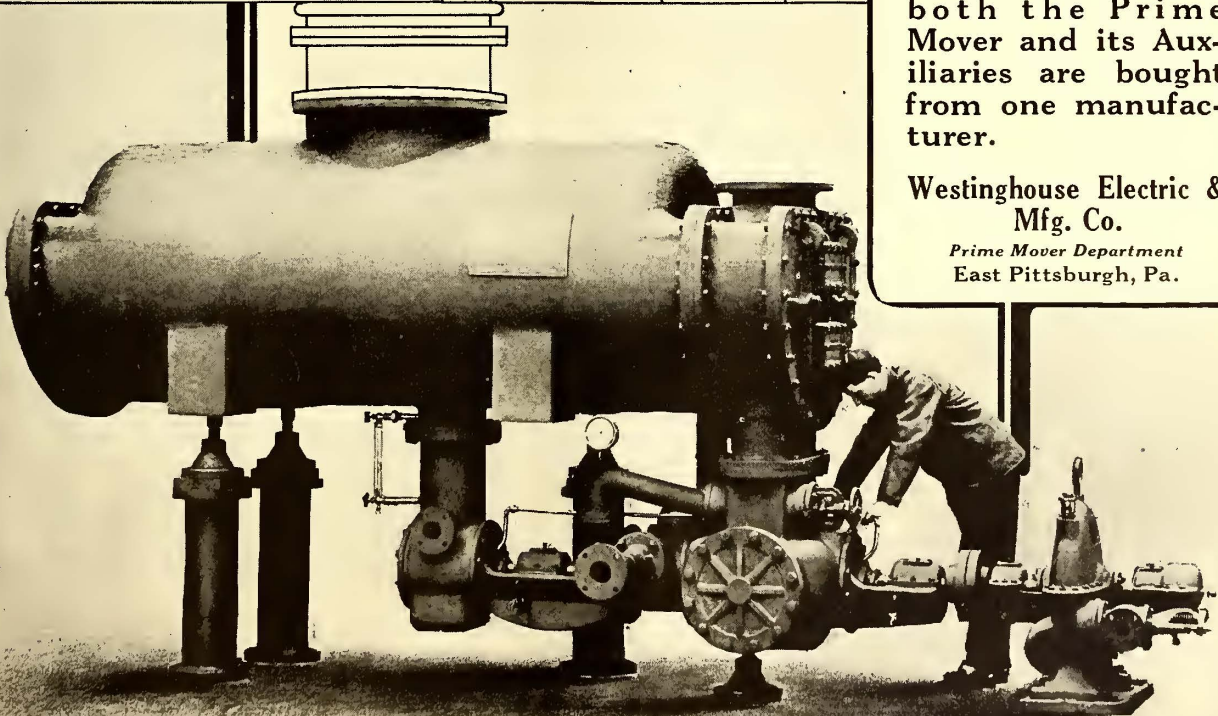
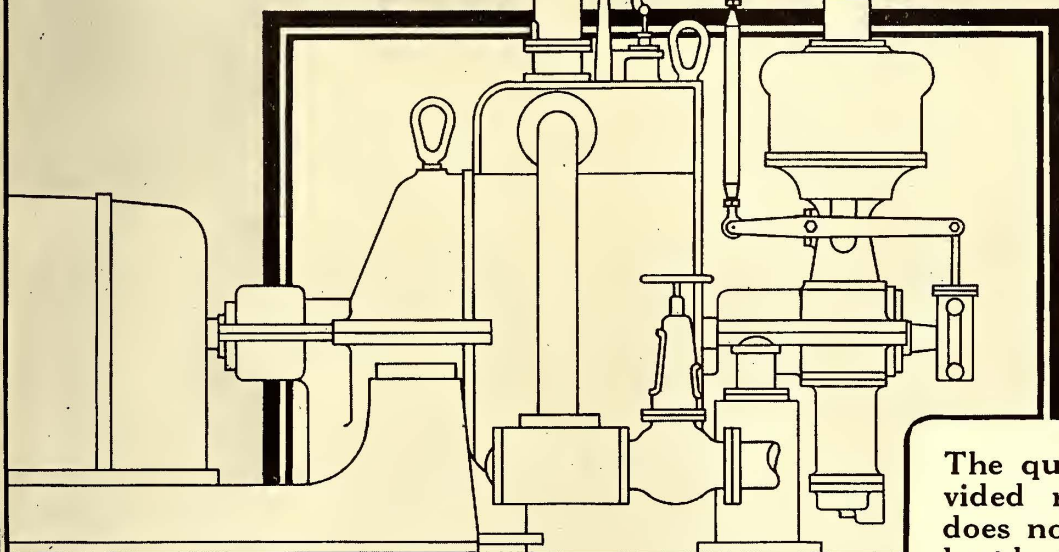
Westinghouse Traction Brake Company

Works: Wilmerding, Pennsylvania

PITTSBURGH: Westinghouse Building
CHICAGO: Railway Exchange Building

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

Westinghouse Surface Condensers



The question of divided responsibility does not arise when both the Prime Mover and its Auxiliaries are bought from one manufacturer.

Westinghouse Electric & Mfg. Co.
Prime Mover Department
East Pittsburgh, Pa.

PUBLISHER'S PAGE

"For General Excellence"



The International Jury of Awards, Panama-Pacific International Exposition, has awarded a Medal of Honor for general excellence and superiority to the McGraw Publications, which include the

Electric Railway Journal

This is the highest award conferred upon a publication.

Readers of the Electric Railway Journal will be gratified by the endorsement of their judgment in selecting the Electric Railway Journal as the publication on which to rely "For General Excellence" in its text and advertising pages.

ELECTRIC RAILWAY JOURNAL

Patch Bituminous Asphalt with a KOEHRING HOT MIXER

Cuts patching costs

Write for *authoritative* figures to prove the economy

—cuts your costs way below your best possible figures in remelting and remixing by stationary plant, or having the work done under contract—and this means a cut, *not* in remelting and remixing costs *alone*, but in the *total cost of ripping up, remixing and relaying old material.*

Besides think of the flexibility of this smaller unit. Haul it from job to job behind a car, use trolley power.

Give this cost-saving hot mixer a *hearing*, especially on its cost-cutting claims for patch work.

800 square yards per day, new 2 inch material.

That's what this mixer can do per day with new 2 inch bituminous material.

Also mixes concrete,—disconnection of asphalt tank and blower and connection of water tank turns it into concrete mixer with capacity of 180 square street yards *per hour.*

Write for cost figures of electric railways which are using this mixer—and remember, its costs-saving justifies its use even if you have a stationary plant.

KOEHRING MACHINE CO.
MILWAUKEE, WIS.



MOTOR
DRIVE-
TROLLEY
POWER

OLD
MATERIAL
RIPPED
FROM
STREET

Re-melting and Re-mixing Old Asphalt



THE purchase of any meritorious article is in reality an investment that yields interest on its performance.

When a product falls down, due to an inexcusable fault, it immediately becomes a liability.

We believe that we are justified in saying that J-M Products stand in the investment class, because they are meritorious. And so as that they will remain in that class we back them up with J-M Responsibility, which really underwrites the investment and assures the income from that product in your service.

The way to buy Electrical Protection consistently is to always order "Noark" Fuses



Often an article can be so consistently good that the user loses his perspective on its real merit. This concern was like that one.

These customers were so accustomed to good fuse protection that there was no novelty in it. They became so used to "Noark" Service that they "blew" themselves to a new lot of cartridge fuses—with the accent on the "cartridge"—

The moral that this taught was a good one for both of us.

They learned that a good "Noark" fuse at a few cents was a safety valve for a device that cost many dollars.

And we learned that by being consistent in making a fuse that gives positive protection that we not only interest new buyers, but sell present users over and over again.

We would like you to try "Noark" fuses.

A Standardized line of Underground Distribution Boxes that will conform to any special requirement—"Noark" Subway Boxes

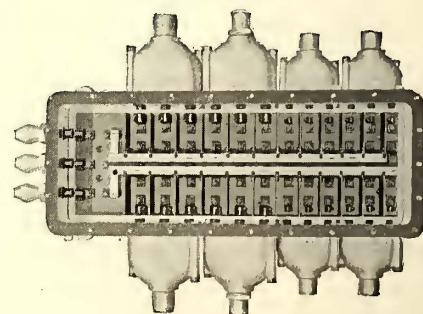
The fact that it is difficult to predict underground distribution box requirements and also that these requirements vary greatly, has prompted a demand for a distribution design that is flexible. A line that will permit of any arrangement of branch circuits, bus-bars, fusing, lugs, etc.

This condition has been studied and met in the design of "Noark" Subway Boxes.

The undesirable features of distribution boxes made "special" and the delay incident to their manufacture is thus eliminated and, furthermore, the unit construction of this line is an economy to the buyer. All the elements of these boxes have been standardized so that any combination of circuits, fusing and feeding can be made without entailing delay in shipment or extra expense.

The structural features of these Boxes are beyond criticism both as to mechanical and electrical features.

Let us quote you on your needs—Now.



H. W. JOHNS-MANVILLE CO.

Akron	Boston	Columbus	Duluth	Kansas City	Minneapolis	Philadelphia	St. Paul	Toledo
Albany	Buffalo	Dallas	Galveston	Los Angeles	Newark	Pittsburgh	Salt Lake City	Washington
Atlanta	Chicago	Dayton	Houghton	Louisville	New Orleans	Portland	San Francisco	Wilkes-Barre
Baltimore	Cincinnati	Denver	Houston	Memphis	New York	Rochester	Seattle	Youngstown
Birmingham	Cleveland	Detroit	Indianapolis	Milwaukee	Omaha	St. Louis	Syracuse	

THE CANADIAN H. W. JOHNS-MANVILLE CO., LTD., Toronto, Winnipeg, Montreal, Vancouver 3225-A 3226-C 3248

For the Good of the Service

Equally as important to the railways as the **design** of a signal is the permanence and the experience of the organization which backs the product.

Long ago the United States Electric Signal Company laid out their policy on the theory that **experience** and **conservative engineering** are of greater value to the buyer than experimentation and sales-enthusiasm.

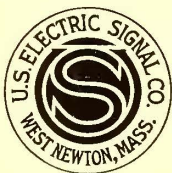
And that is why in all announcements prepared by this company every statement can be substantiated by **facts**.

When it is stated that **United States** electric signals will do a certain thing—no discount need be placed on the assertion—they will **do it**.

It is our earnest desire to establish relations of mutual benefit with the railways.

We believe that this can be accomplished only on the basis of **RELIABILITY** in statement and in product.

Don't you?

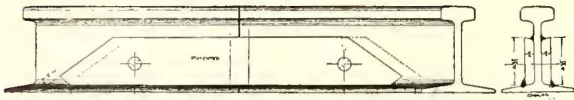


**United States
Electric Signal Co.**
West Newton, Massachusetts

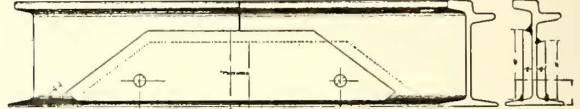
Foreign Representatives
Quilliam Brothers, Cleggs Court,
Chapel Street, Salford, England

WHAT'S THE ANSWER?

"INDIANAPOLIS" WELDED JOINTS



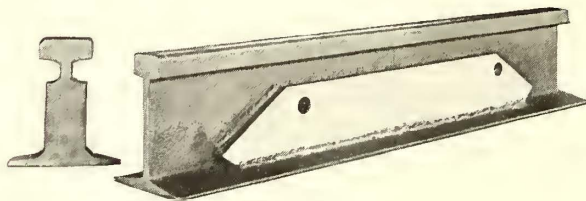
"Simplex" Joint for High Tee Rail



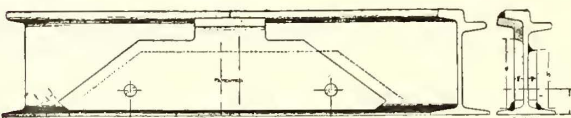
"Simplex" Joint for Guard and Girder Rail

More than fifty (50) street railways, including the largest all over the country, have installed over ten thousand (10,000)

"INDIANAPOLIS" WELDED JOINT AND BONDING PLATES



"Simplex" Joint for High Tee Rail



"Apex" Joint; Supporting Head on Gauge Side for Guard and Girder Rail

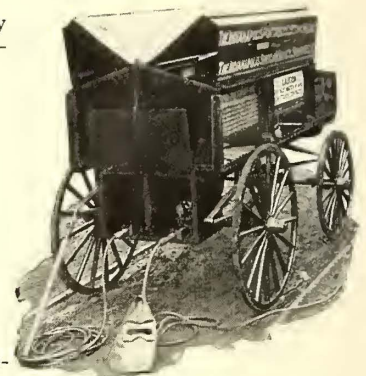
A single joint or any number can be economically applied by

One Man

With an

Indianapolis Portable

ELECTRIC WELDER



he can make a continuous jointless track.

Track of ideal construction for highest efficiency and maximum economy in operation.

NO BOLTS—NO BONDS—NO JOINT MAINTENANCE

Indianapolis Welded Joints

have greater strength and conductivity than the rail itself.

The cost is less than any other type of welded joint, and in many instances less than a mechanical bolted and bonded joint.

Get an estimate on reclaiming old track, it may save you Thousands of Dollars.

Get figures on these joints for new construction and insure against Joint and Bonding Troubles.



"Apex" Joint; Supporting Head on Gauge Side for Guard and Girder Rail

Small and medium size properties can now have the advantages heretofore only possible for large systems.

Large systems use the INDIANAPOLIS method extensively for isolated installations and repairing broken rails.

Maximum efficiency in operation is possible by the use of the INDIANAPOLIS WELDER AND JOINTS.

Write for detailed information

Indianapolis Switch & Frog Company, Springfield, Ohio

SALES OFFICES

New York, Chicago, Kansas City, Spokane, Portland, Seattle, Los Angeles, San Francisco, Denver, Birmingham

The Rail Joint Company
 185 Madison Avenue
 New York

A Grand Prize

THE only Medal of Honor awarded
 for Rail Joint Products in the
 Transportation Department by the
Panama-Pacific International Exposition
 at San Francisco was to
The Rail Joint Company of New York.

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Catalog on request



Type F C Bond



Type P 4 P Bond

“The Bond with the ‘Shot-Over’ Sleeve”—Use It

Because its terminals are made of soft, dense copper, forged to shape in dies. They are very soft and ductile and will not crack under compression.

Because the body of the bond is made of pure lake copper, in both cable and flat wire types. This gives you a flexible bond, one that absorbs vibration perfectly and one in which the strands won't break or crack.

Because body is forged and welded to the terminals by a special process; and on every “Protected” Rail Bond, whether compressed terminal type, pin driven type or duplex stud type, this provides a mechanically protecting sleeve—a “shot-over” sleeve—around the strands at their point of emergence from the terminal. It allows the cables or wires to emerge from the terminals in their original form, neither flattened, distorted, reduced in area or burnt.

In every “Protected” Rail Bond, where vibration is most severe—at the junction of terminal and strand, you get new, live, unburnt, mechanically protected copper to absorb it. This is why “Protected” Rail Bonds don't crack at this point.

In considering your bonding, remember that “Protected” Rail Bonds are furnished in both compressed terminal and pin driven types; remember that every one has the valuable “shot-over” sleeve features; and remember that the proof of their service lies in the **eighteen years' experience** behind them and in the **over eight millions** that are now in use.

Wouldn't our broad experience in connection with every class and kind of rail bonding problem be of great value to you right now?

It is yours for the asking, without the slightest obligation on your part.

ELECTRIC SERVICE SUPPLIES Co.

Manufacturer of Railway Material and Electrical Supplies

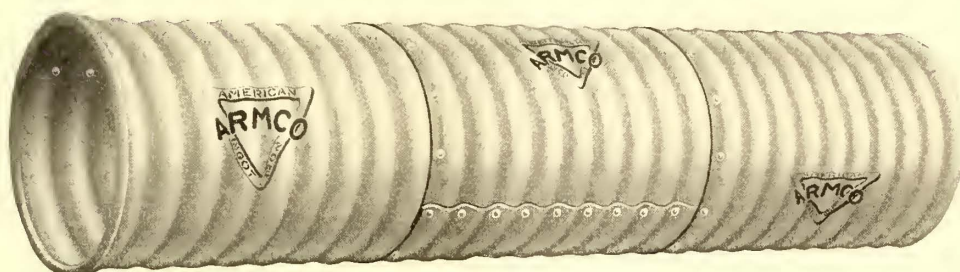
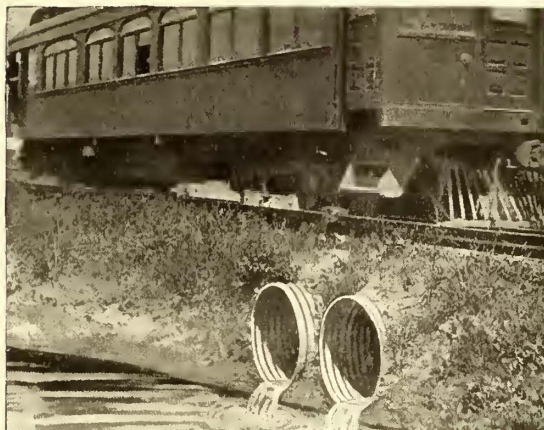
PHILADELPHIA
17th and Cambria Sts.

NEW YORK
Hudson Terminal

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417 So. Dearborn St.

ARMCO IRON

Resists Rust



The Purest and Most Even Iron Obtainable Goes Into

ARMCO AMERICAN INGOT IRON CULVERTS

This means that every chance of that rapid corrosion, which is so destructive to ordinary iron and steel, has been removed. It has become known that if all impurities were eliminated from iron in the making, and perfect evenness of physical structure attained, it would defy deterioration on exposure to the elements or to the soil. Armco Iron is the nearest approach to this ideal that has ever been achieved commer-

cially. Armco Culverts have effected important economies for thousands of users. *Get Armco Culverts for permanence.* You owe it to the efficiency of your electric railway system. If you want to know what *Armco Culverts* have done for many users, send for the data. There are no dissatisfied *Armco Culvert* users.

Write the Nearest Manufacturer for full information and prices on Armco Corrugated Culverts, Siphons, Sheets, Roofing and Formed Products.

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Dixie Culvert & Metal Co.
California, Los Angeles
California Corrugated Culvert Co.
California, West Berkeley
California Corrugated Culvert Co.
Colorado, Denver
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Delaware, Clayton
Delaware Metal Culvert Co.
Florida, Jacksonville
Dixie Culvert & Metal Co.
Georgia, Atlanta
Dixie Culvert & Metal Co.
Illinois, Bloomington
Illinois Corrugated Metal Co.
Indiana, Crawfordsville
W. Q. O'Neill Co.
Iowa, Des Moines
Iowa Pure Iron Culvert Co.
Iowa, Independence
Independence Culvert Co.

Kansas, Topeka
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Kentucky, Louisville
Kentucky Culvert Co.
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Dixie Culvert & Metal Co.
Maryland, Havre de Grace
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New England Metal Culvert Co.
Michigan, Bark River
Bark River Bridge & Culvert Co.
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Michigan Bridge & Pipe Co.
Minnesota, Minneapolis
Lyle Corrugated Culvert Co.
Minnesota, Lyle
Lyle Corrugated Culvert Co.
Missouri, Moberly
Corrugated Culvert Co.
Montana, Missoula
Montana Culvert Co.

Nebraska, Lincoln
Lee-Arnett Co.
Nebraska, Wahoo
Nebraska Culvert & Mfg. Co.
Nevada, Reno
Nevada Metal Mfg. Co.
New Hampshire, Nashua
North-East Metal Culvert Co.
New Jersey, Flemington
Pennsylvania Metal Culvert Co.
New York, Auburn
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North Carolina, Greensboro
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Utah, Woods Cross
Utah Corrugated Culvert & Flume Co.
Virginia, Roanoke
Virginia Metal Culvert Co.
Washington, Spokane
Spokane Cor. Culvert & Tank Co.
Washington, Egan Claire
Bark River Bridge & Culvert Co.

You Can't Afford to Lose

what this trolley
equipment will save

Both wheels and harps last longer and the wear on all overhead is greatly reduced. You save there on renewals and repairs.

The wheel is self-lubricating and needs no attention once installed. That saves labor, lubricant and the car roofing.

Improved design eliminates current waste, resulting in better and more reliable service. That influences public opinion in your favor and brings increased revenue.

So there's a gain for you all along the line—a positive gain that will follow the use of the new, perfected

V-K OILLESS TROLLEY WHEEL and NON-ARCING HARP

The self-lubricating feature of the V-K OILLESS WHEEL is the great thing about it. This consists of a patented, bronze gauze bushing impregnated with a graphite composition—practically indestructible—easily interchangeable. It has high conductivity enabling current to pass right through the bearing because the bearing is not surrounded with an insulating film of oil or grease found in usual practice. Changes in temperature don't affect its lubricating qualities. The wheel is uniformly well balanced—gives

smooth traction always, with perfect contact and the minimum of wire wear.

Here's what the V-K NON-ARCING HARP will do. It is equipped with a patented gripping device that holds the pin firmly and prevents all arcing. It's the loose-fitting pin that wears and burns out the hole, wastes current and scraps the harp early. The V-K locking device is simple—easy to operate—and can not get out of order. The contact springs of the harp prove valuable principally as cushions for the wheel to prevent dewiring from shock.

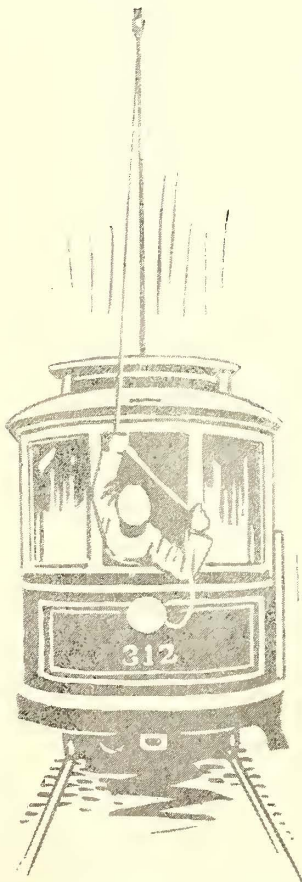
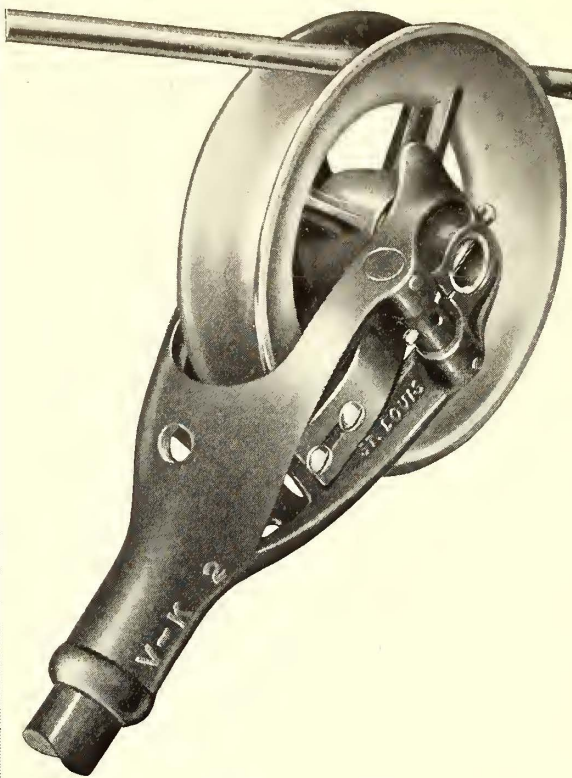
Now—just measure the qualifications of the V-K Equipment against what you are using. Any kind of test of the combination will prove its superiority.

Send for our new illustrated catalog. It contains full information on sizes, styles, etc., covering our whole line of wheels and harps.

More-Jones Brass & Metal Co.

St. Louis, Mo.

Manufacturers of Trolley Wheels and Harps, Contact Springs, Motor Axle Bearings, Armature Bearings, Truck Journal Bearings, Air Compressor Bearings, Armature Babbitt Metal and similar products.





"Golden Glow" on Terre Haute, Indianapolis and Eastern



Interurban headlights are interchangeable with 4-ampere arc lights, without additional resistance

Over the 200 Mark—

When the New York, Westchester & Boston ordered its new Pressed Steel cars equipped with



headlights, it was the 201st prominent company in 18 months to widely adopt these lamps.

Do you know what it means when the biggest and most progressive companies in every state agree on the superiority of a single product?

Do you know of any other article of electric railway equipment which has had such extensive installation in such a short space of time.

Golden Glow headlights showed the way to "Safety Illumination" with incandescent bulbs, and they continually prove their greater efficiency.

In recent tests against competing headlights, using the same bulbs, Golden Glow headlights gave from 10 per cent. to 40 per cent. greater illumination, thus proving our statements that the reflectors in Golden

Glow headlights are the only scientifically correct mirrored glass reflectors for headlight purposes.

Moreover, Golden Glow lamps carry their bulbs in the optically correct position for focusing, are made of pressed steel throughout, parts are electrically welded and finished in baked black enamel. They are dust and weather-proof.

They project a further central beam, give a wider dispersed light, and therefore a more satisfactory illumination than other incandescent headlights.

This is why over 200 railways have made Golden Glow their standard.

Our New Catalog, No. 364-J, describing the entire Golden Glow line, will be sent out only on request. Write for a copy.

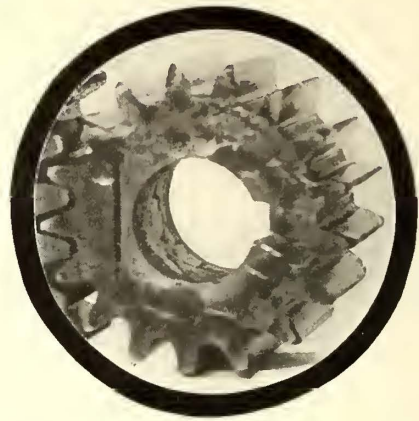
219 East
South Street

The **ESTERLINE** Co.

Indianapolis,
Indiana

This Tool Steel pinion was followed in careful test by a large railway line.

It costs them \$6.00 and freight, and according to their records it has given more mileage than the aggregate they obtained from nine (9) of the untreated pinions previously used.



Assuming that their untreated pinions cost them but \$2.00, which is a very low estimate, this pinion has done the work of \$18.00 worth of soft pinions.

MAKING A NET SAVING OF \$12.00 WHICH GOES ENTIRELY TO DIVIDENDS

This omits the savings in freight on eight pinions and in installation costs, etc.

According to July, 1913, AERA, gross earnings from fares are divided up so that on the average 6.2% or 31/100 cents out of each 5c. fare goes to dividends. On this basis

\$\$\$ It Takes 3,720 5c. Fares to Equal the Earnings From this One Tool Steel Pinion \$\$\$

Fares are GROSS Earnings Gear Savings are NET Earnings

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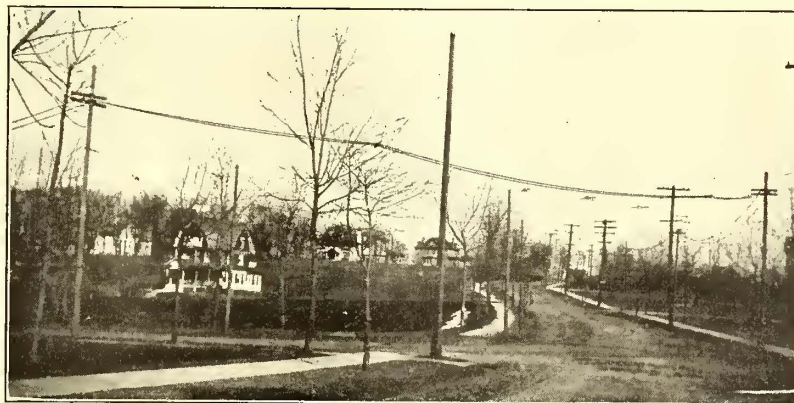
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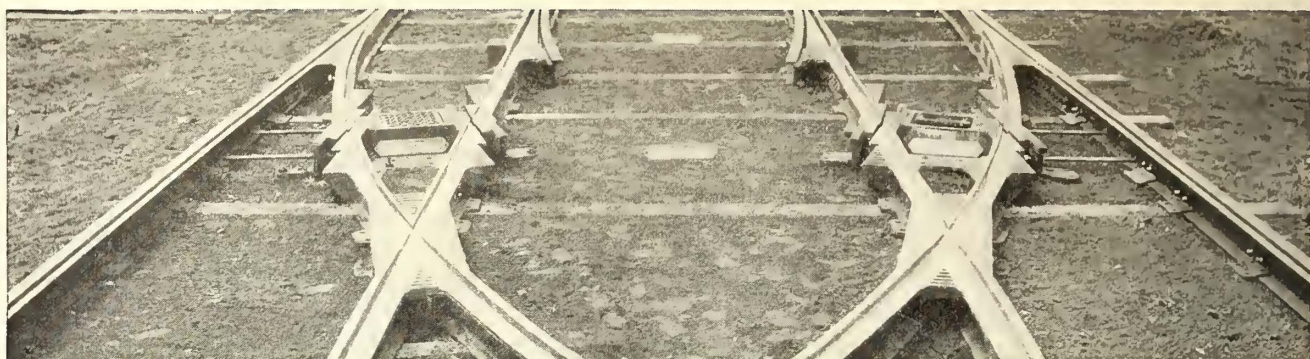
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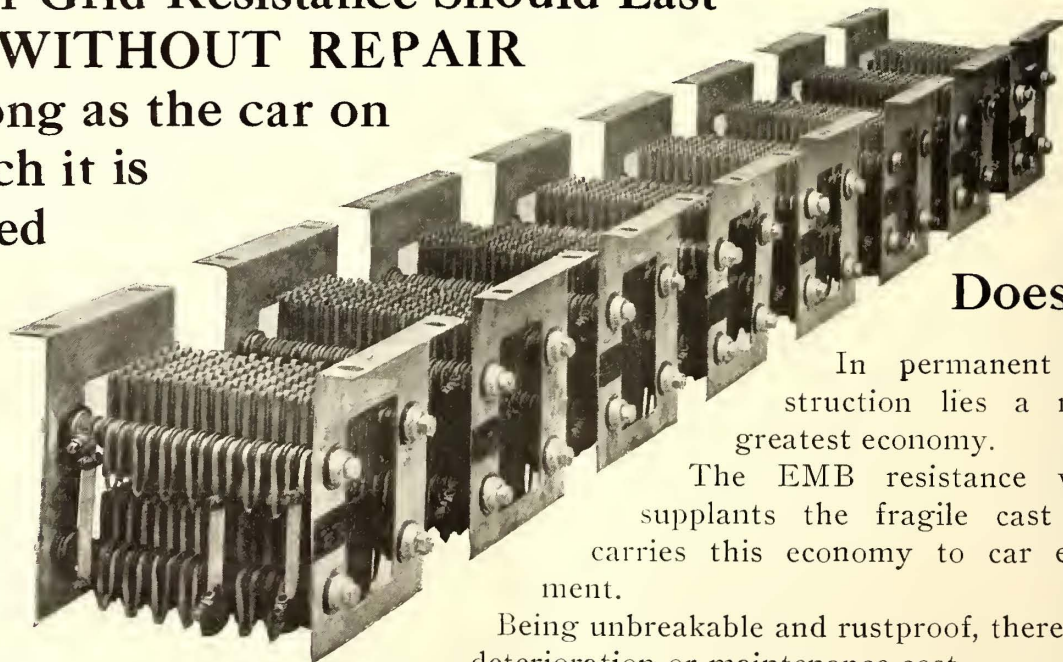
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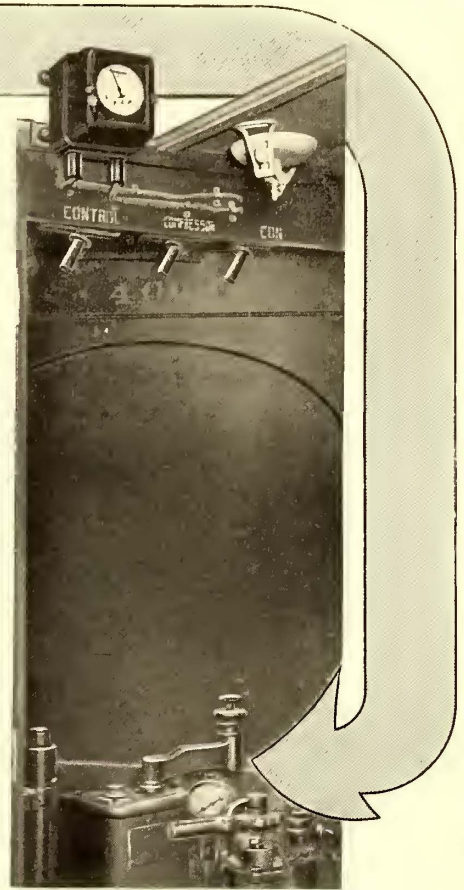
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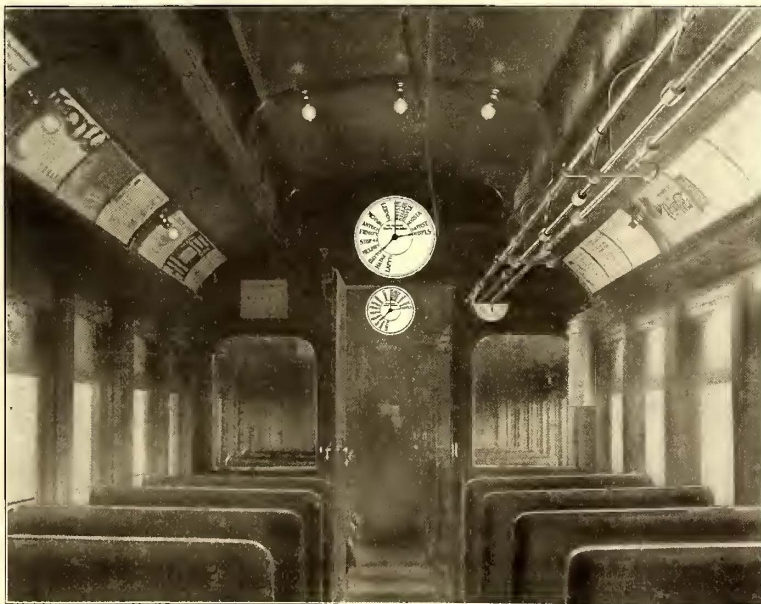
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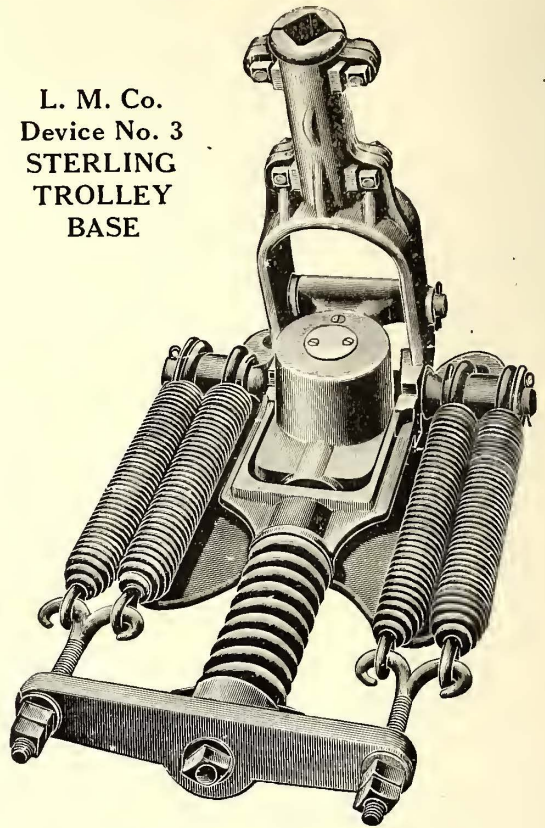
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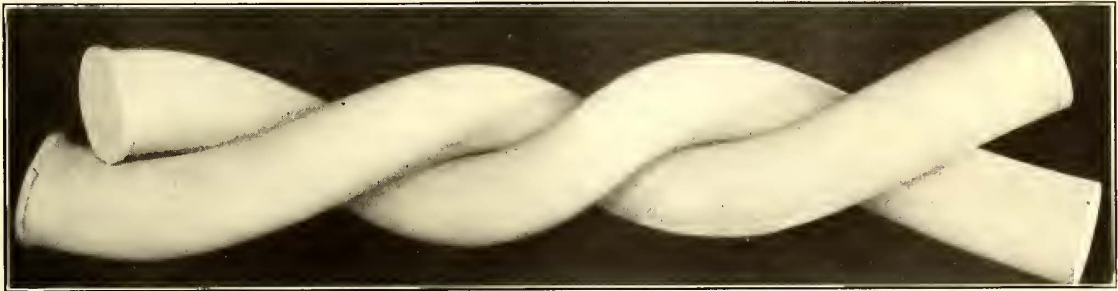
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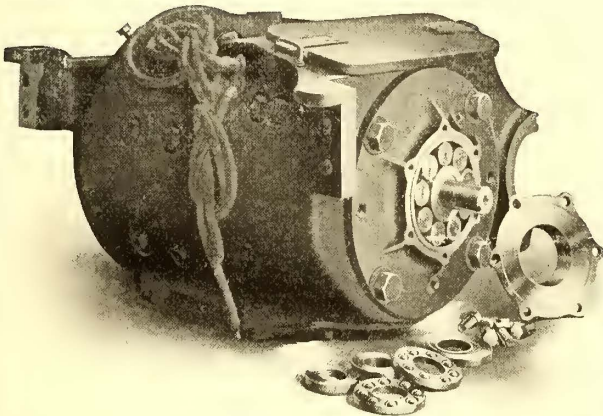


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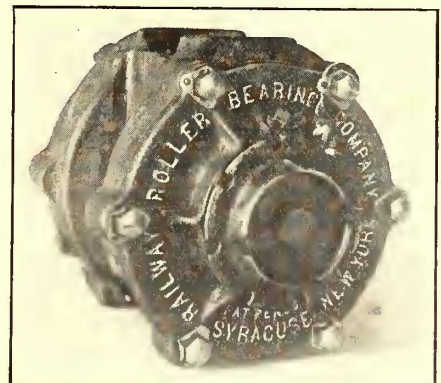
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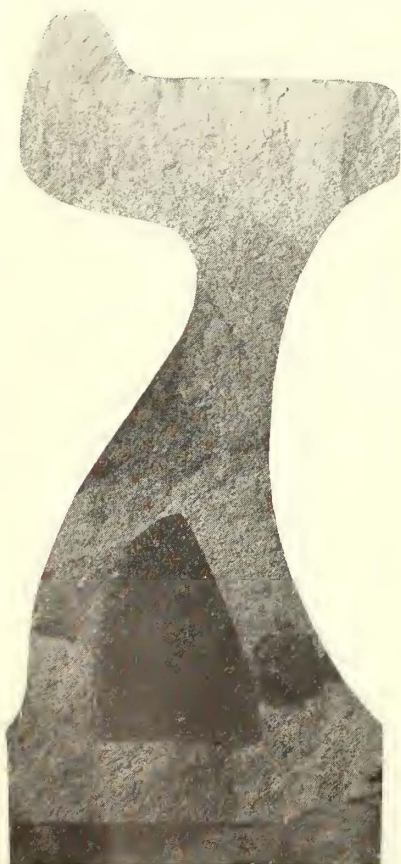


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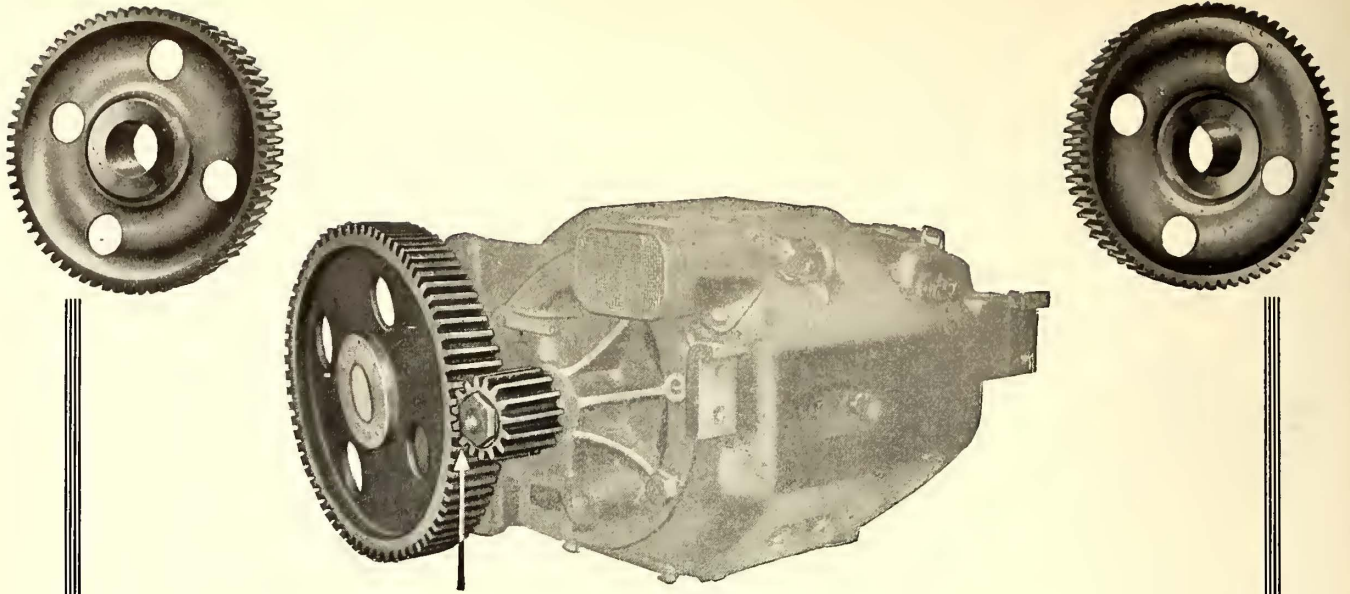


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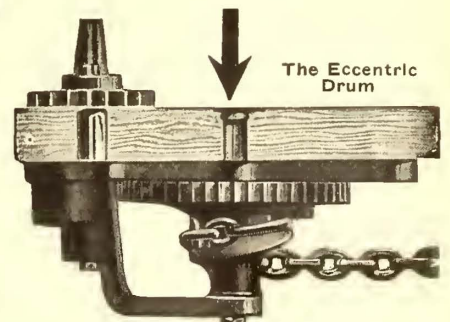
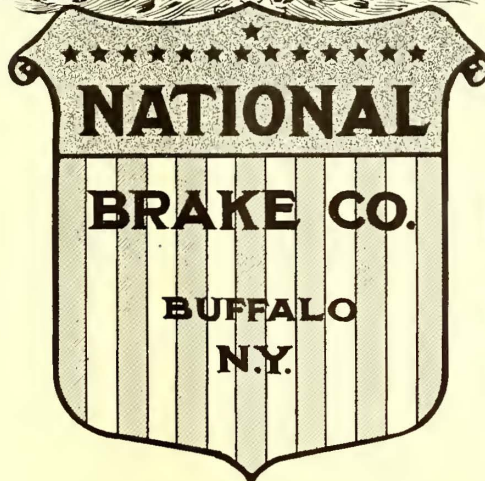
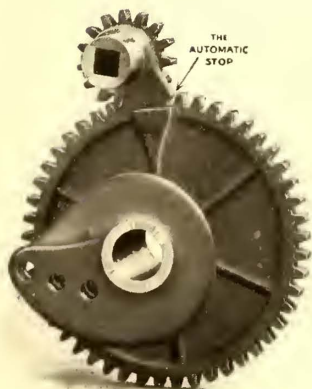
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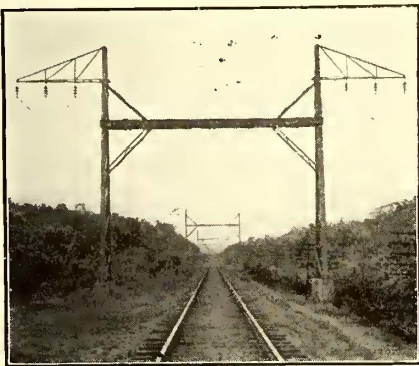
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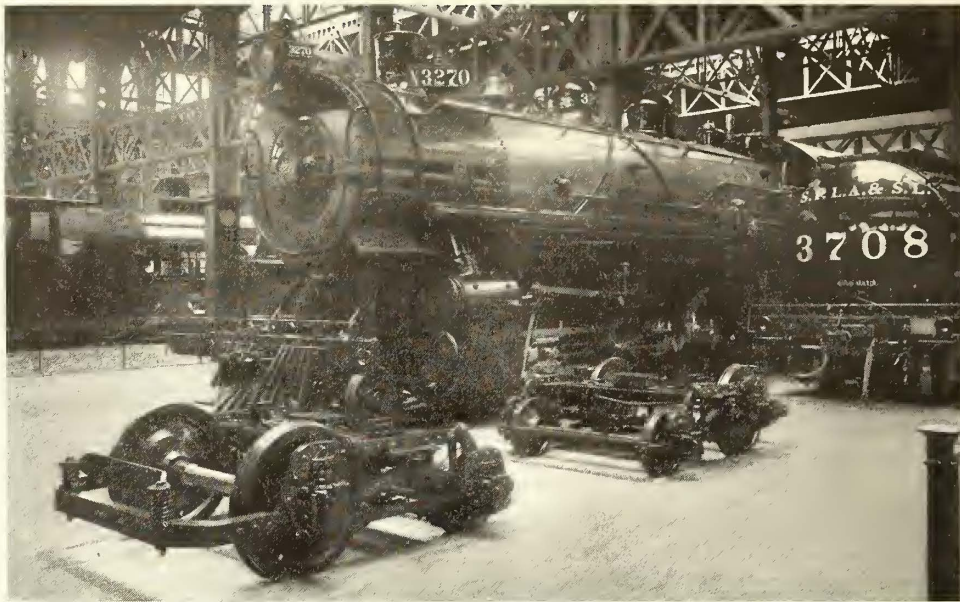
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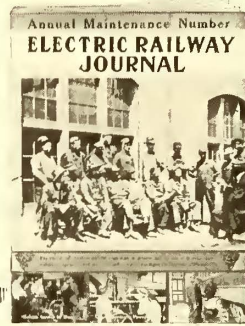
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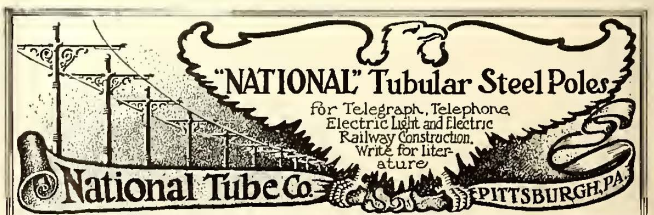
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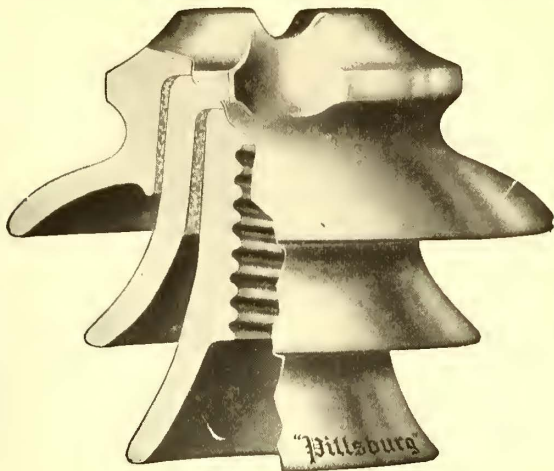
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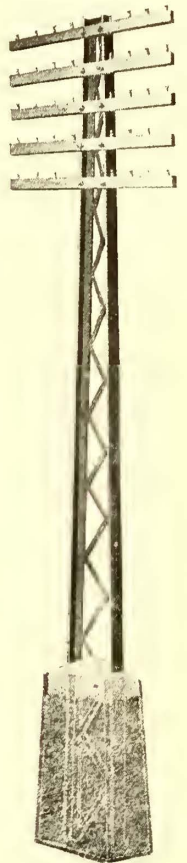
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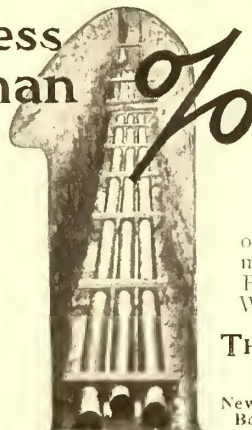
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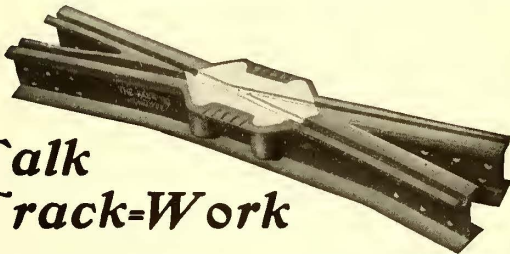
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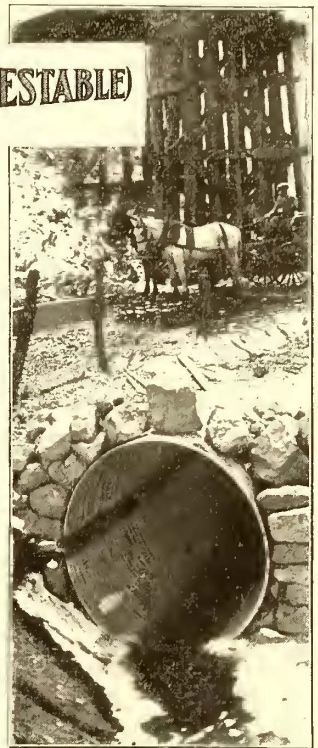
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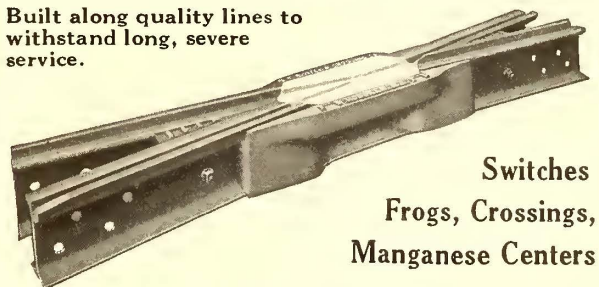
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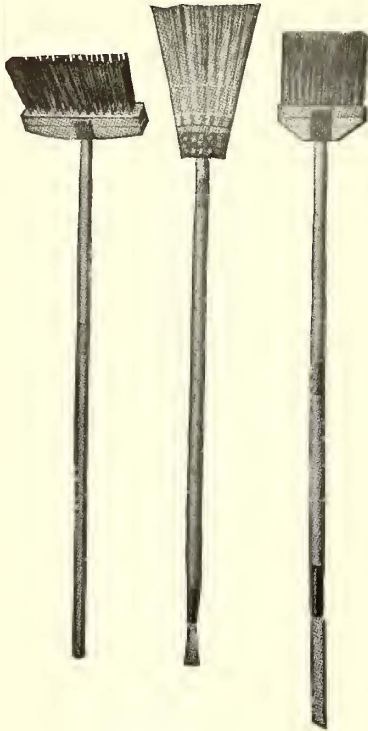
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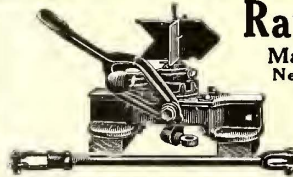
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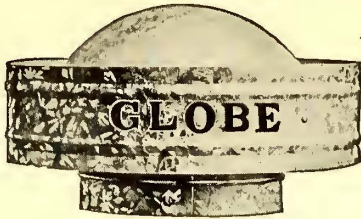
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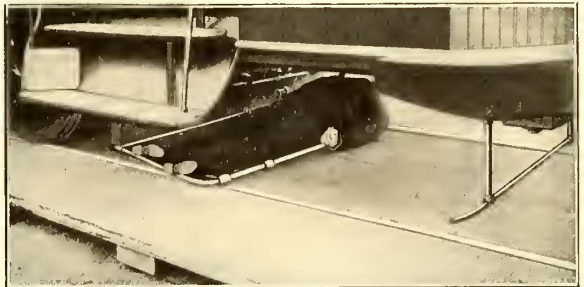
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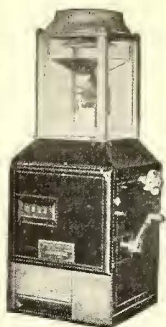
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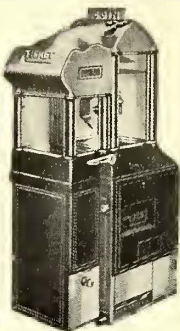
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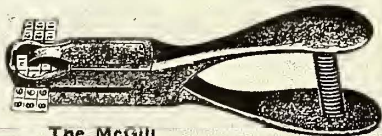
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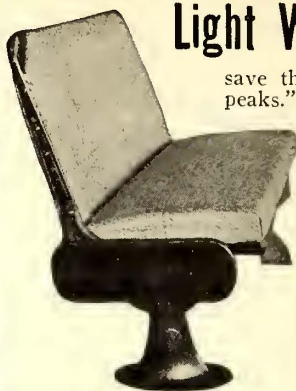
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538 W. HARRISON STREET,

CHICAGO

Light Weight Steel Seats

save the drain on current at "traffic peaks."



WALKOVER Pressed Steel Seats

give more room—more comfort—more money value than any other seat. *Specify them for your new cars.*

Hale and Kilburn Company

New York Philadelphia Chicago

PANTASOTE

The National Standard for Car Curtains and Car Upholstery

AGASOTE HEADLINING

The only headlining made in one solid piece. Will not separate, warp or blister. Waterproof and homogeneous.

The Pantasote Company

11 Broadway, New York

People's Gas Bldg., Chicago, Ill.

797 Monadnock Bldg., San Francisco, Cal.

THE readers of technical papers are busy men. Don't expect one flash of the Searchlight to reveal them all—or one insertion of your advertisement to be read by them all. **Order your Want or For Sale Advertisement published four times or more.** If all of the insertions are not needed we will return the full amount received for whatever space is not used.

Searchlight Department,
ELECTRIC RAILWAY JOURNAL

The Peter Smith Heater Company's Forced Ventilation Hot Air Heaters are approved by the Board of Underwriters', also they are protected with patents in United States and Canada. Catalogue and detail data will be furnished you upon request.

THE PETER SMITH HEATER COMPANY

1735 Mt. Elliott Ave., Detroit, Mich.

Ventilation—Sanitation—Economy—Safety

All Combined in

THE COOPER FORCED VENTILATION HOT AIR HEATER

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

We Also Manufacture Pressed Steel Hot Water Heaters

THE COOPER HEATER CO., CARLISLE, PA.



THE RAILWAY SUPPLY & CURTAIN CO.

CHICAGO

CAR CURTAINS & FIXTURES FOR ALL PURPOSES

CATALOGUE ON REQUEST



INTERNATIONAL SPECIALTIES TALK FOR THEMSELVES

Registers and Register Fittings, Badges, Punches and Bell Cord.

THE INTERNATIONAL REGISTER CO.

15 SOUTH THROOP ST., CHICAGO

IN A WORD THE RAPID READY CHANGE CARRIER

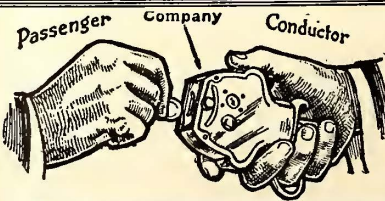


enables conductors to give change quickly. Passengers can pass into car immediately—Prevents crowded platforms—Shortens time at car stops. Just what you need. Price, \$1.75.

CHAS. F. ETTER

904 N. 2nd St., Harrisburg, Pa.

25 - 10 - 5 - 1 or 5



Direct Automatic Registration By the Passenger

Rooke Automatic Register Co.
Providence, R. I.



Philip Nungesser

Now Let Us Prove It To You

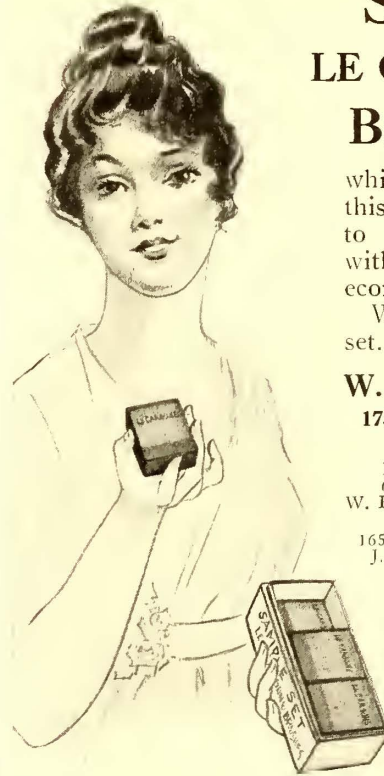
We have proved the month in and month out serviceability of

Nungesser Carbon and Metallic Brushes

to many others in all lines of industry. Will you match your time against our time and expense to either correct any brush troubles you may have, or to improve present conditions? If Better Service interests you, write us for Symptom Blanks.

The Nungesser Carbon & Battery Co.
Cleveland, Ohio

"It's the Trial Set of LE CARBONE Brushes"



which means that this road is about to get acquainted with new brush economy.

Write for your set.

W. J. Jeandron
173 Fulton Street
New York
Pittsburgh Office:
636 Wabash Bldg.
W. P. Poynton, Engineer.
Chicago Office:
1657 Monadnock Block,
J. C. Kyle, Engineer.

3242



Lifts Load from many angles
Here's a jack that takes hold of any load with a hurry-up lift that clears up trouble with a rush. It's the **Buckeye Emergency Jack No. 239 Special**

Made of heavy steel and malleable castings with specially heat-treated forgings by expert workmen. Lifts 16 tons. Get prices.

The Buckeye Jack Mfg. Co.
Alliance, Ohio

7180

2

Don't Depend on Paint to Make Your Car Roofs Leak - proof



If the roof itself is of ordinary canvas, no amount of paint will make it waterproof. This quality must be possessed in the original roofing.

BAYONNE CAR ROOFING

is the best known weather resisting roof material that has entered into car construction. It is "scientifically" waterproofed in its making and all the elements of nature can't make it otherwise. It's "yours for permanence and satisfaction in car roofing." Write for sample book and Price List J-40.

John Boyle & Co., Inc.
New York City

112-114 Duane St. 70-72 Reade St.
Branch House: 202-204 Market St., St. Louis, Mo.

1120

ALEBAUGH
No Spark Brushes
Save Commutators, Power, Brush Cost
ALEBAUGH SELF LUBRICATING CARBON COMPANY
1502 Columbia Ave. Phila., Pa.

UNION SPRING & MANUFACTURING CO.
SPRINGS COIL AND ELLIPTIC
M. C. B. Pressed Steel Journal Box Lids
General Office, First National Bank Bldg., Pittsburgh, Pa.
Works: New Kensington, Pa.
50 Church St., New York. 1204 Fisher Bldg., Chicago, Ill.
Missouri Trust Bldg., St. Louis, Mo.

SEARCHLIGHT SECTION

FOR SALE

- 2—28' 10" Paywithn Cars, 4 G.E. 80 motors, Brill 27 G Trucks, AA1 Air Brakes.
 1—Double Truck Sprinkling Car, 4,000 gallons capacity.
 30—Brill 20' Closed Cars, G.E. 1000 M., Brill 21-E Tr.
 20—Jones 20' Closed Cars, G.E. 52 Motors, Bemis Trucks.
 2—Jackson and Sharp 18' Car Bodies.
 10—42' Kuhlman Int. Cars, Bald. Tr., 4 Wgh. 121 Motors.
 20—Comb. Int. Cars, Bald. Trucks, 4 Wgh. 119 Motors.
 8—Brill 22' Closed Cars, Wgh. 68 Motors, Peck. Trucks.
 1—Jackson and Sharp 18' Car Body.
 4—Brill 30' Express Cars, Brill 22-E Trucks.
 9—Brill 30' Express Cars, complete, 4 G.E. 1000 Motors, AA1 Air Brakes, Brill 27-G Trucks.
 10—Wason 10 B. Open Cars, G.E. 1000 Motors, Bemis Tr.
 5—Brill 10 B. Open Cars, West 12A M., Brill 21-E Trucks.
 8—Brill 14 B. Open Cars, Wgh. 56 Motors, Brill 22-E Tr.
 8—West. 101B-2 Railway Motors, complete.
 40—G.E. 90 Railway Motors, complete.
 20—G.E. 66 Railway Motors, complete.
 103—G.E. 88-B brand new Motors, complete.
 12—G.E. 73 Railway Motors, complete.
 24—G.E. 87 Railway Motors, complete.
 20—G.E. 57 Railway Motors, complete.
 20—G.E. 80 Railway Motors, complete.
 12—G.E. 54 Railway Motors, complete.
 60—G.E. 1000 Railway Motors, complete.
 60—G.E. 800 Railway Motors, complete.
 30—West. 12A Railway Motors, complete.
 32—West. 49 Railway Motors, complete.
 8—West. 38B Railway Motors, complete.
 10—West. 112 Railway Motors, complete.
 4—West. 68-C Railway Motors, complete.
 4—West. 68 Railway Motors, complete.
 22—G.E. 80 Armatures, brand new.
 2—G.E. 87 Armatures, brand new.
 2—G.E. 73-C Armatures, brand new.
 4—G.E. 67 Armatures, brand new.
 18—G.E. 57 Armatures (second-hand), two turn.
 30—G.E. 57 Form A Motor Casings.
 3—West. 101-B2 Armatures, brand new.
 3—West. 93A-2 Armatures, brand new.
 3—West. 93A Armatures, brand new.
 22—K6 Controllers. 62—K10 Controllers.
 44—K11 Controllers. 30—K14 Controllers.
 28—K2 Controllers. 28—B29 Controllers.
 2—Sets Brill 27G Trucks, 4' 6" wheelbase.
 6—Brill 21E Trucks, 7' 6" and 8' wheelbase.
 10—Dupont Trucks, 7' 6" wheelbase.

All of the above apparatus is in first class condition for immediate service. For further particulars apply to

**W. R. KERSCHNER CO., Inc., 50 Church Street
NEW YORK, N. Y.**

WANTED

Immediate delivery

Frequency Changer Set

Capacity 500 k.w. to 1000 k.w. 25 cycle, three phase motor, 13,200 volts, 60 cycle, three phase generator, 13,200 volts. Speed 300 R.P.M.

W. S. Barstow & Co., Inc.

50 Pine St., New York City

MACGOVERN AND COMPANY INC.

FRANK MACGOVERN, Pres. & Gen. Mgr.

114 LIBERTY STREET NEW YORK CITY
Phone, 3375-3376 Rector

60 CYCLE ROTARY CONVERTERS

- 1—300 KW. Westinghouse, 3 phase, 600 volts, D.C., 600 RPM., 500 amps., 370 volts AC., with starting motor.
 1—100 KW. Gen. Elec., type TC, form A, 550 volts, 182 amps. DC., 340 volts AC., 1200 RPM.

25 CYCLE ROTARY CONVERTER

- 1—300 KW. Allis-Chalmers, 3 phase, 6 pole, 650 volts, 462 amps., 500 RPM.

Immediate Delivery

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

CARS FOR SALE

OPEN and CLOSED
MOTOR and TRAIL

Write for Price and Full Particulars to

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg. Philadelphia, Pa.

COMPLETE ARMATURES FOR SALE

FOR ALL THE STANDARD
STREET RAILWAY MOTORS

GET OUR PRICE WE CAN SAVE YOU MONEY

America's Greatest Repair Works

CLEVELAND ARMATURE WORKS, Cleveland, O.

The results of the best practice in electric railway work are recorded every week in the Electric Railway Journal

SEARCHLIGHT SECTION

60 Cycle, Rotary Converters

- 2—General Electric 1000 K.W., 600 v., 360 R.P.M., type "H.C." 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 "H.C." comp. wound, 6 phase. Complete with air cooled trans., 2300 v. reactances and panels.
 - 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:
 8—125 K.W. G.E. 2400 volts prim., 370 volts sec.
 6—75 K.W. Ft. Wayne, 10,000-9000-185-370 v.
 8—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 volta.
 - 1—250 K.W. Genl. Elect., 3 ph., 25 cycle, 500 R.P.M., 600 volta.
- Can also furnish transformers—all voltages.

Railway Car Equipment

- 8—75 H.P. Westinghouse, 112 Railway Motors, 600 volts, newly rewound armatures, full commutators, rebuilt entirely. Will be sold fully guaranteed, upon any reasonable terms of payment.
- 12—G.E. 57 Motors, 50 H.P. Each.
- 16—G.E. 67 Motors, 40 H.P. Each.
- 20—G.E. 201 Motors, 65 H.P. Each.

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.

ARCHER & BALDWIN, 114 Liberty Street

ROOM 302
 Phone Rector 4337-4338

New York

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

POSITIONS WANTED

ASSISTANT superintendent—Situation desired by graduate engineer, experienced in all departments of railway work, five years in track and construction, two years in operating as motorman, instructor, chief instructor and assistant to superintendent; fine references; hard worker; desired salary \$100 a month. Box 771, Elec. Ry. Jour.

ELECTRICAL engineer, superintendent of equipment or general superintendent. Technical graduate, 13 years' experience, engineering, construction and operation. References present employers. Eastern location desired. Address Box 776, Elec. Ry. Jour.

ELECTRICAL engineer, technical graduate, 15 years' practical experience with General Electric, Westinghouse and public utility companies in engineering, construction and operation. Age 36, married; A-1 references. Box 773, Elec. Ry. Jour.

GENERAL auditor, 34, desires change. Wide and varied experience with both municipal and private concerns operating steam and electric railways (city and interurban), light and power and gas properties. Competent to take full charge of office or carry out practical, efficient, and economical auditing and accounting systems according to operating conditions. Correspondence solicited. Address Box 764, Elec. Ry. Jour.

LAND and tax agent—Situation desired by graduate civil engineer with three years' experience in this work holding that position with large Western interurban. Best references. Salary desired \$110 month. Box 770, Elec. Ry. Jour.

Get your Wants into the Searchlight

ADVERTISING RATES

Positions Wanted, Evening Work Wanted, 2 cents a word, minimum charge 50 cents an insertion, payable in advance.

Positions Vacant, Salesmen Wanted, Agencies, all undisplayed Miscellaneous ads, Machinery and Plants For Sale (with one line of display heading), 3 cents a word, minimum charge \$1.50 an insertion.

All advertisements for bids cost \$2.40 an inch. Advertisements in display type cost as follows for single insertions:

1-16 page, \$5.00	1 in. single col., \$3.00
1-8 page, 10.00	4 in. single col., 11.60
1-4 page, 20.00	8 in. single col., 22.40

In replying to advertisements, send copies of testimonials, etc., instead of originals.

POSITIONS WANTED

MASTER mechanic open for position. Twenty years' experience maintaining rolling equipment, interurban and local. Can handle men to advantage. All references. Am American, married. Address Box 774, Elec. Ry. Jour.

SALESMAN—Situation desired as salesman by graduate civil engineer, thirteen years' experience in all departments of electric railway work in both East and West. Three months as salesman of lubricating oil. Best references. Good worker. Box 772, Elec. Ry. Jour.

POSITIONS WANTED

STREET railway superintendent with 22 years' practical experience wishes to make a change. Thoroughly acquainted with all branches of the work. Economical and capable manager, very successful in handling men. Box 775, Elec. Ry. Jour.

TRACK foreman, roadmaster or engineer—Situation desired by graduate technical engineer experienced as foreman, inspector, chief clerk way and structures department, purchasing agent, twelve years' experience, nine with Stone & Webster; best references; hustler; salary desired \$100 month. Box 769, Elec. Ry. Jour.

FOR SALE

New Trolley Wire Bargain

Eighteen One-Mile Reels

No. 0000 Hard Drawn Grooved Copper Trolley Wire

On Original Reels

Bought by Mistake

Low Price to Move Quick

Wire or Telephone Us



RAILS, EQUIPMENT, ETC.

Undisplayed
 Cards Under
 Positions Wanted
 Cost 50 Cents
 for 25 Words

Keep Your Eyes on the Journal's Searchlight Section

Machinery
 Advertisements
 Undisplayed
 Cost \$1.50
 for 50 Words

READY - REFERENCE INDEX

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

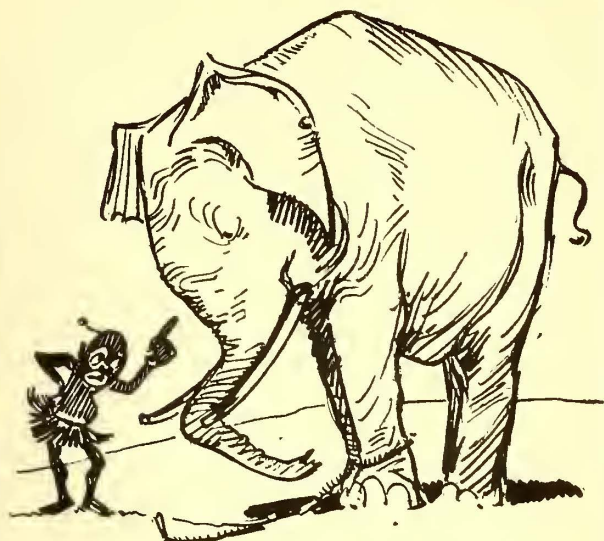
Over 300 different products are here listed.
The Alphabetical Index (see eighth page following) gives the page number of each advertisement.

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.

- Accountants.**
Greims Corporation, H. E.
- Acetylene Service.**
Searchlight Co., The.
- Advertising, Street Car.**
Collier, Inc., Barron G.
- Air Cleaners.**
Lord Mfg. Co.
- Alloys, Steel and Iron**
Titanium Alloy Mfg. Co.
- Alloys and Bearing Metals.**
(See Bearings and Bearing Metals.)
- Anchors, Guy.**
Johns-Manville Co., H. W.
Westinghouse Elec. & M. Co.
- Architects**
Kennard, Ralph B.
- Automobiles and Busses.**
Brill Co., The J. G.
- Axle Straighteners.**
Columbia M. W. & M. I. Co.
- Axles.**
Brill Co., The J. G.
Cambria Steel Co.
Carnegie Steel Co.
Cincinnati Car Co.
National Tube Co.
Niles Car & Mfg. Co.
St. Louis Car Co.
Standard Steel Works Co.
U. S. Metal & Mfg. Co.
Westinghouse Elec. & M. Co.
- Babbling Devices.**
American General Eng'g Co.
Columbia M. W. & M. I. Co.
- Badges and Buttons.**
International Register Co., The
- Bankers and Brokers.**
Halsey & Co., N. W.
- Batteries, Dry.**
Johns-Manville Co., H. W.
Nungesser Carbon & Battery Co.
- Batteries, Storage.**
Electric Storage Battery Co.
Esterline Co.
- Bearings, Center.**
Baldwin Locomotive Works.
- Bearings and Bearing Metals.**
American General Eng'g Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Long Co., E. G.
More-Jones Brass & Metal Co.
St. Louis Car Co.
- Bearings, Roller and Ball.**
Railway Roller Bearing Co.
- Bells and Gongs.**
Brill Co., The J. G.
Electric Service Supplies Co.
Ohio Signal Co.
Reiter, G. C.
St. Louis Car Co.
- Benders, Rail.**
Niles-Bement-Pond Co.
- Blowers.**
General Electric Co.
Westinghouse Elec. & M. Co.
- Boiler Cleaning Compounds.**
Dearborn Chemical Co.
Johns-Manville Co., H. W.
- Boiler Coverings.**
Johns-Manville Co., H. W.
- Boiler Graphite.**
Dixon Crucible Co., Jos.
- Boiler Tubes.**
National Tube Co.
- Boilers.**
Babcock & Wilcox Co.
- Bond Clips.**
Electric Railway Improv. Co.
- Bond Testers.**
American Steel & Wire Co.
- Bonding Tools.**
American Steel & Wire Co.
Electric Railway Improv. Co.
Electric Service Supplies Co.
- Bonds, Rail.**
American Steel & Wire Co.
Electric Railway Improv. Co.
Electric Service Supplies Co.
General Electric Co.
Johns-Manville Co., H. W.
Roebling's Sons Co., John A.
- Book Publishers.**
McGraw-Hill Book Co., Inc.
- Boring, Tools, Car Wheel.**
Niles-Bement-Pond Co.
- Braces, Rail.**
Kilby Frog & Switch Co.
- Brackets and Cross Arms. (See also Poles, Ties, Posts, Piling and Lumber.)**
American Bridge Co.
Bates Expanded Steel Truss Co.
Electric Service Supplies Co.
Lindsley Bros. Co.
- Brake Adjusters.**
Anderson Brake Adjuster Co.
Savage-Ward Brake Co.
- Brake Shoes.**
American Brake S. & Fdy. Co.
Barbour-Stockwell Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Long Co., E. G.
St. Louis Car Co.
- Brakes, Brake Systems and Brake Parts.**
Anderson Brake Adjuster Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
Long Co., E. G.
Lord Mfg. Co.
National Brake Co.
St. Louis Car Co.
U. S. Metal & Mfg. Co.
Westinghouse Traction Brake Co.
- Brazing. (See Welding.)**
- Bridges and Buildings.**
American Bridge Co.
- Brooms, Track, Steel or Rattan.**
Paxson Co., J. W.
- Brushes, Carbon.**
Calebrough Self-Lubricating Carbon Co.
Dixon Crucible Co., Jos.
General Electric Co.
Jeandron, W. J.
LeCarbone Co.
Morgan Crucible Co.
Nungesser Carbon & Battery Co.
Westinghouse Elec. & M. Co.
- Bumpers, Car Seat.**
Electric Service Supplies Co.
Imperial Rubber Co.
Massachusetts Chemical Co.
Walpole Tire & Rubber Co.
- Bunkers, Coal**
American Bridge Co.
- Bunting.**
Boyle & Co., Inc., John.
- Bushings, Fibre.**
Diamond State Fibre 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, 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.
Kuhlman Car Co., G. C.
Niles Car & Mfg. Co.
St. Louis Car Co.
Wason Mfg. Co.
- Cars, Self-Propelled.**
Electric Storage Battery Co.
General Electric Co.
- Castings, Composition or Copper.**
Anderson M. Co., A. & J. M.
- Castings, Gray Iron and Steel.**
American B. S. & Fdry. Co.
American Bridge Co.
American General Eng'g Co.
Columbia M. W. & M. I. Co.
Falk Co.
Long Co., E. G.
St. Louis Car Co.
St. Louis Steel Fdry. Co.
Standard Steel Works Co.
Union Spring & Mfg. Co.
- Castings, Malleable and Brass.**
American B. S. & Fdry. Co.
American General Eng'g Co.
Long Co., E. G.
St. Louis Car Co.
- Catchers and Retrievers, Trolley.**
Eclipse Railway Supply Co.
Electric Service Supplies Co.
Long Co., E. G.
Lord Mfg. Co.
Wood Co., C. N.
- Ceiling, Car.**
Pantasote Co.
- Change Carriers.**
Etter, Chas. F.
McGill Ticket Punch Co.
- Cheese Cloth.**
Boyle & Co., Inc., John.
- Circuit Breakers.**
Cutter Electrical & Mfg. Co.
General Electric Co.
Westinghouse Elec. & M. Co.
- Clamps and Connectors, for Wires and Cables.**
American General Eng'g Co.
Anderson M. Co., A. & J. M.
Electrical Engineers Equipment Co.
Electric Service Supplies Co.
General Electric Co.
Klein & Sons, M.
Standard Railway Supply Co.
Westinghouse Elec. & M. Co.
- Cleaners and Scrapers, Track. (See also Snow-Plows, Sweepers and Brooms.)**
Brill Co., The J. G.
Cincinnati Car Co.
- Cleats, Car Wirling.**
General Electric Co.
- Clusters and Sockets.**
General Electric Co.
- Coal and Ash Handling. (See Conveying and Hoisting Machinery.)**
- Coil Banding and Winding Machines.**
American General Eng'g Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
- Coil Impregnation.**
Vacuum Impregnating Wks.
- Coils, Armature and Field.**
Cleveland Armature Works.
Columbia M. W. & M. I. Co.
D & W Fuse Co.
General Electric Co.
Roebling's Sons Co., J. A.
Westinghouse Elec. & M. Co.
- Coils, Choke and Kicking.**
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.
- Coin-Counting Machines.**
International Register Co., The
Johnson Fare Box Co.
- Commutator Slotters.**
American General Eng'g Co.
General Electric Co.
Westinghouse Elec. & M. Co.
Wood Co., Chas. N.
- Commutator Truing Devices.**
American General Eng'g Co.
General Electric Co.
- Commutators or Parts.**
American General Eng'g Co.
Cleveland Armature Works.
Columbia M. W. & M. I. Co.
General Electric Co.
Long Co., E. G.
Westinghouse Elec. & M. Co.
- Compressors, Air.**
Curtis & Co. Mfg. Co.
General Electric Co.
Westinghouse Trac. Br. Co.
- Condensers.**
General Electric Co.
Westinghouse Machine Co.
- Conduits, Flexible.**
Fibre Conduit Co.
- Conduits, Underground.**
Fibre Conduit Co.
Johns-Manville Co., H. W.



SHACKLED

If an elephant exerts elephant force he can break almost any bond.

Yet you see natives weave a rope of grass in a few seconds and tie the elephant with it.

This flimsy cord, and a warning, serve to keep him from running away.

A little "pep" on the part of the elephant would give him freedom. Flimsy grass cords of custom bind a good many railway men in the same way.

Take brushes, for instance. Few have any real idea of the economies possible by a *prescription* of *Morganite* brushes by *Morgan brush engineers*.

Start something. All it requires to have these economies made evident is to drop a note *now* to



Factory, Brooklyn

AGENTS:

Lewis & Roth Co., 312 Denckla Bldg., Philadelphia
 Electrical Engineering & Mfg. Co.
 First National Bank Bldg., Pittsburgh

The Highest Grade Portable Instruments Ever Produced!

Weston

Model 45 D. C. Portable Ammeters and Voltmeters



Designed to meet the demand for a medium-priced Ammeter and Voltmeter. They are guaranteed to be of sufficient accuracy (one per cent) for general testing in electric power plants, or for outdoor work.

They are shielded from the influence of external magnetic fields, the movement and magnetic system being enclosed in an iron case permanently mounted in a handsome wooden carrying-box with hinged cover.

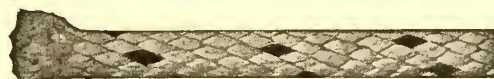
The scale has a mirror over which the knife-edge pointer travels. Readings can be made within 1/10 of a division at any part of the scale.

In mechanical and electrical workmanship the Weston Model 45 Portable Ammeters and Voltmeters practically attain perfection.

A full description will be found in Bulletin 501, which will be mailed to you on request.

Weston Electrical Instrument Co.
 21 Weston Ave., Newark, N. J.

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



"Trade Mark Reg. U. S. Pat. Off."

Samson Spot Waterproofed Trolley Cord

Made of fine cotton yarn braided hard and smooth. Inspected and guaranteed free from flaws. Proved to be the most durable and economical. Samples and information gladly sent.

SAMSON CORDAGE WORKS, BOSTON, MASS.

The "Nycap=Exide" Battery

for
STORAGE BATTERY STREET CARS
 THE ELECTRIC STORAGE BATTERY CO.
 PHILADELPHIA

Hard scale is a habit that any engineer can overcome by the regular use of

DIXON'S BOILER GRAPHITE

Save money, work, time and trouble. Write for free booklet No. 108-T.

Made in Jersey City, N. J., by the

JOSEPH DIXON CRUCIBLE COMPANY
 Established 1827

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

Electric Railway Journal

READY-REFERENCE INDEX

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

- Controller Regulators.**
Electric Service Supplies Co.
- Controllers or Parts.**
American General Eng'g Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
General Electric Co.
Johns-Manville Co., H. W.
Kerschner Co., Inc., W. R.
Westinghouse Elec. & M. Co.
- Controlling Systems.**
General Electric Co.
Westinghouse Elec. & M. Co.
- Converters, Rotary.**
General Electric Co.
Westinghouse Elec. & M. Co.
- Conveying and Hoisting Machinery.**
American Bridge Co.
Green Eng'g Co.
- Cord, Bell, Trolley, Register, etc.**
Brill Co., The J. G.
Electric Service Supplies Co.
Imperial Rubber Co.
International Register Co., The
Long Co., E. G.
Roebling's Sons Co., John A.
Samson Cordage Works.
- Cord Connectors and Couplers.**
Electric Service Supplies Co.
Samson Cordage Works.
Wood Co., Chas. N.
- Cotton Duck.**
Boyle & Co., Inc., John.
- Couplers, Car.**
Brill Co., The J. G.
Cincinnati Car Co.
Long Co., E. G.
Van Dorn Coupler Co.
Westinghouse Trac. Brake Co.
- Cranes. (See also Hoists.)**
Niles-Bement-Pond Co.
Thew Automatic Shovel Co.
- Creosoting. (See Wood Preservatives.)**
- Cross Arms. (See Brackets.)**
- Crossing Signals. (See Signals, Crossing.)**
- Crossings, Track. (See Track, Special Work.)**
- Culverts.**
American Rolling Mill Co.
Atlas Metal Works.
Bark River B. & Culvert Co.
California Corr. Culvert Co.
Canton Culvert & S'lo Co.
Coast Culvert & Flume Co.
Corrugated Culvert Co.
Delaware Metal Culvert Co.
Dixie Culvert & Metal Co.
Hardesty Mfg. Co., R.
Illinois Corrugated Metal Co.
Independence Cor. Culvert Co.
Iowa Pure Iron Culvert Co.
Kentucky Culvert Co.
Lec-Arnett Co.
Lone Star Culvert Co.
Lyle Corrugated Culvert Co.
Michigan Bridge & Pipe Co.
Montana Culvert Co.
Nebraska Culvert & Mfg. Co.
Nevada Metal Mfg. Co.
New England Metal Cul. Co.
North East Metal Cul. Co.
Northwestern Sheet & I. Wks.
O'Neal Co., W. Q.
Ohio Corrugated Culvert Co.
Pennsylvania Metal Cul. Co.
Road Supply & Metal Co.
Sioux Falls Metal Culvert Co.
Spencer, J. N.
Spokane Corr. Cul. Co.
Tennessee Metal Culvert Co.
Utah Corr. Culvert & Flume Co.
Virginia Metal & Culvert Co.
Western Metal Mfg. Co.
- Curtains and Curtain Fixtures.**
Brill Co., The J. G.
Electric Service Supplies Co.
Pantasote Co., The.
Railway Supply & Curtain Co.
St. Louis Car Co.
- Cushions, Field Coll.**
Massachusetts Chemical Co.
Walpole Tire & Rubber Co.
- Derailing Devices.**
Cleveland Frog & Crossing Co.
U. S. Metal & Mfg. Co.
- Despatching Systems.**
Northey-Simmen Signal Co., Ltd.
Simmen Auto. Ry. Sig. Co.
- Detective Service.**
Drummond's Detective Agency
Wisch Service, P. Edward.
- Door Operating Devices.**
Electric Service Supplies Co.
- Doors, Asbestos.**
Johns-Manville Co., H. W.
- Doors and Door Fixtures.**
Brill Co., The J. G.
Electric Service Supplies Co.
Hale & Kilburn Co.
- Doors, Folding Vestibule.**
Electric Service Supplies Co.
- Doors, Steel Rolling.**
Kinnear Mfg. Co.
- Draft Rigging. (See Couplers, Car.)**
- Drills, Track.**
American Steel & Wire Co.
Electric Service Supplies Co.
Long Co., E. G.
- Dryers and Purifiers, Oil. (See Purifiers and Dryers, Oil.)**
- Dryers, Sand.**
Zelnicker Supply Co., W. A.
- Engineers, Consulting, Contracting and Operating.**
Archbold-Brady Co.
Arnold Co.
Bemis, Anthony J.
Burch, Edw. P.
Byllesby & Co., H. M.
Drum & Co., A. L.
Ford, Bacon & Davis.
Greims Corporation, H. E.
Gulick-Henderson Co.
Hatch, E. G.
Hovey, M. H.
Hunt & Co., Robert W.
Jackson, D. C., & Wm. B.
Kennard, Ralph B.
Richey, Albert S.
Roosevelt & Thompson.
Sanderson & Porter.
Scofield Engineering Co.
Stone & Webster Eng. Corp.
White Companies, J. G.
Woodmansee & Davidson, Inc.
- Engines, Gas and Oil.**
Westinghouse Machine Co.
- Engines, Steam.**
Westinghouse Machine Co.
- Fare Boxes.**
American General Eng'g Co.
Brill Co., The J. G.
International Register Co., The
Johnson Fare Box Co.
- Fences, Woven Wire, and Fence Posts.**
American Steel & Wire Co.
- Fencing, Wire.**
American Steel & Wire Co.
- Fenders and Wheel Guards.**
Brill Co., The J. G.
Cincinnati Car Co.
Consolidated Car Fender Co.
Eclipse Railway Supply Co.
Electric Service Supplies Co.
Parmenter F. & W. G. Co.
Star Brass Works.
- Fibre**
Diamond State Fibre Co.
Westinghouse Elec. & M. Co.
- Fibre Tubing.**
Diamond State Fibre Co.
Fibre Conduit Co.
Johns-Manville Co., H. W.
Westinghouse Elec. & M. Co.
- Field Colls. (See Coils.)**
- Fire Extinguishing Apparatus.**
Imperial Rubber Co.
Johns-Manville Co., H. W.
Pyrene Mfg. Co.
- Fire-proofing Material.**
Johns-Manville Co., H. W.
- Fittings, Malleable, Cast Iron & Brass.**
National Tube Co.
- Flooring, Composition.**
American Mason Safety T. Co.
Johns-Manville Co., H. W.
- Forgings.**
Standard Steel Works Co.
- Furnaces. (See Stokers.)**
- Fuses and Fuse Boxes.**
American General Eng'g Co.
Columbia M. W. & M. I. Co.
D & W Fuse Co.
General Electric Co.
Johns-Manville Co., H. W.
Westinghouse Elec. & M. Co.
- Fuses, Refillable.**
Columbia M. W. & M. I. Co.
Economy Fuse Mfg. Co.
Johns-Manville Co., H. W.
- Gaskets.**
Diamond State Fibre Co.
Imperial Rubber Co.
Johns-Manville Co., H. W.
Power Specialty Co.
- Gas Producers.**
Westinghouse Machine Co.
- Gates, Car.**
Brill Co., The J. G.
Cincinnati Car Co.
Jewett Car Co.
- Gear Blanks.**
Carnegie Steel Co.
Diamond State Fibre Co.
Standard Steel Wks. Co.
- Gear Cases.**
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Kerschner Co., Inc., W. R.
Westinghouse Elec. & M. Co.
- Gears and Pinions.**
American General Eng'g Co.
Columbia M. W. & M. I. Co.
Diamond State Fibre Co.
Electric Service Supplies Co.
General Electric Co.
Kerschner Co., Inc., W. R.
Long Co., E. G.
Nuttall Co., R. D.
Tool Steel Gear & Pinion Co.
- Generators, Alt.-Current.**
General Electric Co.
Westinghouse Elec. & M. Co.
- Generators, Dir.-Current.**
General Electric Co.
Westinghouse Elec. & M. Co.
- Gongs. (See Bells and Gongs.)**
- Gongs, Rotary Foot.**
Reiter, G. C.
- Graphite.**
Dixon Crucible Co., Jos.
Morgan Crucible Co.
- Grates, Chain.**
Green Engrg. Co.
- Greases. (See Lubricants.)**
- Grinders, Portable, Electric.**
Indianapolis Switch & Frog Co.
Railway Track-work Co.
- Grinders and Grinding Wheels.**
Indianapolis Switch & Frog Co.
- Guards, Cattle.**
American Bridge Co.
- Guards, Trolley.**
Electric Service Supplies Co.
- Harps, Trolley.**
American General Eng'g Co.
Anderson M. Co., A. & J. M.
Electric Service Supplies Co.
More-Jones Brass & Metal Co.
Nuttall Co., R. D.
Star Brass Works.
Universal Trolley Wheel Co.
- Headlights.**
Electric Service Supplies Co.
Esterline Co.
General Electric Co.
Long Co., E. G.
St. Louis Car Co.
Westinghouse Elec. & M. Co.
- Headliners.**
Pantasote Co.
U. S. Metal & Mfg. Co.
- Heaters, Car, Electric.**
Johns-Manville Co., H. W.
- Heaters, Car, Hot Air.**
Cooper Heater Co.
Smith Heater Co., Peter.
- Heaters, Car, Hot Water.**
Cooper Heater Co.
Smith Heater Co., Peter.
- Heaters, Car, Stove.**
Electric Service Supplies Co.
- Hoists and Lifts.**
Curtis & Co., Mfg. Co.
Duff Manufacturing Co.
Ford Chain Block & Mfg. Co.
Niles-Bement-Pond Co.
- Hose, Pneumatic and Fire.**
Imperial Rubber Co.
Johns-Manville Co., H. W.
- Hydraulic Machinery.**
Niles-Bement-Pond Co.
- Hydrogrounds.**
Brach Supply Co., L. S.
- Impregnating Apparatus. (See Vacuum Drying Apparatus.)**
- Inspection.**
Elec'l Testing Laboratories, Inc.
Hunt & Co., Robert W.
- Instruments, Measuring, Testing and Recording.**
Esterline Co.
General Electric Co.
Johns-Manville Co., H. W.
Sangamo Electric Co.
Westinghouse Elec. & M. Co.
Weston Elec. Instrument Co.
- Insulating Cloths, Paper and Tape.**
American Vul. Fibre Co.
Anderson M. Co., A. & J. M.
Diamond State Fibre Co.
General Electric Co.
Imperial Rubber Co.
Johns-Manville Co., H. W.
Massachusetts Chemical Co.
Sherwin-Williams Co.
Walpole Tire & Rubber Co.

The Dividing Line



Safety

Danger

“D & W” Fuses

You can follow the example of important electric railways like the New York Interborough and put your rolling stock under the protection of “D & W” Fuses.

They are economical protection. We are not only speaking of the safety they insure to railroad properties, but of the fact that they will not blow UNDER their rated capacity.

Instead of the defective interior construction of inferior fuses, you have a link construction scientifically designed. Riveted joints and perfect alignment guarantee perfect electrical conductivity.

One word—INVESTIGATE.

D & W FUSE COMPANY
Providence, R. I.

3

Tape Talks No. 4

The Tape on the High Tension

The responsibility resting on tapes and compounds used for the insulation of high tension cable splices is exceeded by no other application. A homogeneity of quality—a uniformity of dielectric strength—a permanency of efficiency that defies all service conditions, without deterioration, is an absolute necessity in materials for high tension work. Our No. 280 High Tension Cable Tape and Neponset Splicing Compound were especially designed to efficiently fulfill these conditions. Their service records show that they do. Write for quotations.

Walpole Tire & Rubber Co.

Massachusetts Chemical Co.'s Products

Walpole, Mass.

Pioneers in Insulation Engineering

71678



SAFETY FIRST—ECONOMY NEXT

Non-renewable fuses are an expense. A good, renewable fuse is an investment.

The only good Renewable Fuse on the market is marked “Economy”

Write for Catalog No. 2 and Bulletin

ECONOMY FUSE & MFG. COMPANY, KINZIE AND ORLEANS STS., CHICAGO

IRCO FRICTION TAPES

For Electric Railway and Lighting Use

Economy and Efficiency Combined

IMPERIAL RUBBER CO., 253 Broadway, New York, U. S. A.

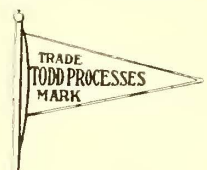
KINNEAR Steel Rolling Doors FOR CAR HOUSES

Compact, Durable, Easily and Speedily Operated and Fire-proof. Openings of any size may be equipped and the doors motor-operated if desired. Manufactured by the

KINNEAR MANUFACTURING CO., Columbus, Ohio
BOSTON PHILADELPHIA CHICAGO

Sterling Insulating Varnishes Sterling Iron Enamel Paints

There is a Sterling product best for every insulating purpose.

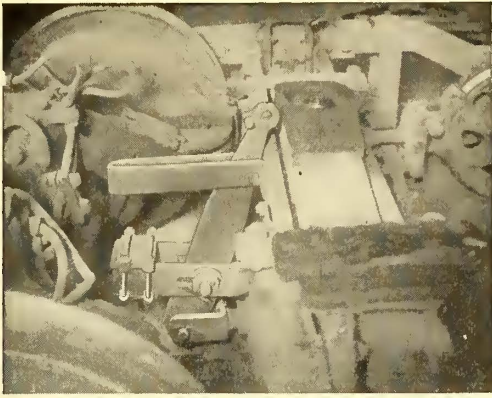


The Sterling Varnish Co.
Pittsburgh, Pa.

READY-REFERENCE INDEX

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

- Insulation.** (See also Paints.)
Anderson M. Co., A. & J. M.
Diamond State Fibre Co.
Electric Service Supplies Co.
Imperial Rubber Co.
General Electric Co.
Johns-Manville Co., H. W.
Massachusetts Chemical Co.
Sherwin-Williams Co.
Sterling Varnish Co.
Walpole Tire & Rubber Co.
Westinghouse Elec. & M. Co.
- Insulators.** (See also Line Material.)
Anderson M. Co., A. & J. M.
Drew Elec. & Mfg. Co.
Electric Service Supplies Co.
General Electric Co.
Johns-Manville Co., H. W.
Pittsburgh High Voltage Insulator Co.
Westinghouse Elec. & M. Co.
- Insurance, Fire.**
Marsh & McLennan Co.
- Jacks.** (See also Cranes, Hoists and Lifts.)
American General Eng'g. Co.
Brill Co., The J. G.
Buckeye Jack Mfg. Co.
Columbia M. W. & M. I. Co.
Duff Manufacturing Co.
- Jack Boxes.** (See also Telephones and Parts.)
Electric Service Supplies Co.
- Joints, Rail.**
Carnegie Steel Co.
Falk Co.
Rail Joint Co.
Zelnicker Supply Co., W. A.
- Journal Boxes.**
Brill Co., The J. G.
Long Co., E. G.
Railway Roller Bearing Co.
- Laboratories.**
Elec. Testing Laboratories, Inc.
- Lamp Guards and Fixtures.**
Anderson M. Co., A. & J. M.
Electric Service Supplies Co.
General Electric Co.
Johns-Manville Co., H. W.
Westinghouse Elec. & M. Co.
- Lamps, Arc and Incandescent.**
Anderson Mfg. Co., A. & J. M.
Esterline Co.
General Electric Co.
Westinghouse Elec. & M. Co.
- Lathes, Car Wheel.**
Niles-Bement-Pond Co.
- Lifters, Car Step.**
Consolidated Car Fender Co.
- Lightning Protection.**
Anderson M. Co., A. & J. M.
Brach Supply Co., L. S.
Electric Service Supplies Co.
General Electric Co.
Lord Mfg. Co.
Westinghouse Elec. & M. Co.
- Line Material.** (See also Brackets, Insulators, Wires, etc.)
American General Eng'g. Co.
Anderson M. Co., A. & J. M.
Archbold-Brady Co.
Diamond State Fibre Co.
- Drew Elec. & Mfg. Co.**
Electrical Engineers Equipment Co.
Electric Service Supplies Co.
General Electric Co.
Hatch, E. G.
Johns-Manville Co., H. W.
Westinghouse Elec. & M. Co.
- Lock Nuts and Washers.** (See Nuts and Bolts.)
- Locomotives, Electric.**
Baldwin Locomotive Works.
Brill Co., The J. G.
General Electric Co.
Westinghouse Elec. & M. Co.
- Lubricants, Oil and Grease.**
Dearborn Chemical Co.
Dixon Crucible Co., Jos.
Galena Signal Oil Co.
Universal Lubricating Co.
- Lubricating Engineers.**
Galena Signal Oil Co.
- Lumber.** (See Poles, Ties, Posts, etc.)
- Machine Tools.**
Niles-Bement-Pond Co.
- Mats.**
Imperial Rubber Co.
Johns-Manville Co., H. W.
Massachusetts Chemical Co.
Walpole Tire & Rubber Co.
- Meters.** (See Instruments.)
- Meters, Car, Watt-hour.**
Sangamo Electric Co.
- Mica.**
Long Co., E. G.
- Mirrors, Motormen.**
Drew Elec. & Mfg. Co.
- Mixers, Concrete.**
Koehring Machine Co.
- Mixers, Paving.**
Koehring Machine Co.
- Motormen's Seats.**
Electric Service Supplies Co.
Wood Co., Chas. N.
- Motors, Electric.**
General Electric Co.
Westinghouse Elec. & M. Co.
- Nuts and Bolts.**
Barbour-Stockwell Co.
Long Co., E. G.
U. S. Metal & Mfg. Co.
- Oils.** (See Lubricants.)
- Oils, Paints.**
Sterling Varnish Co.
- Overhead Equipment.** (See Line Material.)
- Ozonators.**
General Electric Co.
Westinghouse Elec. & M. Co.
- Packing.**
Diamond State Fibre Co.
Electric Service Supplies Co.
Imperial Rubber Co.
Johns-Manville Co., H. W.
Power Specialty Co.
- Packing Rings, Piston Head.**
McQuay-Norris Mfg. Co.
- Paints and Varnishes.** (Insulating.)
General Electric Co.
Imperial Rubber Co.
Johns-Manville Co., H. W.
Long Co., E. G.
Massachusetts Chemical Co.
Sherwin-Williams Co.
Sterling Varnish Co.
Walpole Tire & Rubber Co.
- Paints and Varnishes.** (Preservative.)
Dixon Crucible Co., Jos.
Johns-Manville Co., H. W.
Long Co., E. G.
Massachusetts Chemical Co.
Sherwin-Williams Co.
Sterling Varnish Co.
Walpole Tire & Rubber Co.
- Paints and Varnishes for Woodwork.**
Massachusetts Chemical Co.
Sherwin-Williams Co.
Walpole Tire & Rubber Co.
- Paving Bricks, Filler & Stretcher.**
Nelsonville Brick Co.
- Paving Material.**
American E. S. & Fdy. Co.
Barrett Mfg. Co.
International Creol. & Con. Co.
Nelsonville Brick Co.
U. S. Metal & Mfg. Co.
- Paving Pitch.**
Barrett Mfg. Co.
- Pickups. (Trolley Wire.)**
Electric Service Supplies Co.
- Pinion Pullers.**
American General Eng'g. Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Wood Co., Chas. N.
- Pinions.** (See Gears.)
- Pins, Wood and Iron.**
Electric Service Supplies Co.
- Pipe.**
National Tube Co.
- Pipe Fittings.**
National Tube Co.
Power Specialty Co.
Standard Steel Works Co.
- Pole Sleeves.**
Drew Elec. & Mfg. Co.
- Poles, Metal Street.**
Bates Expanded Steel Truss Co.
Diamond Steel Pole Co.
National Tube Co.
U. S. Metal & Mfg. Co.
- Poles, Ties, Posts, Piling and Lumber.**
Bell Lumber Co.
International Creol. & Con. Co.
Lindsley Bros. Co.
Page & Hill Co.
Valentine-Clark Co.
White Marble Lime Co.
- Poles and Ties, Treated.**
C-A-Wood-Preserver Co.
International Creol. & Con. Co.
Lindsley Bros. Co.
Page & Hill Co.
Valentine-Clark Co.
- Poles, Trolley.**
Anderson M. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Long Co., E. G.
National Tube Co.
Nuttall Co., R. D.
- Preservatives.** (See Wood Preservatives.)
- Pressure Regulators.**
General Electric Co.
- Punches, Ticket.**
International Register Co., The
McGill Ticket Punch Co.
Wood Co., C. N.
- Rail Grinders.** (See Grinders.)
- Rail Welding.** (See Brazing & Welding Processes.)
- Rails, New.**
Cambria Steel Co.
- Rails, Relaying.**
Zelnicker Supply Co., W. A.
- Rattan.**
Brill Co., The J. G.
Electric Service Supplies Co.
Hale & Kilburn Co.
Jewett Car Co.
St. Louis Car Co.
- Registers and Fittings.**
Bonham Recorder Co.
Brill Co., The J. G.
Cincinnati Car Co.
Electric Service Supplies Co.
International Register Co., The
Long Co., E. G.
Rooke Automatic Register Co.
- Reinforcing Concrete.**
American Steel & Wire Co.
- Repair Shop Appliances.** (See also Coil Banding and Winding Machines.)
American General Eng'g. Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
- Repair Work.** (See also Coils, Armature and Field.)
Cleveland Armature Works.
Columbia M. W. & M. I. Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.
- Replacers, Car.**
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
U. S. Metal & Mfg. Co.
- Resistance, Grid.**
Elcon Co.
- Resistance, Wire and Tube.**
General Electric Co.
Westinghouse Elec. & M. Co.
- Retrievers, Trolley.** (See Catchers and Retrievers, Trolley.)
- Rheostats.**
Elcon Co.
General Electric Co.
- Roofing, Building.**
Johns-Manville Co., H. W.



Away with Brake-Rigging Adjustments

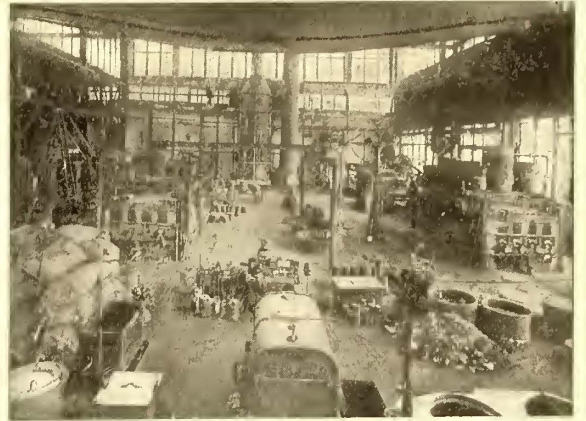
Equip the car with the S. W. B. Shim Slack Adjuster and it will automatically take up the slack as fast as the shoes wear.

S.W.B. Automatic Shim Slack Adjuster

prevents flat wheels; insures quick, uniform application of brakes; reduces wear of wheels; saves time of men and gives brake shoes a double life.

Write for descriptive bulletin—a money-saving, time-saving story.

The Savage-Ward Brake Co., Inc.
Whitehall Building, New York



A Section of Nuttall Heat Treating Department

Heat Treated Motor Gearing for every class of service.

Nuttall - - Pittsburgh

BRAKE SHOES

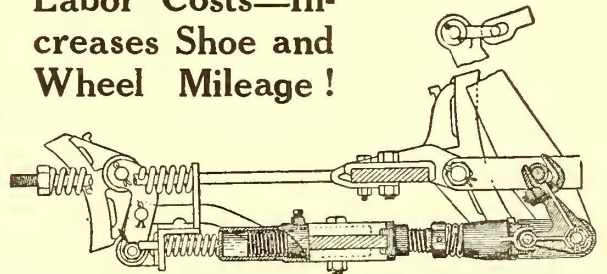
The Brake Shoe Business

No one man can know more than a small portion of the vast fund of information relating to brake shoe design, construction and application. But *collectively* the members of the American Brake Shoe and Foundry Company know a great deal about brake shoes and braking. Our knowledge has saved thousands of dollars to many electric railways. We are at *your* service.

American Brake Shoe & Foundry Co.
MAHWAH, N. J.

30 Church St., New York McCormick Bldg., Chicago

Promotes Safety—Cuts Down Labor Costs—Increases Shoe and Wheel Mileage!



The Anderson Automatic Slack Adjuster

This device automatically maintains the proper shoe clearance, keeping the brakes at the highest point of efficiency, preventing the too close adjustment which not only causes undue wear on wheels and shoes but wastes current. Get our new schedule of prices and trial proposition. They will interest you.

Anderson Brake Adjuster Co.
OMAHA, NEB.

William R. Garton, Sales Engr., 299 Broadway, N. Y.
Grayson Railway Supply Co., Southwestern Rep., St. Louis, Mo.

READY-REFERENCE INDEX

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

- Roofing, Car.**
Boyle & Co., Inc., John.
Pantasote Co.
Johns-Manville Co., H. W.
- Rubber Specialties.**
Imperial Rubber Co.
Massachusetts Chemical Co.
Walpole Tire & Rubber Co.
- Rubbing Cloth.**
Boyle & Co., Inc., John.
- Sand Blasts.**
Curtis & Co. Mfg. Co.
- Sanders, Track.**
Brill Co., The J. G.
Electric Service Supplies Co.
Jewett Car Co.
St. Louis Car Co.
- Sash Fixtures, Car.**
Brill Co., The J. G.
- Sash Operators.**
Drouvé Co., The G.
- Sash, Metal, Car Window.**
Hale & Kilburn Co.
- Seats, Car.**
Brill Co., The J. G.
Hale & Kilburn Co.
Jewett Car Co.
St. Louis Car Co.
- Seating Material. (See also Rattan.)**
Brill Co., The J. G.
Jewett Car Co.
Pantasote Co.
- Second-Hand Equipment.**
(See pages 48, 49.)
- Shade Rollers.**
Hartshorn Co., Stewart.
- Shades, Vestibule.**
Brill Co., The J. G.
Electric Service Supplies Co.
- Shovels, Power.**
Thew Automatic Shovel Co.
- Signals, Highway Crossing.**
Brach Supply Co., L. S.
Electric Service Supplies Co.
Northey-Simmen Sig. Co., Ltd.
Ohio Signal Co.
Simmen Auto Ry. Sig. Co.
U. S. Electric Signal Co.
- Signal Systems, Block.**
Electric Service Supplies Co.
Federal Signal Co.
Northey-Simmen Sig. Co., Ltd.
Simmen Auto Ry. Sig. Co.
U. S. Electric Signal Co.
Wood Co., Chas. N.
- Signs, Car and Track.**
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
- Skids, Car.**
Lord Mfg. Co.
- Skylights, Steel Puttyless.**
Drouvé Co., The G.
- Slack Adjusters**
(See Brake Adjusters.)
- Sleet Wheels and Cutters.**
American General Eng'g Co.
Anderson M. Co., A. & J. M.
Drew Elec. & Mfg. Co.
Nuttall Co., R. D.
- Snow-Plows, Sweepers and Brooms.**
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Consolidated Car Fender Co.
- Soaps.**
Sherwin-Williams Co.
- Solder & Solder Flux.**
Westinghouse Elec. & M. Co.
- Speed Indicators.**
Johns-Manville Co., H. W.
Wood Co., C. N.
- Splicing Compounds.**
American General Eng'g Co.
Imperial Rubber Co.
Johns-Manville Co., H. W.
Massachusetts Chemical Co.
Walpole Tire & Rubber Co.
Westinghouse El. & Mfg. Co.
- Splicing Sleeves. (See Clamps and Connectors.)**
- Springs.**
American Steel & Wire Co.
Brill Co., The J. G.
Niles Car & Mfg. Co.
Standard Steel Works Co.
Union Spring & Mfg. Co.
- Sprinklers, Track and Road.**
Brill Co., The J. G.
St. Louis Car Co.
- Steps, Car.**
American Mason S. T. Co.
Universal Safety Tread Co.
- Stokers, Mechanical.**
Babcock & Wilcox Co.
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THE CINCINNATI CAR COMPANY

WORKS:

WINTON PLACE
CINCINNATI, OHIO

Niles Car & Manufacturing Co.

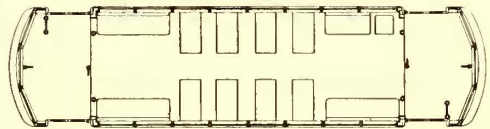
Niles, Ohio

Niles "All-Service" Single Truck Car

It can be operated one-man or two-men, near-side or far-side, single-end or double-end, prepayment or collect; as all doors and steps are under exclusive control of the car crew by means of removable handles.

This car permits experiments in operating methods without any expense in altering cars.

The entire frame and outside sheathing are of steel of the lightest possible construction consistent with necessary strength.



Length 32' 0", Seating capacity 32.

When buying cars ask yourself this question, "Can I repair and maintain all parts at once in our own shops?" If pressings or forgings from special dies are offered, insist on getting standard commercial shapes and sheets which are always on the market. This is Niles standard practice.

*We make all kinds of electric cars.
Write us about one-man plans.*

Van Dorn Radial M. C. B. Coupler—with Pivoting Head

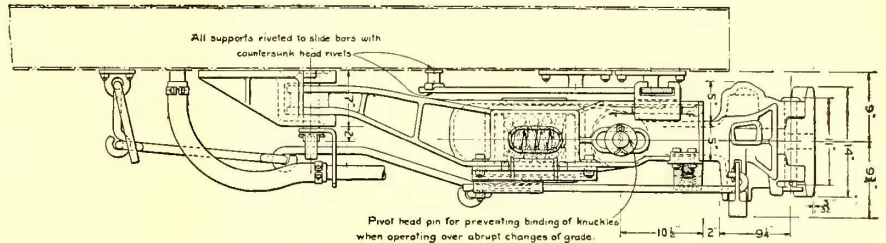
Has extended guard arm and butting wall. Prevents buckling in coupling and in train operation.

Pivoting head (M. C. B. type) prevents binding on severe changes in grade.

Head has deep knuckles which permit wide vertical movement.

Radial carrier eliminates binding even on 30 foot radius curve.

Uncouples from side of car.



Draft rigging has double Hercules springs which effectively absorb impact shocks. Anchors close to sills give strong anchorage and proper clearance.

Write for blueprints and additional information

Van Dorn Coupler Company
2325 So. Paulina St., Chicago, Ill.

LONGWEAR BUSHINGS

Hardened
Steel
Accurate
Uniform



Dimensions
Exactly
as
You Specify

E. G. Long Company

50 Church Street

New York

TULC

FOR TROLLEY WHEELS

From a trolley wheel manufacturer.

We are well pleased with the work of the TULC you have furnished us. There is body enough to stand up, yet is liquid enough to thoroughly lubricate our wheels.

THE UNIVERSAL LUBRICATING CO.
Schofield Building CLEVELAND, O.

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NOTICE TO ADVERTISERS:

Printing begins on Tuesday of each week.
Changes of copy received up to 10 A. M. Monday will appear in the issue of the following week, but no proofs can be submitted for OK before publication.
New Advertisements (not changes of copy) received up

to Wednesday noon can appear in the issue of that week, but no proofs can be shown.
If proofs before printing are required, change of copy and copy for new advertisements must be in our hands 10 days in advance of the date of publication.

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Titanium in Rail Steel

No. 24

The outstanding fact is that none of the rails which failed were Titanium-treated rails

THE CHICAGO & ALTON RAILROAD COMPANY

Chicago, June 14th, 1915

The Titanium Alloy Mfg. Co.,
1845 Peoples Gas Bldg., Chicago.

Gentlemen:-

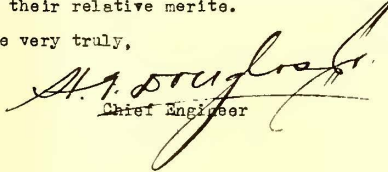
In harmony with your request, I beg to advise that we purchased in 1912-13, substantially 22,000 tons of Open Hearth 90 lb. ARA Series "A" rail. Of this order, 6,000 tons of this rail were treated with .10% titanium. All of the rail was laid without election at all points along the line of our road where rail renewals were determined. A considerable proportion of this rail, or to be exact, 47 track miles, was laid on our Western Division where we have our worst grade and curve conditions.

This rail has now all been in the track substantially two years and been subjected to very heavy traffic. Of this total tonnage, we have had forty rail failures and none of these rails to fail were from the 6,000 tons of titanium treated rails.

It is obvious that there is substantially 27% of the foregoing 22,000 tons treated with ferro-titanium alloy and, as stated, not one of these rails has failed or has any evidence of failing so far as I am now advised although they are all given a very careful inspection.

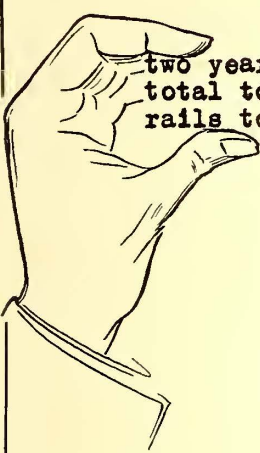
We are observing these rails with the greatest interest with a view of ascertaining their relative merits.

Yours very truly,



Chief Engineer

D-C



TITANIUM ALLOY MANUFACTURING COMPANY

Operating Under Rossi Patents

Processes and Products Patented

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

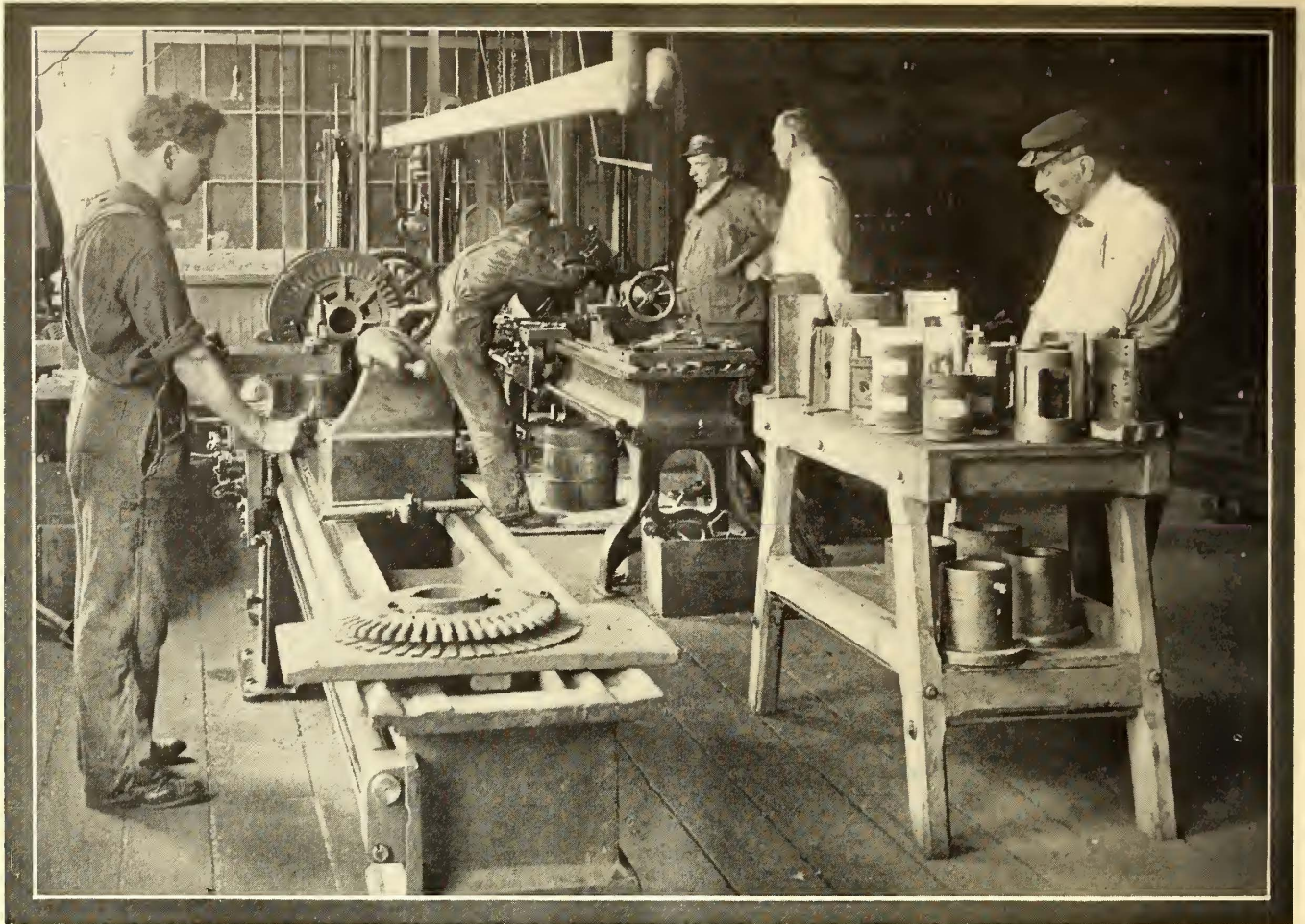


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Galena Service is Far Reaching



To the Galena experts bearings are just as important as oils.

Their business is to give the benefit of their wide experience with the object of increasing savings above the amount specified in the Galena contract—the benefit of which goes to the road.

Galena oils and Galena service will materially reduce your lubricating and maintenance cost.

Let us state what we will guarantee to save your road.

Galena-Signal Oil Co.
Franklin, Pa.



BRILL CAR SEATS

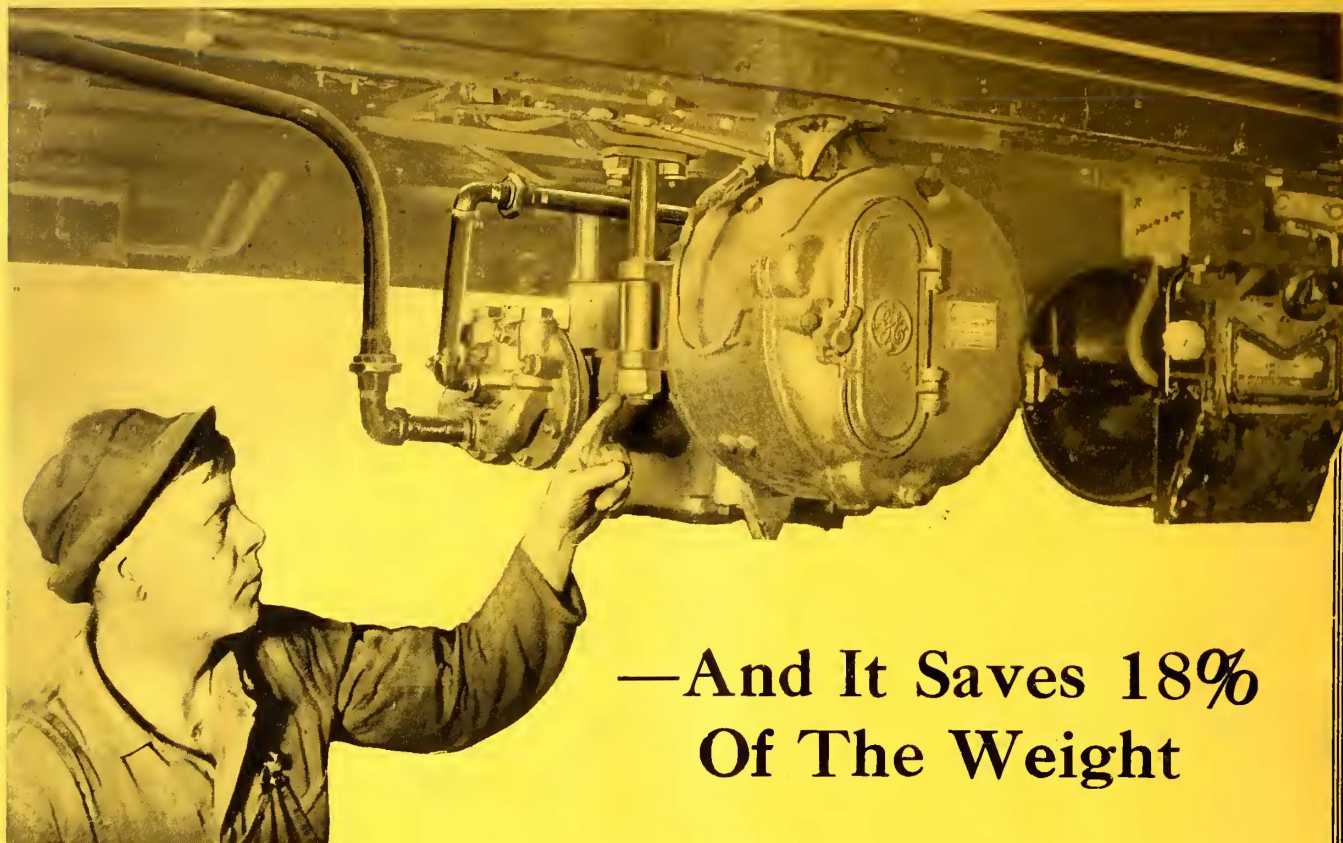


BRILL "Winner" seats are not built too lightly to stand the racket and give long service on heavy traffic lines. They weigh 63 pounds and, while this is considered comparatively light, it is plenty to allow generous proportions to every part. The pedestal, aisle, and wall plates are of pressed steel and the seat rails are of steel angle section. Perfectly equalized double levers at each end are pivoted to extra-substantial seat back arms; the rockers that tilt the cushion are positive in their action; there are no parts subject to excessive wear. Altogether the mechanism is too simple and strong to fail in any particular. By a special method of dovetailing the seat cushion frames, they are made capable of undergoing rough treatment without danger of becoming loose; the spring supports, corrugated spring plates, jute webbing, canvas interlining, felt pad, canvas-lined twill-woven rattan, and the style of spline employed to secure the rattan and prevent cutting or excessive wear, are all of a superior character to secure longest service. The back is built on the same general plan. While these seats are usually covered with twill-woven rattan of Brill manufacture, they are also upholstered in any other kind of material desired, or with wooden slat seat and back. Interurban car seats of the "Winner" type have the same excellent features.

THE J. G. BRILL COMPANY
 Philadelphia, Pa.
 AMERICAN CAR COMPANY
 St. Louis, Mo.
 G. C. KUHLMAN CAR CO.
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 Paris, France



AGENCIES: PIERSON, ROEDING & Co., San Francisco, Los Angeles, Portland, Seattle. NOYES BROTHERS, Melbourne, Sidney, Dunedin, Brisbane, Perth. C. DUBBELMAN, 48 Rue du Luxembourg, Brussels. SHACKLEFORD & Co., Calle San Martin 201, Buenos Aires. THOMAS BARLOW & SONS, Durban, Natal. SHEWAN, TOMES & Co., Hong Kong, Canton, Shanghai. G. CHECCHETTI, Piazza Sicilia, 1, Milan. LONDON OFFICE, 110 Cannon Street, E.C.



—And It Saves 18% Of The Weight

This new three-point suspension gives the Cp-27-B Compressor marked advantages over other types.

A glance at the above photograph shows how it affects arrangement and clearance, making a simple, clean cut installation close up to the floor of the car.

The big saving in weight—a reduction of 18%—makes the Cp-27-B Compressor lighter than any other compressor of its service capacity, on the market.

The Cp-27-B Compressor has all the advantages of reliability, low maintenance, and freedom from noise and vibration which have characterized the well-known Cp-27-A Compressor.

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