

ELECTRIC RAILWAY JOURNAL

Volume 47
Number 26
June 24, 1916

McGraw
Publishing
Co., Inc.



DAVIS STEEL WHEELS

The steel wheel with a one-wear tread.

No slid flats — no turning — no trouble with motor clearances.

A hard, tough manganese tread and flange.

A soft, ductile steel plate and hub.

20% saving in weight.

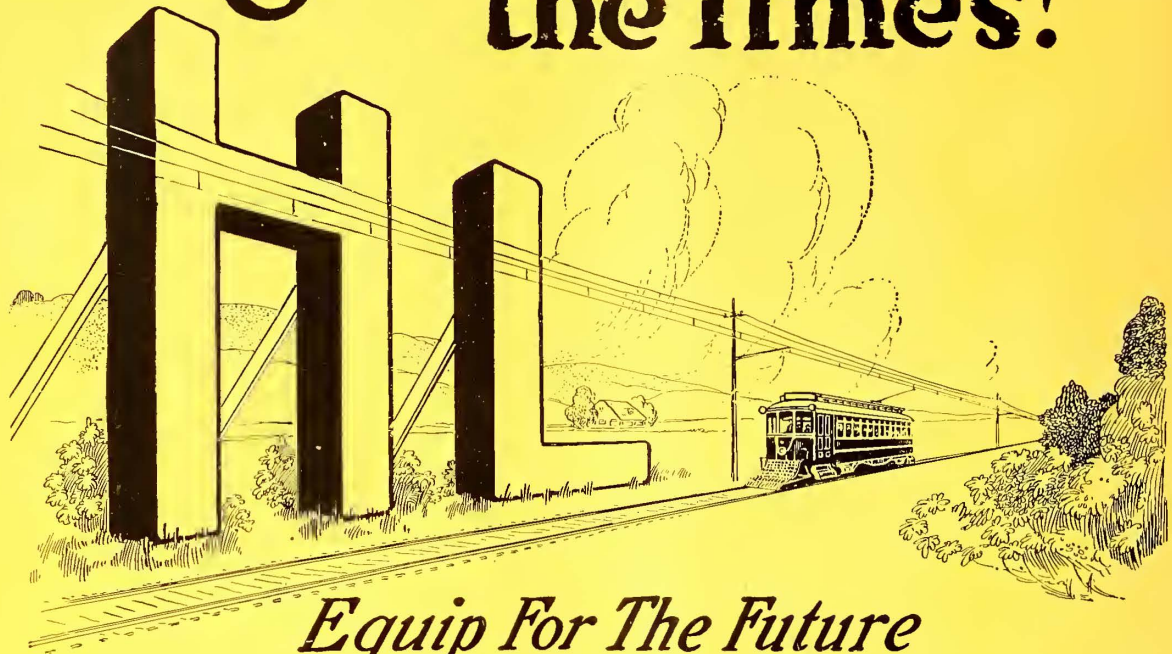
Minimum maintenance cost. Strength — safety — economy.

The steel wheel backed by years of successful service.

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

Quick delivery assured. Write.

"Signs of the Times!"



Equip For The Future

More and more is this long-standing and far-sighted policy of our highly organized steam railroad system being adopted by the men behind America's wonderful network of electric railways.

"Buy today for conditions of tomorrow," says the successful railway manager; "purchase equipment whose **endurance** and **flexibility** fit it to traffic expansion, and whose **simplicity** and **economy** harmonize with the great age of engineering efficiency in which we now live."

To such careful thinkers—appeals Westinghouse HL Control.

"The Control That's Best By Test"

Westinghouse Electric & Manufacturing Co.

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Toledo, Ohio
Washington, D. C.

*W. E. & M. Co. of Texas

Electric Railway Journal

New York, June 24, 1916

Volume XLVII 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.



A Suitable Brake for Each Class of Electric Railway Service

Westinghouse Straight Air Brake for slow-moving cars.

Westinghouse "Featherweight" Straight Air Brake with Emergency Feature for single motor car, or two-car (motor and trailer) train in city and suburban service where moderate speeds prevail.

Westinghouse Quick Recharge, Quick Service, Graduated Release, Straight Air Feature, High Pressure Emergency, Automatic Brake for electric trains of two to five cars for suburban and interurban high speed service.

Westinghouse Quick Action, Quick Recharge, Quick Service, Graduated Release, Automatic Brake for trains of five to ten cars in high speed electric railway service.

Westinghouse Electro-Pneumatic, Instant-Acting, High-Pressure Emergency, Automatic Brake for elevated, subway and high-speed electric surface lines, also for electrified divisions of steam railways.

Westinghouse Variable-Load Brake for all heavy Electric Traction Service.

Our field corps of Engineers and Inspectors is made up of "firingle" specialists, trained with reference to all Air Brake Problems of Operation and Maintenance. These experts are at your service.

Westinghouse Traction Brake Company

General Office and Works: Wilmerding, Pa.

PITTSBURGH: Westinghouse Building

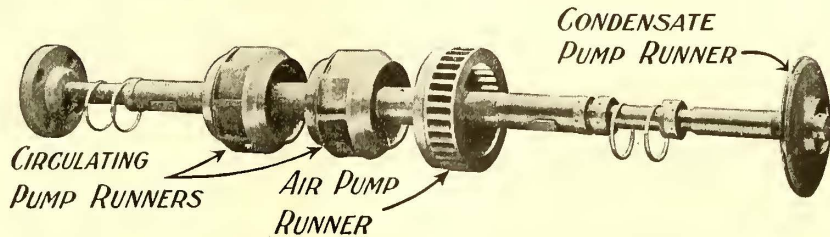
CHICAGO: Railway Exchange Building



NEW YORK: City Investing Building

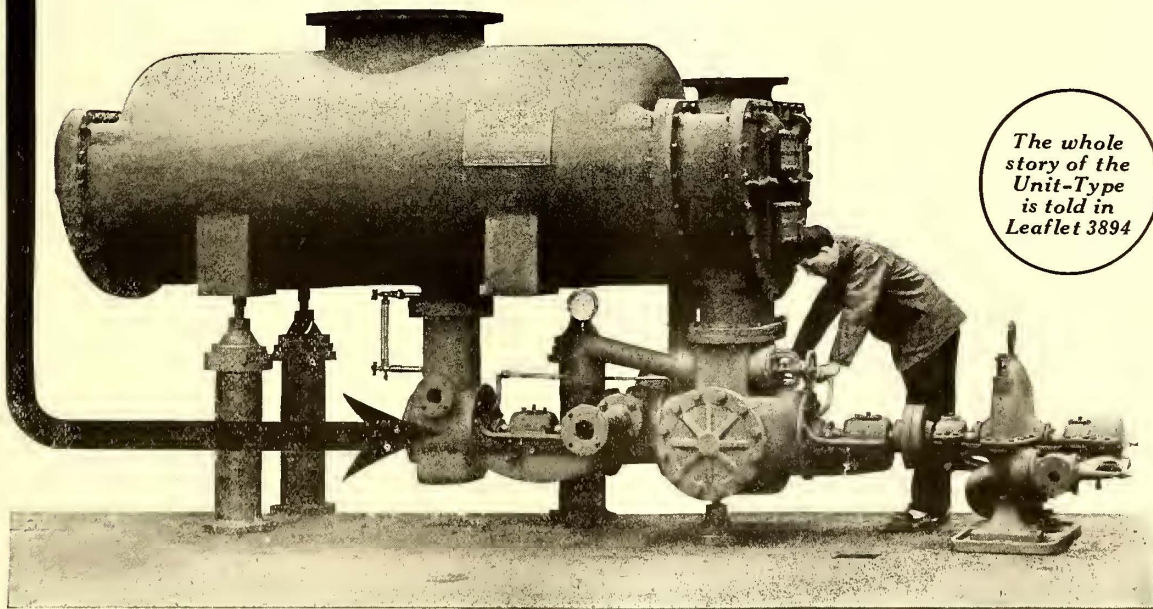
ST. LOUIS: Security Building

The One-Shaft-For-All Construction



The Westinghouse
Unit Type Surface Condenser
**Is Unequaled
in Compactness**

This is due principally to placing all pumps on one shaft, with one drive, and suspending them directly beneath condenser body.



The whole story of the Unit-Type is told in Leaflet 3894

Westinghouse Electric & Manufacturing Co.
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Chicago, Ill.
Cincinnati, Ohio
Cleveland, Ohio
Columbus, Ohio
*Dallas, Tex.

Dayton, Ohio
Denver, Colo.
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Joplin, Mo.



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

Tell Your Triumphs in the Annual Convention Number

September 30, 1916

This is proving to be one of the biggest buying years in the electric railway business.

Up to June 15, for example, we reported the purchase of 2102 cars or 75 per cent of the total number purchased in the entire year 1915.

In times like these everybody can get **some** business, but **big** business comes only to the concerns that make good and that **advertise** their making good.

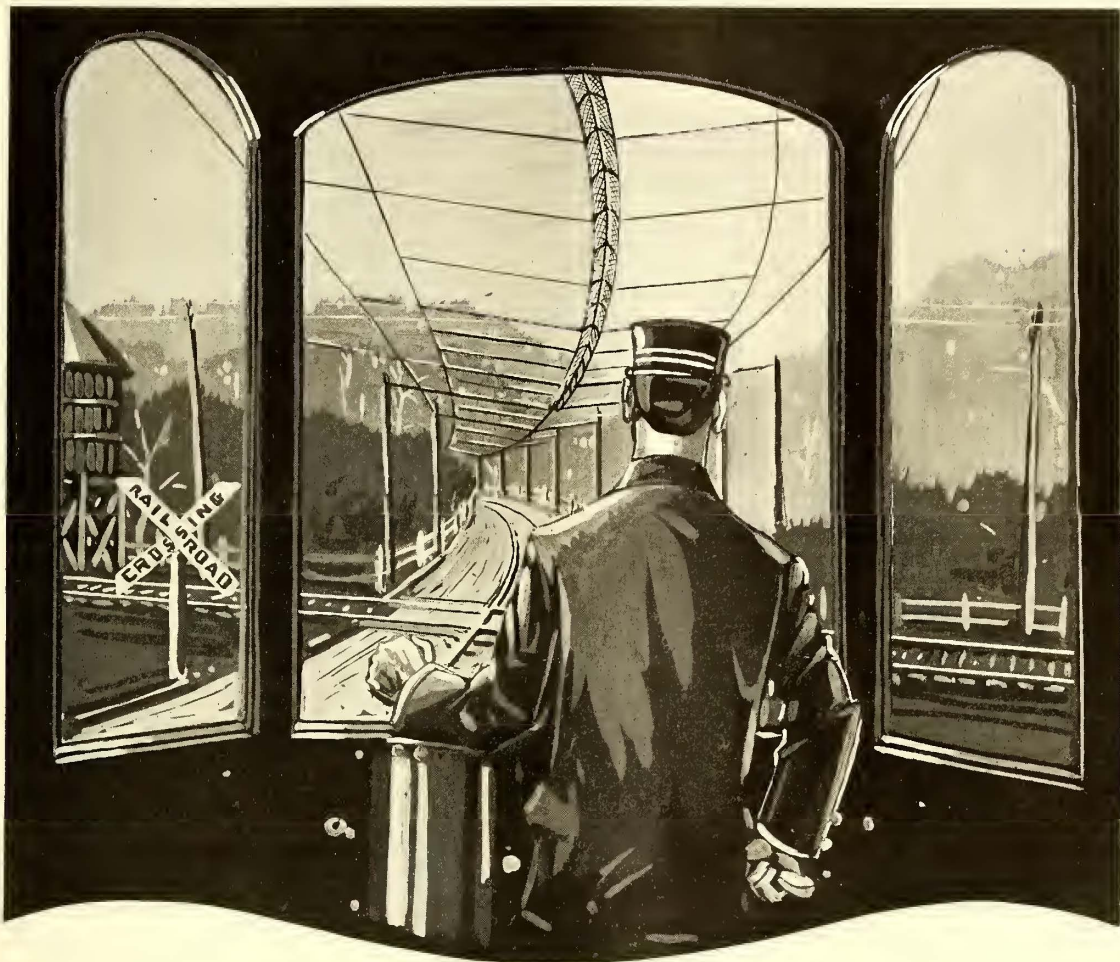
The Annual Convention Number for 1916 offers you a wonderful opportunity to exploit the big things you have done this year; and to show for what a wide range of conditions your equipment has been adopted.

In preparing such an announcement, we want you to use all the facilities we have in following up installations, securing service photographs and other data.

Therefore, let's get together at once. Neither you nor we want a mere space-filling job. Both of us want business pullers. A note will bring us!

Electric Railway Journal

Member Audit Bureau of Circulations

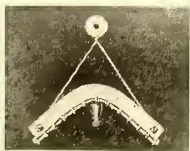


Safety Ahead— National Trolley Guard

One of the surest ways to make your grade-crossings safe is to equip them with National Trolley Guard. It is dependable.

It stays in position the year round with little maintenance.

It unfailingly catches any trolley that may jump and furnishes power to carry the car and passengers to safety.



Patented—For Sale Only by

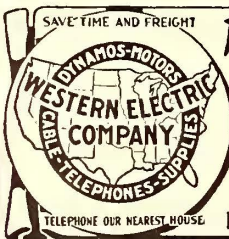
THE OHIO BRASS CO.

Mansfield, Ohio

THE TAPE WITH THE FULL WEIGHT

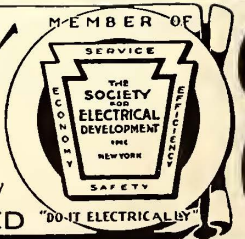


INSULATING MATERIALS OF WESTERN ELECTRIC QUALITY

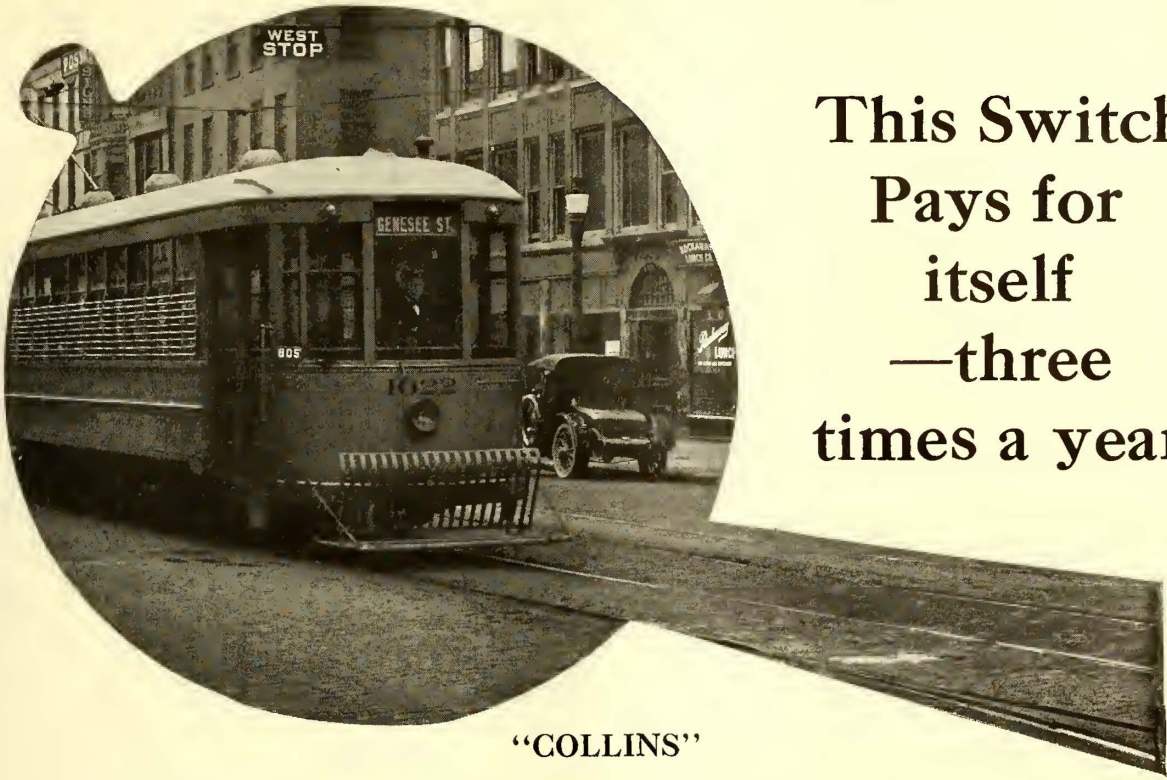


Western Electric Company INCORPORATED

- | | | | | |
|--------------|-------------|--------------|---------------|----------------|
| New York | Atlanta | Chicago | Kansas City | San Francisco |
| Buffalo | Richmond | Milwaukee | St. Louis | Oakland |
| Newark | Savannah | Indianapolis | Dallas | Los Angeles |
| Philadelphia | New Orleans | Detroit | Houston | Seattle |
| Boston | Birmingham | Cleveland | Oklahoma City | Portland |
| Pittsburgh | Cincinnati | Minneapolis | St. Paul | Omaha |
| | | | Denver | Salt Lake City |



EQUIPMENT FOR EVERY ELECTRICAL NEED "DO-IT ELECTRICALLY"



“COLLINS”

Non-Splitting Electric Track Switch

Since the Rochester lines of the New York State Railways installed this Collins non-splitting, non-splashing electric track switch it has paid for itself each three months according to an article by Mr. C. L. Cadle, Electrical Engineer, in the Electric Railway Journal of April 15, 1916.

That speaks well for the **economy** of this switch, but of equal importance are the particular **services** they have re-

ceived from this particular type of switch.

They have a switch that cannot be thrown between the trucks of a car by a following movement under the contactor.

—they have a switch that cannot splash mud and water; that has a most positive anti-straddling device; that is automatically sealed; that cannot be damaged by car standing under contactor.

Let us send you particulars showing the ease of installation, inspection and maintenance.

Write us for full details.

United States Electric Signal Company

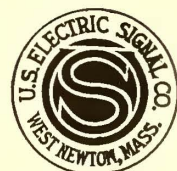
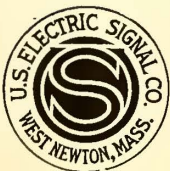
West Newton, Massachusetts

Representatives

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

Chicago: Warren Moore Osborn, McCormick Bldg.

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



Phono-Electric Wire Merits Loom Larger With Time

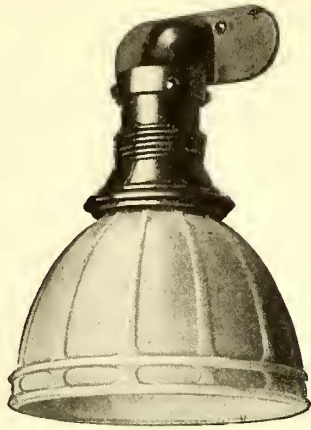
In the early days of electric railroading when No. 0 trolley wire was a common size on its lines, the Brooklyn Rapid Transit System was a pioneer user of No. 0 Phono-Electric on curves.

To-day the Brooklyn Rapid Transit System is using miles and miles of Phono-Electric trolley wire in larger sizes, not only on curves but on long tangents where uninterrupted service is most essential.

Phono-Electric has given uninterrupted satisfaction in every size and for every service.

BRIDGEPORT BRASS CO.
BRIDGEPORT CONNECTICUT





Bracket Type



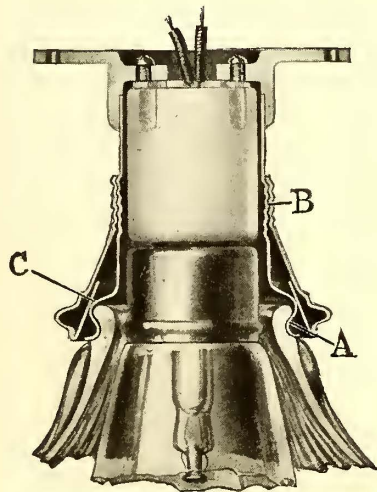
Straight Pendant Type
Round Base



Straight Pendant Type
Square Base

“Safety” Car Lighting Fixtures

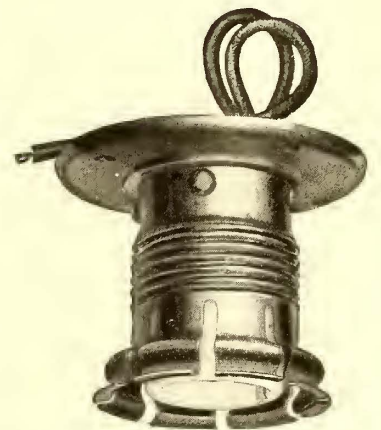
Well Lighted Cars with Safety Fixtures Make More Money



“Safety” Fixture
Section View

“Safety” Car Lighting Fixtures are specially designed for Railway use. They will not rattle in the holder; are free from loose screws, springs or other intricate parts; they hold the reflector primarily by flexible fingers so that the reflector cannot possibly break or fall, and they necessitate only one-hand operation to remove and replace the reflector.

The reflector or shade is held primarily by a plurality of metal fingers, engaging the neck of the reflector at A. An additional safeguard in the form of a clamping sleeve is adjustable on threaded portion B, until its conical-shaped inner surface bears against the metal fingers at C.



“Safety” Fixture, with clamping sleeve removed, showing flexible fingers which are sufficiently rigid to hold the reflector until the clamping sleeve is screwed down in place.

And you will find that “Safety” Fixtures when used in combination with suitable reflectors and Mazda lamps will almost invariably reduce current consumption 50% as compared with bare lamps. They are designed for use with various types and sizes of reflectors and lamps so that proper relation between reflector and lamp is assured in any combination.

When you use “Safety” Car Lighting Fixtures your reflectors cannot drop, rattle or break. Their superiority is best proved by the fact that over 90,000 are in use on steam and electric railways in the United States, their safety features being an almost universal requirement. Write for special booklets.

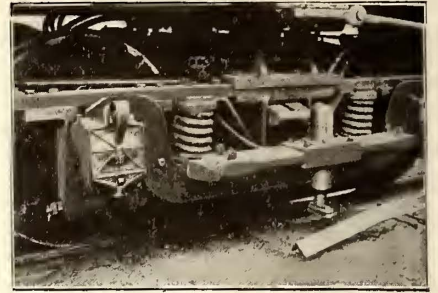
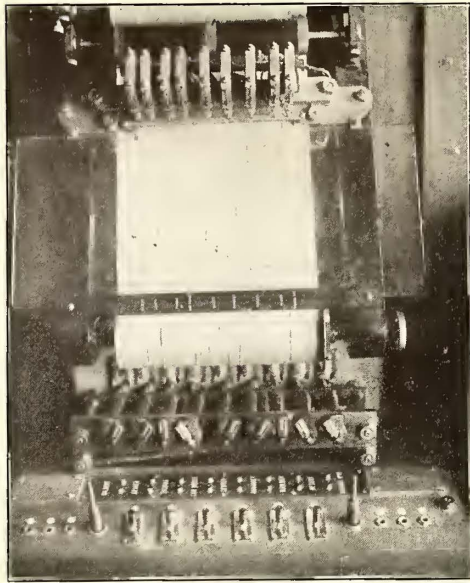
ELECTRIC SERVICE SUPPLIES Co.

Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA
17th and Cambria Sts.

NEW YORK
50 Church St.

CHICAGO
Monadnock Bldg.



The

← FROM THE TRAIN

**SIMMEN
SYSTEM
Signals**

TO THE TRAIN →

**Both
Ways**

To the Train

Signals to the train are communicated in such a way that they cannot be overlooked. They are in the cab within a short distance of the motorman's eyes, and the indication is continuous. The signals are communicated to the cab by means of a short signal rail, and a contact shoe carried on the truck of the car so that it will pass over the signal rail. Whatever indication is received on the signal rail is carried as a continuous indication until changed by another rail. Green means proceed; red means stop. With such a signal there can be no doubt in the mind of the motorman as to his running rights.

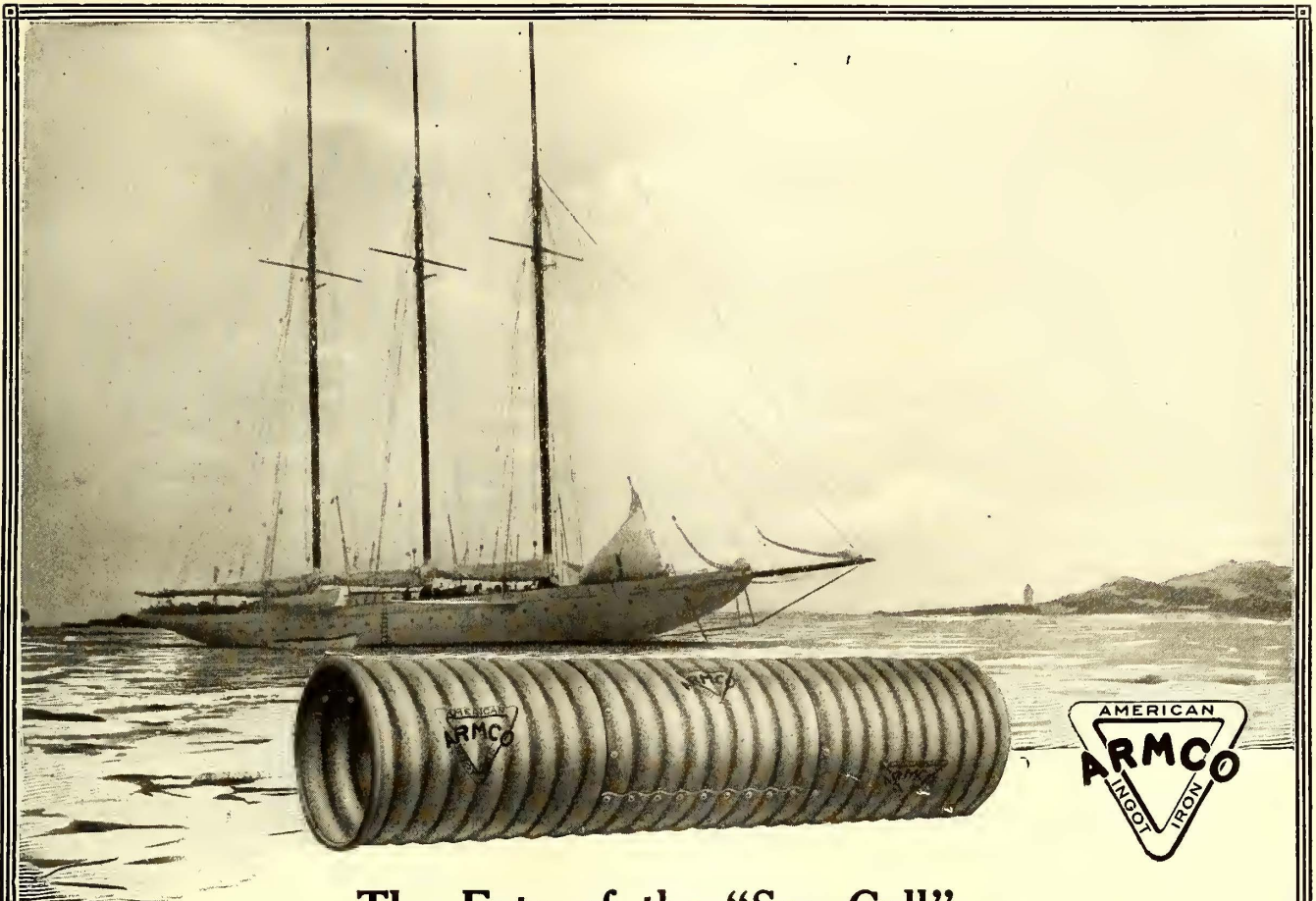
From the Train

The same contact rail that automatically sets the signal in the motorman's cab also, and at the same time, signals **from** the train to the dispatcher. This signal to the dispatcher is received in such a way that it automatically records the location of the train and the time the train reached that location. The many signals received by the dispatcher as each train passes each siding are so received that the result is a train sheet in graphic form, made automatically by the movement of the trains themselves. With such a record of train movements there can be no doubt in the mind of the dispatcher as to the exact location of every train on his division.

SIMMEN AUTOMATIC RAILWAY SIGNAL CO.

1575 Niagara Street, Buffalo, N. Y.

PACIFIC COAST REPRESENTATIVE: W. H. CRAWFORD, 609 SPALDING BLDG., PORTLAND, OREGON



The Fate of the "Sea Call"

WITHIN two months after her maiden voyage, the beautiful \$500,000 "Sea Call" went to the junk pile. The steel portions of her hull had corroded to utter failure.

All the hull plates below the water line were of a special alloy metal, well known for its effective resistance to corrosion. This very fact led to disaster, since a vicious galvanic action was set up between this metal and the steel, when both were exposed to the sea water. This action, though far more intense, is the same in kind as the rusting of ordinary steel or iron, which is chiefly a galvanic corrosion resulting from the presence of impurities.

Armco Iron's rust-resistance is due to its great purity and to the scientific care taken in its manufacture. Armco (American Ingot) Iron is the most nearly perfect in respect to evenness, freedom

ARMCO IRON Resists Rust

from gases and all other features that form the basis of long service in sheet metal.

That's why we recommend Armco Iron for corrugated culverts for highways and railroads, for semi-circular smooth flumes, for silos and grain bins, for roofing, ventilators, tanks, conductor pipes, window-frames, skylights and other sheet metal employed in building, and for a great variety of formed products which are exposed to the weather or to other corrosive conditions.

Write the Nearest Factory for Full Information

Arkansas, Little Rock—Dixie Culvert & Metal Co.
 California, Los Angeles—California Corr. Culvert Co.
 California, West Berkeley—California Corrugated Culvert Company
 Colorado, Denver—R. Hardesty Mfg. Co.
 Delaware, Clayton—Delaware Metal Culvert Co.
 Florida, Jacksonville—Dixie Culvert & Metal Company
 Georgia, Atlanta—Dixie Culvert & Metal Company
 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—The Road Supply & Metal Co.
 Kentucky, Louisville—Kentucky Culvert Mfg. Co.
 Louisiana, New Orleans—Dixie Culvert & Metal Co.
 Maryland, Havre de Grace—Spencer, J. N.
 Massachusetts, Palmer—New England Metal Culvert Company

Michigan, Bark River—Bark River Bridge & Culvert Company
 Michigan, Lansing—Michigan Bridge & Pipe Co.
 Minnesota, Minneapolis—Lyle Corrugated Culvert Co.
 Minnesota, Lyle—Lyle Corrugated Culvert Co.
 Missouri, Moberly—Corrugated Culvert Co.
 Montana, Missoula—Montana Culvert & Flume Co.
 Nebraska, Lincoln—Lee-Arnett Co.
 Nebraska, Wahoo—Nebraska Culvert & Mfg. Co.
 Nevada, Reno—Nevada Metal Mfg. Co.
 New Hampshire, Nashua—North-East Metal Culvert Co.
 New Jersey, Flemington—Pennsylvania Metal Culvert Company
 New York, Auburn—Pennsylvania Metal Culvert Co.
 North Dakota, Wapeton—Northwestern Sheet & Iron Works

Ohio, Middletown—The American Rolling Mill Co.
 The Ohio Corrugated Culvert Co.
 Oklahoma, Shawnee—Dixie Culvert & Metal Company
 Oregon, Portland—Coast Culvert & Flume Co.
 Pennsylvania, Warren—Pennsylvania Metal Culvert Co.
 South Dakota, Sioux Falls—Sioux Falls Metal Culvert Company
 Tennessee, Nashville—Tennessee Metal Culvert Co.
 Texas, Dallas—Wyatt Metal Works
 Texas, El Paso—Western Metal Manufacturing Co.
 Texas, Houston—Lone Star Culvert Company
 Utah, Woods Cross—Utah Corrugated Culvert & Flume Company
 Virginia, Roanoke—Virginia Metal Culvert Company
 Washington, Spokane—Spokane Corrugated Culvert & Tank Company
 Wisconsin, Eau Claire—Bark River Bridge & Culvert Company

ANNOUNCEMENT

We are prepared to make prompt deliveries on all sizes of

Electric Railway Axles and Armature Shafts

made to A. S. T. M. or A. E. R. A. specifications

From our modern plant, operated by experienced axle makers, under the supervision of metallurgical experts, we are now supplying many prominent railways with axles in the forged, annealed and heat-treated grades, prepared under the most rigid specifications and inspection.

Our nearest agent will gladly give you detailed information.

H. F. Keegan, First National Bank
Bldg., Chicago

G. E. Watts, Candler Bldg., Atlanta

Southern Railway Supply & Equip.
Co., St. Louis

F. F. Bodler, San Francisco

S. I. Wales, Los Angeles

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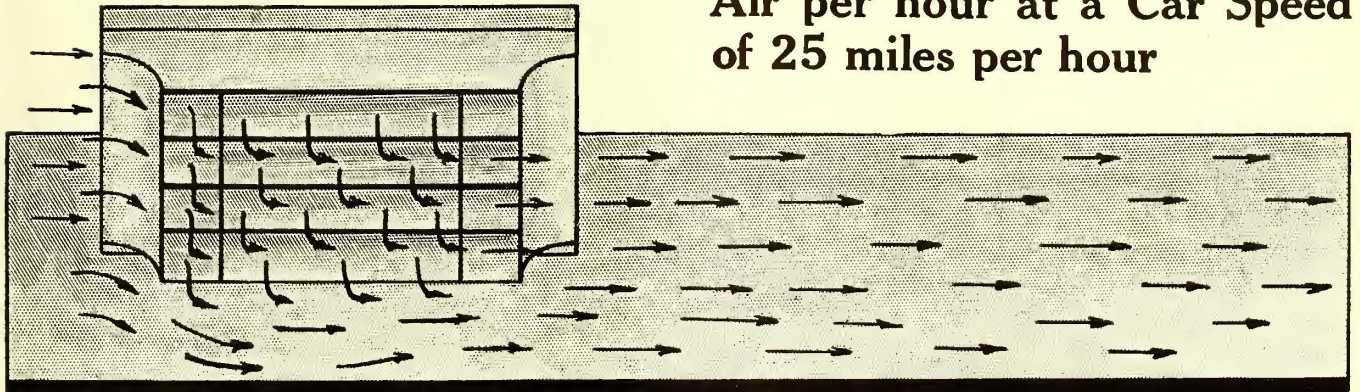
VALLEY STEEL COMPANY

GENERAL OFFICE AND WORKS:

EAST ST. LOUIS, ILLINOIS

This Garland Ventilator

Removes 33,100 cubic feet of Air per hour at a Car Speed of 25 miles per hour



Every scientific ventilator test made in the last 10 years has proven that Garland ventilators are the most effective on the market. And where highest class equipment is selected Garland ventilators are always specified.

These tests prove that a fewer number of Garland ventilators will equal the performance of a greater number of other types. Or with the same number Garland ventilation is far more efficient. A car so equipped has wholesome air, no drafts, no dirt or water falling on heads of passengers.

Mr. T. H. Garland will gladly give his advice on your problems but ask him NOW or in July—don't wait until Fall.

Garland Ventilators, Design "B," on cars of Tucson Rapid Transit Co.



Efficiency Test of Design "F" Garland Ventilator made by Armour Institute

Velocity of air current; speed of train: Miles per Hour	Velocity of air thru ventilator, Feet per minute	Volume of air thru ventilator, Cubic feet per minute	Volume of air thru ventilator, Cubic feet per hour
5	221	110	6600
10	433	216	12900
15	667	333	19900
20	886	443	26500
25	1105	552	33100
30	1330	665	39900
35	1551	775	46500
40	1773	886	53100
45	1990	995	59700
50	2111	1105	66300

Holden & White

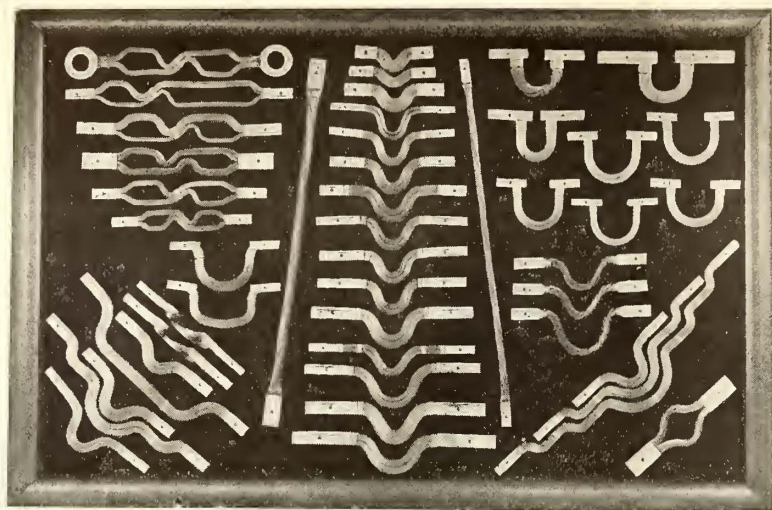
Electric Railway Sales Distributors for The Garland Ventilator Company

1508 Fisher Building, Chicago

U. S. Metal & Mfg. Co., New York
 F. F. Bodler, San Francisco
 Alfred Connor, Denver

C. F. Saenger & Company, Cleveland
 W. M. McClintock, St. Paul

Brown & Hall Supply Company, St. Louis
 W. F. McKenney, Portland, Ore.
 S. I. Wailes, Los Angeles.



**There is no Shortage
of
ERICO
WELDED
BONDS**

Just as the Erico Bond is making good its promises of service, so the organization behind the Erico Bond is making good its promises of delivery.

There is no shortage of Erico Bonds, despite the fact that thus far 1916 has been the best of the 16 years of Erico success.

Dependable Bonds—Prompt deliveries

The Electric Railway Improvement Co.
Cleveland, Ohio

Daylight Savings Idea

You don't have to set the clock an hour ahead to effect savings. You can begin any time right in your own yard on that pile of wooden poles, cross-arms, ties, timbers, fence posts, etc.

You can double the life of your lumber and do even better than halve the cost by the use of

Reeve's Wood Preserver

"The Easy Way to Prevent Decay"

Let us tell you, here, how Reeves Wood Preserver does this at a trifling cost (a pole can be treated for less than 25 cents).

Send card now for test outfit and information.

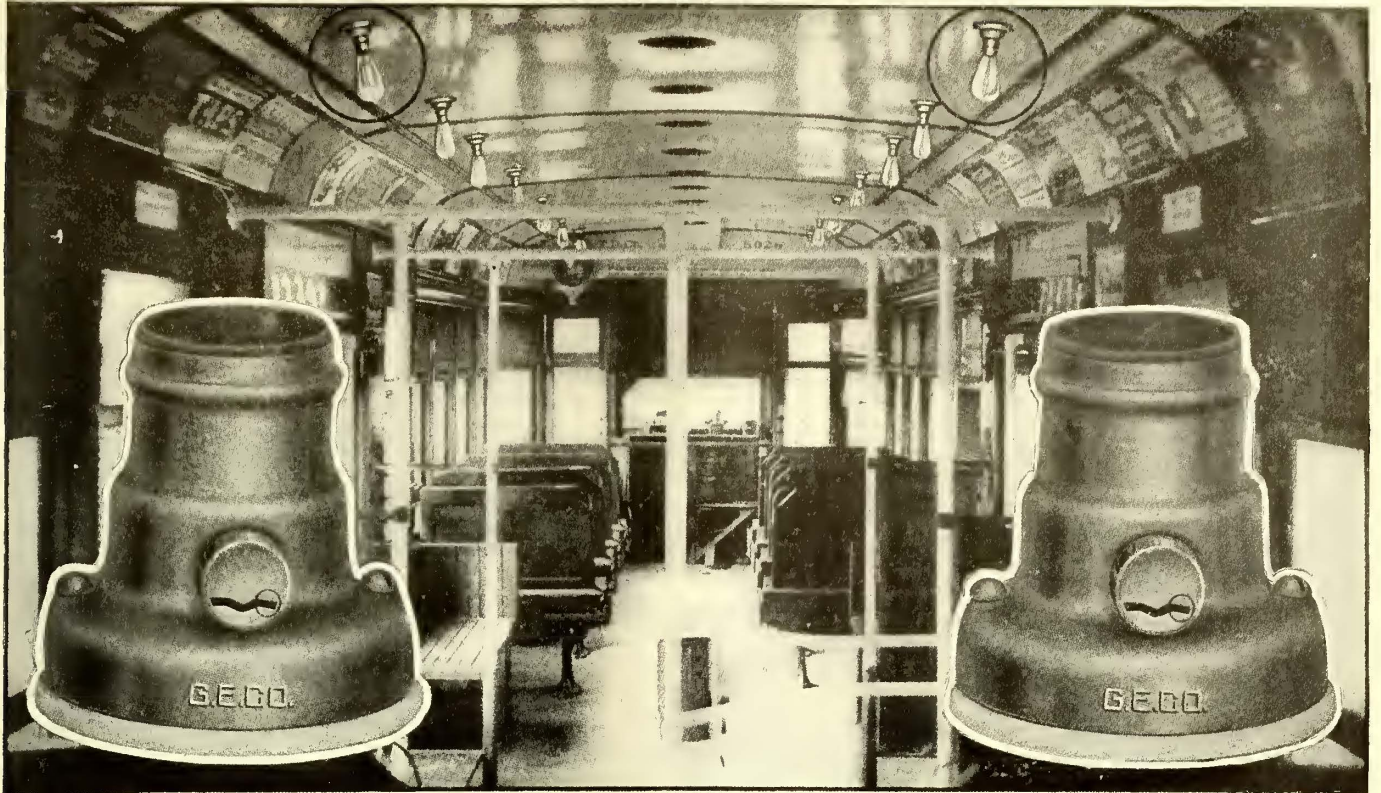


- Penetrates naturally.
- Requires no heating.
- Any workman can apply it—right.
- Contains 80 per cent coal tar creosote.
- Insoluble in water.
- Does not leach or wash out.
- Air does not dry it out.
- Does not corrode spikes or bolts.
- Does not impair the strength of the wood.
- Kills bacteria and insects.

The Reeves Co.
New Orleans, La.

"The Greatest Possible Service per Dollar"





G-E Locking Receptacles in B. R. T. Car, New York City

G-E Locking Receptacles prevent theft of Lamps

During the past three years the Brooklyn Rapid Transit System has purchased more than 100,000 G-E locking receptacles for use in its cars. On the elevated lines alone former losses of 150 lamps a day have been practically eliminated by means of these receptacles.

Not only is it practically impossible to remove lamps from G-E locking receptacles without a key but, until the key is inserted, the screw shell of the socket swivels freely, preventing injury to either the lamp base or socket from attempts to steal the lamp.

G-E locking receptacles also prevent lamps from jarring loose, thus eliminating breakage and imperfect contact as well as accidents due to broken bulbs.

G-E Reliable wiring devices are sold by distributors in all large cities

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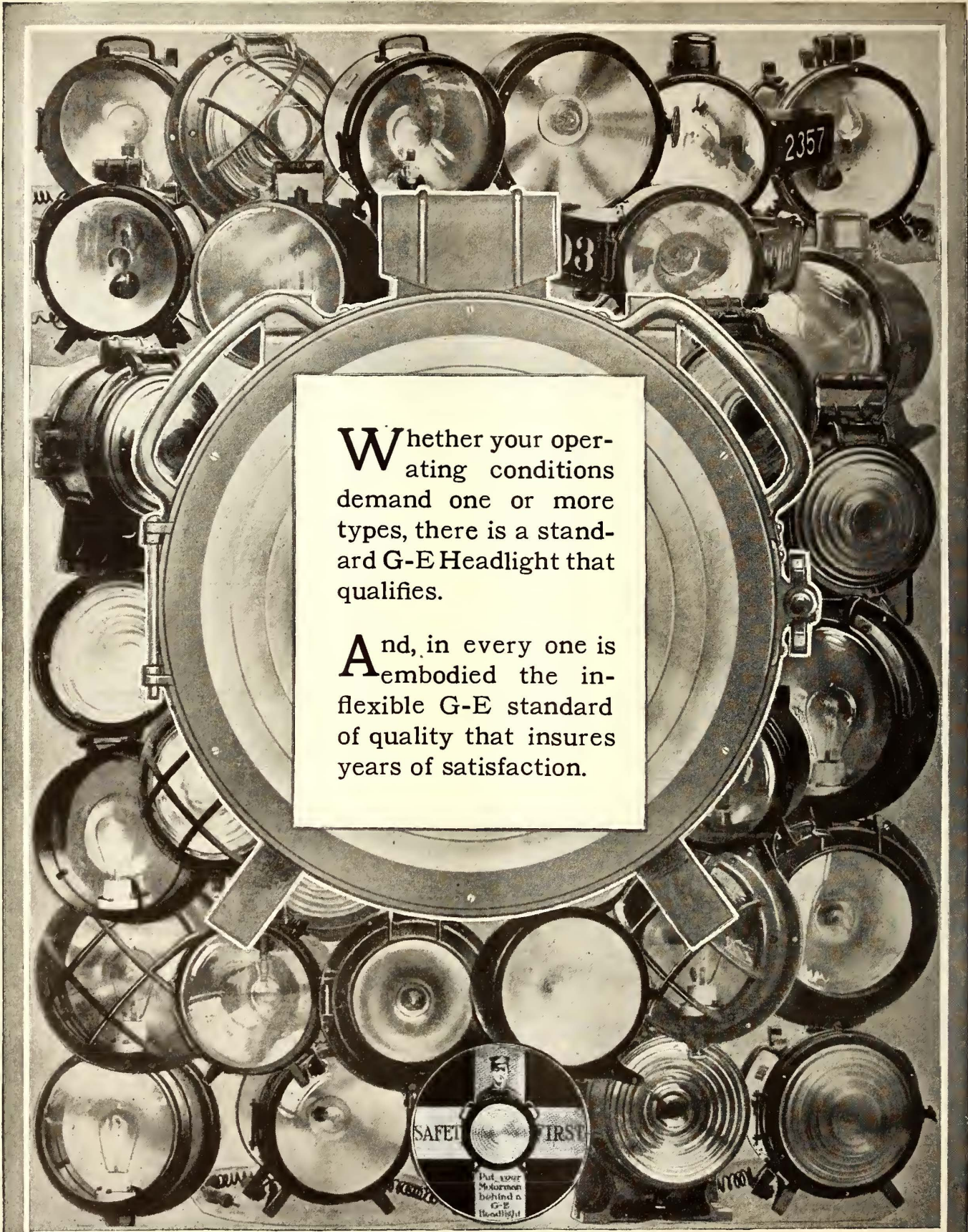


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For Michigan business refer to General Electric Company of Michigan, Detroit.
For Texas, Oklahoma and Arizona business refer to Southwest General Electric Company (formerly Hobson Electric Co.), Dallas, El Paso, Houston and Oklahoma City. For Canadian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



Whether your operating conditions demand one or more types, there is a standard G-E Headlight that qualifies.

And, in every one is embodied the inflexible G-E standard of quality that insures years of satisfaction.

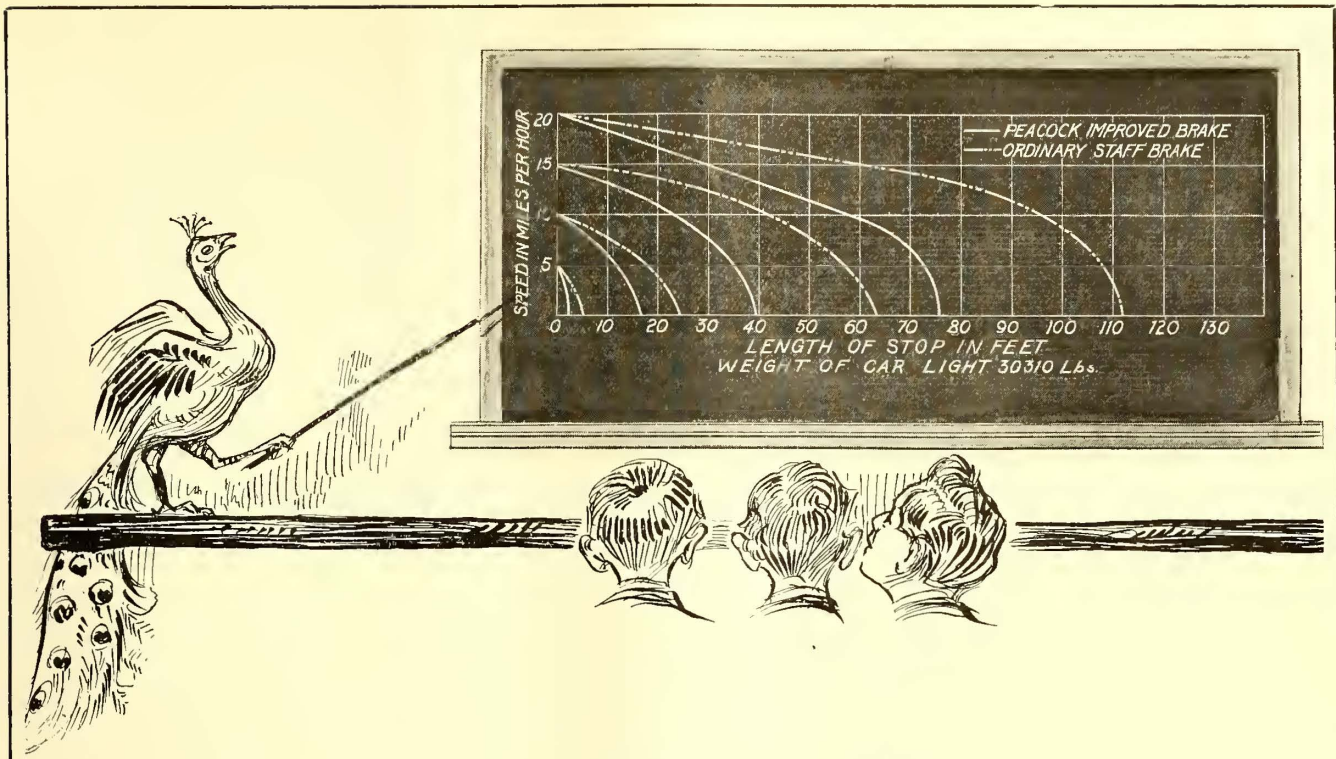


General Electric Company

General Office



Schenectady, N. Y.



Peacocks Won at Each of These Speeds

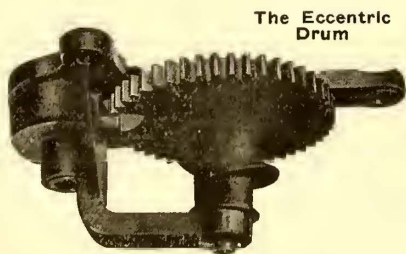
These curves are derived from some tests made by the Public Service Commission, First District, New York.

Note how the advantage of the Peacock increases with the speed of the car being braked.

The staff brake allowed the car to run:

- 3 ft. more than the Peacock from 5 m.p.h.
- 7.5 ft. more than the Peacock from 10 m.p.h.
- 23.5 ft. more than the Peacock from 15 m.p.h.
- 36.5 ft. more than the Peacock from 20 m.p.h.

Another thing worth mention: These tests proved conclusively that the powerful Peacock is so flexible that it will not overbrake or lock the wheels of an empty car without load.



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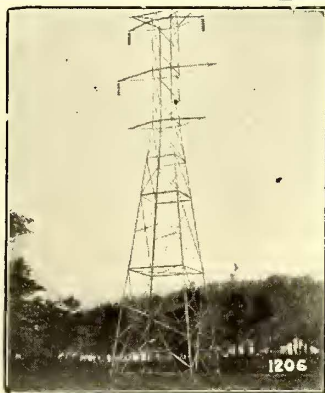
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Do You Love Weeds?

John Burroughs loves some of them, but our kindly naturalist never had charge of a Way department!

Track engineers may like thistles, mullein, motherwort, henbane, dandelions and buttercups in their places—but those places are not between or along the rails.

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Comprising not only Atlas "A" chemical, Atlas "A" spraying equipment but also an Atlas "A" supervisor who knows just what amount is needed to kill off your particular kind of plant pests—

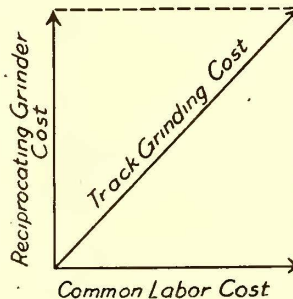
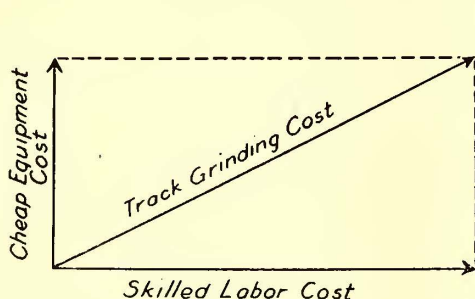
Offers the only sensible, scientific way to make and keep a track clean and safe. Pulling and scythes are as out-of-date as ginning cotton by hand or using a sharpened stick for a plow.

Let us tell you what results have been obtained by Atlas customers in previous years.

Write for booklet "How to Keep a Clean Track"

Atlas Preservative Company of America, (Incorporated)
95-97 Liberty Street
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The Component Costs of Track Grinding are Labor and Equipment



The cost of track grinding resolved into its simplest components is, as in most construction work, merely a question of labor and material. In this case the material is more properly called equipment.

These two items of labor and equipment are, to borrow a mathematical term, **dependent variables**, that is to say, the value of the equipment depends on the value of the labor and vice versa.

Cheap grinding equipment demands skilled labor to get anything like a result. Besides, cheap equipment is always inefficient from the standpoint of time—time is wasted on the original grinding, time is wasted in taking two or three licks to do one job. Time wasted means many labor-hours at high rates which makes the labor component so high that the resultant track grinding cost is appalling.

Now consider how proper equipment affects grinding costs. The proportionate charge for proper equipment when distributed against a particular job increases the equip-

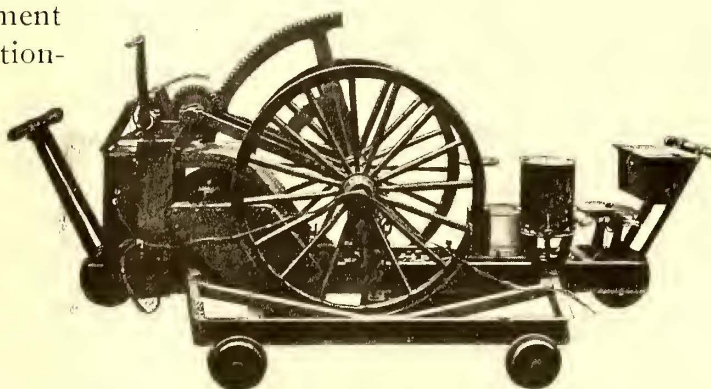
ment component very little. On the other hand, the labor component is slashed left and right, bringing the resultant track grinding cost down perceptibly.

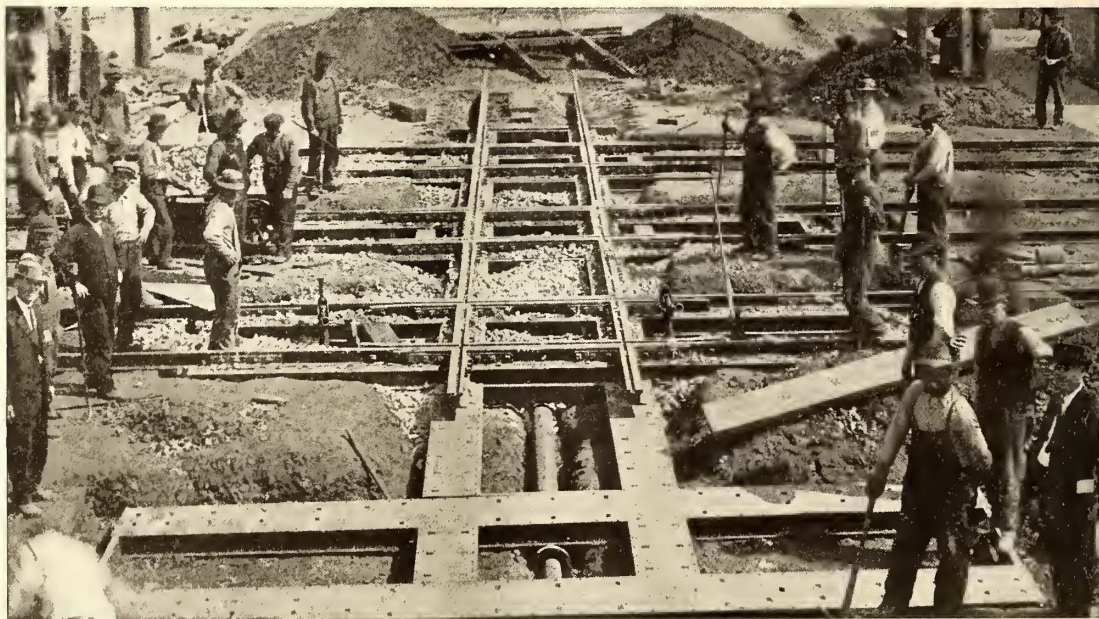
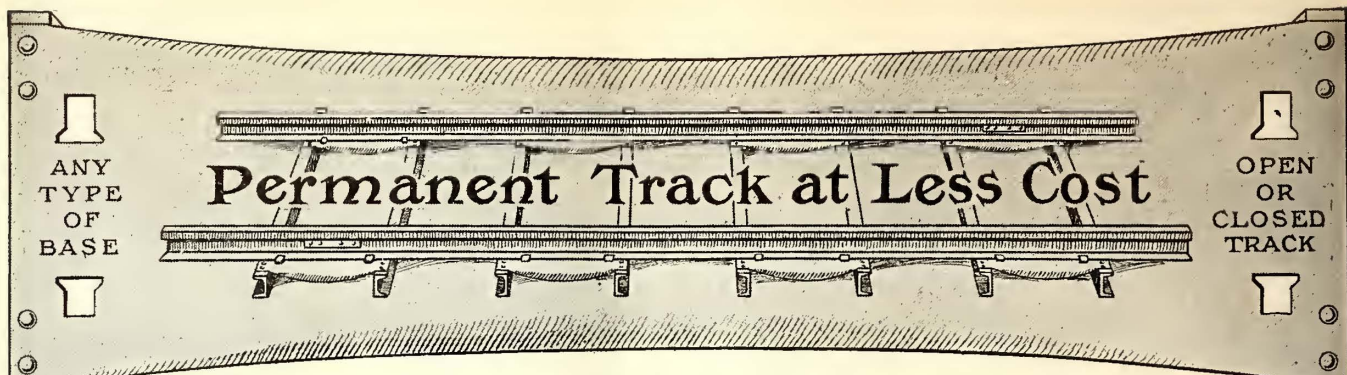
The Reciprocating Track Grinder

is the equipment for you to reduce your labor component to a minimum. No **skilled** labor is required. It does the work **right the first time**. It does the work in the **quickest time**. The **reciprocating** motion of its **large, flat, self-adjusting** abrasive bricks assures you of this.

You are invited to prove it on your own tracks at OUR expense. Write for our proposition.

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30th and Walnut Streets,
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It is hard to support heavy service straight track on wooden ties spaced as closely together as possible.

It is still harder, if not impracticable, to use wooden ties to support crossings which have twice the service of the straight track, and with the ties actually spaced to poorer

advantage than on straight track! The result is constant trouble and expense trying to keep your crossings to line and grade.

Discard this practice and support your crossings on *International Steel Foundations*.

We can make shipment in three weeks

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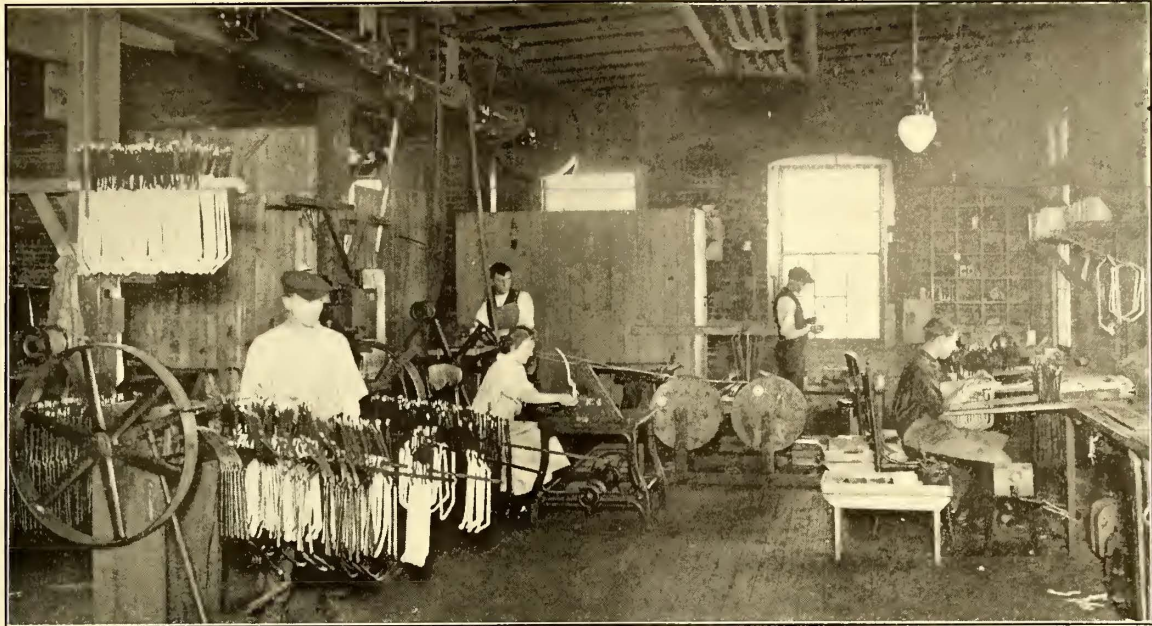
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You know that Columbia-made coil winding and taping machines are standard on many systems.

But do you know that we also make armature and field coils for all types of motors?

If you are not completely equipped to turn out all the coils you need in good time and at an economical figure, give us a chance to show you.

Quick Coil Delivery and Low Prices

Columbia quality, price and delivery are also embodied in these items:

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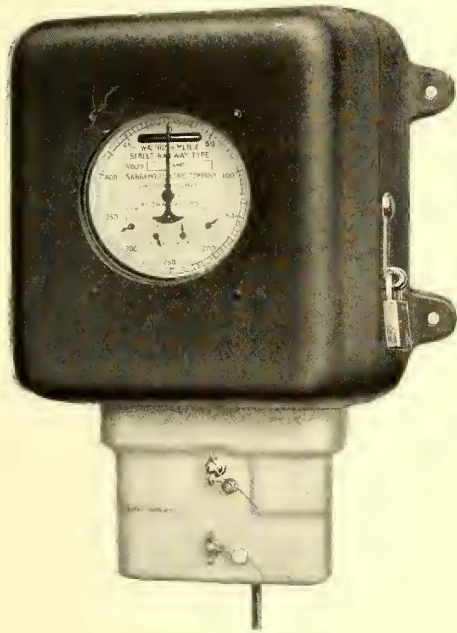
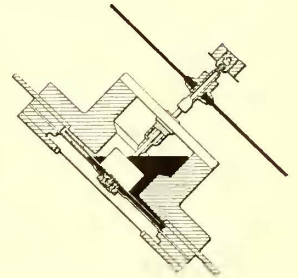
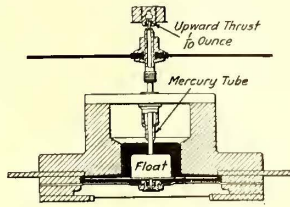
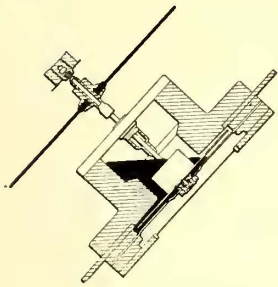
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What the "ECONOMY" Meter is



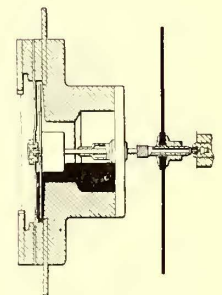
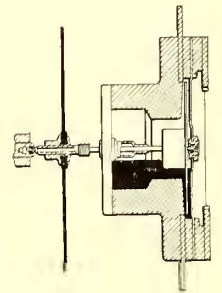
The construction used with great success in all Sangamo D-5 meters, as shown herewith, to prevent the spilling of mercury when the meter is inverted, either in shipment or thereafter, is preserved in the new "ECONOMY" meter so that, contrary to the opinion of many not familiar with the construction, these meters may be handled in any way without the least danger of spilling mercury and thereby impairing the operation of the measuring element.

The standard circular dial furnished on "ECONOMY" meters is large and easily read at a distance, the main dial being used for the daily or trip readings, while the small dials are used only by the inspector or checker at intervals of a day or a week, in order to check the total readings of tickets turned in by the motorman.

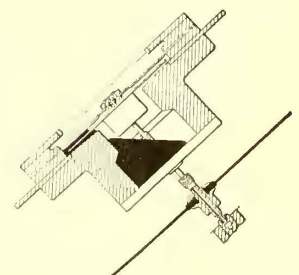
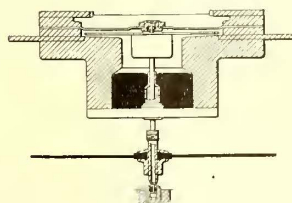
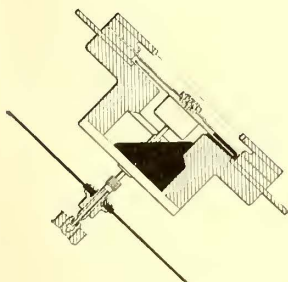
The cover of the meter closes against a heavy felt gasket entirely around the upper rim of the base and is locked securely by a cam and padlock so that the entire meter is absolutely dust and water tight when connected and sealed for service.

From results with the older type "ECONOMY" meters, and which in ruggedness have not been equal to the new type, it may safely be stated that the average cost of maintenance and repairs on these meters will run less than \$2.50 per annum per meter under the most severe conditions of electric railway service.

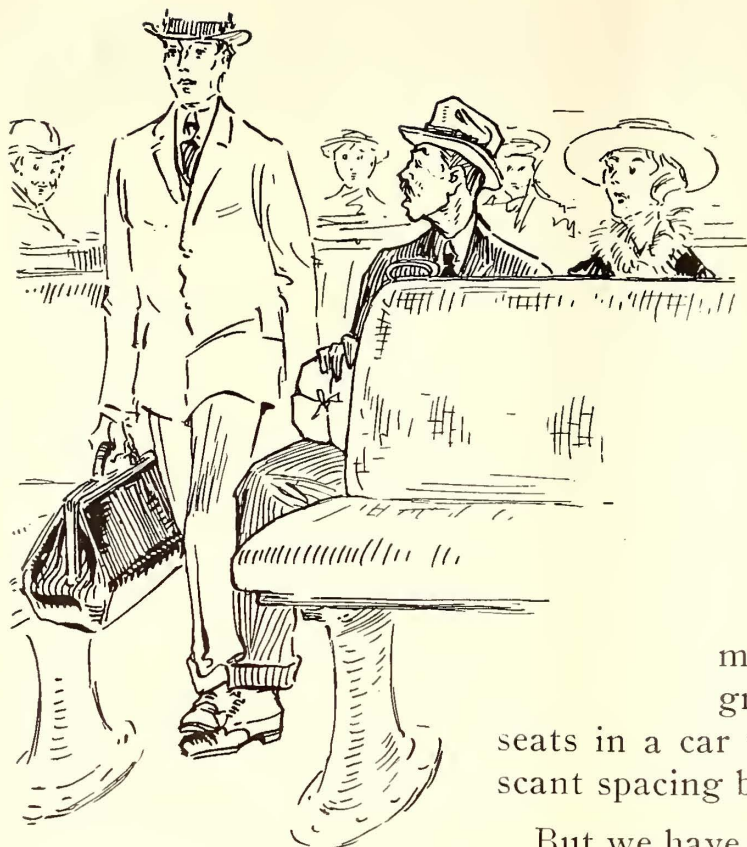
Let us send you complete details of the "ECONOMY" meter—what it has helped accomplish in actual service on electric railways throughout the country.



ECONOMY BUILT LIKE A WATCH METERS



Sangamo Electric Company Springfield, Illinois



The Width of the Car, the Seat and the Aisle

It's a neat problem on many a railway to get a full-grown pair of double cross-seats in a car whose width is limited by scant spacing between tracks.

But we have faced the problem so often that if you tell us the facts in time we can gain you many a precious inch. For instance:

We ought to know whether you intend to use commercial shapes or plate girders for the car sides;

How the posts will be spaced;

Whether the convertible sash will drop or raise;

How much of the end areas you want to devote to longitudinal seating—for the bigger these areas, the narrower you can afford to make the aisle between the cross-seats;

If you will operate single or double-end.

These are some of the facts a conscientious seat-designer needs to

Give Railways Seat Satisfaction

Hale & Kilburn Co.

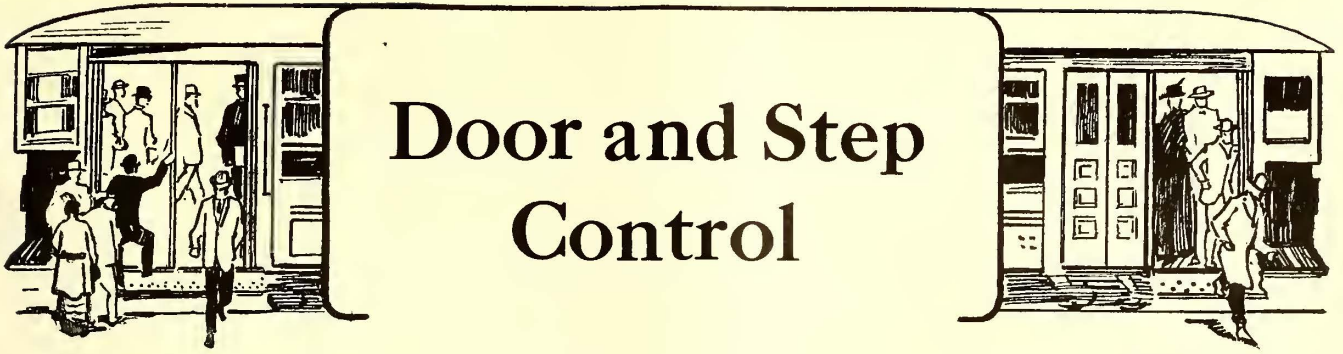
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Door and Step Control

NATIONAL Pneumatic Door Engines are built to be controlled Manually, Pneumatically or Electrically.

Electrical control through push-buttons is advisable under the following conditions:

First—When the car construction is such that it would be difficult to make a mechanical connection between the valve of the engine and the controlling station.

Second—When it is desirable to prevent the conductor from opening the door while the car is in motion.

Manual or Lever control of the valve is usually recommended by us, however, for the following reasons:

First—It simplifies the mechanism.

Second—It does not demand storage batteries to insure the operation of the doors if power is off the trolley.

Third—It is much easier to inspect.

Fourth—The first cost is less.

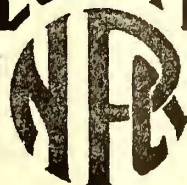
Fifth—The lever or handle becomes an indicator showing the operator when the door is opened and closed.

Sixth—It is a more natural movement to open or close a door by moving a handle or lever than by pushing a button.

Seventh—The operator is freed from erroneous door operation due to pushing the wrong button, particularly when several doors are operated from one nest of buttons.

Eighth—It is very essential that a power-operated door should be fully and instantly under the command of the operator. This command is obtained more positively by means of a lever or handle than by means of push-buttons. Without letting go, the operator merely turns the handle in one direction or the other to get the required motion of the door, whereas with push-buttons he must move his hand from one button to the other to keep the door under command.

NATIONAL PNEUMATIC COMPANY



50 Church St. New York

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A—Bronze Lock Nut. B—Hollow Steel Case-Hardened Lubricating Shaft. C—Cotter Pin. D—Rivets. E—Steel Adjustment Screws (Right and Left). F—Bronze Contact Spring. H—Cotter Pin Hole. K—Expanding and Contracting Slot.

PERFECT fit and sustained tightness of the axle pin are obtained by means of the patented gripping device exclusive with the V-K NON-ARCING HARP. This prevents arcing, insures a perfect bearing for the wheel at all times and facilitates an uninterrupted current flow through wheel pin and harp.

This adjustable gripping device is simple and effective. Wheels and pins can be changed quickly.

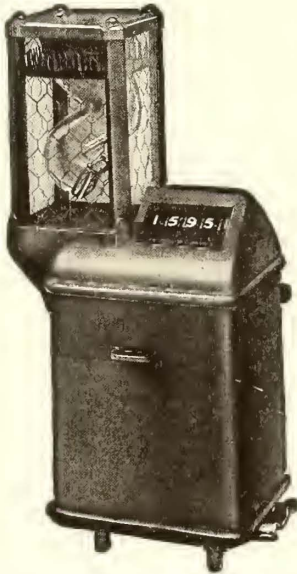
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**The R 10
International
Single Register**

This is a full-geared register having the largest trip figures of any single fare register, a 4-inch bell and a phosphor bronze bell hammer that never breaks, all contained in the smallest case. It may be operated by rods or cords from either side of car or by a foot ringing device in P A Y E cars. It has a bronze case, principal wearing parts of hardened chrome nickel steel, and represents the best grade of workmanship.



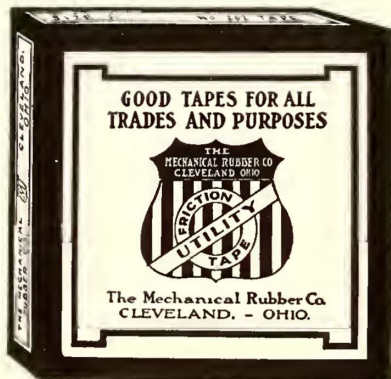
**The INTERNATIONAL
Money Counting Fare Box
Type C 16
For One-Man Cars**

This box receives the fares from passengers, counts the money, and delivers it to the conductor for change. It is the simplest method of getting all the fares on one-man cars that are operated double end.

We design and build fare collection equipment to meet *all* and *any* traffic conditions. What are your requirements?

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That Counts**



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High Insulation Resistance

Its Adhesiveness is
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**Buckeye
Splicing Tape**

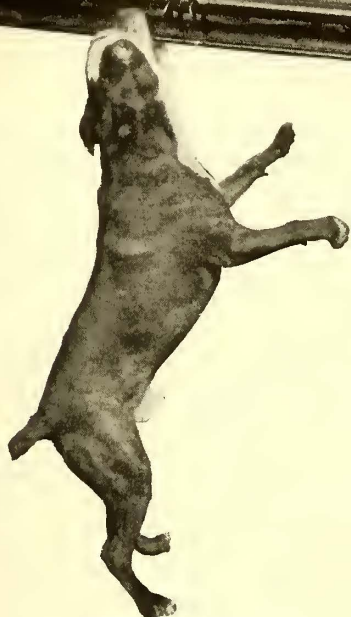
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Family*

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Strength, Encasing the
Splice in a Puncture-Proof
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Make the Splice—
Then Forget It—
Buckeye Becomes Part of
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The Mechanical Rubber Co.
Cleveland

A Bulldog HOLDS



A bulldog holds, and in some things it is very good to imitate his grip. But it is very difficult to persuade a bulldog to *let go*.

Now, two important qualities are required in a perfect car curtain:

- (1) It must hold.
- (2) It must let go, each at the proper time.

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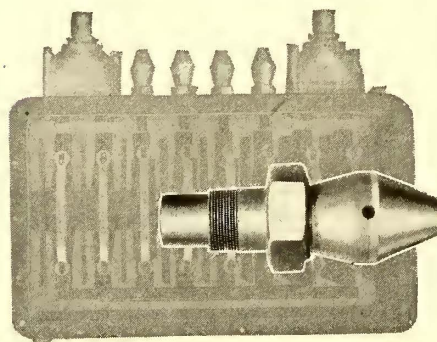


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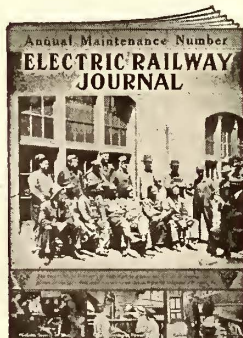
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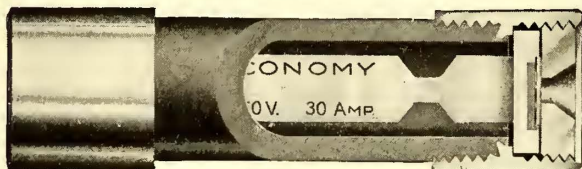


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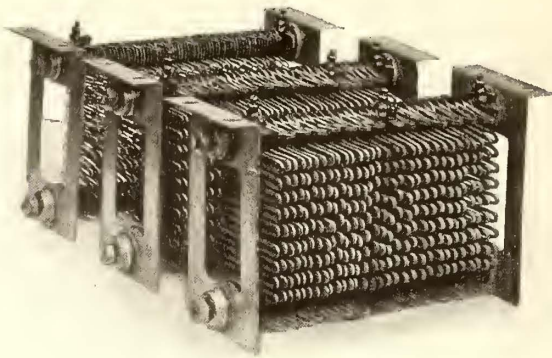
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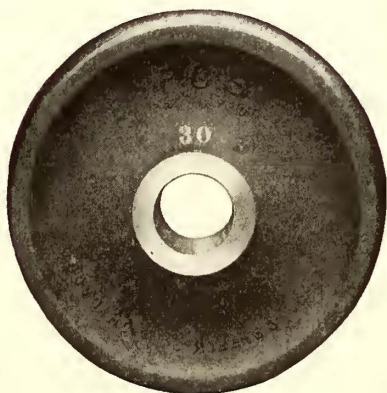
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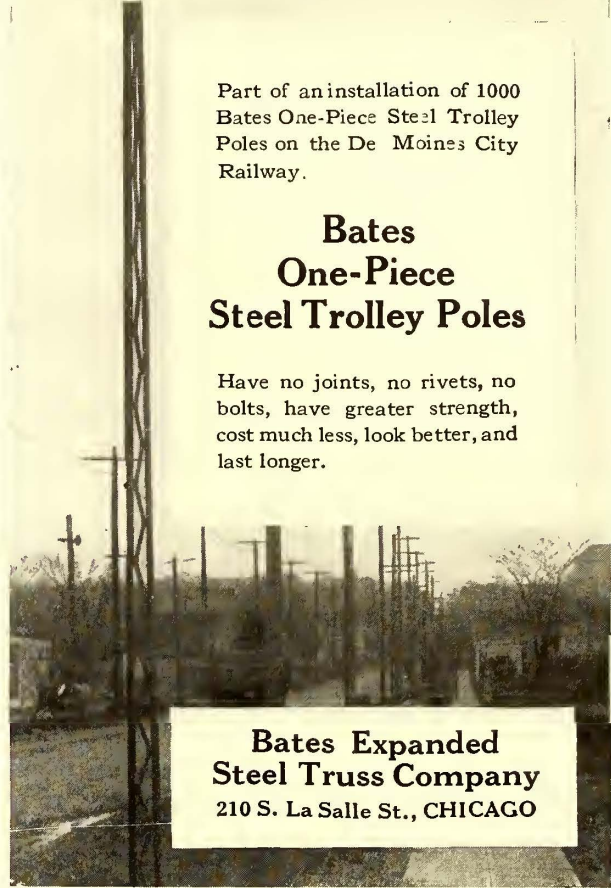
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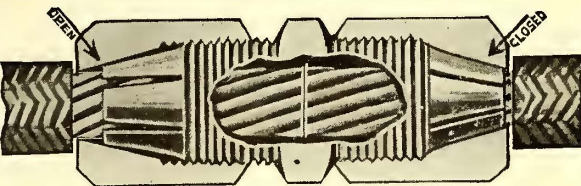


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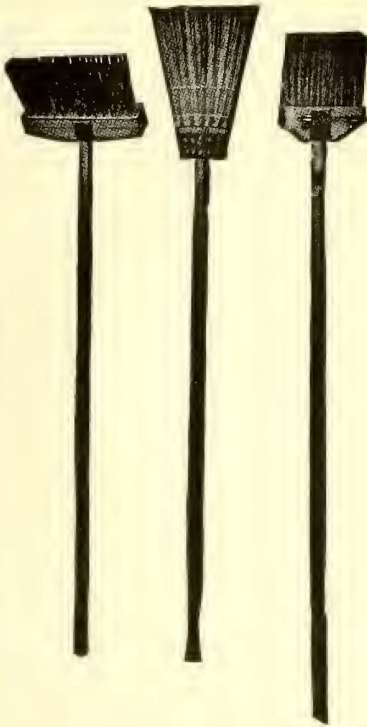
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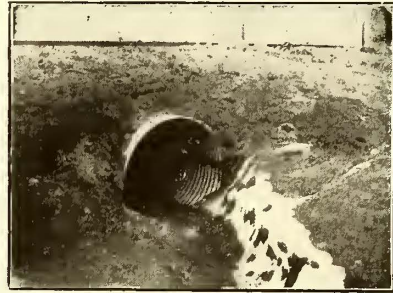
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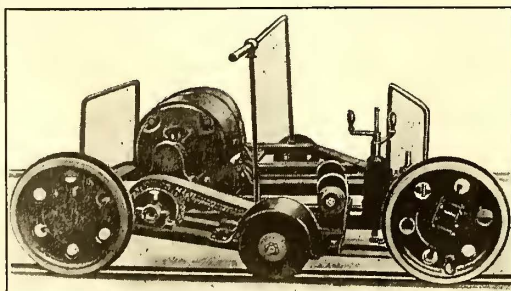
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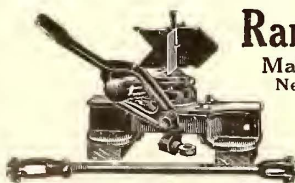
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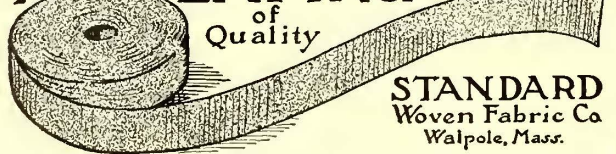
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AMERICAN GENERAL ENGINEERING CO.
 253 Broadway, New York, U. S. A.

The Best Shade Rollers For Cars

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

Stewart Hartshorn

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

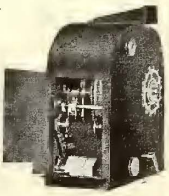
KINNEAR MANUFACTURING CO., Columbus, Ohio
 BOSTON PHILADELPHIA CHICAGO

For the Answer to your Fare Collection Problems
 Write for "Earnings Per Passenger Mile" It tells how the

BONHAM TRAFFIC RECORDER

Will Meet Your Needs

The Bonham Recorder Co., Hamilton, Ohio

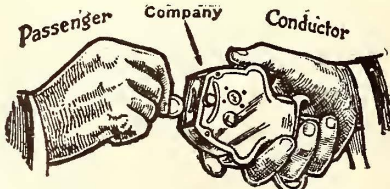


T

Rails and Nelsonville Filler and Stretcher Brick

offer all the advantages without the disadvantages of the groove rail. Construction approved by City Engineers.

THE NELSONVILLE BRICK CO., Nelsonville, Ohio



Passenger Company Conductor

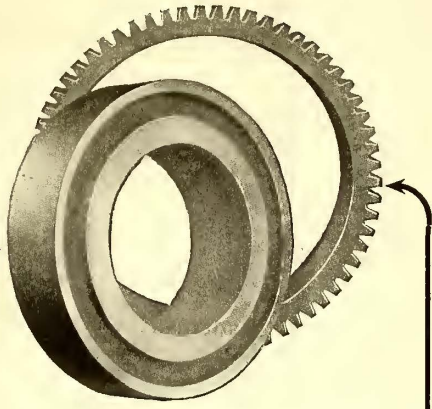
Direct Automatic Registration By the Passenger

Rooke Automatic Register Co.
 Providence, R. I.

The Big Three

D & W Fuses, Deltabeston Wire Delta Tape

D & W Fuse Co., Providence, R. I.



This Mild Steel Core is permanent on the axle.

This Treated Steel Rim is easily removed and renewed when worn out.

Ultimate Economy 36% Compared to Solid Gear.

NUTTALL-PITTSBURG



Radio-Thrust Journal Boxes

can be applied to standard trucks without change. Ask for our designs.

GURNEY BALL BEARING CO.
CONRAD PATENT LICENSEE
JAMESTOWN, NEW YORK

Non-Glaring Headlights

that throw the light along the track far ahead—but only 3½ ft. high are made possible by the use of the

Osgood Deflector Lens

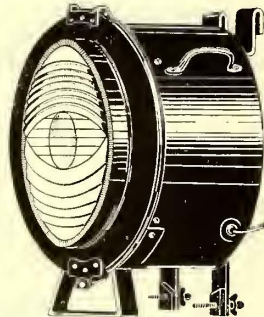
A prismatic glass lens that fits into the lamps in place of the ordinary lens.

Used by the fastest Electric Railway in the United States as regular equipment on trains attaining a speed of 80 miles an hour.

Thousands in use for automobile lighting.

Write for prices and particulars.

OSGOOD LENS & SUPPLY CO.
Dept. 10, 339 S. Wabash Ave., CHICAGO



The Kalamazoo Trolley Wheels

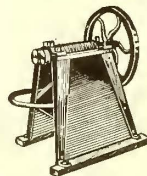
have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.



THE STAR BRASS WORKS
KALAMAZOO, MICH., U. S. A.

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



Saved from the Ashes as many tickets are, means nickels lost to you. Avoid the risk.

Patten Ticket Destroyer is used right in the office under the eyes of trustworthy employes.

It mutilates beyond redemption.

Scrap sold will pay for the machines.

Ask us for Circular J.

PAUL B. PATTEN CO.,
78 Lafayette St., Salem, Mass., U. S. A.



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

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

STANWOOD STEPS—are non-slipping and self-cleaning. Above products are used on all leading Railroads. For details address

AMERICAN MASON SAFETY TREAD CO.
Main Offices: Lowell, Mass. Branch Offices: Boston, New York City, Chicago, Philadelphia, Kansas City, Cleveland, St. Louis.

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.

SEARCHLIGHT SECTION

FOR SALE

- 2—Cincinnati fourteen bench open car bodies.
- 8—Brill fourteen bench open cars, West. 56 Motors, Brill 22-E Trucks.
- 40—Brill ten bench open cars, West. 68 Motors, Peckham Trucks.
- 16—42' Interurban Cars, Baldwin Trucks, 4 West. 121 Motors.
- 25—Brill 20' Closed Cars, 2 West. 56 Motors, Brill 22-E Trucks.
- 40—Brill 20' Closed Cars, G.E. 1000 Motors, Peckham Trucks.
- 6—Brill 30' Express Cars complete, 4 G.E. 1000 Motors, Brill 27-G Trucks, AA-1 Air Brakes.
- 30—G.E. 90 Railway Motors complete.
- 20—G.E. 73 Railway Motors complete.
- 40—G.E. 1000 Railway Motors complete.
- 20—G.E. 800 Railway Motors complete.
- 18—G.E. 87 Railway Motors complete.
- 18—G.E. 57 Railway Motors complete. Form H.
- 12—G.E. 57 Railway Motors complete. Form A.
- 22—West. 12A Railway Motors complete.
- 12—West. 38B Railway Motors complete.
- 10—West. 112 Railway Motors complete.
- 18—West. 101-B-2 Armatures, Brand New.
- 6—West. 93-A-2 Armatures, Brand New.
- 2—West. 93 Armatures, Brand New.
- 14—G.E. 80-A Armatures, Brand New.
- 4—G.E. 87 Armatures, Brand New.
- 3—G.E. 73-C Armatures, Brand New.
- 6—G.E. 67 Armatures, Brand New.
- 12—G.E. 57 Armatures, second-hand; two turn.
- 14—West. 56 Armatures, second-hand.
- 40—K10 Controllers.
- 12—K28B Controllers.
- 26—K6 Controllers.
- 22—K11 Controllers.
- 12—K14 Controllers.
- 6—Brill 21-E Trucks, 7' 6" and 8' wheel base.

All of the above Apparatus is in first class condition for immediate service

For further particulars apply to

W. R. KERSCHNER COMPANY, Inc.
50 Church Street, New York City

FOR SALE

Immediate Delivery Unused Material

WIRE CABLE:

1000 ft. 1" Dia. 37-Strand Sweeds Iron.

LARGE BOLTS:

1" Dia. 20" to 30" long.
1 1/8" Dia. 4" to 6 1/2" long.
1 1/4" Dia. 5 1/2" to 24" long.

STEEL BARS.

Rounds—5/8" to 1 7/8" Dia.
Flats—3/8" to 2" x 2" to 6".

PLATES:

3/8" to 1 1/2" x 7" to 36".

SPIKES:

3 1/2—4—4 1/2 x 3/8—7/16—1/2.

NUT LOCKS:

5/8" to 1 1/4".

JOINTS:

160 Pairs Lorain 70-264.
250 Pairs Lorain 129-403.

RAILS:

12 lb. to 45 lb. Tee.

FROGS & SWITCHES:

Dia. Turnouts 60 lb. and 70 lb.
Split Switches and Frogs.
Switch Stands.

Central Track Supply Co.

Box 636
Springfield, Ohio

ARCHER & BALDWIN

114-118 Liberty Street New York City
TELEPHONE 4337-4333 RECTOR

500 K. W. Rotary Converter

1—500 K.W. 60 Cycle General Electric Rotary Converter, 3 phase, Type H.C.—12—500—600 R.P.M., 600 volts D.C., complete with end play device, speed limit device and field rheostat.

Railway Motors

4—75 to 90 H.P. Westinghouse No. 112 Railway Motors, newly rewound, practically new.

IMMEDIATE DELIVERY

MACGOVERN & COMPANY, Inc.

FRANK MACGOVERN, Pres. & Gen. Mgr.

114 LIBERTY STREET NEW YORK CITY

Steam and Electrical Machinery

Air Compressors, Pumps, Hoists, etc.

CARS FOR SALE

OPEN and CLOSED
MOTOR and TRAIL

Write for Price and Full Particulars to

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg. Philadelphia, Pa.

COMPLETE ARMATURES FOR SALE

FOR ALL THE STANDARD
STREET RAILWAY MOTORS

GET OUR PRICE WE CAN SAVE YOU MONEY

America's Greatest Repair Works

CLEVELAND ARMATURE WORKS, Cleveland, O.

Get Your Wants into the Searchlight

SEARCHLIGHT SECTION

Get your Wants into the Searchlight

ADVERTISING RATES

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

Under "Positions Vacant," including Agents and Agencies Wanted, Representatives Wanted, Salesmen Wanted, Partners Wanted, Desk Room Wanted or For Rent, Business Opportunities, Employment Agencies, and Miscel-

laneous For Sale, For Rent, and Want ads; also Auction Notices, Receivers' Sales, Machinery and Plants For Sale or Wanted (with one line of display heading), undisplayed advertisements cost three cents a word, minimum charge \$1.50 an insertion.

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

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

ADVERTISEMENTS IN DISPLAY TYPE

cost as follows for single insertions:

1/8 p. (1 1/2 x 3 3/8 ins.)	.....\$5.00	1 in. (1 x 2 3/8 ins.)	..... \$3.00
1/8 p. (2 3/8 x 3 3/8 ins.)	.....10.00	4 inches (4 x 2 3/8 ins.)	..... 11.60
1/4 p. (5 x 3 3/8 or 2 3/8 x 7 ins.)	.....20.00	8 inches (8 x 2 3/8 ins.)	..... 22.40
1/2 p. (10 1/4 x 3 3/8 or 5 x 7 ins.)	.....40.00	15 inches	..... 40.50
		1 page (10 1/4 x 7 ins.) 30 inches	.....\$80.00

For space to be used within one year, to be divided to suit requirements of advertiser, provided some space is used in each issue following first insertion:

1 page	..... \$80 a page	18 pages	.....\$56 a page
3 pages	..... 72 a page	26 pages	..... 53 a page
6 pages	..... 64 a page	40 pages	..... 52 a page
12 pages	..... 56 a page	52 pages	..... 50 a page

In replying to advertisements, do NOT enclose original testimonials, drawings or photographs that you may want returned. Advertisements for men often produce several hundred applications and no employer can be expected to read all of these carefully and return the papers or applications of those in which he is not interested. State your experience and qualifications in as concise and neat a manner as possible and enclose COPIES of your testimonials.

When advertising machinery, use your own name and address—or a local address of some kind—so that the readers can wire direct and get quick replies. We advise also that you state in your advertisement the present location of plant that is offered for sale, or point of delivery provided you are in the market for equipment.

FOR SALE

Generators for Sale

2—1200 KW., 25 cycle, 6600 volt, 3 phase General Electric alternators with 30" x 50" x 60" Allis-Corliss horizontal cross-compound engines, 1—800 KW., 600 volt direct current generator with 32" x 60" simple Allis-Corliss engine. United Railways Company, 3869 Park ave., St. Louis, Mo.

Rails for Sale

2 1/2 miles 56-lb. Relaying Rails, Luria Bros. & Co., 50 Church Street, New York.

Gas Producer & Engine for Sale

75 hp, producer and 3 cylinder gas engine with 50 kw. direct connected generator. Fairbanks-Morse Co. outfit. Best condition. American Caramel Company, Lancaster, Pa.

FLAT BRIDGE OR TRAM RAILS

150 tons 47 and 60 lb. 30' lengths,
also
200 tons 7" 70 lb. Shanghai,
20 tons 6" 60 lb.

And any quantity, any section of choice relaying "T" rails.

ZELNICKER IN ST. LOUIS

CARS AND EQUIPMENT

Immediate Shipment
1200 Kegs of 6 x 5/8 Standard

RAILROAD SPIKES

\$2.00 per cwt. Pittsburgh.

Also, large tonnage of

RELAYERS

M. K. FRANK, 917 Frick Bldg.
Pittsburgh, Pa.

MISCELLANEOUS WANTS

T Rail Wanted

One and one-half miles of Shanghai T Rail wanted for delivery in July or August. T. M. Ellis, care Beloit Traction Co., N. 2nd St. Road, Rockford, Ill.

Generator Sets Wanted At Once

2 motor generator sets, 200 to 400 K.W., D.C. generator. 500-600 volts alternator, 3 phase 60 cycle, 2300 volts. Separate machines that could be used with a flexible coupling would be acceptable.

Kingston, Portsmouth & Cataraqui Electric Railway Co.

Kingston Ont., Can.

POSITIONS WANTED

ACCOUNTANT, age 25, married, graduate of high school and business course, five years' experience in steam and electric railway offices. desires position as auditor receipts or traveling auditor with good prospect for advancement. Have good references. Box 948, Elec. Ry. Jour.

DRAFTSMAN wants position. Has had eight years' experience with railway companies doing general drawing, statistical and appraisal work in both mechanical and civil engineering departments. Can furnish good references. Box 1101, Elec. Ry. Jour.

ENGINEER, 29 years of age; good experience on power and sub-station drafting and construction, desires permanent position. South preferred but not absolutely necessary. Box 1105, Elec. Ry. Jour., 1570 Old Colony Bldg., Chicago, Ill.

FOREMAN—Position wanted as shop and car-house foreman, 14 years' practical experience. Strictly sober and reliable. Box 1089, Elec. Ry. Jour., Real Estate Trust Bldg., Phila., Pa.

POSITIONS WANTED

FOREMAN for general shop and line wants position; good wireman and machinist; some experience as armature winder. Can take care of overhead line and shops and operate at low cost. Small road preferred. Let work show results. Will call within reasonable distance if desired. Box 1094, Elec. Ry. Jour., Real Estate Trust Bldg., Philadelphia, Pa.

MAN with 10 years' experience in car shop and power station work wants position as superintendent of a small electric ring system. Box 1085, Elec. Ry. Jour., 1570 Old Colony Bldg., Chicago, Ill.

MASTER mechanic open for position. Eighteen years' experience City and Interurban high speed equipment, first class shop manager. Unquestionable ability. A-1 references. Box 1091, Elec. Ry. Jour., Real Estate Trust Bldg., Philadelphia, Pa.

POSITIONS VACANT

ELECTRICIAN, competent to wind armatures and take care of over-head work, also repairs on cars. Married man preferred. Run two regular cars. Only sober man need apply. Steady work. State wages. Box 1084, Elec. Ry. Jour., 1570 Old Colony Bldg., Chicago, Ill.

WAY Engineer—A commercial company desires services of a young energetic engineer who has had practical experience in surface track constructions, particularly supervision or as foreman in charge. Prefer one with moderate technical education and a fair draftsman. Salary moderate but with excellent chances of advancement. State full particulars and expectations. Box 1097, Elec. Ry. Jour.

Keep your eye
on the
Searchlight
and your
Advertisements in it

Get your Wants
into the Searchlight

READY-REFERENCE INDEX

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

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

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

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

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

- Acetylene Apparatus.** (See Cutting Apparatus, Oxy-Acetylene.)
- Acetylene Service.**
Prest-O-Lite Co., Inc., The.
- Advertising, Street Car.**
Collier, Inc., Barron G.
- Air Cleaners.**
Lord Mfg. Co.
- Alloys, Steel & Iron.**
Titanium Alloy Mfg. Co.
- Alloys and Bearing Metals.** (See Bearings and Bearing Metals.)
- Anchors, Guy.**
Holden & White.
Johns-Manville Co., H. W.
Ohio Brass Co.
Western Electric Co.
Westinghouse Elec. & M. Co.
- Anti-Climbers.**
Railway Improvement Co.
- Armature Shafts.**
Valley Steel Co.
- Automobiles and Busses.**
Brill Co., The J. G.
- Axle Straighteners.**
Columbia M. W. & M. I. Co.
- Axles.**
Bemis Car Truck Co.
Brill Co., The J. G.
Carnegie Steel Co.
Cincinnati Car Co.
St. Louis Car Co.
Standard Steel Works Co.
U. S. Metal & Mfg. Co.
Valley Steel Co.
Westinghouse Elec. & M. Co.
- Babbitting Devices.**
American General Eng'g Co.
Columbia M. W. & M. I. Co.
- Badges and Buttons.**
International Register Co., The
Western Electric Co.
- Banks and Brokers.**
Halsey & Co., N. W.
Redmond & Co.
- Batteries, Dry.**
Johns-Manville Co., H. W.
Western Electric Co.
- Batteries, Storage.**
Electric Storage Battery Co.
Western Electric Co.
- Bearings, Center.**
Baldwin Locomotive Works.
Holden & White.
- Bearings and Bearing Metals.**
Ajax Metal Co.
American General Eng'g Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Kerschner Co., Inc., W. R.
Long Co., E. G.
More-Jones Brass & M. Co.
St. Louis Car Co.
Westinghouse Elec. & M. Co.
- Bearings, Roller and Ball.**
Guerny Ball Bearing Co.
Railway Roller Bearing Co.
- Bearings, Roller Side.**
Holden & White.
- Bells and Gongs.**
Brill Co., The J. G.
Electric Service Supplies Co.
St. Louis Car Co.
Western Electric Co.
- Benders, Rail.**
Niles-Bement-Pond Co.
- Blow Torches for Soldering and Brazing.** (See Cutting Apparatus, Oxy-Acetylene.)
- Blowers.**
General Electric Co.
Westinghouse Elec. & M. Co.
- Boiler Cleaning Compounds.**
Dearborn Chemical Co.
- Boiler Coverings.**
Johns-Manville Co., H. W.
- Boiler Graphite.**
Dixon Crucible Co., Joseph.
- Boilers.**
Babcock & Wilcox Co.
- Bond Clips.**
Electric Railway Improv. Co.
- Bond Testers.**
American Steel & Wire Co.
- Bonding Apparatus.**
Electric Railway Improv. Co.
Ohio Brass Co.
Prest-O-Lite Co., Inc., The.
- Bonding Tools.**
American Steel & Wire Co.
Electric Railway Improv. Co.
Electric Service Supplies Co.
General Electric Co.
Johns-Manville Co., H. W.
Ohio Brass Co.
Roebbling's Sons Co., John A.
Western Electric Co.
Westinghouse Elec. & M. Co.
- Bonds, Rail.**
American Steel & Wire Co.
Electric Railway Improv. Co.
Electric Service Supplies Co.
General Electric Co.
Johns-Manville Co., H. W.
Ohio Brass Co.
Roebbling's Sons Co., John A.
Western Electric Co.
Westinghouse Elec. & M. Co.
- Bonds, Welded.**
Lincoln Bonding Co.
- Book Publishers.**
McGraw-Hill Book Co., Inc.
- Boring Tools, Car Wheel.**
Niles-Bement-Pond Co.
- Braces, 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.
International Creol. & C. Co.
Lindsay Bros. Co.
Ohio Brass Co.
Western Electric Co.
- Brake Adjusters.**
Johns-Manville Co., H. W.
Kerschner Co., Inc., W. R.
Smith-Ward Brake Co., Inc.
- 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.**
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
Holden & White.
Long Co., E. G.
Lord Mfg. Co.
National Brake Co.
St. Louis Car Co.
Westinghouse Trac. Brake Co.
- Brazing.** (See Welding.)
- Bridges & Buildings.**
American Bridge Co.
- Brooms, Track, Steel or Rattan.**
Paxson Co., J. W.
Western Electric Co.
- Brushes, Carbon.**
Calebrough Self - Lubricating Carbon Co.
Dixon Crucible Co. Joseph.
General Electric Co.
Jeandron, W. J.
Morgan Crucible Co.
Western Electric Co.
Westinghouse Elec. & M. Co.
- Brush Holders.**
Anderson Mfg. Co., A. & J. M.
- Bumpers, Car Seat.**
Electric Service Supplies Co.
Imperial Rubber Co.
- Bunkers, Coal.**
American Bridge Co.
- Bunting.**
Boyle & Co., Inc., John.
- Bushings, Fibre.**
Diamond State Fibre Co.
- Bushings, Case Hardened Manganese.**
Bemis Car Truck 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.
Cincinnati Car Co.
Jewett Car Co.
Kuhlman Car Co., G. C.
St. Louis Car Co.
Wason Mfg. Co.
- Cars, Self-Propelled.**
Electric Storage Battery Co.
General Electric Co.
- Castings, Brass.**
Frankel Connector Co.
More-Jones Brass & M. Co.
- Castings, Composition or Copper.**
Anderson M. Co., A. & J. M.
- Castings, Gray Iron and Steel.**
American B. S. & Fdry. Co.
American Bridge Co.
American General Eng'g Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Long Co., E. G.
St. Louis Car Co.
St. Louis Steel Fdry.
Standard Steel Works Co.
Union Springs & Mfg. Co.
- Castings, Malleable and Brass.**
American Brake S. & Fdy. Co.
Bemis Car Truck Co.
Long Co., E. G.
St. Louis Car Co.
- Catchers and Retrievers, Trolley.**
Eclipse Railway Supply Co.
Electric Service Supplies Co.
Holden & White.
Kerschner Co., Inc., W. R.
Long Co., E. G.
Lord Mfg. Co.
Ohio Brass Co.
Wood Co., C. N.
- Ceiling Car.**
Pantasote Co., The.
- Chargers, Storage Battery.**
General Electric Co.
- Cheese Cloth.**
Boyle & Co., Inc., John
- Chemists.**
Little, Arthur D., Inc.
- Circuit Breakers.**
Cutter Electrical & Mfg. Co.
General Electric Co.
Western Electric Co.
Westinghouse Elec. & M. Co.
- Clamps.**
Frankel Connector Co.
- Clamps and Connectors, for Wires and Cables.**
American General Eng'g Co.
Anderson M. Co., A. & J. M.
Electric Service Supplies Co.
General Electric Co.
Klein & Sons, M.
Ohio Brass Co.
Western Electric Co.
Westinghouse Elec. & M. Co.
- Cleaners and Scrapers, Track.** (See also Snow-Plows, Sweepers and Brooms.)
Brill Co., The J. G.
Cincinnati Car Co.
Ohio Brass Co.
Western Electric 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.
Kerschner Co., Inc., W. R.
Western Electric Co.



The Scrap Heap is No Place for Old Field Coils

Their copper content is too valuable to sell at a scrap price.

Send them to us. We will remove the old insulation, clean the copper and rewind it into new coils (under our new process) securing for you coils of the same size, shape and number of turns as the old ones, at the mere cost of the insulation.

Salamander Pure Asbestos

is the insulation we use, and coils treated with it will not carbonize with age nor break down under overload.

All sizes of Salamander Asbestos Fireproof Wire from No. 3/0 to No. 34 B. & S. G. carried in stock. We also sell flexible asbestos insulated and asbestos braided conductors for heater connections, etc.

Correspondence solicited.

Independent Lamp & Wire Co., Inc.

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

For General Testing
 in Electric Power Plants, or for Outdoor Work

Weston

Model 45

D. C. Portable Ammeters and Voltmeters

Designed to meet the demand for a medium-priced Ammeter and Voltmeter. Their accuracy is guaranteed within 1%.

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

The Eclipse Railway Supply Co. CLEVELAND, OHIO

Manufacturers of the

ECLIPSE LIFE GUARD **ECLIPSE WHEELGUARD**
ECLIPSE TROLLEY RETRIEVER **ACME FENDER**



"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.

1 SAMSON CORDAGE WORKS, BOSTON, MASS.

"Watch Your Step"

If it has
 Universal Safety Tread
 on it,
 Proceed in Safety.
 If Not,
 Be Careful

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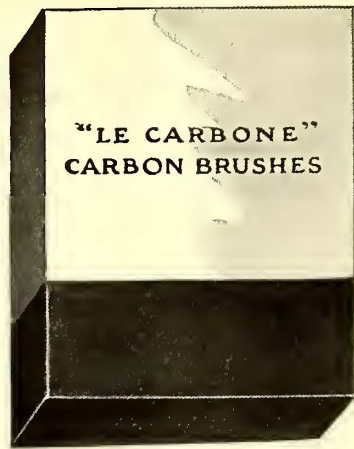
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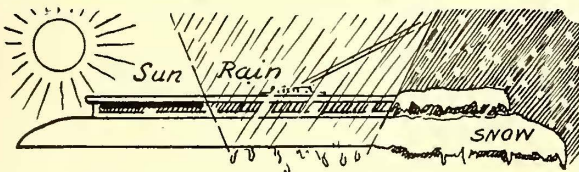
RAILWAY SUPPLIES

SELLING AGENTS FOR

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

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

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Eastern Agents for Union Fibre Co.
Southern and New England Agents for Thayer & Co.



"Bayonne" Car Roofing

Made and impregnated to withstand the elements
Only One Color Coat Necessary at Home

Made from a closely-woven special fabric, every fibre of which is treated with a *preservative* which renders it proof against the quick deterioration to which ordinary painted cotton duck is susceptible. Neat in appearance—saves time, maintenance and prevents leakage. Three weights, yellow and brown, widths from 22 to 120 inches. *Compare the samples!*
FADELESS—WATERPROOF.

John Boyle & Co., Inc., 112-114 Duane St., N. Y.
Branch House, 202-204 Market St., St. Louis, Mo.

LONGWEAR BUSHINGS

For Brake Gear

Hardened
Steel
Accurate
Uniform



also
LONGWEAR
BRAKE PINS
to
Specifications

E. G. Long Company

50 Church Street

New York

It Would Be Almost a Miracle

if one or more of the 8,000 men who regularly receive the JOURNAL did not happen to want that used machine which you want to sell. The

Searchlight Section

brings buyers and sellers together

Copy received until Wednesday noon for publication in the issue of that week.

The Baldwin Locomotive Works

Philadelphia, Pa.

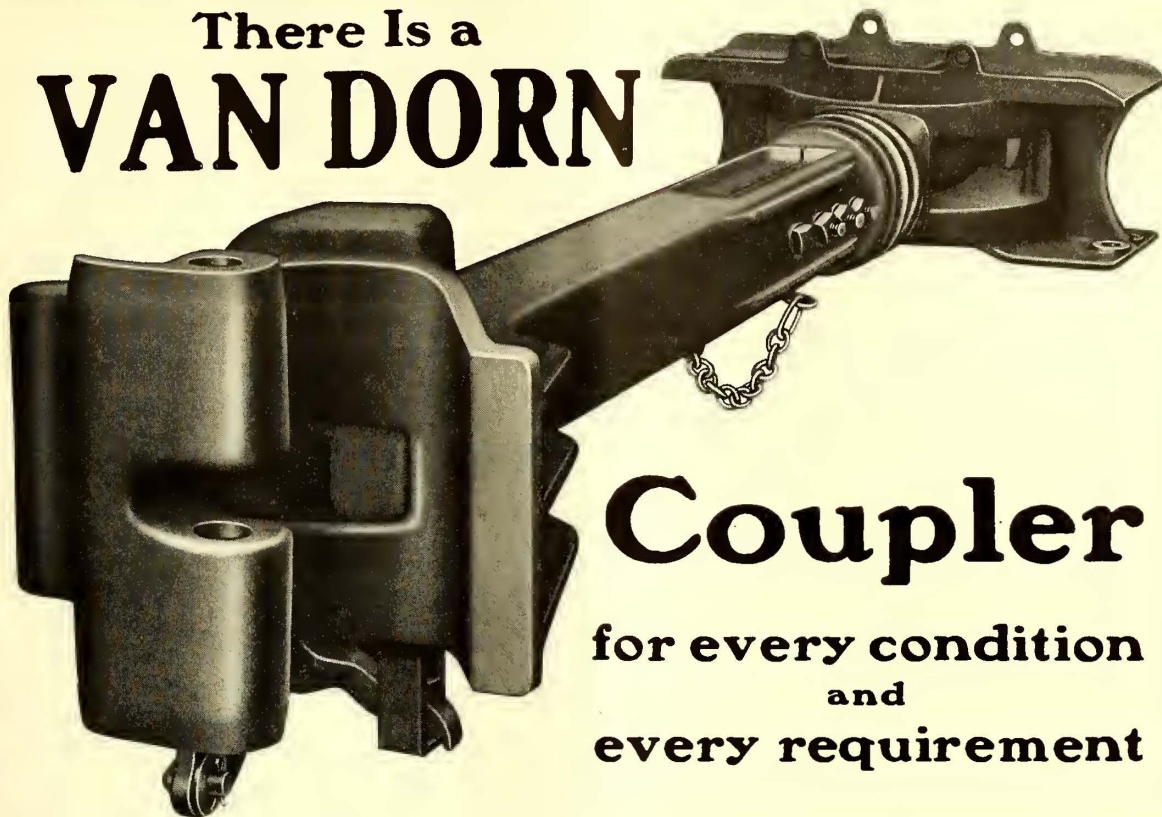
ELECTRIC MOTOR and TRAILER TRUCKS

READY-REFERENCE INDEX

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

- Seating Material.** (See also **Rattan**.)
Brill Co., The J. G.
Jewett Car Co.
Pantastote Co., The.
- Second-Hand Equipment.**
(See pages 50, 51.)
- Shade Rollers.**
Hartshorn Co., Stewart.
- Shades, Vestibule.**
Brill Co., The J. G.
Electric Service Supplies Co.
- Shovels, Power.**
Allis-Chalmers Mfg. Co.
- Signals, Highway Crossing.**
Electric Service Supplies Co.
Simmen Auto Ry. Signal Co.
U. S. Electric Signal Co.
- Signal Systems, Block.**
Electric Service Supplies Co.
Federal Signal Co.
Simmen Auto Ry. Signal Co.
U. S. Electric Signal Co.
Western Electric Co.
Wood Co., C. N.
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Lord Mfg. Co.
- Slack Adjusters.** (See **Brake Adjusters**.)
- Sleet Wheels and Cutters.**
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Anderson M. Co., A. & J. M.
Bonney-Vehslage Tool Co.
Drew Electric & Mfg. Co.
More-Jones Brass & M. Co.
Nuttall Co., R. D.
- Snow-Plows, Removers, Sweepers, etc.**
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Columbia M. W. & M. I. Co.
Consolidated Car Fender Co.
- Solder and Solder Flux.**
Westinghouse Elec. & M. Co.
- Soldering and Brazing Apparatus.** (See **Welding Proc. & App.**)
- 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.
Westinghouse Elec. & M. Co.
- Splicing Sieves.** (See **Clamps and Connectors**.)
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Bemis Car Truck Co.
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Long Co., E. G.
Standard Steel Works Co.
Union Spring & Mfg. Co.
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St. Louis Car Co.
- Steps, Car.**
American Mason S. T. Co.
Universal Safety Tread Co.
- Stokers, Mechanical.**
Babcock & Wilcox Co.
Green Eng'g Co.
Murphy Iron Works.
Westinghouse Elec. & M. Co.
- Storage Batteries.** (See **Batteries, Storage**.)
- Structural Iron.** (See **Bridges**.)
- Superheaters.**
Babcock & Wilcox.
Power Specialty Co.
- Sweepers, Snow.** (See **Snow-Plows, Sweepers and Brooms**.)
- Switchboard Mats.**
Imperial Rubber Co.
Western Electric Co.
- Switchstands.**
Kilby Frog & Switch Co.
Ramapo Iron Works.
- Switches, Automatic.**
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Western Electric Co.
- Switches, Track.** (See **Track Special Work**.)
- Switches and Switchboards.**
Allis-Chalmers Mfg. Co.
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Cutter Electrical & Mfg. Co.
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General Electric Co.
Western Electric Co.
Westinghouse Elec. & M. Co.
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Ingersoll-Rand Co.
- Tapes & Cloth.** (See **Insulating Cloths, Paper and Tape**.)
- Telephone and Parts.**
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Western Electric Co.
- Testing Clips.**
Frankel Connector Co.
- Testing, Commercial and Electrical.**
Electrical Testing Laboratories, Inc.
Hunt Co., Robert W.
- Testing Instruments.** (See **Instruments, Electrical, Measuring, Testing**.)
- Terminals.**
Frankel Connector Co.
- Thermostats.**
Gold Car Heatin & Lighting Co.
Railway Utility Co.
Smith Heater Co., Peter.
- Ticket Choppers & Destroyers.**
Patten Co., Paul B.
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American Bridge Co.
Barbour-Stockwell Co.
Carnegie Steel Co.
International Steel Tie Co., The.
- Ties, Wood.** (See **Poles, Ties, etc.**)
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American Steel & Wire Co.
Columbia M. W. & M. I. Co.
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Johns-Manville Co., H. W.
Klein & Sons, M.
Railway Track-work Co.
- Torches, Acetylene.** (See **Cutting Apparatus, Oxy-Acetylene**.)
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- Towers & Transmission Structures.**
American Bridge Co.
Archbold-Brady Co.
Bates Expanded Steel and Truss Co.
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Barbour-Stockwell Co.
Cleveland Frog & Crossing Co.
Columbia M. W. & M. I. Co.
Kilby Frog & Switch Co.
New York S. & Cross. Co.
Ramapo Iron Works Co.
St. Louis Steel Fdry. Co.
- Transfers.** (See **Tickets**.)
- Transfer Tables.**
American Bridge Co.
Archbold-Brady Co.
- Transformers.**
Allis-Chalmers Mfg. Co.
General Electric Co.
Western Electric Co.
Westinghouse Elec. & M. Co.
- Treads, Safety, Stair and Car Step.**
American Mason Safety T. Co.
Imperial Rubber Co.
Universal Safety Tread Co.
- Trolley Bases.**
Anderson M. Co., A. & J. M.
Electric Service Supplies Co.
General Electric Co.
Holden & White.
Lord Mfg. Co.
More-Jones Brass & M. Co.
Nuttall Co., R. D.
Ohio Brass Co.
- Trolley Bases, Retrieving.**
Holden & White.
- Trolley Shoe.**
Holden & White.
- Trolleys and Trolley Systems.**
Curtis & Co., Mfg. Co.
Ford Chain Block & Mfg. Co.
- Trucks, Car.**
Baldwin Locomotive Works.
Bemis Car Truck Co.
Brill Co., The J. G.
Cincinnati Car Co.
Long Co., E. G.
St. Louis Car Co.
- Turbines, Steam.**
Allis-Chalmers Mfg. Co.
General Electric Co.
Western Electric Co.
Westinghouse Elec. & M. Co.
- Turbines, Water.**
Allis-Chalmers Mfg. Co.
- Vacuum Drying & Impregnating Apparatus.**
Allis-Chalmers Mfg. Co.
- Valves.**
Ohio Brass Co.
- Varnishes.** (See **Paints, etc.**)
- Ventilators, Car.**
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Cincinnati Car Co.
Holden & White.
Railway Utility Co.
St. Louis Car Co.
Smith Heater Co., Peter.
- Vestibules, Portable.**
Brill Co., The J. G.
- Volt Meter.** (See **Instruments**.)
- Washers.**
Diamond State Fibre Co.
- Weed Killer.**
Atlas Preservative Co. of America.
- Welding Processes and Apparatus.**
Electric Railway Improve. Co.
General Electric Co.
Prest-O-Lite Co., Inc., The.
U. S. Metal & Mfg. Co.
Westinghouse Elec. & M. Co.
- Wheel Guards.** (See **Fender and Wheel Guards**.)
- Wheels, Car, Cast Iron.**
Bemis Car Truck Co.
Griffin Wheel Co.
Long Co., E. G.
- Wheels, Car. (Steel and Steel Tired.)**
Bemis Car Truck Co.
Carnegie Steel Co.
Standard Steel Works Co.
- Wheels, Trolley.**
American General Eng'g Co.
Anderson M. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
General Electric Co.
Holden & White.
Johns-Manville Co., H. W.
Long Co., E. G.
More-Jones Brass & M. Co.
Nuttall Co., R. D.
Star Brass Works.
- Whistles, Air.**
General Electric Co.
Ohio Brass Co.
- Winding Machines.** (See **Coil Banding and Winding Machines**.)
- Wire Rope.**
American Steel & Wire Co.
Roebbling's Sons Co., John A.
- Wires and Cables.**
Aluminum Co. of America.
American Steel & Wire Co.
D & W Fuse Co.
General Electric Co.
Roebbling's Sons Co., John A.
Western Electric Co.
Westinghouse Elec. & M. Co.
- Wood Preservatives.**
Barrett Co., The.
Bridgeport Brass Co.
C-A-Wood Preserver Co.
International Creol. & Con. Co.
Lindsay Bros. Co.
Reeves Co., The.
Union Insulating Co.
Valentine-Clark Co.

There Is a
VAN DORN



Coupler

for every condition
and
every requirement

The Van Dorn Radial M.C.B. Coupler

is shown above

It has a positive lock, lock-set, and knuckle throw.

Couples by impact and uncouples from side of car.

Has extended guard arm and butting wall.

Greatly facilitates coupling and prevents buckling.

Head has deep knuckles which permit wide vertical movement.

Radial carrier eliminates binding even on 30-ft. radius curve.

Van Dorn couplers are made in various types and sizes, each having special patented features. Combined with Van Dorn draft riggings they meet the particular problems of every class of service.

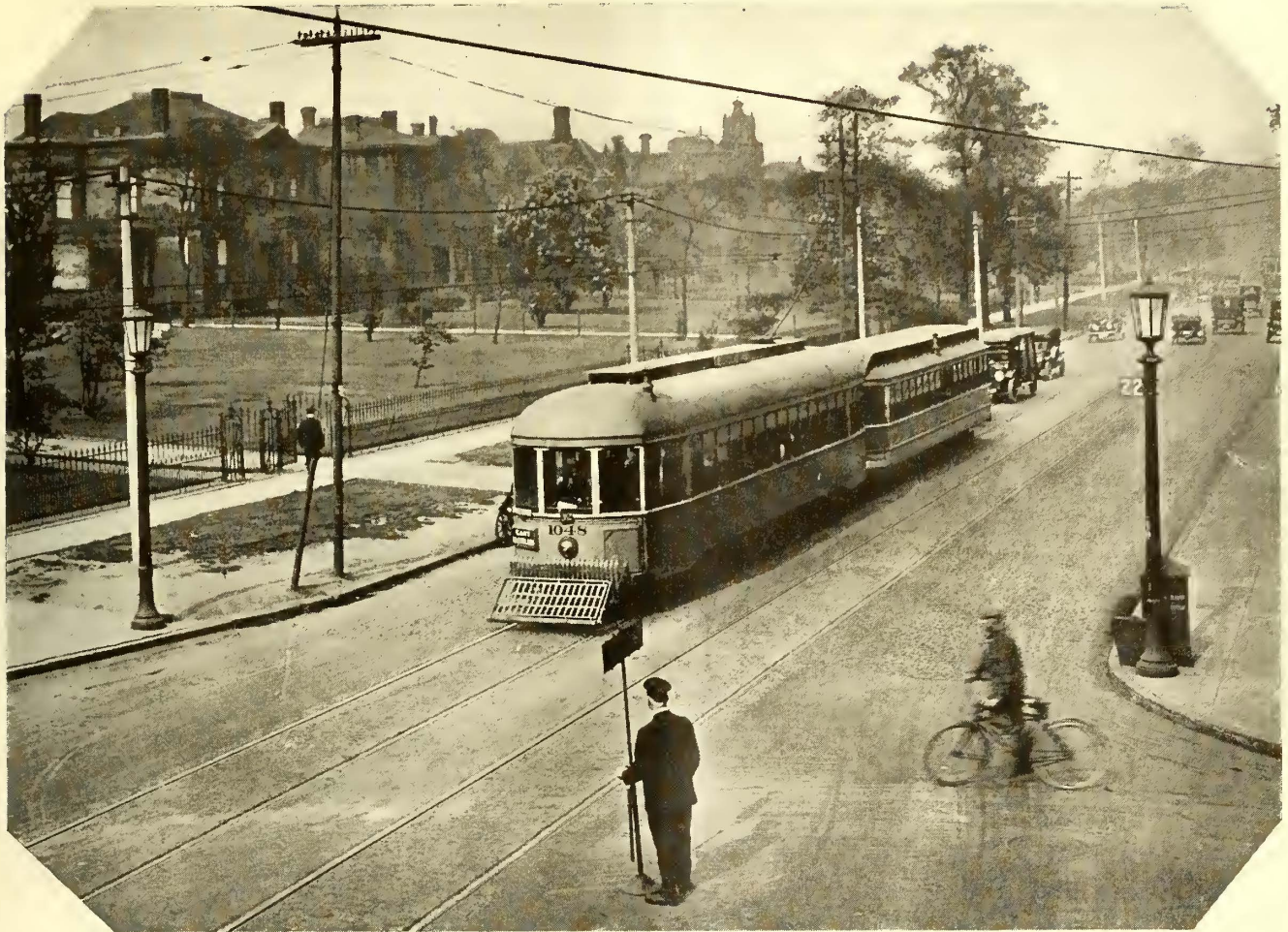
Van Dorn M.C.B., Pin and Link, Car and Air couplers are safe, strong, light and durable.

**Write for blueprints and
additional information**

Van Dorn Coupler Co.

2325 So. Paulina St.

Chicago, Ill.



TITANIUM

On Aristocratic Euclid Avenue

Euclid Avenue, Cleveland, is one of America's greatest show streets. Objection to the construction of track on "Millionaires' Row," between Twenty-second and Fortieth Streets, was always strong.

Therefore, when permission to build was finally obtained, the Cleveland Railway put down the most durable construction possible.

That construction includes Titanium-treated rail. Plain grinder rail (high tee).

The Cleveland Railways' first purchase of Titanium-treated rail was made in 1910. It consisted of 500 tons of 80-lb. ASCE rail. About 2100 tons of 103-lb. 426 section was laid in 1911 on Prospect Avenue, Payne Avenue and other places. Since 1911 a little more than 2100 tons has been laid each year, except in 1915, when 3500 tons of 95-lb. 400 section was laid.

Charles H. Clark, Maintenance-of-Way Engineer, says he has never had a break or any trouble whatever with Titanium-treated rail, which is saying something. He believes it essential to treat rail with Titanium.

TITANIUM ALLOY MANUFACTURING COMPANY

Operating Under Rossi Patents

Processes and Products Patented

General Office and Works:
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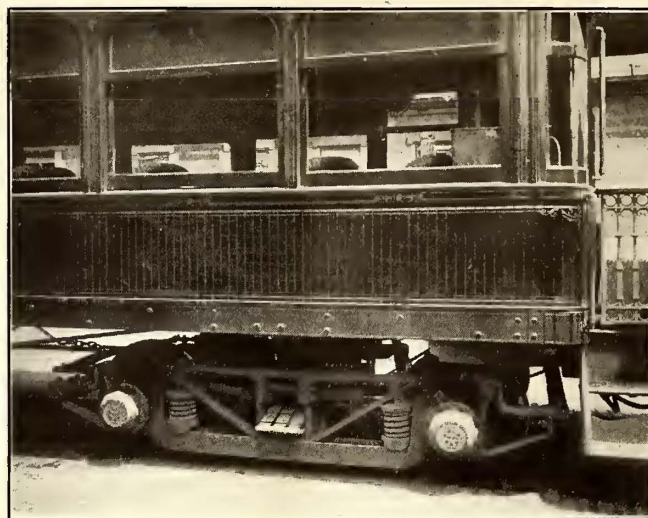


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VIEW OF TRUCK EQUIPPED WITH ROLLER BEARINGS

ROLLWAY BEARINGS

An Illuminating Summary

"Summing up the situation in regard to roller bearings, some of the advantages of their use may be enumerated as follows: Decrease of power, especially at peaks and during acceleration; more coasting; low lubrication and maintenance costs; reduced axle fractures; reduced pull-ins; fewer cars needed, reducing the investment, and possible adoption of smaller motors, and, therefore, less waste.

"The reduced energy demand means, in addition, wear on trolley wire and trolley wheels. With bearings of the anti-friction type, the axles are kept in the exact alignment, while with plain bearings there is considerable lost motion due to journal brass movement in the journal boxes, and to the ends of the journal being pushed to one side of the journal brass. With the anti-friction bearings there is also a reduction in brakeshoe and wheel wear. A car equipped with these bearings will coast further than one with plain bearings, and will accelerate at a higher rate with the same current."

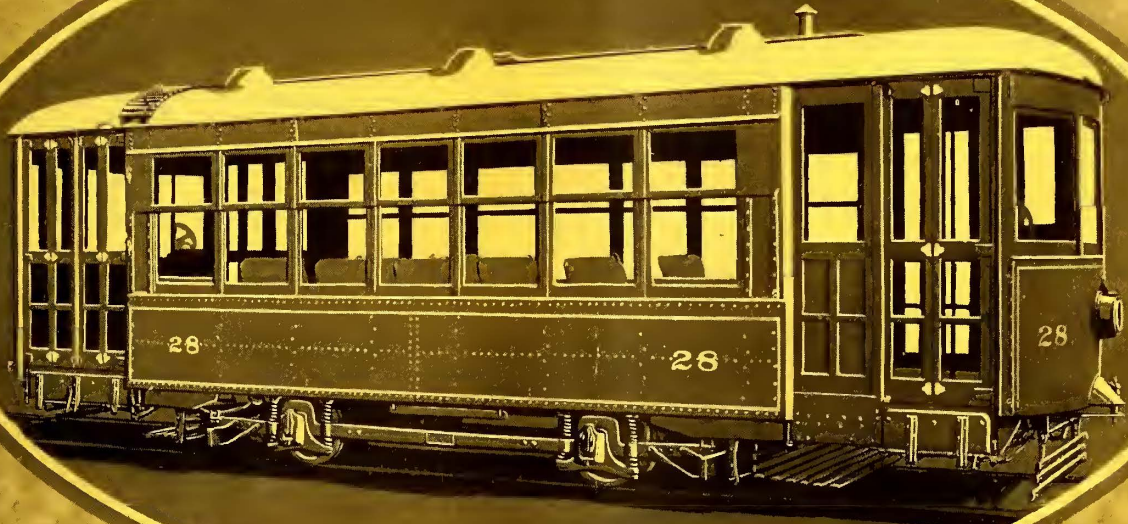
(From an article entitled "Results Obtained with Roller Bearings on Interurban Cars" by W. B. Voth and A. C. Metcalfe, respectively Chief Engineer and Master Mechanic Empire United Railways, Inc., Syracuse, N. Y.)



Think it over

The Railway Roller Bearing Co.

SYRACUSE, N. Y.

BRILL

THE car illustrated is a striking example of what may be done in single-truck car construction. Its overall length—29 feet—is made possible by the Brill 21-E Truck upon which it is mounted, the truck having a wheel base of 8 ft. 6 in. This car length makes possible a seating capacity of 34 persons. Mounting the car on the single truck keeps the weight down to a figure that speaks eloquently for economy, the total weight of the car and truck being but 12,285 pounds, or a weight per seated passenger of 361 pounds.

The J. G. Brill Company Philadelphia, Pa.
American Car Company St. Louis, Mo.
G. C. Kuhlman Car Company, Cleveland, Ohio
Wason Mfg. Company Springfield, Mass.

Prepare Now For Summer Traffic

This view shows a G-E Portable Substation of the semi-outdoor type—300 kw. continuous capacity, 450 kw. two hours and 900 kw. momentary load. In the semi-outdoor type the high tension alternating current equipment is all outdoors, thereby eliminating the insulation and clearance problems presented by the totally enclosed construction, and making it possible to use a car of smaller dimensions. The clearances of this substation are 11 ft. 6 in. high, 8 ft. 6 in. wide—Total weight 80,000 pounds.

The Modern G-E Portable Substation will go anywhere your cars can go—carrying 1000 or 1500 kw. on

momentary swings and giving reliable and economical power capacity at the point of application of your peak load.

The benefits are greater now than ever before—for the G-E commutating pole synchronous converter has made new economies possible. For the same service your first cost will be greatly reduced because this type of converter can commute 300% momentary loads, and it is **commutation that is most essential** for this class of service.

A letter to our nearest office stating your estimated requirements will bring information of immediate value to your road.

6034



General Electric Company

General office
Schenectady, N. Y.



Sales offices
in all large cities