

ELECTRIC RAILWAY JOURNAL

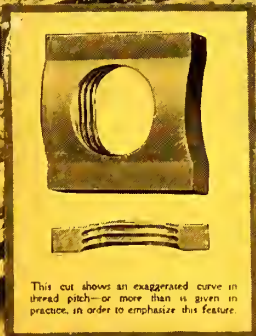
Volume XLIII, Number 25

New York, June 20, 1914

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Electric Railway Journal

New York, June 27, 1914

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Harry G. Abendroth gives an analysis and description of the overhead charges in valuation, based upon the classification of overhead charges of the Accountants' Association.	Committee on equipment received reports on various subjects from sub-committees. Meeting of the committee on power generation. Other committee activities.
Oxy-acetylene in an Electric Railway Shop 1438	Communications 1462
This article describes the great variety of welding and cutting jobs possible with oxy-acetylene equipment from broken gear teeth and chipped wheel flanges to the shafts of large machine tools. The descriptions and costs apply to work done on the Illinois Traction System.	Status of Prepayment Patents. All-Steel Cars for City Service.
Meeting of Central Electric Railway Accountants' Association 1444	Equipment and Its Maintenance 1464
This meeting was held in Toledo, June 24. E. L. Kase-meier read a paper on "Compiling Operating Expenses." Reports were received from committees on passenger accounts and freight accounts.	Improvements in Detroit Coil Baking Oven— <i>By T. L. Keller.</i> Testing Type M Contactor Coils Without Removal— <i>By F. E. Case.</i> Equipment Defects—Circuit Breakers and Hood Switches—III— <i>By C. W. Squier, E. E.</i> Electric-Welded Joint and Rail Brace Used in Cincinnati. Seamless and Rivetless Gear Cases. Torque Compensators. Self-Propelled Freight Passenger Car.
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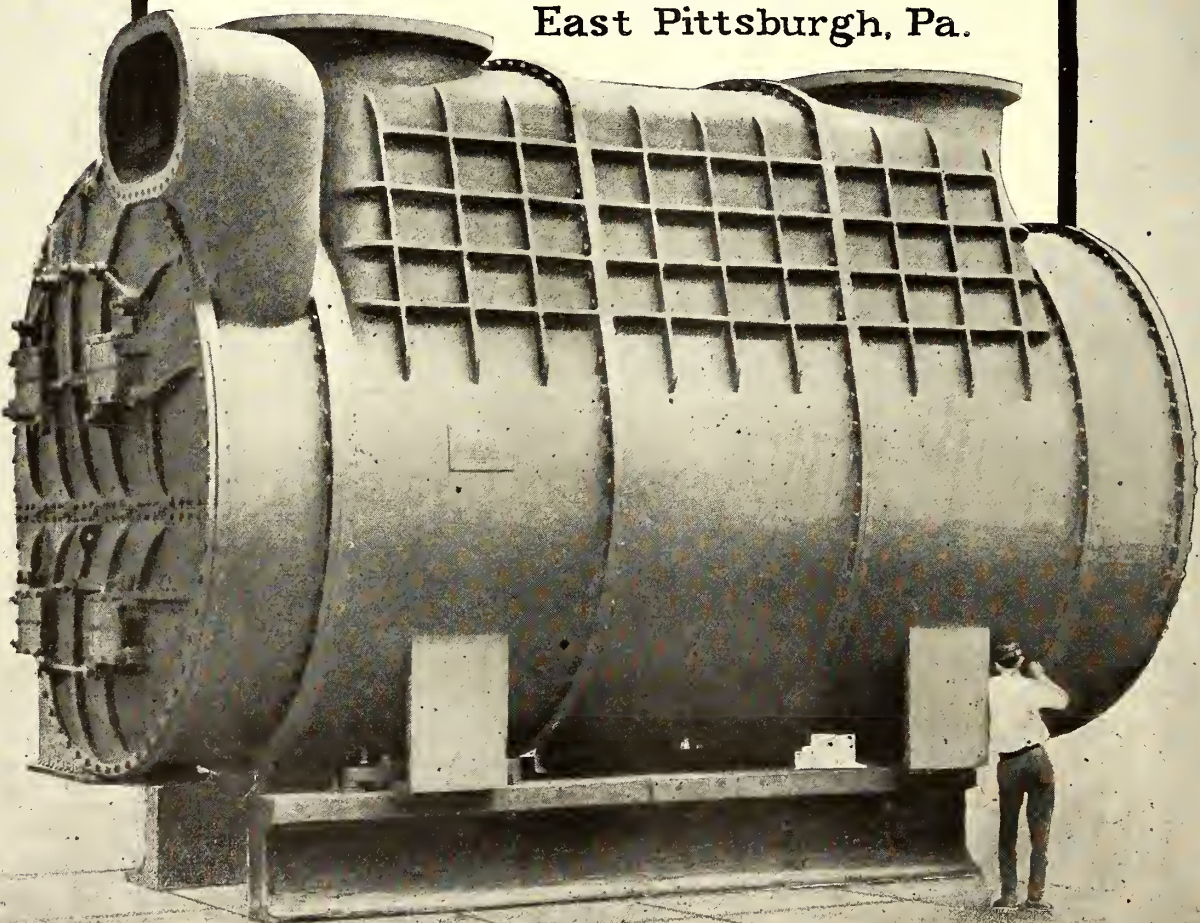
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<i>Third Prize Story . . .</i>	<i>200</i>	<i>Sixth Prize Story . . .</i>	<i>50</i>

1. The purpose we have in mind is to draw from the experience and practical knowledge of railroad officials and employees, striking stories of Air Brake Performance. We know that the history of the Art of Braking Railroad Trains is rich in dramatic but as yet unwritten narrative. On the one hand is a vast amount of such material as spectacular escape from wreck or disaster; and on the other hand a still larger—and largely unexplored—field covering the concrete evidences that efficient train control is the supreme factor in the ability to handle heavier freight and passenger traffic; and that increased tonnage, longer trains, higher speeds, etc., are simply visible demonstrations of the controlling influence of the Air Brake as expressed in the larger earning power possible from operations.

2. Each "story" must be written either from the practical experiences or personal observations of the writer or from information obtained at first hand from railroad men who actually know the facts.

Each contestant may choose his own individual style of expression, use railroad dialect if desired and illustrations if thought advisable. Correct names, dates, places and persons should be used so far as possible but fictitious substitutes may be employed providing this is so stated in the transmitting letter and the fundamental facts related have actually occurred.

There is no limitation as to the time when the facts given in the story may have occurred, but naturally these facts will be of larger interest if covering recent years and particularly if they apply to present standard forms of Westinghouse Brake Equipment.

The stories will be judged primarily upon the convincing character of the narrative as to the value of the Air Brake; originality; striking or unusual features; accuracy of facts given; relation of the story to present day conditions; concise expression; and brevity.

3. The contest is open to bona fide employees of any railroad, steam or electric, in the United States, operating regular traffic schedules, without limitation of any kind as to age, character of work, education, or other qualification.

4. No "story" shall be more than two thousand words in length. Manuscripts exceeding two thousand words will not be considered in the competition.

Each "story" should be written on one side of the sheet only and preferably typewritten. Neither name, address, nor other means of identification should be shown except in the transmitting letter.

5. No expense is involved in entering this contest but it is understood that all narratives submitted become the property of the Westinghouse Air Brake Company, whether securing an award or otherwise.

6. Decision as to merits of the stories submitted will be placed absolutely in the hands of a Committee of Judges composed of three prominent persons not associated in any way with the Westinghouse interests.

7. Each "story" should be addressed to the "Judges of Prize Contest," Room 2121, 165 Broadway, New York, N. Y. When received and serially numbered, the manuscripts, without name or other identification, will be turned over to the Committee of Judges by a disinterested party appointed by and acting for the Committee, and who will retain the transmitting letters after making careful record thereon of the serial number of the manuscript. The Judges will, therefore, pass upon the manuscript submitted without knowing by whom written until after the award is made.

8. All stories to be considered in this competition must be in the hands of the Committee on or before August 1, 1914. Announcement of awards by the Committee of Judges will be made as promptly as possible thereafter.

Westinghouse Air Brake Company

WILMERDING, PA.

PUBLISHER'S PAGE

*Now for Lake Champlain!*The Big Meeting of the
New York Electric Railway Association*June 30 and July 1*

New York electric railway men and their friends will meet for business and pleasure at the Hotel Champlain, Bluff Point, N. Y.—the thirty-second annual meeting of the Association. You should be there with them—for what you can do to help the others and for what they will do to help you.

TUESDAY is Accident Insurance and Accident Prevention Day. Note the speakers—

Hon. Robert E. Dowling, Chairman, Workmen's Compensation Commission of the State of New York; Hon. James J. Hoey, Second Deputy Superintendent of Insurance of the State of New York; Hon. Cyrus W. Phillips, Deputy Commissioner, Workmen's Compensation Commission of the State of New York, Rochester, N. Y.; Mr. John T. Stone, President, Maryland Casualty Company; Mr. Ernest Gonzenbach, General Manager, Empire United Railways, Inc.; Mr. F. Spencer Baldwin, Manager State Insurance Fund, Workmen's Compensation Commission of the State of New York, New York, N. Y.; Mr. James P. Barnes, General Manager, Syracuse & Suburban Railroad Company.

WEDNESDAY MORNING is an Efficiency session.

Mr. Charles J. Witherwax, General Passenger Agent, Schenectady Railway

Company; Mr. F. A. Bagg, Chief Engineer, Fonda, Johnstown & Gloversville Railroad Company, and Mr. W. H. Sawyer, Ford, Bacon & Davis, will be the speakers.

WEDNESDAY AFTERNOON, the Question Box will provide food for a year's thought.

SPEAKING OF FOOD—there's the Banquet Tuesday evening, with President Frank Hedley as toastmaster and Mr. W. L. Conwell, Vice-President and Treasurer, Transportation Utilities Company; Mr. Edward A. Maher, Jr., Assistant General Manager, Third Avenue Railroad Company, and Mr. Howard MacSherry, Attorney, Public Service Corporation of New Jersey, as speakers.

ENTERTAINMENT? Surely—the program says: "There will be, as usual, an excellent entertainment program, with special features for the ladies."

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you will have the first complete report of the convention brought to you in your Electric Railway Journal for you to digest and apply at your leisure.

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75 Persons Narrowly Escape Men
Death When Big Cars in
Meet Head-on.

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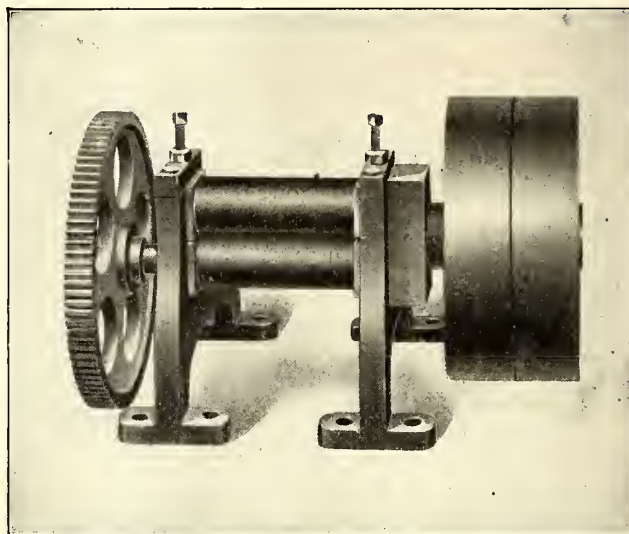
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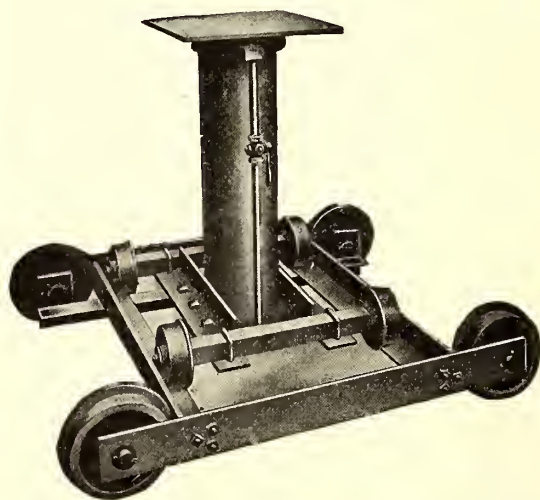
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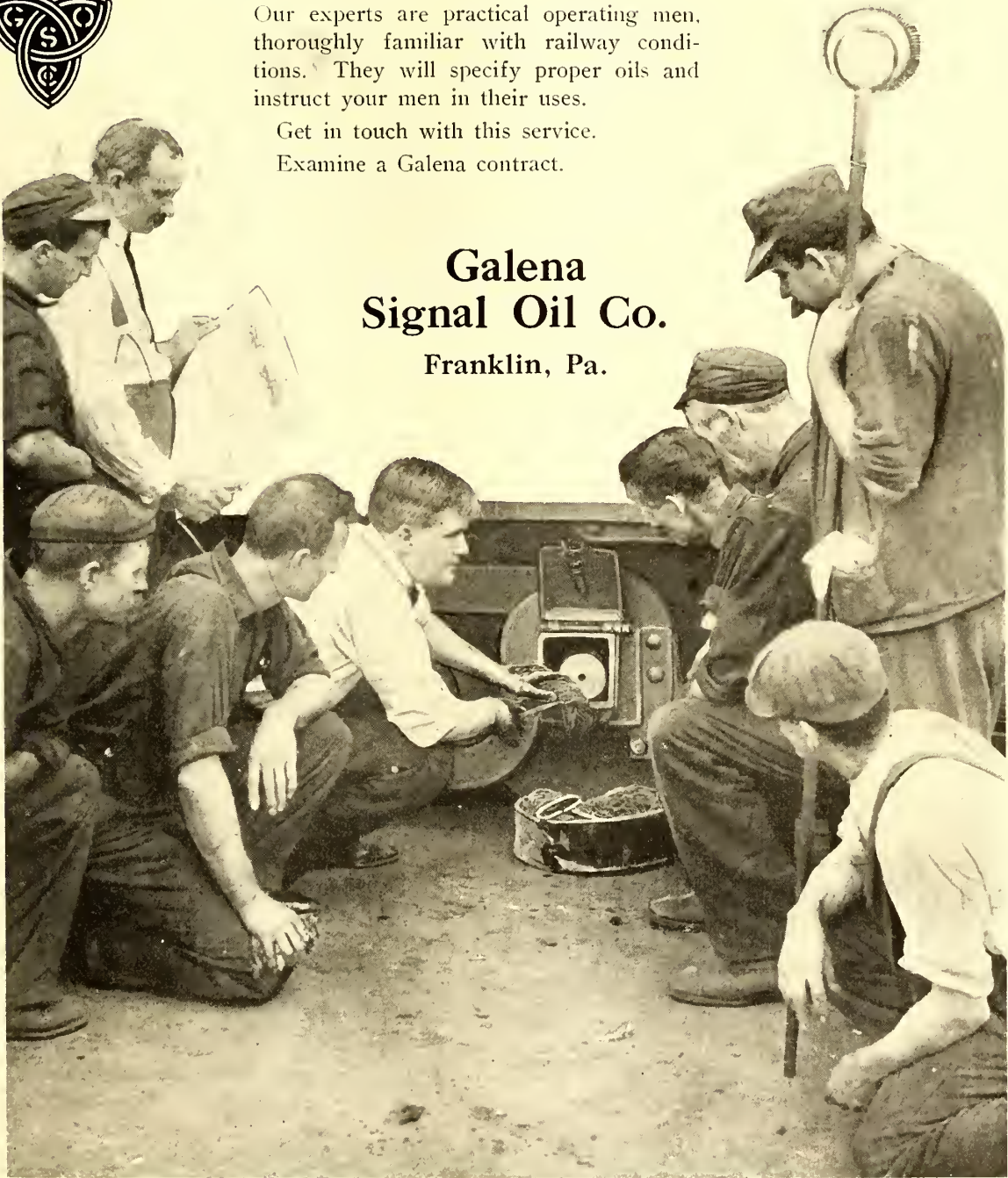
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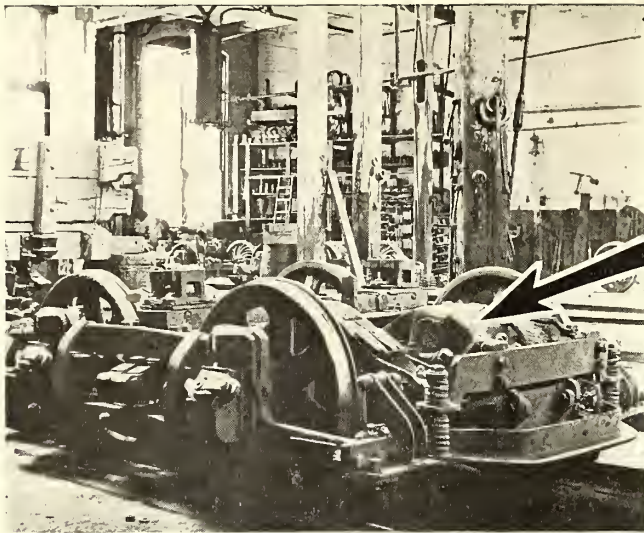
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Insulation broke
down*

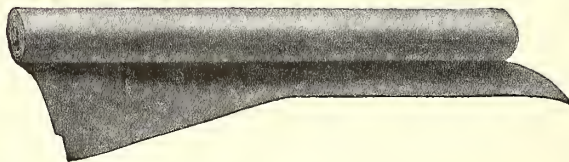
*Add another coil
to this lovely pile
and charge to
"Depreciation"*



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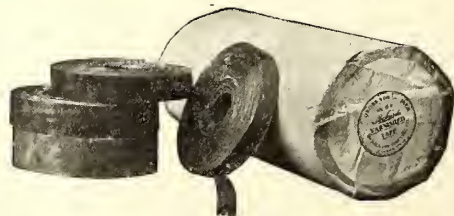
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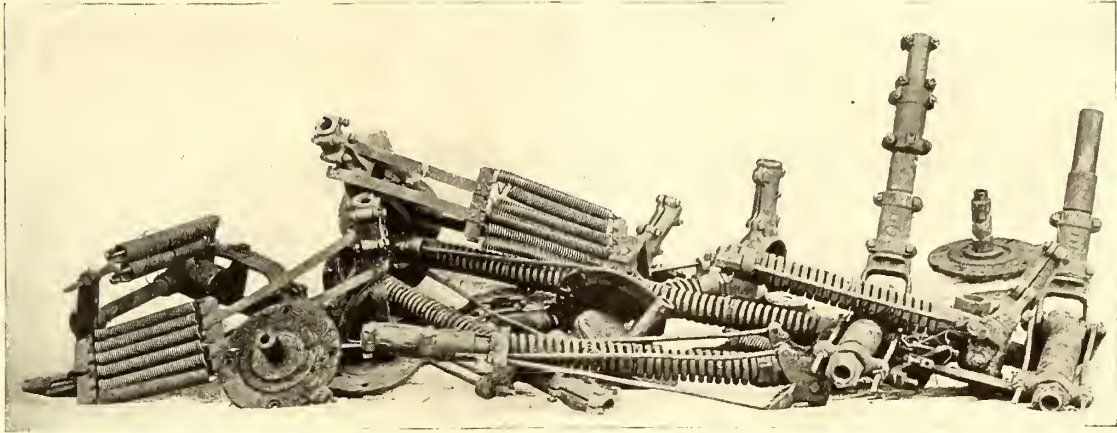
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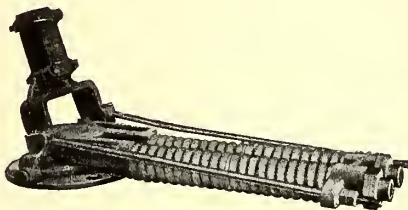


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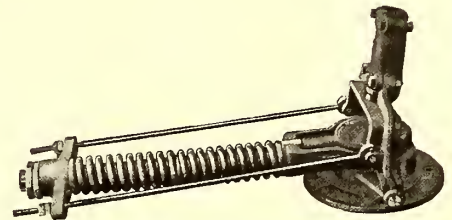
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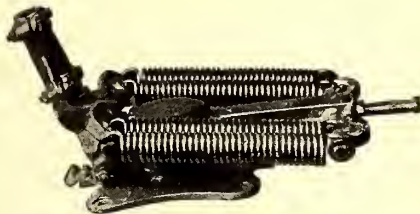
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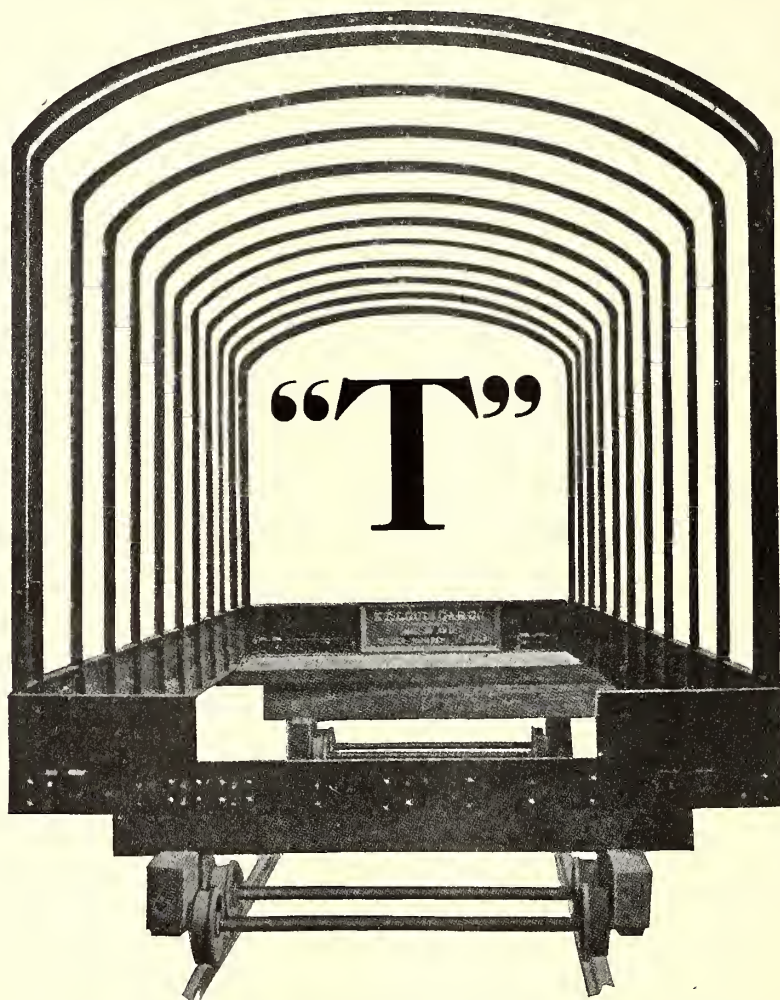


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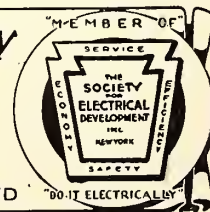


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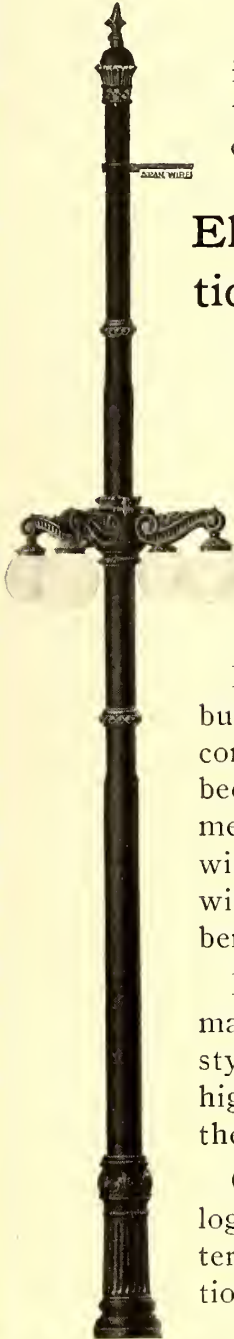
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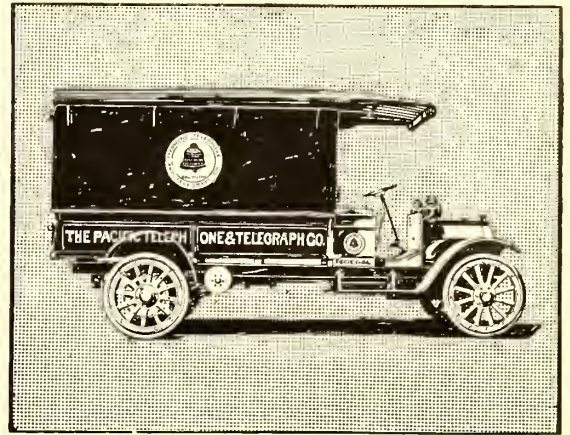
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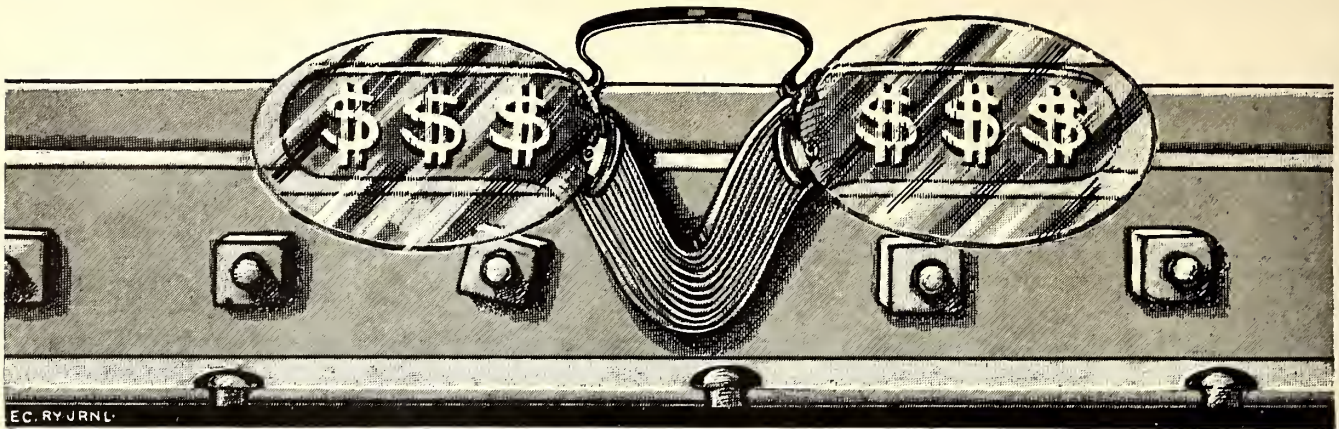
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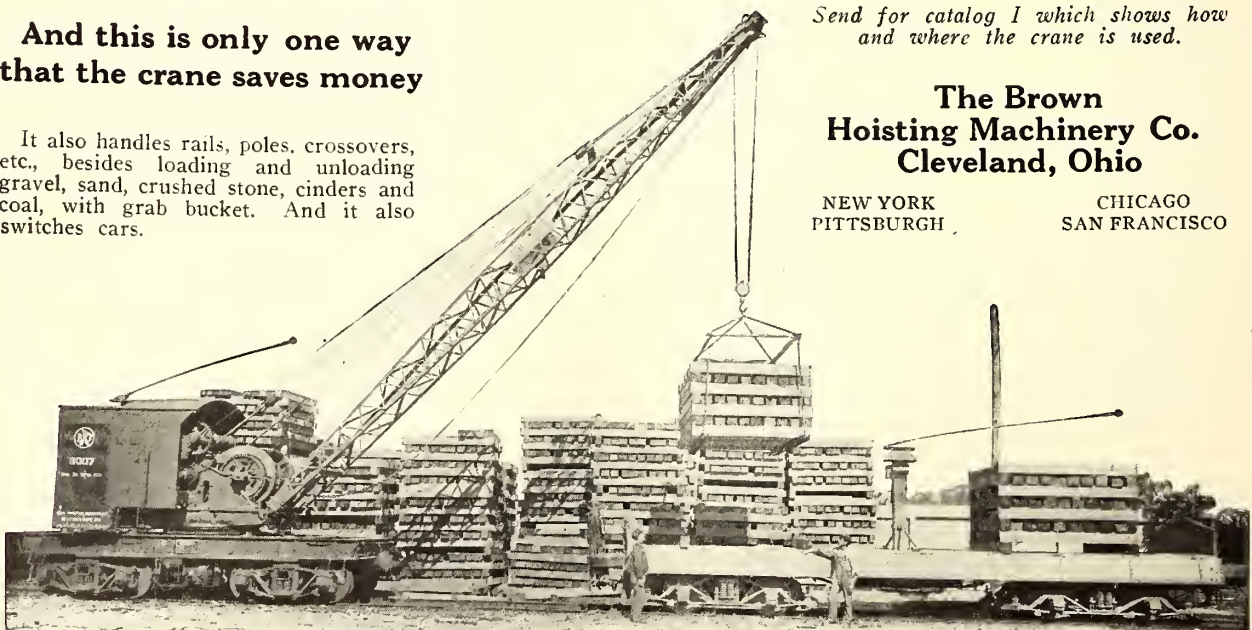
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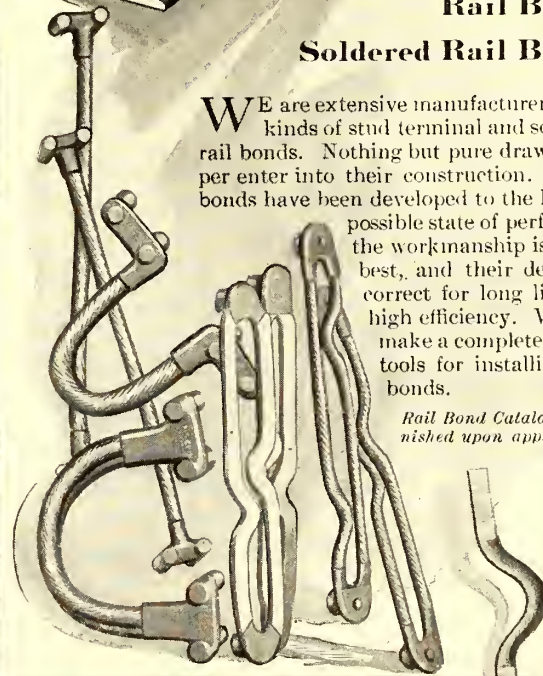
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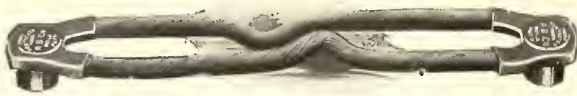


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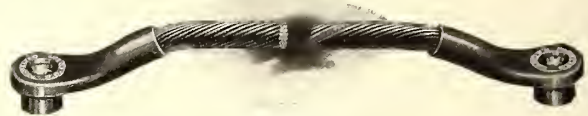
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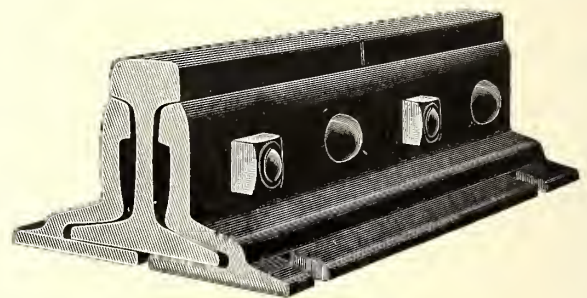
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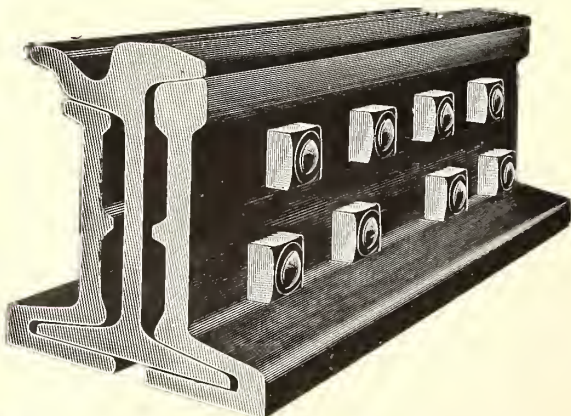
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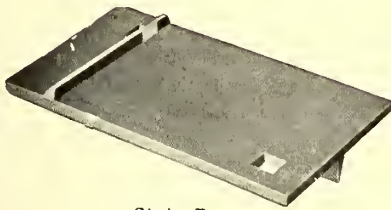
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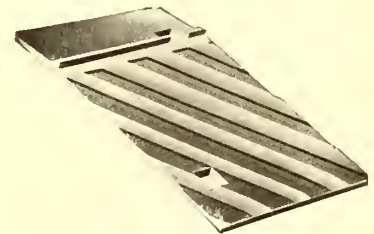
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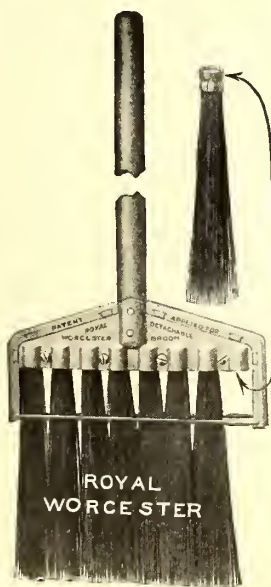
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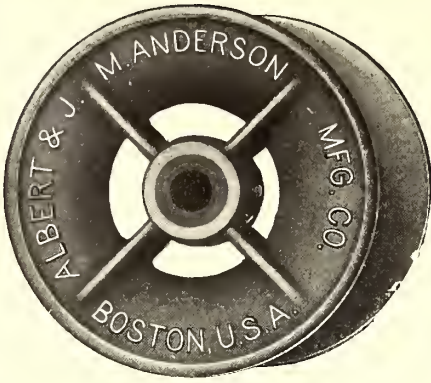
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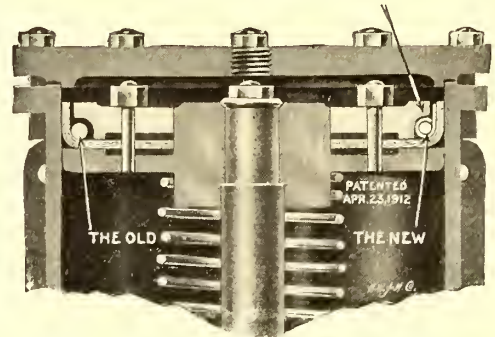
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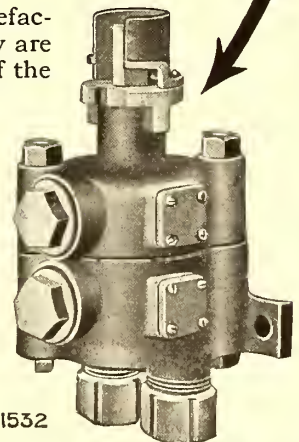
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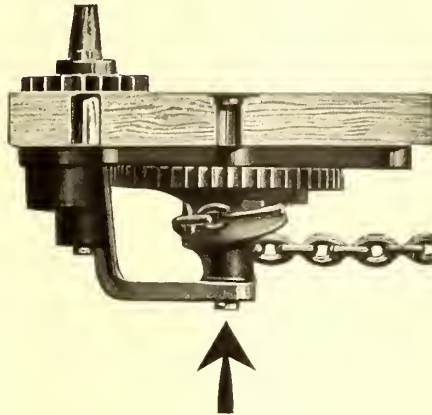
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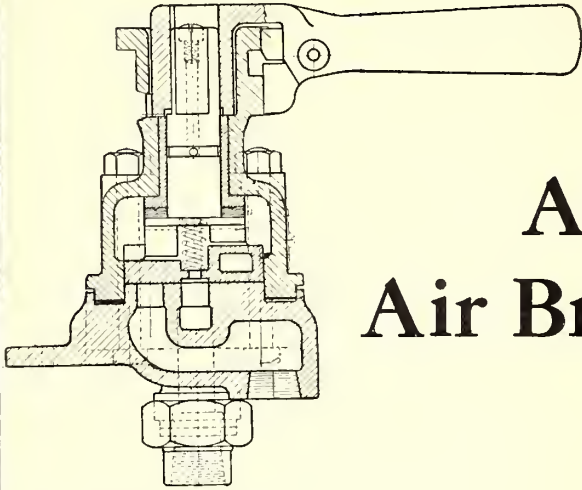
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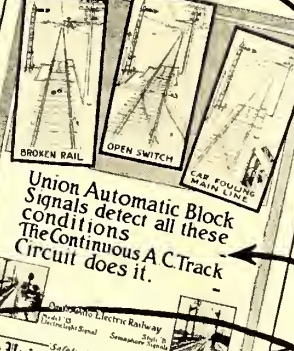
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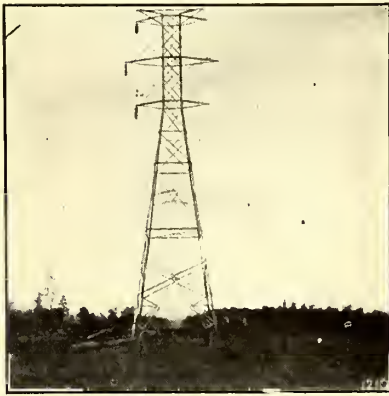
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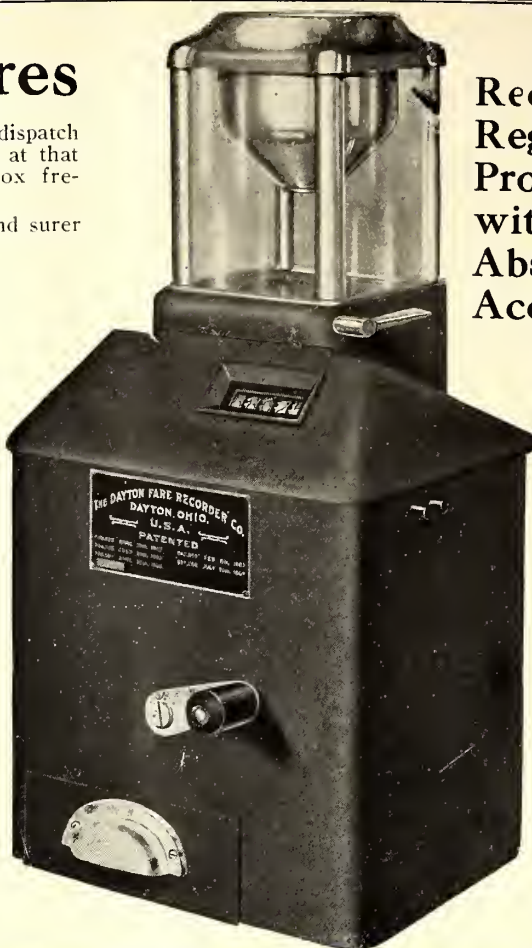
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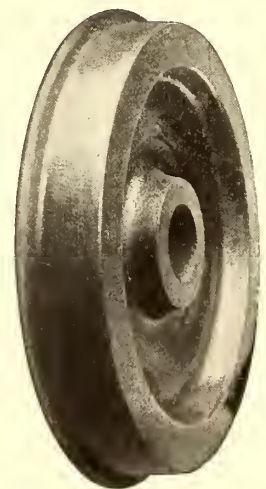
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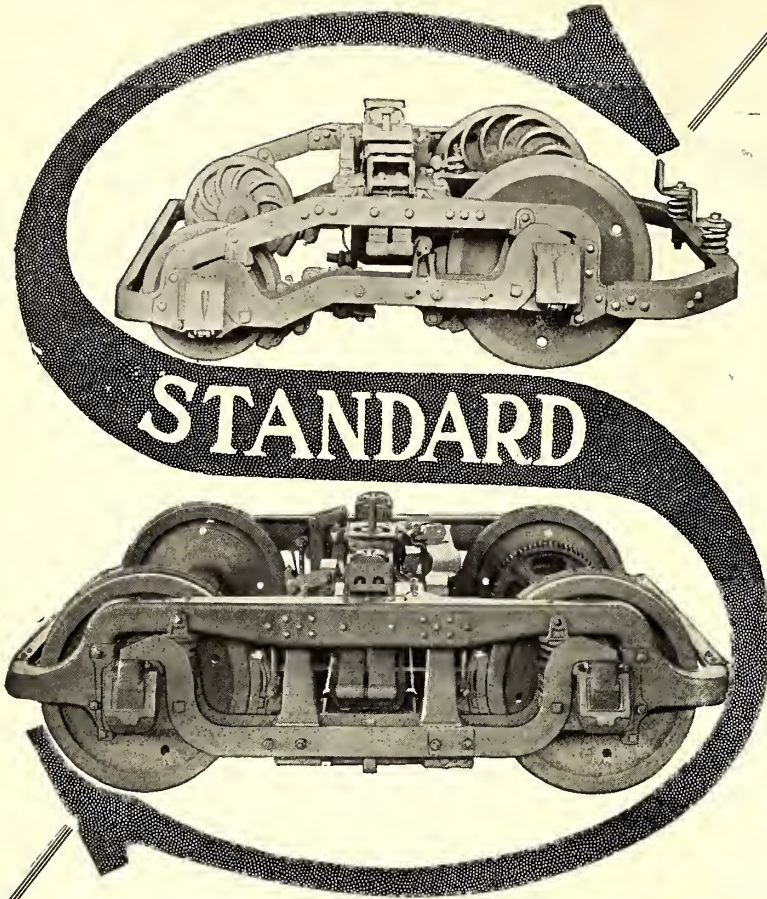


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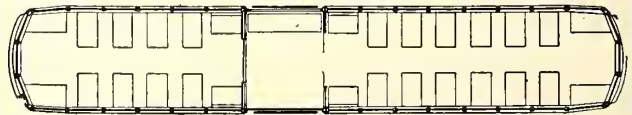
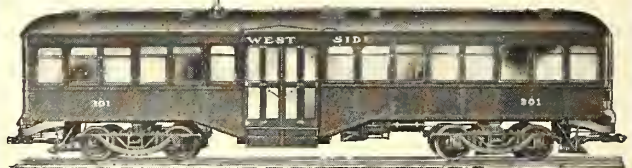
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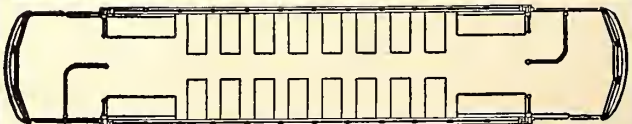
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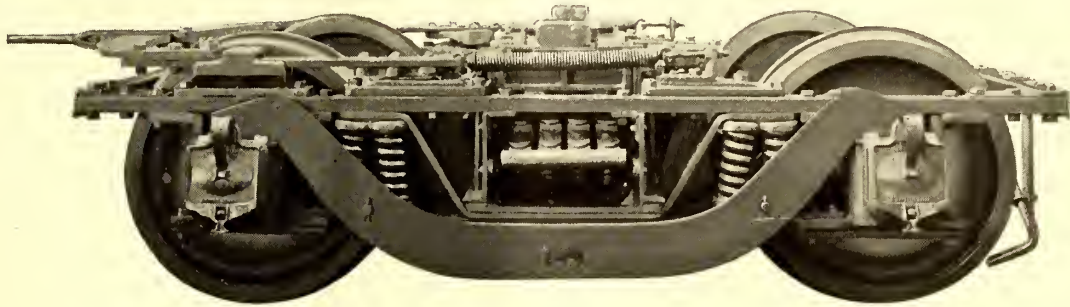
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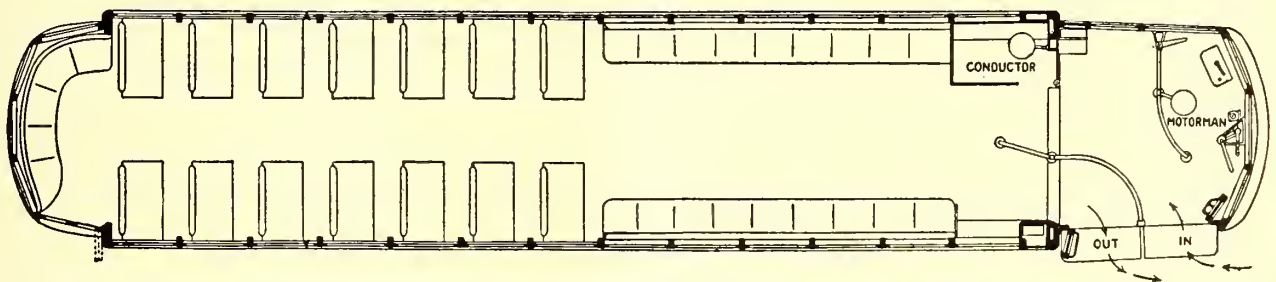
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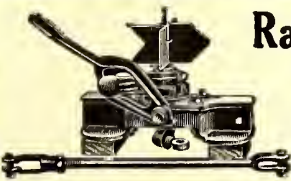
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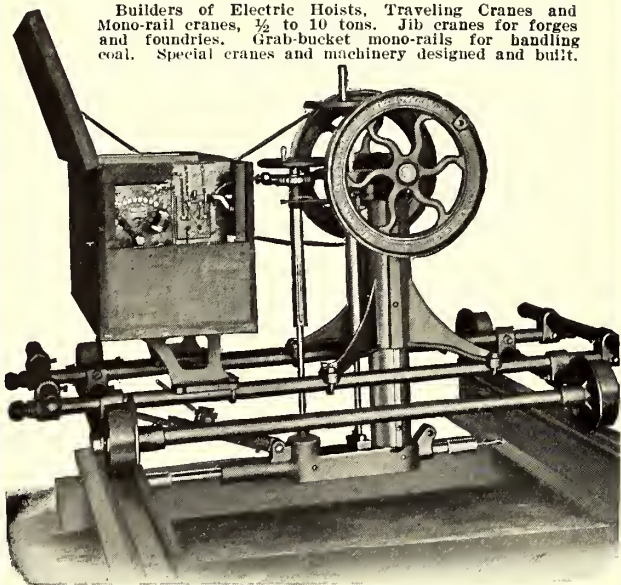
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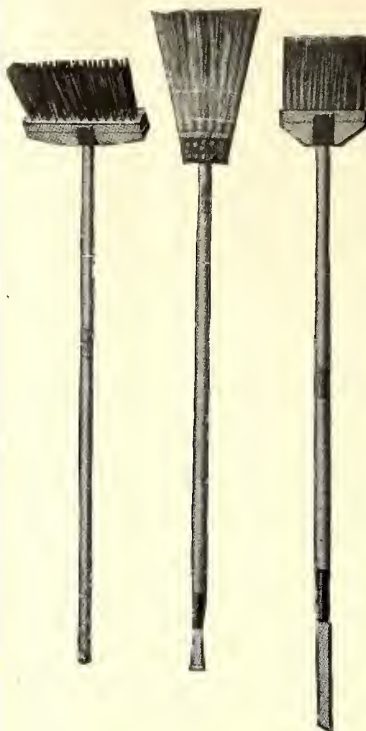
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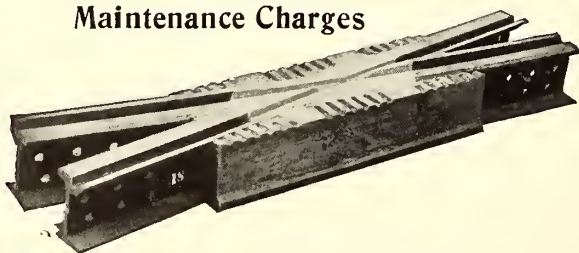
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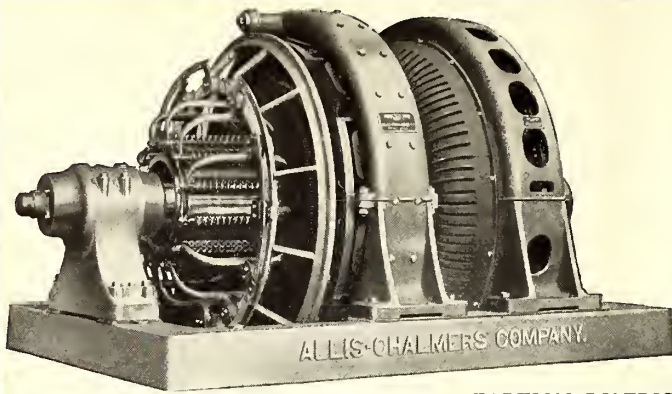
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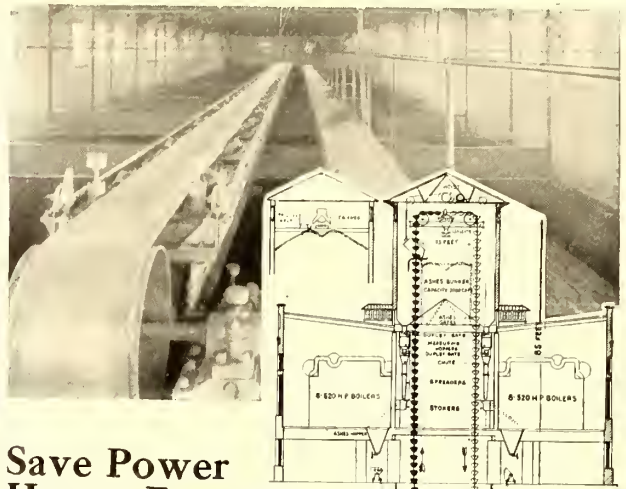
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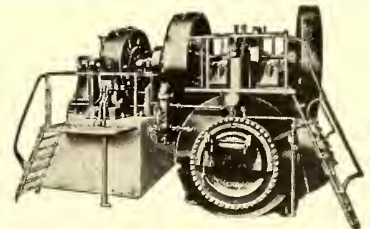
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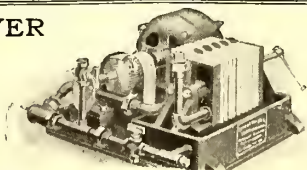
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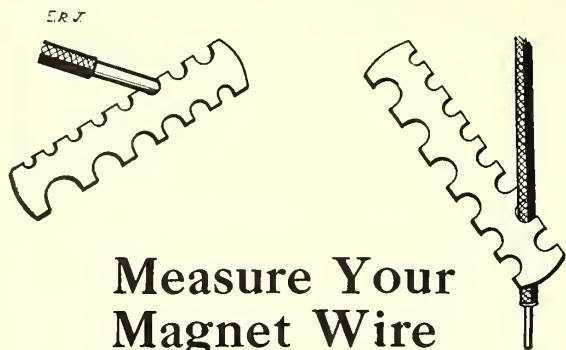


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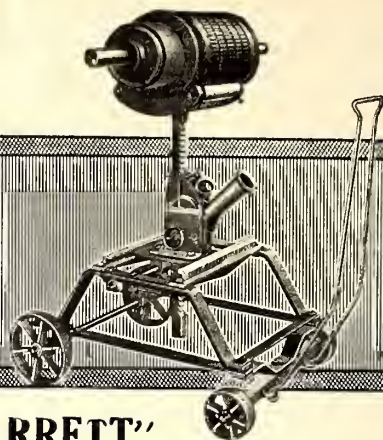
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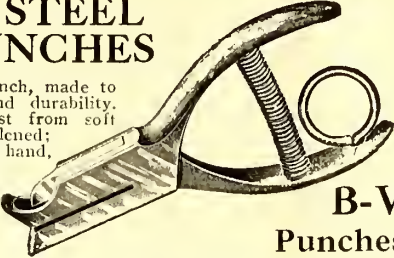
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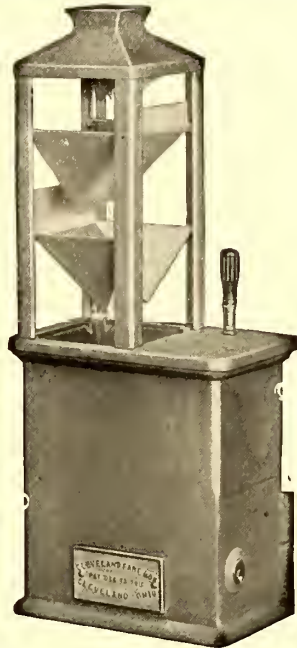
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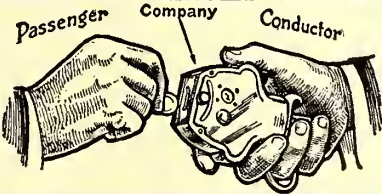
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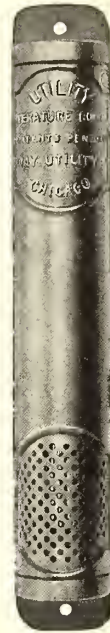
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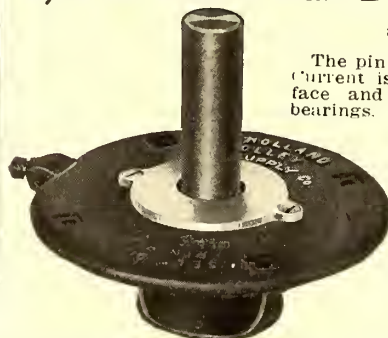
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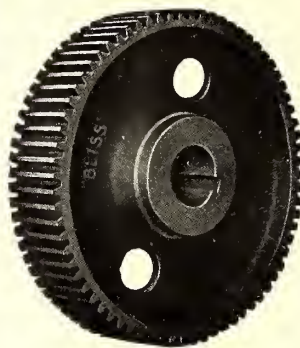


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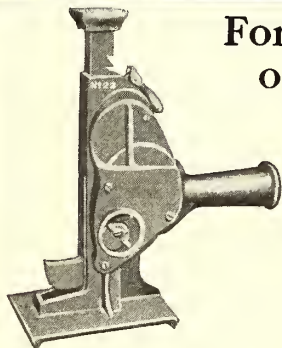
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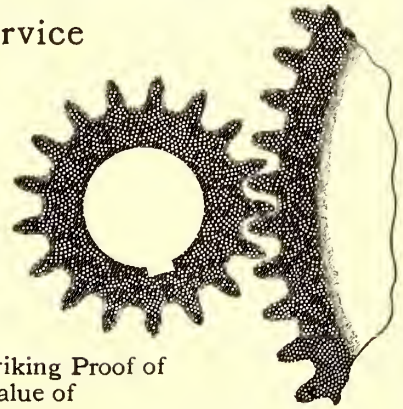
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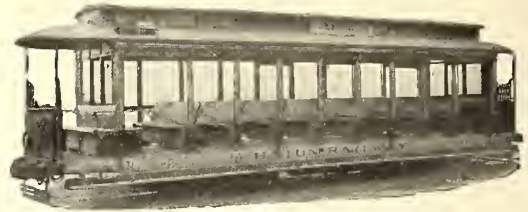
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FOR SALE

Steel Girders and Bridge Material for the West

The following bridge material will be sold in Denver within sixty days. The price will be but a fraction of the cost of new steel and will make the use of this material very economical and advantageous for any work contemplated in or near Colorado.

The following material will be available:

- 1 deck truss, span 108 ft.
- 1 through truss, span 88 ft.
- 24 girders, spans, from 30 to 40 ft.
- 88 girders, spans from 40 to 50 ft.
- 10 girders, spans from 50 to 55 ft.
- Floor beams, columns, etc., etc.

This material is now in use as a double track street railway viaduct, but is to be removed to make way for a larger viaduct.

Write or telegraph to the

DENVER TRAMWAY COMPANY, Denver, Colorado

POSITIONS WANTED

DESIRE POSITION at wiring or foremanship of inspection work. 18 years' experience, familiar with M. U. equipments, street railway equipments, air brake, etc. Good organizer and can handle men; good references. Go anywhere. Married, 39 years of age. Box 526, Elec. Ry. Jour.

EVALUATION of physical properties. Engineer of exceptionally wide experience in handling and adjusting matter incidental to the construction, management and operation of electric railways, is open for engagement and consultation on evaluation and work appertaining thereto. Box 528, Elec. Ry. Jour.

GENERAL superintendent, superintendent of transportation, desires position; 20 years' experience, city and high speed interurban; hustler and economical operator; experience covers all departments; A1 references. Box 507, Elec. Ry. Jour.

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

REAL ESTATE expert. Skilled manager of railway properties is available for engagement and consultation on matters of evaluation, estimating on condemnation proceedings, appraisals, etc. Experience in this work is by few persons in this country. Box 525, Elec. Ry. Jour.

AGENTS AND SALESMEN

Manufacturer's Representative

Seeks new lines. Gentleman of wide experience in the railway field and with extended acquaintance among prominent people desires to represent a few high grade manufacturers. Box 523, 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.

FOR SALE

Bridge For Sale

New single-track girder span sixty feet long. Cooper's E-40 specifications. Rare opportunity for you. Parties ordering bridge failed, hence we offer it at less than cost; also shorter spans. Write at once. Owego Bridge Company, Owego, Tioga Co., N. Y.

Key-Seating Machine for Sale

One Brand New John T. Burr & Company Key-Seating Machine, complete with Westinghouse Type S, 234 H.P., 500 volt, variable speed motor and starting box. W. R. Kerschner, 50 Church St., New York, N. Y.

Box Cars Flats Gondolas

Prompt attention to your requirements. Excellent opportunities to effect savings in purchasing equipment.

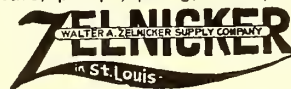
Indiana Car & Equipment Co.

1303 Gt. Northern Bldg., Chicago, Ill.

THE HAND BOOK OF USED MATERIAL

Gives attractive offerings on rails, locos., cars, pumps, piling, tanks, etc.

Write for your Copy



Free on Request

MISCELLANEOUS

R. R. LABORERS

Best of Americans and foreigners for track and construction work; we get the right kind of help supplied free of charge to employers; your patronage solicited. We are also boarding contractors, one man or a train load laborers and tradesmen.

Write, wire or phone.

Diamond Railway & Construction Company

32 West Canal Street, Chicago
 Phone Franklin 3529

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.

- | | | | |
|---|---|--|--|
| Advertising, Street Car.
Collier, Inc., Barron G. | Boiler Graphite.
Dixon Crucible Co., Jos. | General Electric Co.
Jeandron, W. J.
Le Valley Vitae Car. Br. Co.
Morgan Crucible Co.
Nungesser Carbon & Bty. Co.
Western Electric Co.
Westinghouse E. & M. Co. | Ceilings, Car.
Pantasote Co. |
| Alloys and Bearing Metals.
(See Bearings and Bearing Metals.) | Boiler Tubes.
National Tube Co. | Buckets, Grab.
Beaumont Co., R. H. | Chain and Belt Machinery.
Beaumont Co., R. H. |
| Alloys, Steel and Iron.
Titanium Alloy Mfg. Co. | Boilers.
Babcock & Wilcox Co. | Bumpers, Car, Seat.
Elastic Tip Co.
Electric Service Supplies Co.
Imperial Rubber Co.
Massachusetts Chemical Co.
Walpole Tire & Rubber Co. | Circuit Breakers.
Cutter Electrical & Mfg. Co.
Garton Co., W. R.
General Electric Co.
Western Electric Co.
Westinghouse Elec. & M. Co. |
| Anchors, Guy.
Garton Co., W. R.
Johns-Manville Co., H. W.
Western Electric Co.
Westinghouse El. & M. Co. | Bond Testers.
American Steel & Wire Co. | Bunkers, Coal.
American Bridge Co.
Beaumont Co., R. H.
Brown Hoisting Machinery 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.
Hubbard & Co.
Western Electric Co.
Westinghouse Elec. & M. Co. |
| Automobiles and Busses.
Brill Co., The J. G.
Federal Motor Truck Co. | Bonding Tools.
American Steel & Wire Co.
Electric Railway Imp. Co.
Electric Service Supplies Co. | Bushings, Rubber.
Imperial Rubber Co. | Cleaners and Scrapers, Track (See also Snow-Plows Sweepers and Brooms.)
Brill Co., The J. G.
Cincinnati Car Co.
Root Spring Car Co.
Russell Car & Snow-Plow Co.
Van Dorn & Dutton Co. |
| Axle Straighteners.
Columbia M. W. & M. I. Co. | Bonds, Rail.
American Steel & Wire Co.
Electric Railway Imp. Co.
Electric Service Supplies Co.
Garton Co., W. R.
General Electric Co.
Johns-Manville Co., H. W.
Roebbling's Sons Co., John A.
Union Electric Co.
Western Electric Co. | Buttons. (See Badges and Buttons.) | Cleats, Car Wiring.
General Electric Co. |
| Axles.
Bemis Car Truck Co.
Brill Co., The J. S.
Cincinnati Car Co.
National Tube Co.
Niles Car & Mfg. Co.
Railway Steel Spring Co.
St. Louis Car Co.
Standard Motor Truck Co.
Standard Steel Works Co.
U. S. Metal & Mfg. Co.
Westinghouse Elec. & M. Co. | Book Publishers.
McGraw-Hill Book Co., Inc. | Cables. (See Wires and Cables.) | Clusters and Sockets.
General Electric Co. |
| Babbitting Devices.
American General Eng'g Co.
Columbia M. W. & M. I. Co. | Boring Tools, Car Wheel.
Niles-Bement-Pond Co. | Carbon Brushes. (See Brushes, Carbon.) | Coal and Ash Handling. (See Conveying and Hoisting Machinery.) |
| Badges & Buttons.
International Register Co.
Western Electric Co. | Braces, Rail.
Kilby Frog & Switch Co.
Weir Frog Co. | Car Equipment. (For Fenders, Heaters, Registers, Wheels, etc., see those Headings.) | Coil Banding and Winding Machines.
American General Engrg. Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Garton Co., W. R.
Western Electric Co. |
| Bankers and Brokers.
Halsey & Co., N. W. | Brackets and Cross Arms. (See also Poles, Ties, Posts, Piling and Lumber.)
American Bridge Co.
Creaghead Engineering Co.
Electric Service Supplies Co.
Hubbard & Co.
International Cr. & Con. Co.
Lindsley Bros. Co.
Union Electric Co.
Western Electric Co. | Cars, Near-Side.
Near-Side Car Co. | Coils, Armature and Field.
Cleveland Armature Works.
Columbia M. W. & M. I. Co.
D & W Fuse Co.
General Electric Co.
Roebbling's Sons Co., J. A.
Western Electric Co.
Westinghouse El. & M. Co. |
| Batteries, Dry.
Johns-Manville Co., H. W.
Western Electric Co. | Brakes, Brake Systems and Brake Parts.
Allis-Chalmers Mfg. Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Long Co., E. G.
McGuire-Cummings Mfg. Co.
National Brake Co.
National Brake & Elec. Co.
St. Louis Car Co.
U. S. Metal & Mfg. Co.
Westinghouse Air Brake Co. | Cars, Passenger, Freight, Express, etc.
American Car Co.
Brill Co., The J. G.
Cincinnati Car Co.
Jewett Car Co.
Kuhlman Car Co., G. C.
Near-Side Car Co.
Niles Car & Mfg. Co.
Russell Car & Snow-Plow Co.
St. Louis Car Co.
Stephenson Co., John.
Wason Mfg. Co. | Coils, Choke and Kicking.
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co. |
| Batteries, Storage.
Electric Storage Battery Co.
Esterline Co.
Western Electric Co. | Bearing Tools, Car Wheel.
Niles-Bement-Pond Co. | Cars, Self-Propelled.
Electric Storage Battery Co.
General Electric Co. | Coin-Counting Machines.
International Register Co. |
| Bearings and Bearing Metals.
American General Eng'g Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Long Co., E. G.
More-Jones Brass & Metal Co.
St. Louis Car Co.
Westinghouse Elec. & M. Co. | Brazing and Welding Processes.
Electric Railway Imp. Co.
Indianapolis Switch & Frog Co.
Westinghouse Elec. & M. Co. | Castings, Composition or Copper.
Anderson M. Co., A. & J. M. | Commutator Slotters.
American General Eng'g Co.
General Electric Co.
Westinghouse Elec. & M. Co.
Wood Co., Chas. N. |
| Bearings, Roller and Ball.
Hess-Bright Mfg. Co.
Railway Roller Bearing Co. | Bridges and Buildings.
American Bridge Co.
Brown Hoisting Machinery Co. | 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.
Falk Co.
Long Co., E. G.
St. Louis Car Co.
Standard Steel Works Co.
Union Spring & Mfg. Co.
Wharton, Jr., & Co., Wm. | Commutator Truing Devices.
American General Eng'g Co.
General Electric Co. |
| Bells and Gongs.
Brill Co., The J. G.
Electric Service Supplies Co.
National Tube Co.
St. Louis Car Co.
Western Electric Co. | Brooms, Track, Steel or Rattan.
Faxon Co., J. W.
Western Electric Co.
Worcester Brush & Scraper Co.
Zelnicke Supply Co., W. A. | Catchers and Retriever.
Trolley.
Eclipse Railway Supply Co.
Electric Service Supplies Co.
Holland Trolley Supply Co.
Long Co., E. G.
Union Electric Co.
Wasson Eng'g & Supply Co.
Wood Co., C. N. | Commutators or Parts.
American General Engrg. Co.
Cleveland Armature Works.
Columbia M. W. & M. I. Co.
Garton Co., W. R.
General Electric Co.
Long Co., E. G.
Western Electric Co.
Westinghouse Elec. & M. Co. |
| Benders, Rail.
Niles-Bement-Pond Co.
Wharton, Jr., & Co., Wm.
Zelnicke Supply Co., W. A. | Brushes, Carbon.
Dixon Crucible Co., Jos.
Drew Elec. & Mfg. Co. | Compressors, Air.
Allis-Chalmers Mfg. Co.
Curtis & Co. Mfg. Co.
General Electric Co.
National Brake & Elec. Co.
Westinghouse Trac. Br. Co. | |



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



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



MODEL 280, Triple Range Portable Volt-Ammeter.
(One-quarter Size.)



MODEL 268, Switch-board Volt-Ammeter. Reads Amperes, Press Button for Volts.
(One-quarter Size.)

WESTON

Miniature Precision Instruments for Direct Current

A new group of very small Indicating Instruments
COMPACT—ACCURATE—DURABLE—BEAUTIFUL

PORTABLE

Voltmeters, Millivoltmeters, Volt-Ammeters, Ammeters, Mil-Ammeters are supplied in single, double and triple ranges. **The Triple range Volt-Ammeter comprising six instruments in one.**

This group also includes **BATTERY TESTERS.**

SWITCHBOARD

Voltmeters Volt-Ammeters Ammeters Mil-Ammeters

This new line of instruments represents the latest development of the pivoted moving coil, permanent magnet type for low ranges. The refinement of design and mechanical work in them has been carried to a degree which would appear to be almost impossible of accomplishment, if the results were not evident in the instruments themselves.

They embody characteristics which have made the well known Weston Standards famous throughout the world.

They are accurate, dead beat and extremely sensitive.

They may be left continuously in circuit at full load without injury and are shielded against the external electrical and magnetic influences of other apparatus in their vicinity.

They are substantially constructed and may be safely sent long distances through the mails and will withstand an extraordinary amount of vibration without injury.

They have the longest scale ever provided in instruments with equal length of pointer.

Each model has been thoroughly tested under the most severe conditions of service and in experiments extending over more than one year.

The portable instruments may be conveniently carried in the coat pocket.

The prices have been established upon so low a scale that any one may possess one or more of these remarkable instruments at moderate cost.

If you cannot obtain the instrument desired from your dealer, write us.

The several models and ranges offer a selection from over 300 different combinations, listed in Bulletin No. 8. Will be mailed upon request.

WESTON ELECTRICAL INSTRUMENT COMPANY

Mr. Stanley Brown, 114 Liberty St., New York City.

Badt-Westburg Elec. Co., 832 Monadnock Block, Chicago, Ill.

Mr. F. E. Gilbert, 303-4 Hale Bldg., 1326 Chestnut St., Philadelphia, Pa.

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Mr. Frank E. Smith, 682 Mission St., San Francisco, Cal.

Mr. S. C. Dinsmore, 1933 Dime Bank Bldg., Detroit, Mich.

Mr. Walter P. Ambos Co., 1729

East 12th St., Cleveland, Ohio.

A. H. Winter Joyner, Ltd, No 76 Bay St, Toronto, Canada.

Weston Instrument Co., Ltd., Geneststrasse 5, Schoenberg, Berlin, Germany.

Mr. D. R. Petest, 415 Fourth Nat'l Bank Bldg., Atlanta, Ga.

Mr. Edwin Wortham, Suite 28.

Main Office and Works:

NEWARK, N. J.

Allison Building, 8th St. and Main St., Richmond, Va.

Northern Elec. & Mfg. Co., Ltd., 814 Notre Dame St. West, Montreal, Canada.

Weston Electrical Instrument Co., Audrey House, Ely Place, Holborn, London, E. C.

The Link Between Better Motor Commutation and Maximum Brush Economy



Battersea Brushes

The economy of a carbon brush does not depend alone on mere brush life. A brush may be enduring yet inefficient. Your brushes affect the economy of motor operation and maintenance accordingly as they promote or injure correct commutation.

In Battersea Brushes you find the means of promoting commutation efficiency and at the same time insuring yourself maximum brush economy. Because we guarantee the number of car miles you get from every Battersea brush you use. Write for details now.

The Morgan Crucible Co., L't'd.

114 Liberty Street, New York City.

LEWIS-ROTH CO., 312 Denckla Building, Philadelphia

READY-REFERENCE INDEX

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

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Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Machine Co.
- Conduits, Underground.**
Johns-Manville Co., H. W.
Western Electric Co.
- Controller Regulators.**
Electric Service Supplies Co.
- Controllers or Parts.**
Allis-Chalmers Mfg. Co.
American General Engrg. Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
General Electric Co.
Johns-Manville Co., H. W.
Kerschner, W. R.
Westinghouse Elec. & M. Co.
- Controlling Systems.**
General Electric Co.
Westinghouse Elec. & M. Co.
- Converters, Rotary.**
Allis-Chalmers Mfg. Co.
General Electric Co.
Western Elec. Co.
Westinghouse Elec. & M. Co.
- Conveying and Hoisting Machinery.**
Beaumont Co., R. H.
Brown Hoisting Machinery Co.
Green Eng'g Co.
Northern Engineering Wks.
- Cord, Bell, Trolley, Register, Etc.**
Brill Co., The J. G.
Electric Service Supplies Co.
Garton Co., W. R.
Imperial Rubber Co.
International Reg. Co.
Long Co., E. G.
Roebing's Sons Co., John A.
Samson Cordage Works.
- Cord Connectors and Couplers.**
Electric Service Supplies Co.
Samson Cordage Works.
Wood Co., Chas. N.
- Couplers, Car.**
Brill Co., The J. G.
Cincinnati Car Co.
Long Co., E. G.
Putnam, Geo. H.
Westinghouse Air Brake Co.
- Cranes. (See also Hoists.)**
Allis-Chalmers Mfg. Co.
Beaumont Co., R. H.
Brown Hoisting Machinery Co.
Johnston & Jennings Co.
Niles-Bement-Pond Co.
Northern Engineering Works.
- Creosoting. (See Wood Preservatives.)**
- Cross Arms. (See Brackets.)**
- Crossing Signals. (See Signals, Crossing.)**
- Crossings, Track. (See Track, Special Work.)**
- Culverts.**
Arnett Co., Lee.
Atlas Metal Works.
Bark River B. & Culvert Co.
California Corr. Culvert Co.
Canton Culvert 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.
Kentucky Culvert Mfg. Co.
Lone Star Culvert Co.
Lyle Corrugated Culvert Co.
Michigan Bridge & Pipe Co.
Montana Culvert Co.
Nebraska Culvert Co.
Nevada Metal Mfg. Co.
North East Metal Cul. Co.
Northwest Sheet & I. Wks.
Ohio Corrugated Culvert Co.
Oklahoma Corr. Culvert Co.
Pennsylvania Metal Cul. Co.
Princeton Sheet Metal Wks.
Road Supply & Metal Co.
Sioux Falls Culvert Co.
Spencer, J. N.
Spokane Cor. Cul. & Tank Co.
- Tennessee Metal Culvert Co.**
Utah Culvert Co.
Virginia Metal & Culvert Co.
Western Metal Mfg. Co.
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Electric Service Supplies Co.
Pantasote Co., The.
St. Louis Car Co.
- Cushions, Field Coil.**
Massachusetts Chemical Co.
Walpole Tire & Rubber Co.
- Derailing Devices.**
Cleveland Frog & Crossing Co.
U. S. Metal & Mfg. Co.
Wharton, Jr., & Co., Wm.
- Despatching Systems.**
Western Electric Co.
- Detective Service.**
Wisch Service, P. Edward.
- Door Operating Devices.**
Electric Service Supplies Co.
Prepayment Car Sales 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.
Prepayment Car Sales Co.
- Doors, Steel Rolling.**
Kinnear Mfg. Co.
- Draft Rigging. (See Couplers, Car.)**
- Drills, Track.**
American Steel & Wire Co.
Electric Service Supplies Co.
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Long Co., E. G.
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- Dryers, Sand.**
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Jackson, D. C. & Wm. B.
McHenry & Murray.
Richey, Albert S.
Roosevelt & Thompson.
Sanderson & Porter.
Schott Co., W. H.
Scofield Engineering Co.
Stone & Webster Eng. Corp.
White Companies, J. G.
Woodmansee & Davidson, Inc.
- Engines, Gas and Oil.**
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Buckeye Engine Co.
Westinghouse Machine Co.
- Engines, Steam.**
Allis-Chalmers Mfg. Co.
Buckeye Engine Co.
Westinghouse Machine Co.
- Fare Boxes.**
American General Engrg. Co.
Brill Co., The J. G.
Cleveland Fare Box Co.
Dayton Fare Recorder Co.
International Register Co.
- Fences, Woven Wire and Fence Posts.**
American Steel & Wire Co.
- Fencing Wire.**
American Steel & Wire Co.
- Fenders and Wheel Guards.**
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Cincinnati Car Co.
Consolidated Car Fender Co.
Eclipse Railway Supply Co.
Electric Service Supplies Co.
- Fonger Fender Co.**
Parmenter F. & W. G. Co.
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Root Spring Scraper Co.
Star Brass Works.
Western Electric Co.
- Fibre.**
American Vul. Fibre Co.
Continental Fibre Co.
Diamond State Fibre Co.
Westinghouse E. & M. Co.
- Fibre Tubing.**
Continental Fibre Co.
Westinghouse Elec. & M. Co.
- Field Coils. (See Coils.)**
- Fire Extinguishing Apparatus.**
Imperial Rubber Co.
Johns-Manville Co., H. W.
Pyrene Mfg. Co.
- Fire-proofing Material.**
Johns-Manville Co., H. W.
- Flangers.**
Russell Car & Snow-Plow Co.
- Flooring, Composition.**
American Mason Safety T. Co.
Western Electric Co.
- Forgings.**
American Bridge Co.
Bliss Co., E. W.
Standard Motor Truck Co.
Standard Steel Works Co.
- Forging & Punching Machinery.**
Bliss Co., E. W.
- 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.
Western Electric Co.
Westinghouse Elec. & M. Co.
- Fuses, Refillable.**
Columbia M. W. & M. I. Co.
Monarch Refillable Fuse Co.
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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.
Standard Steel Wks. Co.
- Gear Cases.**
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Kerschner, W. R.
Westinghouse Elec. & M. Co.
- Gears and Pinions.**
American General Engrg. Co.
Amer. Vulcanized Fibre Co.
Bemis Car Truck Co.
Bliss Co., E. W.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Garton Co., W. R.
General Electric Co.
Kerschner, W. R.
Long Co., E. G.
Nuttall Co., R. D.
Van Dorn & Dutton Co.
- Generators, Alt.-Current.**
Allis-Chalmers Mfg. Co.
General Electric Co.
National Brake & Elec. Co.
Western Electric Co.
Westinghouse Elec. & M. Co.
- Generators, Dir.-Current.**
Allis-Chalmers Mfg. Co.
General Electric Co.
National Brake & Elec. Co.
Western Electric Co.
Westinghouse Elec. & M. Co.
- Gongs. (See Bells and Gongs.)**
- Graphite.**
Dixon Crucible Co., Jos.
Morgan Crucible Co.
- Grates, Chain.**
Green Eng. Co.
- Greases. (See Lubricants.)**
- Grinders and Grinding Wheels.**
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Western Electric Co.
- Guards, Cattle.**
American Bridge Co.
- Guards, Trolley.**
Electric Service Supplies Co.
- Harps, Trolley.**
American General Engrg. Co.
Anderson M. Co., A. & J. M.
Electric Service Supplies Co.
Garton Co., W. R.
Holland Trolley Supply Co.
More-Jones Brass & Metal Co.
Nuttall Co., R. D.
Star Brass Works.
Western Electric Co.
- Headlights.**
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Esterline Co.
Garton Co., W. R.
General Electric Co.
Long Co., E. G.
St. Louis Car Co.
Union Electric Co.
Western Electric Co.
Westinghouse Elec. & M. Co.
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Pantasote Co.
U. S. Metal & Mfg. Co.
- Heaters, Car, Electric.**
Gold Car Htg. & Ltg. Co.
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.**
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Niles-Bement-Pond Co.
Northern Engineering Works.
Van Dorn & Dutton Co.
- Hose, Pneumatic and Fire.**
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Nichols-Lintern Co.
- Hydraulic Machinery.**
Allis-Chalmers Mfg. Co.
Niles-Bement-Pond Co.
- Impregnating Apparatus. (See Vacuum Drying Apparatus.)**
- Inspection.**
Hunt & Co., Robert W.
- Instruments, Measuring, Testing and Recording.**
Esterline Co.
General Electric Co.
Johns-Manville Co., H. W.
Western 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.
Garton Co., W. R.
General Electric Co.
Imperial Rubber Co.
Johns-Manville Co., H. W.
Massachusetts Chemical Co.
Packard Electric Co.
Sherwin-Williams Co.
Walpole Tire & Rubber Co.
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WALPOLE, MASS.
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There is a Sterling product best for every insulating purpose.

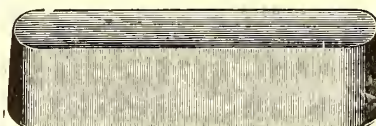


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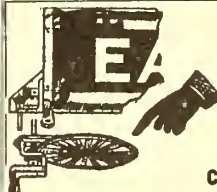


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By means of it, conductor or motorman can change sign without leaving platform. All that has to be done is to turn the crank. Better investigate.

CREAGHEAD ENGINEERING CO., CINCINNATI, O.

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.
Electric Service Supplies Co.
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Garton Co., W. R.
General Electric Co.
Johns-Manville Co., H. W.
Massachusetts Chemical Co.
Sherwin-Williams Co.
Sterling Varnish Co.
Union Electric Co.
Walpole Tire & Rubber Co.
Western Electric Co.
Westinghouse Elec. & M. Co.
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Creaghead Engineering Co.
Drew Electric & Mfg. Co.
Electric Service Supplies Co.
Garton Co., W. R.
General Electric Co.
Johns-Manville Co., H. W.
Ohio Brass Co.
Western Electric Co.
Westinghouse Elec. & M. Co.
- Insulator Pins.**
Hubbard & 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.
Western Electric Co.
- Joints, Rail.**
Carnegie Steel Co.
Elyria Iron & Steel Co.
Falk Co.
Rail Joint Co.
Zelnicker Supply Co., W. A.
- Journal Boxes.**
Bemis Car Truck Co.
Brill Co., The J. G.
Hess-Bright Mfg. Co.
Long Co., E. G.
Railway Roller Bearing Co.
- Lamp Guards and Fixtures.**
Anderson M. Co., A. & J. M.
Creaghead Engineering Co.
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.
- Lamps, Arc and Incandescent.**
Anderson Mfg. Co., A. & J. M.
Esterline Co.
General Electric Co.
Western Electric Co.
Westinghouse Elec. & M. Co.
Westinghouse Lamp Co.
- Lamps, Signal and Marker.**
Nichols-Lintern Co.
- Lathes, Car Wheel.**
Niles-Bement-Pond Co.
- Lifters, Car Step.**
Consolidated Car Fender Co.
- Lightning Protection.**
Anderson M. Co., A. & J. M.
Electric Service Supplies Co.
Garton Co., W. R.
General Electric Co.
Union Electric Co.
Western Electric Co.
Westinghouse Elec. & M. Co.
- Line Material.** (See also Brackets, Insulators, Wires, etc.)
American General Eng'g Co.
Amer. Vulcanized Fibre Co.
Anderson M. Co., A. & J. M.
Archbold-Brady Co.
Creaghead Eng'g Co.
Drew Electric & Mfg. Co.
Electric Service Supplies Co.
Garton Co., W. R.
- General Electric Co.**
Hubbard & Co.
Johns-Manville Co., H. W.
Union Electric Co.
Western Electric Co.
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.
Russell Car & Snow-Plow Co.
Westinghouse Elec. & M. Co.
- Lubricating Engineers.**
Galena Signal Oil Co.
- Lubricants, Oil and Grease.**
Dearborn Chemical Co.
Dixon Crucible Co., Jos.
Galena Signal Oil Co.
Universal Lubricating Co.
Whitmore Mfg. Co.
- Lumber.** (See Poles, Ties, Posts, etc.)
- Machine Tools.**
Niles-Bement-Pond Co.
- Mats.**
Imperial Rubber Co.
Massachusetts Chemical Co.
Walpole Tire & Rubber Co.
- Meters.** (See Instruments.)
- Mica.**
Electric Service Co.
Long Co., E. G.
- Mirrors for Motormen.**
Drew Electric & Mfg. Co.
- Monorail Systems.**
Johnston & Jennings Co.
- Motormen's Seats.**
Electric Service Supplies Co.
Wood Co., Chas. N.
- Motors, Electric.**
Allis-Chalmers Mfg. Co.
General Electric Co.
Western Electric Co.
Westinghouse Elec. & M. Co.
- Nuts & Bolts.**
Allis-Chalmers Mfg. Co.
American Lock Nut Co.
Barbour-Stockwell Co.
Hubbard & Co.
Long Co., E. G.
Standard Motor Truck Co.
U. S. Metal & Mfg. Co.
- Oils.** (See Lubricants.)
- Oils, Paint.**
Sterling Varnish Co.
- Ovens, Drying, Baking, etc.**
Oven Equipment & Mfg. Co.
- Overhead Equipment.** (See Line Material.)
- Ozonators.**
General Electric Co.
Westinghouse Elec. & M. Co.
- Packing.**
Electric Service Supplies Co.
Garton Co., W. R.
Imperial Rubber Co.
Johns-Manville Co., H. W.
Power Specialty Co.
- Paints and Varnishes.** (Insulating.)
General Electric Co.
Imperial Rubber Co.
Long Co., E. G.
Massachusetts Chemical Co.
Packard Electric Co.
Sherwin-Williams Co.
Sterling Varnish Co.
Union Electric Co.
Walpole Tire & Rubber Co.
- Paints and Varnishes.** (Preservative.)
Dixon Crucible Co., Jos.
Long Co., E. G.
Massachusetts Chemical Co.
Sherwin-Williams Co.
Sterling Varnish Co.
Walpole Tire & Rubber Co.
- Paints and Varnishes for Wood-work.**
Massachusetts Chemical Co.
Sherwin-Williams Co.
Walpole Tire & Rubber Co.
- Paving Material.**
American B. S. & Fdy. Co.
Barrett Mfg. Co.
International Creo. & Con. 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, Reinforcing.**
Hubbard & Co.
- Pole Sleeves.**
Drew Electric & Mfg. Co.
- Poles, Metal Street.**
American Bridge Co.
Creaghead Engineering Co.
Garton Co., W. R.
Hubbard & Co.
National Tube Co.
U. S. Metal & Mfg. Co.
- Poles, Ties, Posts, Piling and Lumber.**
Garton Co., W. R.
International Creo. & Con. Co.
Lindsley Bros. Co.
Naugle Pole & Tie Co.
Page & Hill Co.
Western Electric Co.
- Poles and Ties, Treated.**
International Creo. & Con. Co.
Lindsley Bros. Co.
Page & Hill Co.
Western Electric Co.
- Poles, Trolley.**
Anderson M. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Garton Co., W. R.
Long Co., E. G.
National Tube Co.
Nuttall Co., R. D.
- Preservatives.** (See Wood Preservatives.)
- Pressure Regulators.**
General Electric Co.
- Pumps.**
Allis-Chalmers Mfg. Co.
- Punches, Ticket.**
Bonney-Vehslage Tool Co.
International Register Co.
Wood Co., C. N.
- Purifiers and Dryers, Oil.**
Hunt, Edw. J.
- Rail Grinders.** (See Grinders.)
- Rail Welding.** (See Brazing & Welding Processes.)
- Rails, Relaying.**
Zelnicker Supply Co., W. A.
- Rattan.**
Brill Co., The J. G.
Electric Service Supplies Co.
Hale & Kilburn Co.
Jewett Car Co.
Russell Car & Snow-Plow Co.
St. Louis Car Co.
- Registers and Fittings.**
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Cincinnati Car Co.
Dayton Fare Recorder Co.
Drew Electric & M. Co.
Electric Service Supplies Co.
International Register Co.
Long Co., E. G.
Rooke Automatic Register Co.
Union Electric 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. & M. Co.
- Replacers, Car.**
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
U. S. Metal & Mfg. Co.
- Resistance, Wire and Tube.**
General Electric Co.
Western Electric Co.
Westinghouse Elec. & M. Co.
- Retrievers, Trolley.** (See Catchers and Retrievers, Trolley.)
- Rheostats.**
General Electric Co.
- Roofing, Building.**
Johns-Manville Co., H. W.
- Roofing, Car.**
Pantasote Co.
- Rubber Specialties.**
Imperial Rubber Co.
Massachusetts Chemical Co.
Walpole Tire & Rubber Co.
- Sand Blasts.**
Curtis & Co. Mfg. Co.
- Sanders, Track.**
Brill Co., The J. G.
Electric Service Supplies Co.
Holland Trolley Supply Co.
Jewett Car Co.
Nichols-Lintern Co.
St. Louis Car Co.
- Sash Fixtures, Car.**
Brill Co., The J. G.
- Sash, Metal, Car Window.**
Hale & Kilburn Co.
- Sash Operating Apparatus.**
Lord & Burnham Co.
- Seats, Car.**
Brill Co., The J. G.
Hale & Kilburn Co.
Jewett Car Co.
St. Louis Car Co.
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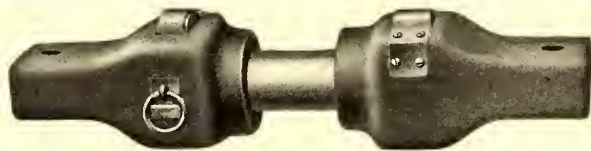
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READY-REFERENCE INDEX

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

- Second-Hand Equipment.**
(See Pages 56, 57.)
- Shade Rollers.**
Hartshorn Co., Stewart.
- Shades, Vestibule.**
Brill Co., The J. G.
Electric Service Supplies Co.
- Shovels.**
Hubbard & Co.
- Shovels, Power.**
Allis-Chalmers Mfg. Co.
- Signals, Highway Crossing.**
Electric Service Supplies Co.
Protective Signal & Mfg. Co.
Street Railway-Signal Co.
U. S. Electric Signal Co.
- Signal Systems, Block.**
Federal Signal Co.
Street Railway-Signal Co.
Union Switch & Signal Co.
U. S. Electric Signal Co.
Western Electric Co.
Wood Co., Chas. N.
- Signs, Car and Track.**
Columbia M. W. & M. I. Co.
Creaghead Engineering Co.
Electric Service Supplies Co.
Western Electric Co.
- Skylights.**
National Ventilating Co.
- Slack Adjusters.** (See Brake Adjusters.)
- Sleet Wheels and Cutters.**
American General Engrg. Co.
Anderson M. Co., A. & J. M.
Bonney-Vehslage Tool Co.
Drew Electric & Mfg. Co.
Garton Co., W. R.
Holland Trolley Supply 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.
Russell Car & Snow-Plow Co.
- Soaps.**
Sherwin-Williams Co.
- Solder and Solder Flux.**
Westinghouse Elec. & M. Co.
- Speed Indicators.**
Wood Co., C. N.
- Splicing Compounds.**
American General Eng'g Co.
Imperial Rubber Co.
Massachusetts Chemical Co.
Walpole Tire & Rubber Co.
Westinghouse Elec. & M. Co.
- Splicing Sleeves.** (See Clamps and Connectors.)
- Springs.**
American Steel & Wire Co.
Brill Co., The J. G.
Niles Car & Mfg. Co.
Railway Steel Spring Co.
Standard Steel Works Co.
Union Spring & Mfg. Co.
- Sprinklers, Track and Road.**
Brill Co., The J. G.
Russell Car & Snow-Plow Co.
St. Louis Car Co.
- Steps, Car.**
American Mason S. T. Co.
- Stokers, Mechanical.**
Babcock & Wilcox Co.
Green Eng. Co.
Murphy Iron Works.
Westinghouse Machine Co.
- Storage Batteries.** (See Batteries, Storage.)
- Structural Iron.** (See Bridges.)
- Superheaters.**
Babcock & Wilcox Co.
Power Specialty Co.
- Sweepers, Snow.** (See Snow-Plows, Sweepers and Brooms.)
- Switchboard Mats.**
Imperial Rubber Co.
Indianapolis S. & Frog Co.
Massachusetts Chemical Co.
Walpole Tire & Rubber Co.
Western Electric Co.
- Switchstands.**
Kilby Frog & Switch Co.
Ramapo Iron Works.
Weir Frog Co.
Wharton, Jr., & Co., Wm.
- Switches, Automatic.**
U. S. Electric Signal Co.
Western Electric Co.
- Switches, Track.** (See Track, Special Work.)
- Switches and Switchboards.**
Allis-Chalmers Mfg. Co.
Anderson M. Co., A. & J. M.
Consolidated Car-Heating Co.
Cutter Electrical & Mfg. Co.
Electric Service Supplies Co.
General Electric Co.
Nichols-Lintern Co.
Western Electric Co.
Westinghouse Elec. & M. Co.
- Tanks.**
American Bridge Co.
- Tapes & Cloth.** (See Insulating Cloths, Paper and Tape.)
- Telephones and Parts.**
Electric Service Supplies Co.
Western Electric Co.
- Testing, Electrical.**
Hunt & Co., Robert W.
- Testing Instruments.** (See Instruments, Electrical, Measuring, Testing.)
- Thermostats.**
Gold Car Heating & Ltg. Co.
Railway Utility Co.
- Tie Plates.**
Elyria Iron & Steel Co.
- Ties & Tie Rods (Steel).**
American Bridge Co.
Barbour-Stockwell Co.
Carnegie Steel Co.
- Ties, Wood.** (See Poles, Ties, etc.)
- Tools, Track and Miscellaneous.**
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American Steel & Wire Co.
Columbia M. W. & M. I. Co.
Drew Electric & Mfg. Co.
Electric Service Supplies Co.
Johns-Manville Co., H. W.
Railway Track-work Co.
Union Electric Co.
- Towers & Transmission Structures.**
American Bridge Co.
Archbold-Brady Co.
Westinghouse Elec. & M. Co.
- Tower Wagons and Automobiles.**
McCardell & Co., J. R.
- Track, Special Work.**
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Cleveland Frog & Crossing Co.
Columbia M. Wks. & M. I. Co.
Falk Co., The.
Indianapolis S. & Frog Co.
Kilby Frog & Switch Co.
New York S. & Cross. Co.
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Ramapo Iron Works Co.
Weir Frog Co.
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- Transfers.** (See Tickets.)
- Transfer Tables.**
American Bridge Co.
Archbold-Brady Co.
Nichols & Bro., G. P.
- Transformers.**
Allis-Chalmers Mfg. Co.
General Electric Co.
National Brake & Elec. Co.
Packard Electric Co.
Western Electric Co.
Westinghouse Elec. & M. Co.
- Treads, Safety, Stair, Car Step.**
American Mason Safety T. Co.
Garton Co., W. R.
Imperial Rubber Co.
- Trolley Bases.**
Anderson M. Co., A. & J. M.
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Holland Trolley Supply Co.
Nuttall Co., R. D.
Union Electric Co.
Wasson Eng'g & Supply Co.
- Trolleys and Trolley Systems**
Curtis & Co. Mfg. Co.
Northern Engineering Works.
- Trucks, Car.**
Baldwin Locomotive Works.
Brill Co., The J. G.
Cincinnati Car Co.
Long Co., E. G.
Niles Car & Mfg. Co.
Russell Car & Snow-Plow Co.
St. Louis Car Co.
Standard Motor Truck Co.
- Tubeing, Steel.**
National Tube Co.
- Turbines, Steam.**
Allis-Chalmers Mfg. Co.
General Electric Co.
Western Electric Co.
Westinghouse Machine Co.
- Turbines, Water.**
Allis-Chalmers Mfg. Co.
- Union Couplings.**
National Tube Co.
- Vacuum Drying and Impregnating Apparatus.**
Allis-Chalmers Mfg. Co.
- Valves.**
National Tube Co.
- Varnishes.** (See Paints, etc.)
- Ventilators, Building.**
Lord & Burnham Co.
National Ventilating Co.
- Ventilators, Car.**
Brill Co., The J. G.
Cincinnati Car Co.
Gold Car H. & L. Co.
Nichols-Lintern Co.
- Railway Utility Co.**
St. Louis Car Co.
Smith Heater Co., Peter.
- Vestibules, Portable.**
Brill Co., The J. G.
- Volt Meters.** (See Instruments.)
- Waste, Cotton and Wool.**
Hagy Waste Works, J. Milton.
- Waste Boxes.**
Garton Co., W. R.
- Welding Car Wheels, Truck, Frames, etc.** (See Brazing and Welding Processes.)
- Wheel Guards.** (See Fenders and Wheel Guards.)
- Wheels, Car, Cast Iron.**
Bemis Car Truck Co.
Long Co., E. G.
- Wheels, Car (Steel and Steel Tired.)**
Bemis Car Truck Co.
Carnegie Steel Co.
Railway Steel Spring Co.
Standard Steel Works Co.
- Wheels, Trolley.**
American General Engrg. Co.
Anderson M. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Drew Electric & Mfg. Co.
Electric Service Supplies Co.
Garton Co., W. R.
General Electric Co.
Holland Trolley Supply Co.
Johns-Manville Co., H. W.
Long Co., E. G.
More-Jones B. & M. Co.
Nuttall Co., R. D.
Star Brass Works.
- Whistles, Air.**
General Electric Co.
- Winding Machines.** (See Coil, Banding and Winding Machines.)
- Window Operating Devices.** (See Sash Operating Apparatus.)
- Wire Rope.**
American Steel & Wire Co.
- Wires and Cables.**
Aluminum Co. of America.
American Steel & Wire Co.
D & W Fuse Co.
Drew Electric & Mfg. Co.
Garton Co., W. R.
General Electric Co.
Packard Electric Co.
Roebling's Sons Co., John A.
Western Electric Co.
Westinghouse Elec. & M. Co.
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International Cr. & Con. Co.
Lindsay Brothers Co.
Sherwin-Williams Co.
- Woodworking Machinery.**
Allis-Chalmers Mfg. Co.

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Ferro Carbon-Titanium treatment produces steel of this kind—that makes rails which wear.

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Increase In
Rail-Life*

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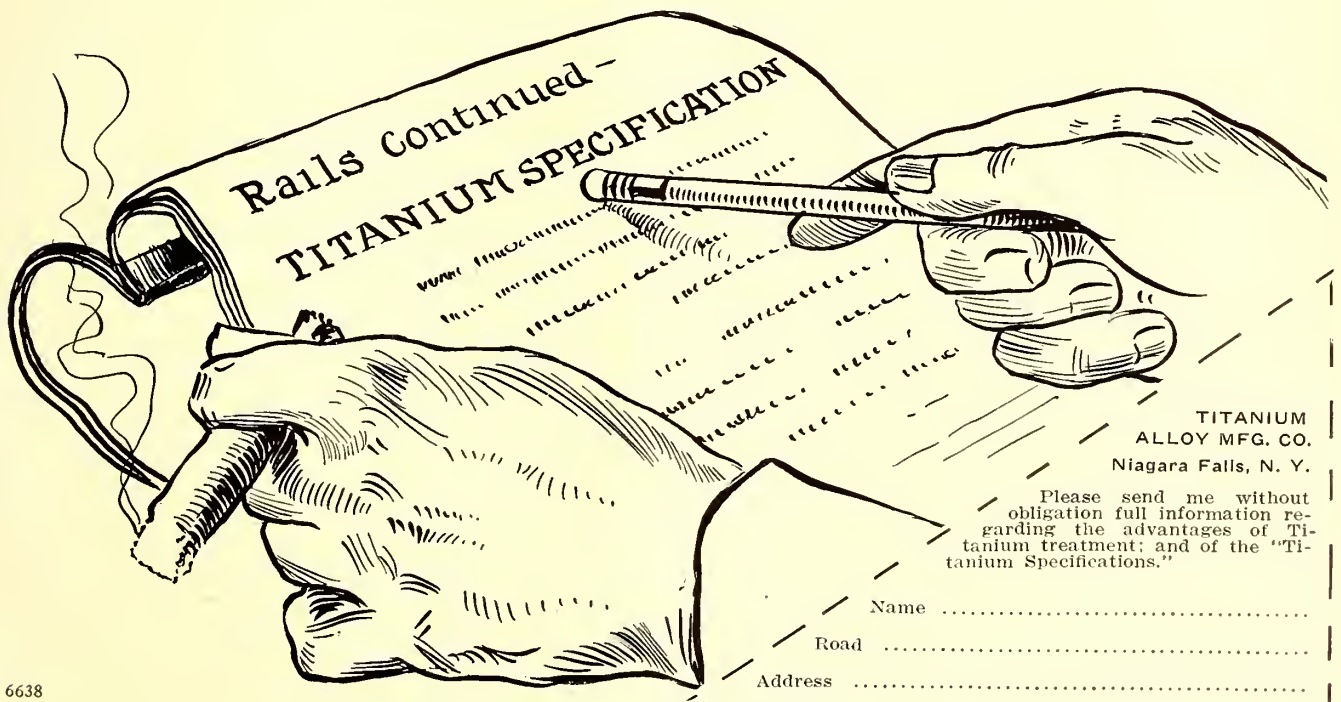
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7544

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BRILL EXPRESS AND FREIGHT CARS

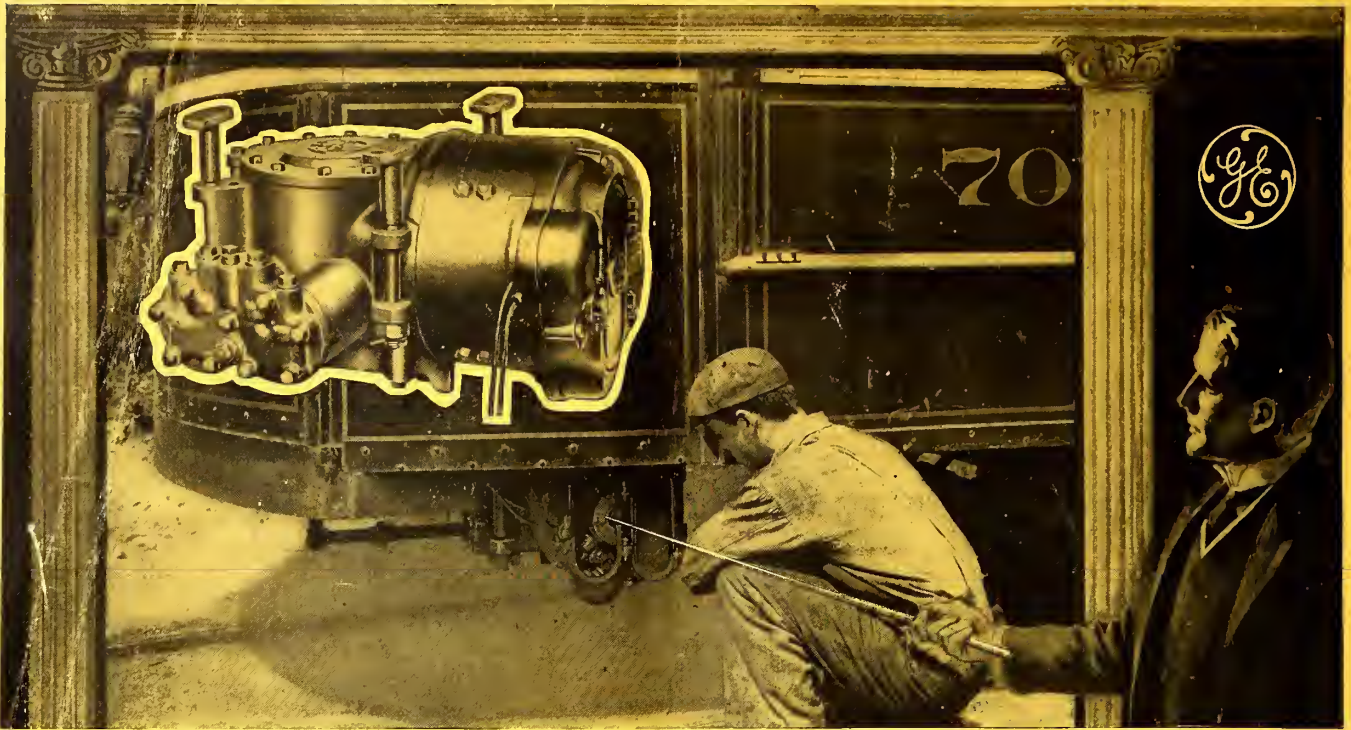


“FROM the short wooden types for suburban service to the long steel interurban, there is a wide variety of express and freight car designs in our photo collection, covering almost every conceivable requirement, and a selection of these is shown in the catalog. The folding seats of this car adapt it to carrying workmen to and from factories and mines or as a smoker coupled to a regular passenger car. On smaller systems express cars can be kept busy by equipping them in this way for special passenger service and for line construction and general utility purposes.”

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