

STREET RAILWAY JOURNAL

A WEEKLY RECORD OF THE WORLD'S PROGRESS IN CITY AND INTERURBAN RAILROADING.

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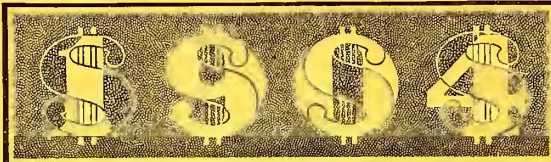
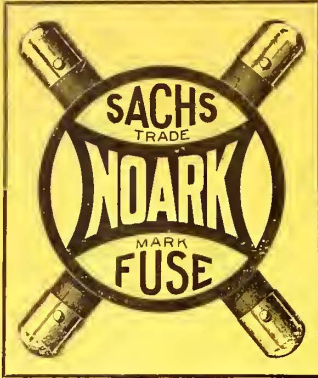
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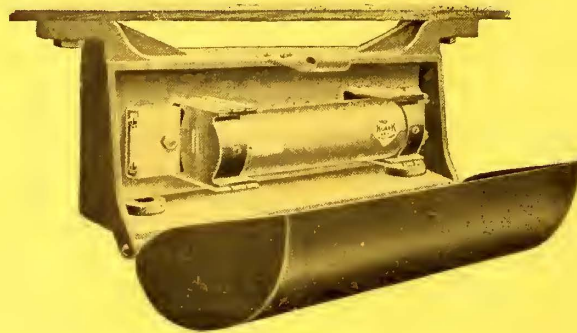
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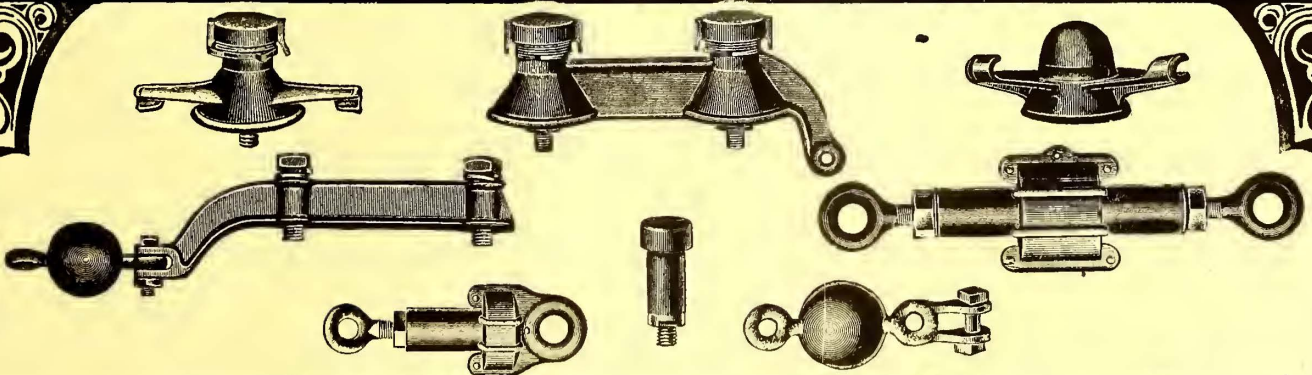
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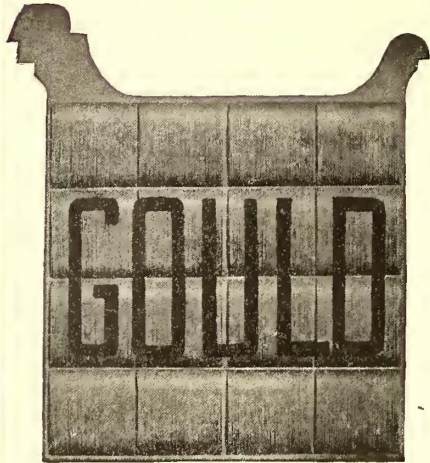
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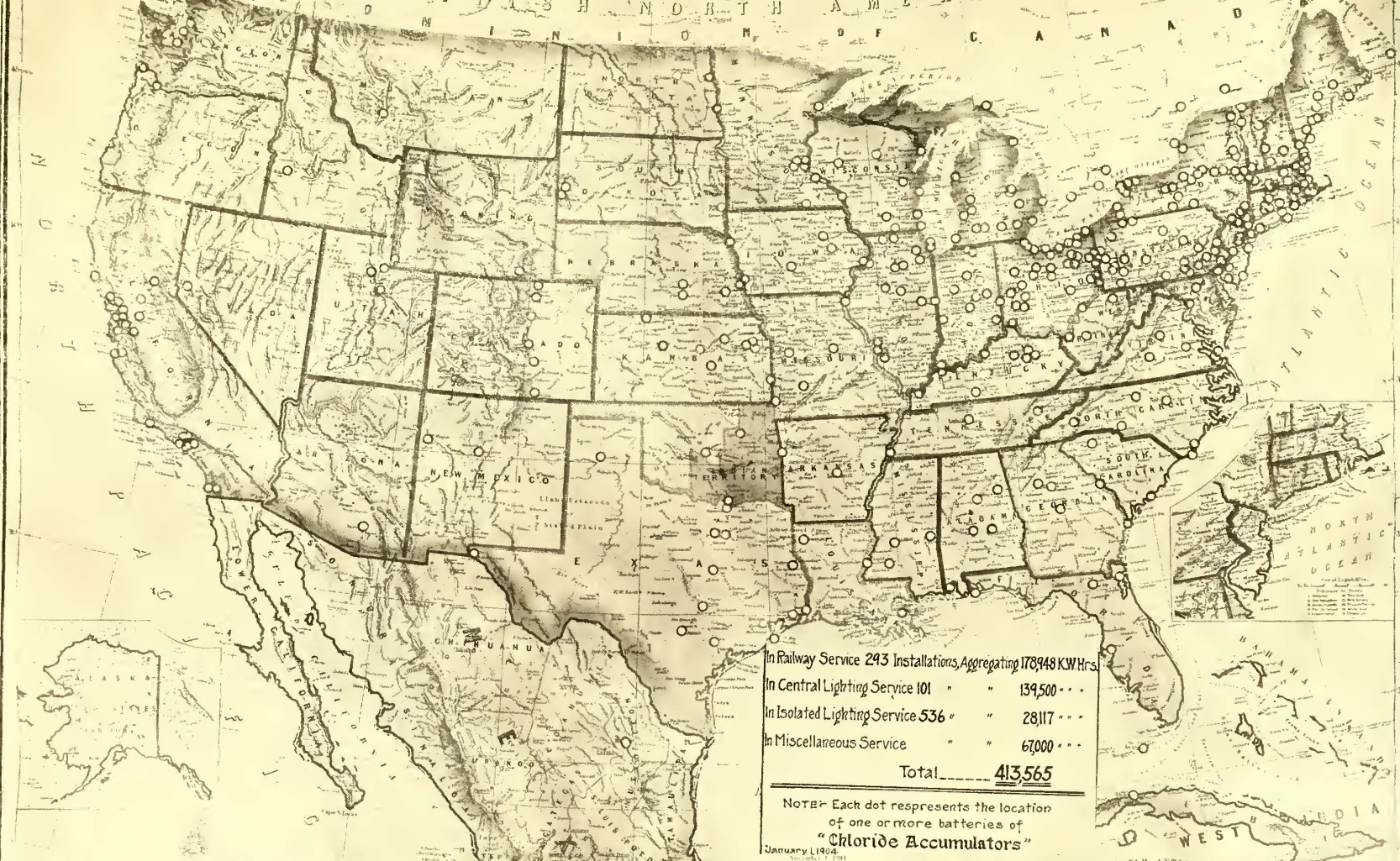
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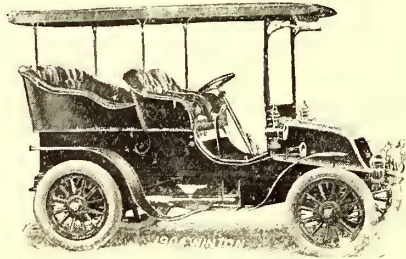
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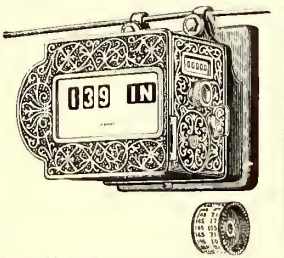
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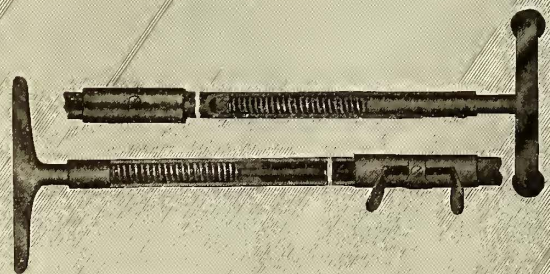
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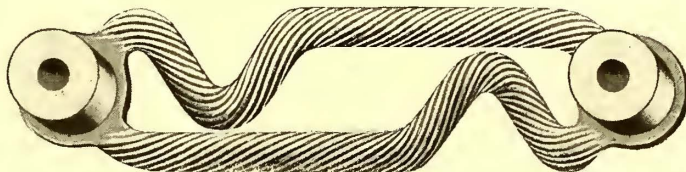
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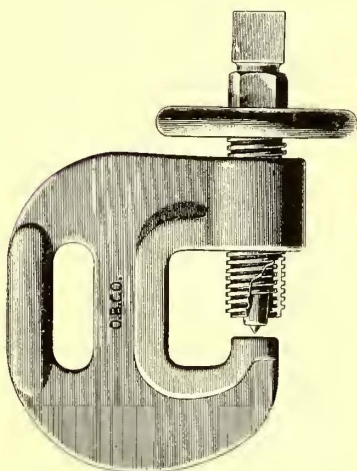
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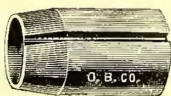
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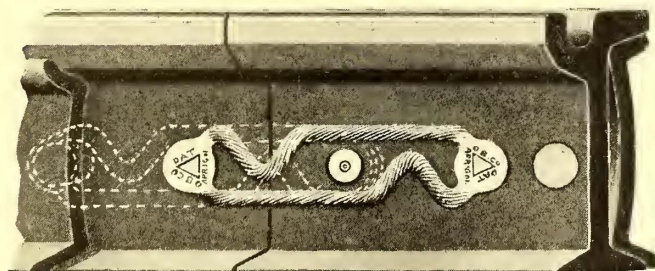
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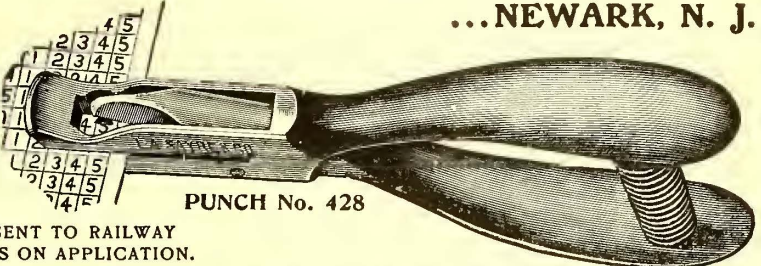
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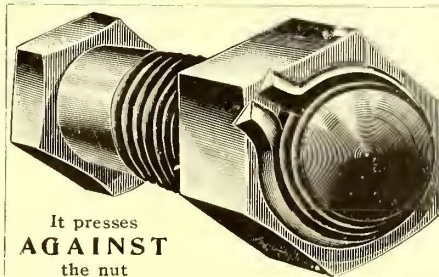
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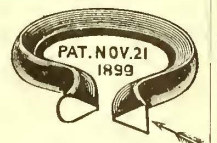
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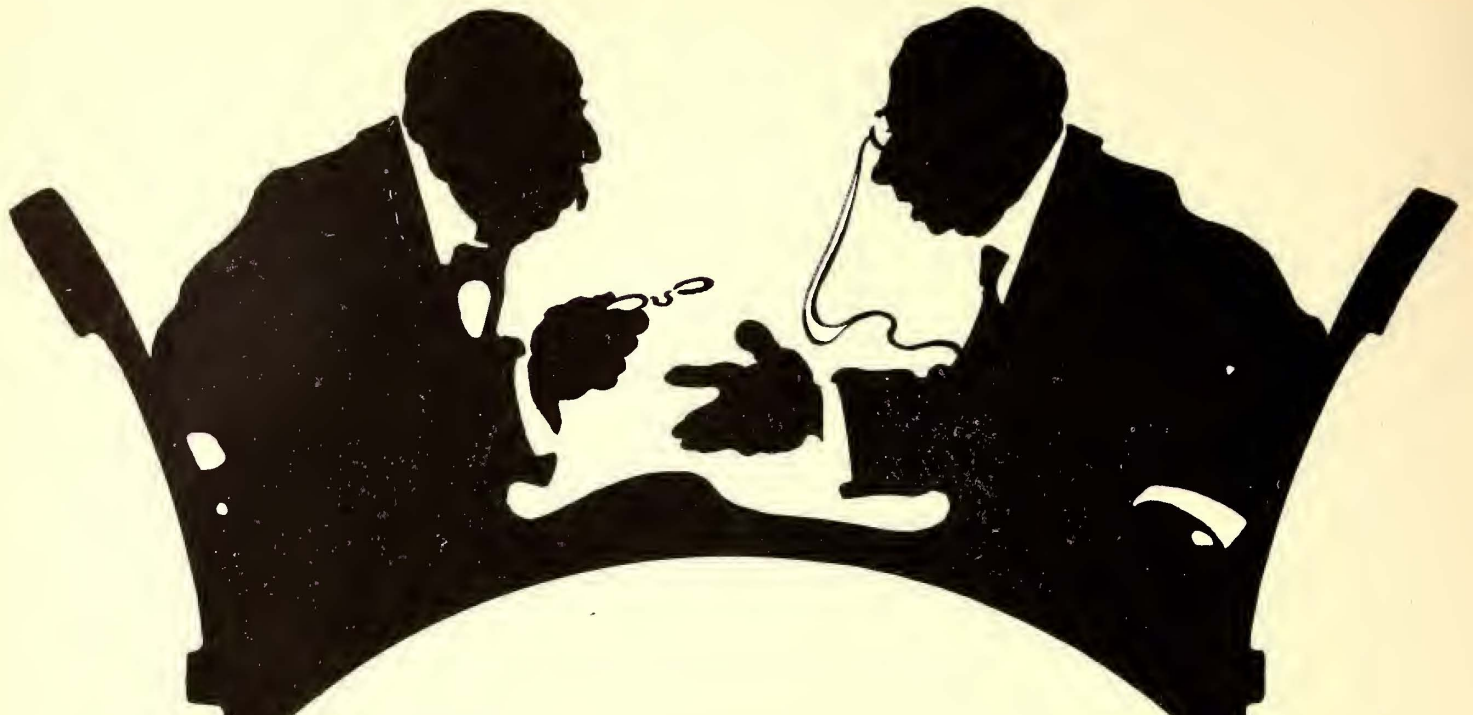


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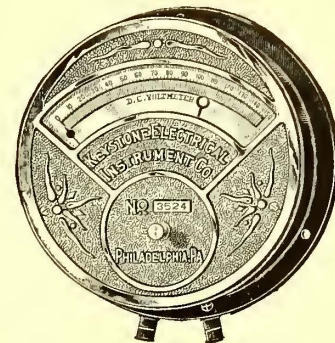
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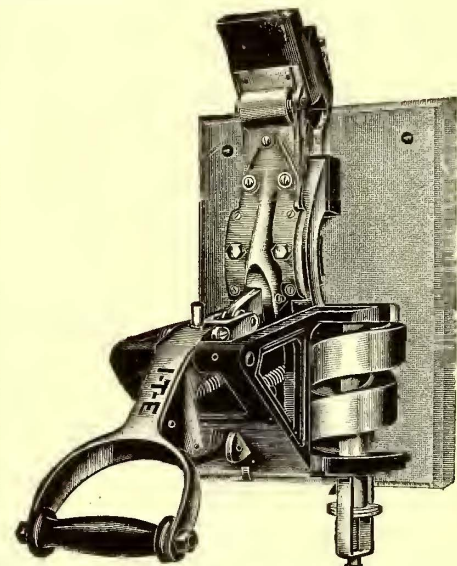
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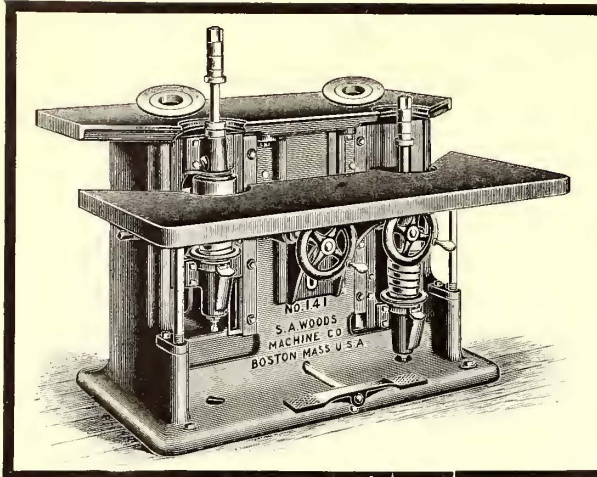
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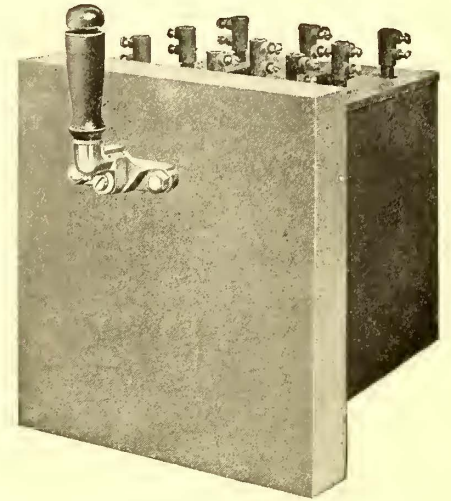
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Ewing, Geo. C.
Falk Co.
*Felten & Guillaume.
*Forst City Electric Co.
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This is due to the fact that when a discharge passes to earth the entire normal difference of potential tries to follow the discharge, and the "ground" thus established is more difficult to open than in other service where the entire normal difference of potential is not between the line and the ground, but between the different sides of the circuit.

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Romünder, Hermann.
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Borden & Lovell.

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Goubert Mfg. Co.
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Gest, Guy M.
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Arnold Elec. Power Station Co.

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 Creaghead Engineering Co.
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 *Dick, Kerr & Co., Ltd.
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 Falk Co.
 Gest, Guy M.
 Hollingsworth, L. Jr.
 Knox Engineering Co.
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 MacAfee, John Blair.
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 White, J. G., & Co.
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(See Conveyors.)

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 Byllesby, H. M., & Co.
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 Ford, Bacon & Davis.
 Hodges, Arthur W.
 Hollingsworth, L., Jr.
 Kitfield, E. H.
 Knox Engineering Co.
 Pierce, Richardson & Neiler.
 Roberts, E. P., & Co.
 Sargent & Lundie.
 Sheaff & Jaastad.
 Sproul & Green.
 Standard Engineering Co.
 Wagner, Herbert A.
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 Western Electrical Supply Co.
 Westinghouse Electric & Mfg. Co.
 *White, J. G. & Co., Ltd.
 White, J. G., & Co.
 Whitted, Thos B.

Engineers, Contracting

(See Contractors.)

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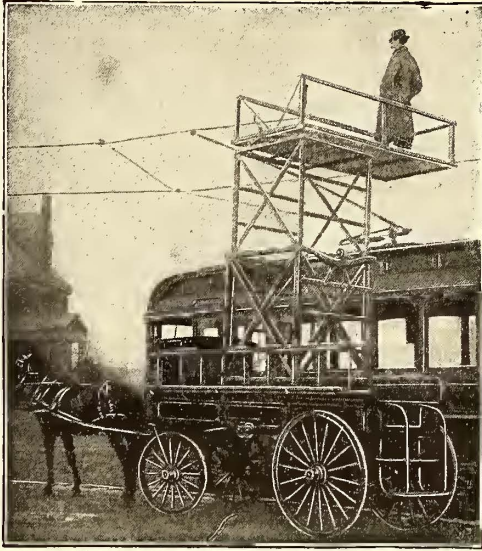
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(See Crossings, Frogs & Switches.)

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(See Replacers, Car.)

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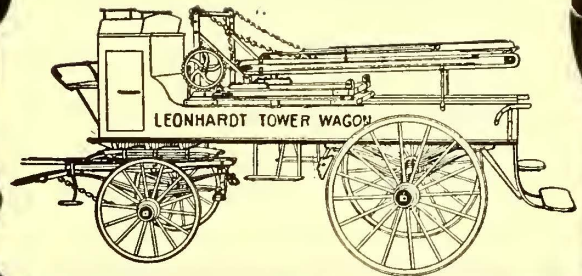
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Wesco Supply Co.
Western Electric Co.
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General Electric Co.
Mayer & Englund.
Ohio Brass Co.
Porter & Berg.
Stuart-Howland Co.
Wendell & MacDuffie.
Wesco Supply Co.
Westinghouse Electric & Mfg. Co.
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American Brass Fdy. Co.,
Anderson, A. & J. M., Mfg. Co.
Bissell, F., Co.
*Blackwell, Robt. W., & Co., Ltd.
*British Thomson-Houston Co.
Carey, Thos. F.
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Craghead Engineering Co.
*Dick, Kerr & Co., Ltd.
Electric Ry. Equip. Co., Cincinnati.
*Electric Tramway Equipment Co.
Ewing, Geo. C.
*Felten & Guillaume.
Garton, W. R., Co.
General Electric Co.
General Railway Supply Co.
Hemingray Glass Co.
H. W. Johns-Manville Co.
Macallen, W. T. C., Co.
*Maschinenfabrik Oerlikon.
Mayer & Englund Co.
Ohio Brass Co.
Porter & Berg.
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Stuart-Howland Co.
Thomas, R., & Sons, Co.
Wendell & MacDuffie.
Wesco Supply Co.
Western Electric Co.
*Witting, Eborall & Co.
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- Lock Nuts**
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Spiral Nut Lock Co.
Weber Railway Joint Mfg. Co.
Wharton, Wm., Jr., & Co.
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Baldwin Locomotive Works.
*British Thomson-Houston Co.
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Burnham, Williams & Co.
General Electric Co.
Jeffrey Mfg. Co.
McGuire Mfg. Co.
Taylor Electric Truck Co.
Wendell & MacDuffie.
Westinghouse Electric & Mfg. Co.
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Crane Co.
Lukenheimer Co.
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Federal Supply Co.
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(See Bearings.)
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Munsell, Eugene, & Co.
Sills-Eddy Mica Co.
- Micanite**
Mica Insulator Co.
- Miniature Railways**
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- Motors, Electric**
Akron Electrical Mfg. Co.
Bissell, F., Co.
*British Thomson-Houston Co.
*British Westinghouse Elec. & Mfg. Co., Ltd.
*Brush Electrical Engineering Co.
Crocker-Wheeler Co.
*Dick, Kerr & Co. Ltd.,
General Electric Co.
Lorain Steel Co.
*Maschinenfabrik Oerlikon.
National Electric Co.
Stanley Electric Mfg. Co.
Sturtevant, B. F., Co.
Westinghouse Electric & Mfg. Co.
*Witting, Eborall & Co., Ltd.
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British Thomson-Houston Co.
General Electric Co.
Westinghouse Electric & Mfg. Co.
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Ironsides Co.
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(See Lubricants.)
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Beacon Paint & Varnish Preservative Co.
- Paints, Preservative**
Atlas Railway Supply Co.
Detroit Graphite Mfg. Co.
Garry Iron & Steel Co.
Sherwin-Williams Co.
- Paints and Varnishes**
Detroit Graphite Mfg. Co.
Forest City Paint & Varnish Co.
McCaskill, Dougall & Co.
Parrott Varnish Co.
Poorman, Warren M.
Sherwin-Williams Co.
Standard Paint Co.
Standard Varnish Works.
Sterling Varnish Co.
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(See Woodwork, Car.)
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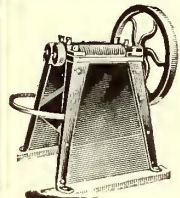
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Walworth Mfg. Co.
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Wyckoff Pipe & Creosoting Co.
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(See Trolley Poles.)
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*Allen, W. H., Son & Co., Ltd.
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Deming Co.
Stilwell-Bierce & Smith-Vaile Co.
*Weir, G. & J.
*Worthington Pump Co., Ltd.
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National Ticket Co.
Poole Bros.
Recording Fare Register Co.
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(See also Heaters and Purifiers.)
- Purifiers, Oil
Burt Mfg. Co.
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Liberty Manufacturing Co.
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(See Bonds, Rails.)
- Rail Joint Testing Instrument
Mayer & Englund Co.
- Rail Joints
(See Joints, Rail.)
- Rails
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*Ashkam Bros. & Wilson, Ltd.
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*Dick, Kerr & Co.
*Hadfield's Steel Foundry Co.
Loran Steel Co.
Pennsylvania Steel Co.
Wharton, Wm. Jr., & Co.
- Rails, Second Hand
(See pages 86-91.)
- Rattan for Sweepers
American Car Co.
Brill, J. G., Co.
Consolidated Car Fender Co.
Hale & Kilburn Mfg. Co.
- Heywood Bros. & Wakefield Co.
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Allison, Giles S.
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DeWitt Sand Box Co.
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Newark Air Sand Box Co.
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Positive Ry. Sander Co.
Ridlon, Frank, Co.
Sterling-Meaker Co.
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Samson Cordage Works.
Silver Lake Co.
- Sashes, Car
American Car Co.
Brill, J. G., Co.
Sjoberg, J. P., & Co.
- Sawing Machines
American Machinery Co.
Woods, S. A., Machine Co.
- Scales, Weighing
Richardson Scale Co.
- Scrap
(See pages 86-91.)
- Seating, Car
Hale & Kilburn Mfg. Co.
Heywood Bros. & Wakefield Co.
*Peters, G. D., & Co., Ltd.
Sjoberg, J. P., & Co.
St. Louis Car Co.
- Second-Hand Apparatus
(See pages 86-91.)
- Separators
Goubert Mfg. Co. (Stratton Sep.)
Harrison Safety Boiler Works.
Phoenix Iron Works Co.
Westinghouse, Church, Kerr & Co.
- Shades, Car
(See Curtains and Curtain Fix-
tures.)
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Garton, W. R., Co.
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Wesco Supply Co.

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(See Crossings, Frogs & Switches.)

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Wendell & MacDuffie.

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Taylor Electric Truck Co.
Union Spring & Mfg. Co.
Van Dorn & Dutton Co.

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Brill, J. G., Co.
Sjoberg, J. P., & Co.

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(See Castings.)

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*Babcock & Wilcox, Ltd.
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*Brush Electrical Engineering Co.
Chase Shawmut Co.
Crouse-Hinds Co.
Cutter Company.
General Electric Co.
*Maschinenfabrik Oerlikon.
Mayer & Englund Co.
*Nalder Bros. & Thompson.
Stuart-Howland Co.
Walker Co., The.
Wesco Supply Co.
Westinghouse Electric Mfg. Co.

Switches, Track

(See Crossings, Frogs & Switches.)

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National Ticket Co.
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Ticket Destroyer

Patten, Paul B.

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(See Punches, Ticket.)

Ticket Systems

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(See Poles and Ties.)

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(See Drills, Track.)

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(See Rails, Joints, Crossings, etc.)

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(See Cord, Bell and Trolley.)

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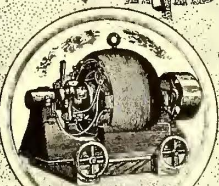
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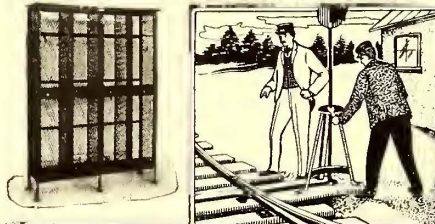
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Collins, Bouchard & Emery.
National Car Wheel Co.
Peckham Manufacturing Co.
Railway Steel Spring Co.
St. Louis Car Wheel Co.
Taylor Electric Truck Co.
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Wheel Truing Brake-Shoe Co.
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Creaghead Engineering Co.
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Garton, W. R., Co.
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*Maguire, F. Z.
Mayer & Englund Co.
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Okonite Co., Ltd., The.
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Porter & Berg.
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*Smith, Fred'k. & Co., Ltd.
Standard Underground Cable Co.
Stuart-Howland Co.
Wendell & MacDuffie.
Wesco Supply Co.
Western Electric Co.
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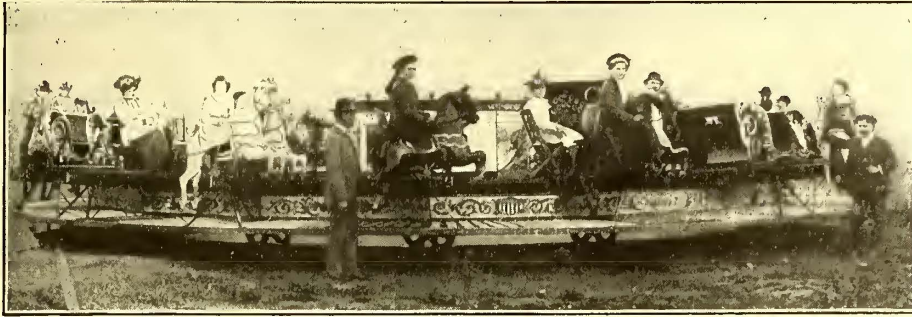
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HAVE been installed by some of our largest railroads and street railway systems to provide places to stow employees' uniforms, street clothing, tools, etc. Material is neither jointed or interwoven, has no cracks or crevices.



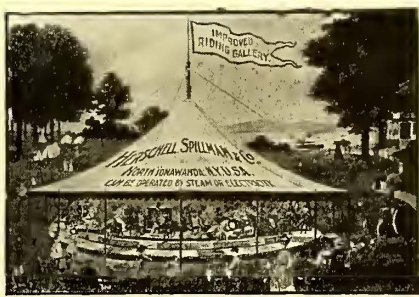
IMPROVED Steam Riding Gallery

We are the Pioneers
in the manufacture of
RIDING GALLERIES
Our Galleries and Miniature Railways
attract the crowds, and pay for them-
selves in one season.

Let us hear from you

ARMITAGE-HERSCHELL CO., NORTH TONAWANDA
NEW YORK, U. S. A.

IMPROVED MERRY-GO-ROUNDS



AND EVERYTHING IN UP-TO-DATE ATTRACTIONS
FOR RAILWAY PARKS

A Ride on one of these Galleries is a pleasure which would leave a
lasting impression on every visitor to your Park. Each horse has a
galloping motion. Will seat comfortably 56 adults. The most durable,
convenient and finest in finish.

Can be operated by Steam or Electricity.

HERSCHELL, SPILLMAN & CO. NORTH
TONAWANDA
N.Y. U.S.A.

California

for an ideal outing this winter. There
is something to see and something to
do. The climate will tempt you out
of doors, and you will be glad of it.
The trip is made quickly and comfort-
ably by the trains of the

Chicago, Milwaukee & St. Paul and Union Pacific Line

The Overland Limited runs via this
route and is the most famous train
across the continent. Complete in-
formation on rates, routes and train
service on request.

F. A. MILLER,
General Passenger Agent.

Chicago



Nineteen Through Trains

In daily service over the Lake Shore & Michigan
Southern Railway, between the cities of Chicago
and Toledo, Cleveland, Buffalo, St. Louis, Indian-
apolis, Cincinnati, Pittsburg, New York and
Boston, in connection with the New York Central,
Boston & Albany, Pittsburg & Lake Erie and Cleve-
land, Cincinnati, Chicago & St. Louis Railroads.

Don't Forget when you buy a through ticket
to tell the ticket agent plainly that you wish it over
the Lake Shore & Michigan Southern Railway.
You will secure the best in travel that money
can buy.

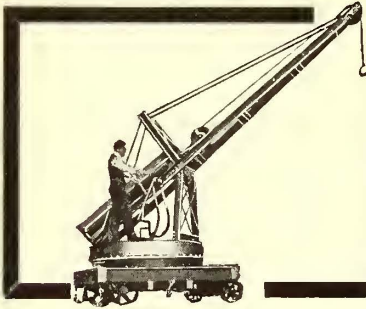
Send for booklet "Privileges for Lake Shore Patrons,"
contains useful information; also, "Book of Trains."

Address **A. J. SMITH,**
G. P. & T. A., CLEVELAND, OHIO.

Write for our
Catalogue of

STANDARD RAILWAY PANELS

The Walker Co.
PHILADELPHIA
NEW YORK
CHICAGO

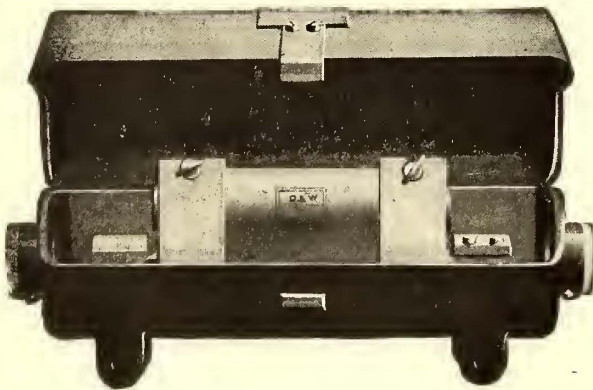


PNEUMATIC OR ELECTRIC REVOLVING

GARRY CRANE

Mounted on car with standard track gauge. May be run to all parts of yard. Rapid—Durable—Efficient. Capacity, 1,000 to 10,000 pounds, or built to any specifications.

The GARRY IRON & STEEL CO., Cleveland, Ohio
GENERAL MACHINE AND STRUCTURAL IRON WORK.



Type R-3 Street Car Motor Cut-Out

HEAVY SERVICE CUT-OUTS

350 TO 500 AMPERES, 650 VOLTS

THESE FUSES HAVE BEEN TESTED UP TO 18,000 AMPERES, 650 VOLTS ON DEAD SHORT CIRCUIT, OPENING WITHOUT ARC OR FLASH.

GIVE US A TRIAL

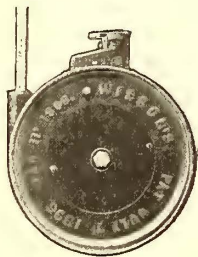
D. & W. FUSE CO. PROVIDENCE, R. I.
New York Office, 92 William Street
A. HALL, BERRY, Manager

AGENCIES:

BOSTON:
Pettingill-Andrews Co.
CHICAGO:
Central Electric Co.

NEW YORK:
Western Electric Co.
ST. LOUIS:
Western Electric Co.

PHILADELPHIA:
Western Electric Co.
SAN FRANCISCO:
California Electrical Works



There's trouble with the trolley poles on cars that are not equipped with the Wilson Trolley Retriever. There are other retrievers, but only one Wilson. Samples shipped subject to your approval.

Ridlon's Representative is an entertaining little magazine, but not too entertaining to be of vital interest to every street railway man. If you are not receiving it, have your name put upon the mail list. It helps us, of course, but then it will help you.

THE WILSON TROLLEY CATCHER CO.,
200 Summer Street, Boston, Mass.



Indians of the Southwest

Where they live and how to get there—their homes, handicraft and ceremonies—an intensely interesting book of more than two hundred pages—written by Geo. A. Dorsey, Ph.D., Curator of Anthropology, Field Columbian Museum, an authority on the "Amerind"—profusely illustrated with half-tones from special photos—handsome cover in colors—sent anywhere on receipt of fifty cents—valuable for schoolroom or library. Address General Passenger Office, A. T. & S. F. Ry. Co., Chicago.

— WE —
BEG TO ANNOUNCE
THAT WE HAVE A NEW,
THOROUGHLY MODERN, WELL
EQUIPPED PLANT, AND ARE IN A
POSITION TO FURNISH COIL AND ELLIPTIC

SPRINGS

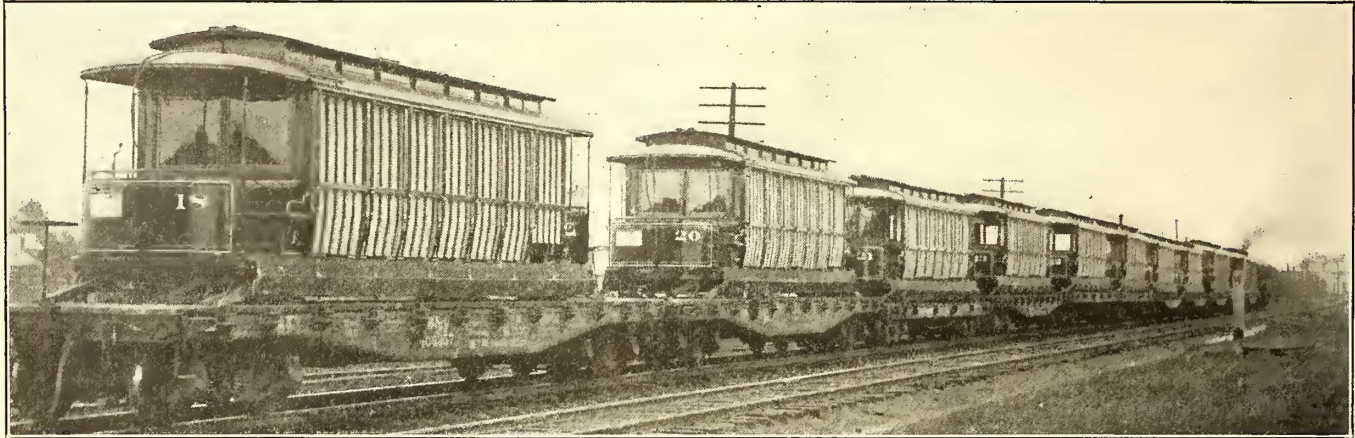
FOR ALL CLASSES OF RAILWAY EQUIPMENT

Simplex Railway Appliance Co.

Office and Works, Hammond, Ind.

SALES OFFICES—NEW YORK AND
CHICAGO

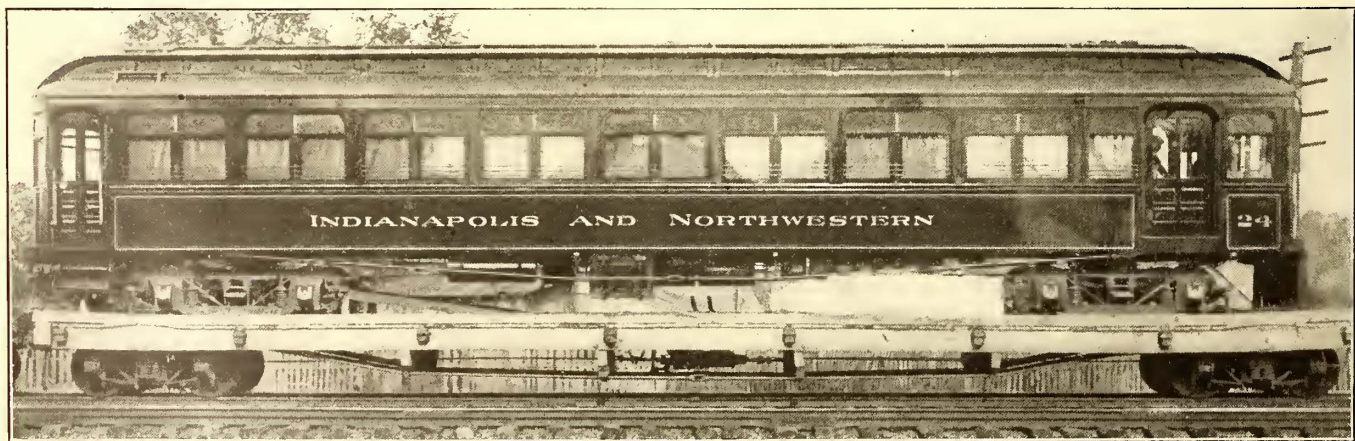
The Jewett Car Company



Shipment of Open Cars to the Wheeling Traction Co.



Interior of Our Standard Interurban Coaches.



We Have Furnished the Entire Equipment for the Above Road.

NEWARK, : : : OHIO, U. S. A.

WE have mailed to all MANAGERS and MASTER MECHANICS as given by the STREET RAILWAY JOURNAL DIRECTORY a copy of our INITIAL CATALOGUE. We hope we have reached *all* interested. If we have not we will consider requests for Catalogues as favors to us. The PHILADELPHIA AIR BRAKE is introduced with the year 1904, but we assure you it has had MORE EXPERIENCE and is NOT AN EXPERIMENT. We respectfully solicit correspondence and investigation.

PHILADELPHIA AIR BRAKE CO.

Real Estate Trust Building

PHILADELPHIA

F. S. DRAKE, Sales Agent

W. W. LAMBERT, Manager

Christensen Air Brakes

INSURE

Quick Stops

Higher Speeds

Perfect Safety

Economy in Operation

Instantaneous Release and Absolute Reliability



Aurora, Elgin & Chicago Railway, Equipped with Christensen Air Brake

Over 10,200

Christensen Air Brake Equipments are in Daily and Highly Satisfactory
Service throughout the World

National Electric Company

General Sales Office
of Air Brake Department
135 BROADWAY, NEW YORK

Milwaukee

CHICAGO : Old Colony Building
CINCINNATI : 809 Traction Bldg.
CLEVELAND : 812 Prospect St.
PHILADELPHIA : 1402 Erie Ave.

R. W. Blackwell & Co., London, Brussels and Paris

Edge & Edge, Sydney, Australia

RAILWAY SKC MOTORS

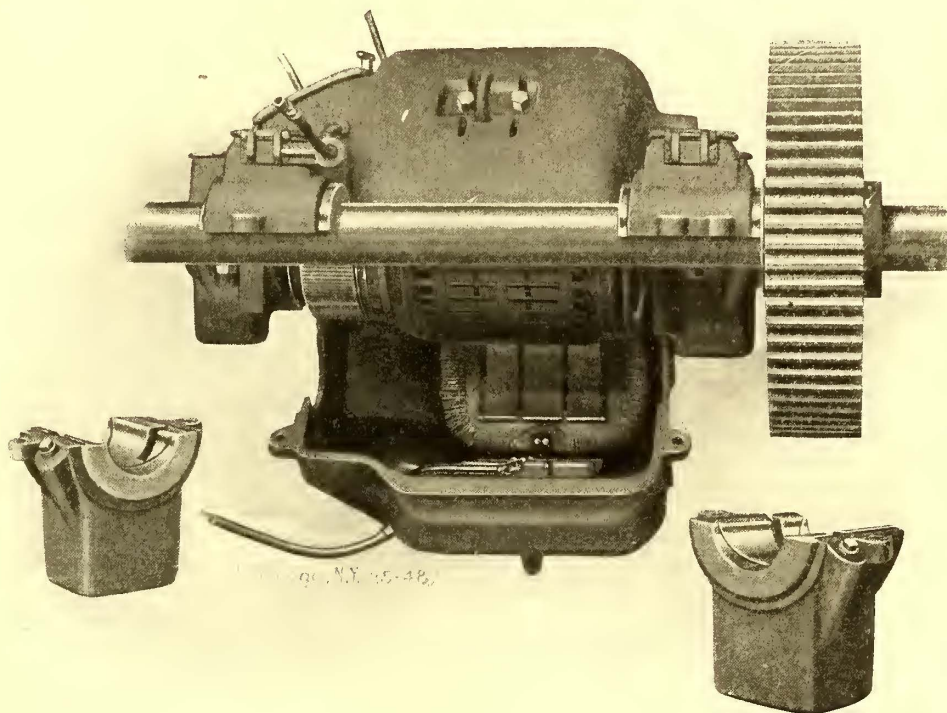
Are distinguished by unusually liberal ventilation
and low temperature in operation

FRAME

THE frame is divided horizontally into halves. The lower half can readily be swung down to the position shown in the illustration, or, if desired, it may be entirely removed,

POLE PIECES

The pole pieces are made up of soft laminated steel punchings riveted together. Each pole piece has a flare at the armature end, which, besides holding the field coil in place, effects the best distribution of the lines of magnetic flux. Ventilating ducts through the body of the pole piece permit air circulation and insure a low temperature of the field coil.



BEARINGS

The bearings are Babbitt lined castiron shells of ample dimensions, with means for abundant and constant lubrication. Both armature and axle bearing caps are bolted to the top half of the motor frame.

FIELD COILS

The field coils are wound of square wire, eliminating the air spaces which occur when round wire is used, and thus securing a rapid transfer of heat from the interior to the surface of the coil. The coils are insulated with successive layers of insulating material with an insulating compound, the layers being thoroughly cemented together into a solid mass. This insulation is water proof and elastic, strong both electrically and mechanically, and because of its solidity, permits of the rapid transfer of heat from the coil.

ARMATURE

The armature is unusually well ventilated. Large ducts parallel to the shaft allow the air to enter the body of the armature and ventilating ducts, perpendicular to the shaft, allow the heat to escape. The end castings project above the level of the coils, so as to protect the end winding from injury. The armature coils are form-wound, dipped and thoroughly insulated with old linen and tape. The band wires holding the coils in place lie in grooves below the general surface of the armature, thereby protecting them from injury.

COVER OVER THE COMMUTATOR

A neat cover over the commutator permits inspection of same and replacing of brushes. Another hand-hole allows inspection from below.

Bulletin 130 gives further details of S. K. C. Railway Motors.

Stanley Electric Mfg. Company, Pittsfield, Mass.

BRANCH OFFICES:

NEW YORK, 29 Broadway.
CHICAGO, Monadnock Block.
BOSTON, Equitable Building.
PHILADELPHIA, P. A., 26 S. 15th St.
CLEVELAND, O., 129-131 Euclid Ave.

SAN FRANCISCO, 31-33 New Montgomery St.
LOS ANGELES, CAL., Douglas Bldg.
BUFFALO, N. Y., 202 Main St.
SEATTLE, WASH., Pioneer Bldg.

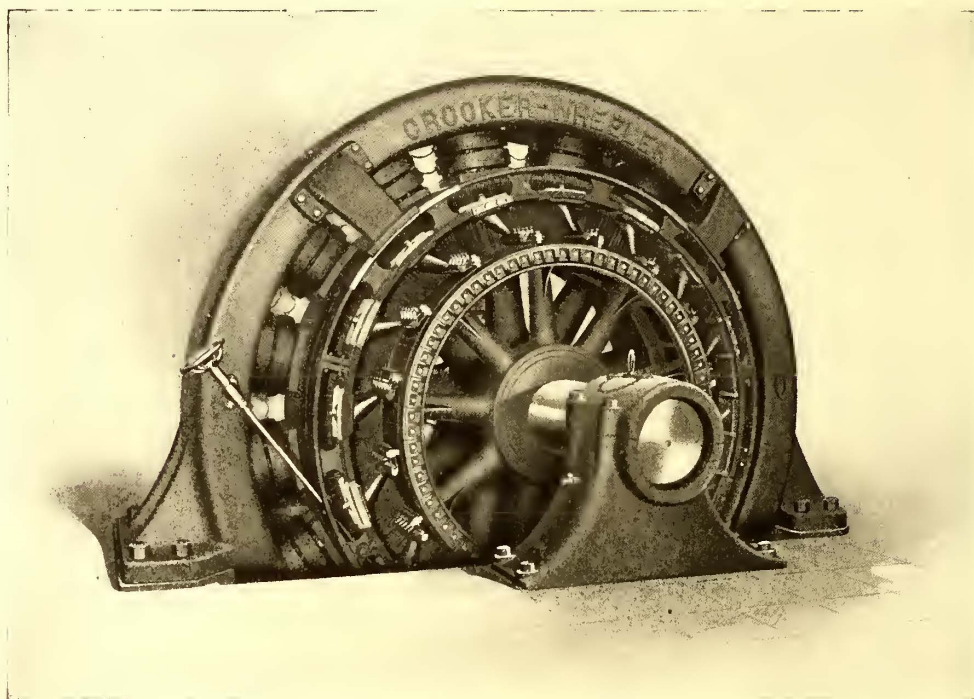
DENVER, COLO., Hendrie & Bolthoff Mfg. and Supply Co.
BUTTE, MONT., Western Mining Supply Co.
ATLANTA, GA., Empire Bldg.

In Canada S. K. C. Apparatus is manufactured by the CANADIAN GENERAL ELECTRIC CO., TORONTO.

Crocker - Wheeler Company

Manufacturers and Electrical Engineers

AMPERE, N. J.



Eight of these Railway Type Generators will be seen in Machinery Hall, at the Louisiana Purchase Exposition, in St. Louis, supplying power to the Intramural Railway

We are Manufacturers of Generators and Motors, and Engineers for their installation in Power Stations and Industrial Plants

Branch Offices

BOSTON

NEW HAVEN

NEW YORK

SYRACUSE

PHILADELPHIA

WASHINGTON

PITTSBURG

CLEVELAND

CHICAGO

ST. LOUIS

DENVER

SAN FRANCISCO

Westinghouse

Single-Phase Motors

For Heavy Railway Lines

With direct current equipments it has been impossible to show any economy in the electrical operation of existing steam roads except in rare instances.

The economical electrical operation of heavy railway lines demands

First: Higher car voltages than are used on existing lines and which probably represents the practicable limit of direct current operation.

The alternating current single-phase motor may be operated with any car voltage demanded by the conditions of economical operation.

Second: A more economical current control than is possible by the rheostatic devices which are required by direct current operation.

The voltage control used with single-phase equipments admits of the operation at all loads with equal economy.

Third: In the handling of long heavy trains, the speed control must be equivalent to the present steam locomotive control.

This is impossible of attainment with direct current apparatus, but may be had with the single-phase equipment with the highest degree of exactness.

Fourth: The system must have a large reserve capacity to "make up time."

Only the single-phase, alternating current equipments meet this important requirement and they may be operated within any limits of speed consistent with safety.

We are prepared to offer these single-phase, alternating current equipments for heavy railway service for operation on lines of 25 cycles and under, and to extend the guarantee of this Company as to efficiency and workmanship.

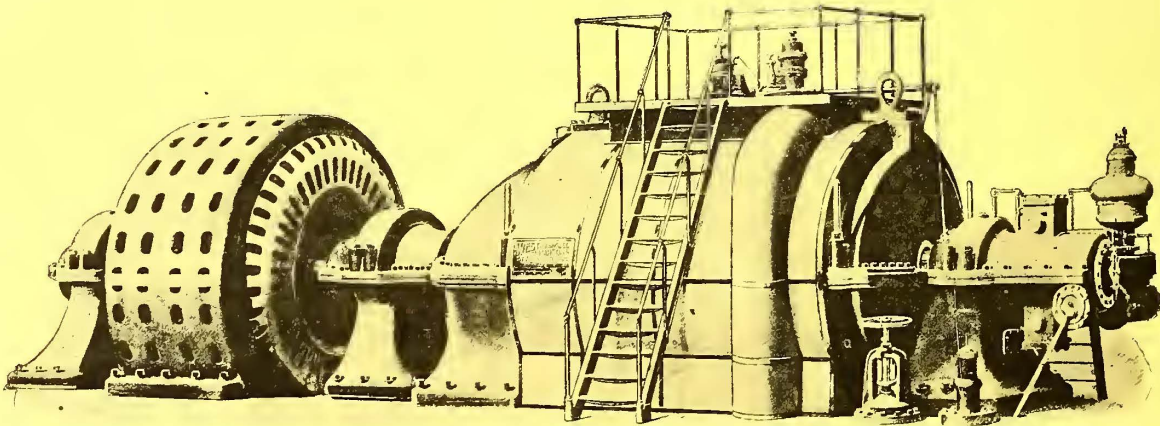
Westinghouse Electric & Mfg. Co.

Pittsburg, Pa.

Westinghouse-Parsons Steam Turbine

The Only Steam Turbine of World-Wide Application

Excepting Small Units



Westinghouse-Parsons 7500 H. P. Steam Turbine Generating Unit.

During the past few years Westinghouse-Parsons Turbines aggregating 175,000 H. P. have been sold in America; 50,000 H. P. of which are in daily operation, the remainder being either ready for shipment or nearing completion.

The first important American installation was made four years ago, consisting of four 600 H. P. Units. These have been running continuously, giving absolutely no trouble.

Official Test Records

of every unit shipped are

Open to Examination

Abroad the Parsons Turbine is represented by an aggregate total of over half a million horse-power, successfully operating in both marine and stationary service.

For particulars, address nearest sales office of

The Westinghouse Machine Co.

Works, East Pittsburg, Pa.

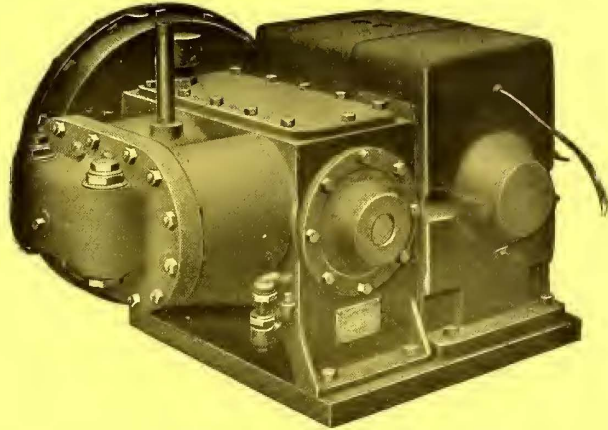
Sales Offices: { New York, 10 Bridge St. Chicago, 171 La Salle Street.
Boston, 131 State St. Detroit, Union Trust Bldg.
Pittsburg, Westinghouse Bldg. Philadelphia, Stephen Girard Bldg.

Designers and Builders of

Steam Engines, Gas Engines, Steam Turbines, Roney Mechanical Stokers

Westinghouse

Motor-Driven Air Compressors



Primarily intended to supply compressed air for traction car brakes, but also particularly adapted for portable blowing outfits and stationary work. They are simple in construction, of the highest efficiency, and designed to occupy the smallest possible space consistent with ample size of all wearing parts.

For air-brake equipments where first cost is an important consideration, Westinghouse Axle-Driven Air Compressors have given the most excellent satisfaction, their use avoiding the cost and maintenance of another motor in the car equipment. Like the motor-driven compressors they are noiseless in operation, and dust and water-proof.

Westinghouse Traction Brake Co.

26 Cortlandt Street, New York.

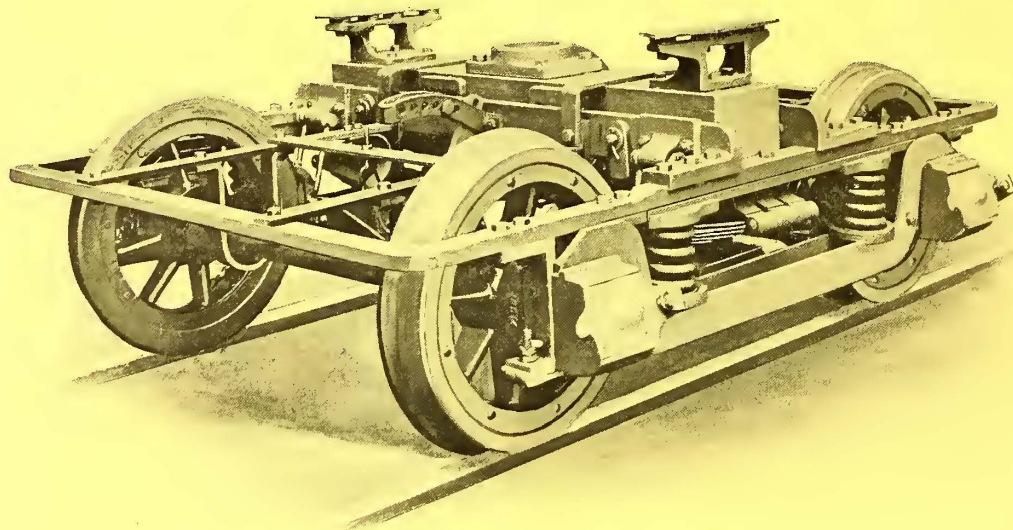
Power Brakes for all classes of Traction Service.
Magnetic Brake and Electric Car Heating System.

Apparatus Manufactured by The Westinghouse Air Brake Co.

Baldwin Locomotive Works

M. C. B. Type Motor Truck

For High-Speed Service



Burnham, Williams & Co.

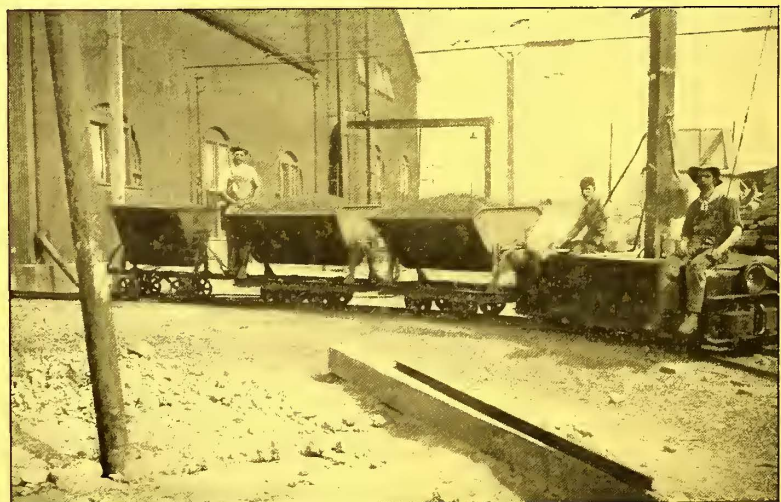
Philadelphia, Pa.

Baldwin=Westinghouse

Electric Locomotives for Surface Haulage

For Industrial Purposes

No expense when standing idle
Strongly constructed
Simple to operate



Hauling Ash Dump Cars. Brooklyn Rapid Transit Co

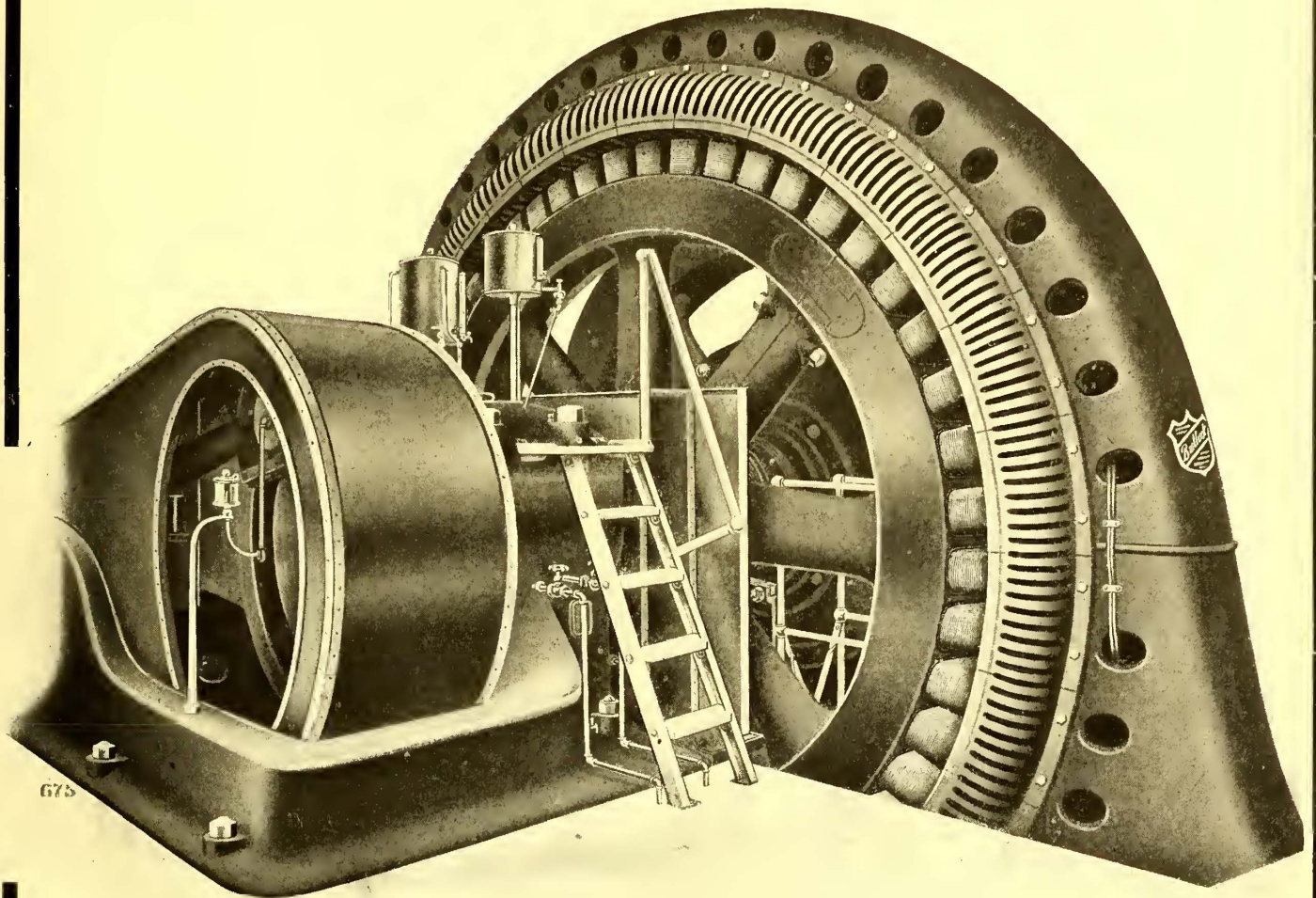
See Illustrated Catalogue: "Electric Locomotives for Surface Haulage."

Baldwin Locomotive Works
Philadelphia, Pa.

Westinghouse Electric & Mfg. Co.
Pittsburg, Pa.

Bullock Electric Mfg. Company

CINCINNATI, OHIO, U. S. A.



1500 kw. Flywheel Type Bullock Generator, Installed at the Denver Gas & Electric Company's Plant

Sales Agents

DISTRICT OFFICES

Boston, Mass., Journal Building
 New York, N. Y., St. Paul Building
 Philadelphia, Pa., North American Building
 Baltimore, Md., 8-10 South Street
 Chicago, Ill., Marquette Building
 Cincinnati, Ohio, East Norwood
 St. Louis, Mo., Chemical Building
 Atlanta, Ga., Empire Building
 Indianapolis, Ind., Stevenson Building

REPRESENTATIVES

Pittsburg, Pa., A. W. Wyckoff & Co., 1723 Farmers' Bank Building
 Cleveland, Ohio, Lehman B. Hoyt, 803 New England Building
 Detroit, Mich., Michigan Electric Co.
 Louisville, Ky., Harry L. Wood, 520 W. Main Street
 New Orleans, W. H. Fleming, Hennen Building
 Denver, Col., Gilbert Wilkes & Co., 435 Seventeenth Street
 Salt Lake City, Utah, Gilbert Wilkes & Co.
 Helena, Mont., Gilbert Wilkes & Co.
 Buffalo, N. Y., Robertson Electric Co., 190 Main Street
 San Francisco, Cal., Wagner Bullock Electric Co., 631 Mission Street
 Los Angeles, Cal., Wagner Bullock Electric Co., Stimpson Building
 Seattle, Wash., Wagner Bullock Electric Co., Room "A" Pacific Block

CANADA

Montreal, Que., Canadian Bullock Electric Mfg. Co., Ltd., Coristine Building
 Toronto, Ont., Canadian Bullock Electric Mfg. Co., Ltd., McKinnon Building

FOREIGN OFFICES

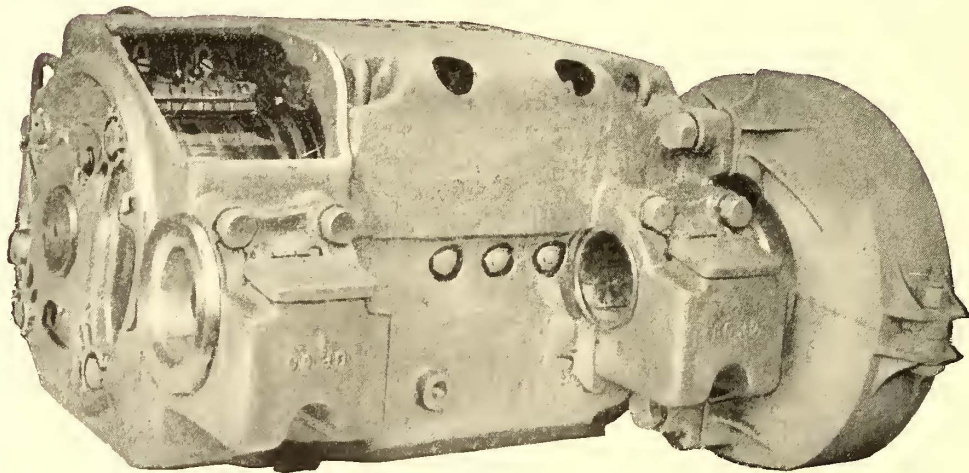
London, Eng., Bergthiel & Young, 12 Camomile Street
 Manchester, Eng., Bergthiel & Young, Cleveland Building
 Melbourne, Australia, Wm. McLean & Co., 317-319 Flinders Lane
 Tokyo, Japan, H. S. Tanaka & Co., Shimbashi
 Manila, P. I., Albert Bryan, 100 Plaza Santa Cruz
 Managua, Nicaragua, Warren B. Reed
 San Jose, Costa Rica, L. E. Allen
 Mexico, Mexico, Cia Benbow Dutton & Co., Apartado 2308
 Constantinople, Turkey, J. G. Johnson & Co.
 Honolulu, H. I., Von Ham Young & Co.

Builders of Direct and Alternating Current Apparatus

GENERAL ELECTRIC COMPANY'S

G. E. 69 Motor

340 of these Motors Ordered by the Interborough Rapid Transit Company, New York City



G. E. 69 Motor. 200 H. P. With Cover Removed

The Sprague-General Electric System of Control has been adopted exclusively by the Interborough Rapid Transit Company, New York City

General Electric Company, Schenectady, N. Y.

New York Office, 44 Broad Street

Sales Offices in all Large Cities

FOR GREAT BRITAIN AND IRELAND:

The British Thomson-Houston Company, Ltd., Rugby and 83 Cannon St., London, E.C.

The Record of a Year

Under the above heading there appeared in the *Street Railway Journal* for January 3, 1903, the following statement:

"During 1901 there were published in the fifty-two American issues of the *STREET RAILWAY JOURNAL*, 2,070 pages of paid advertising, exclusive of all indexes, book advertisements, etc. In the twelve International numbers for the same year there were 363 additional pages of European advertising, making a total of 2,433 pages for the year.

"The corresponding figures for 1902 show 2,383 American and 417 European pages, a total of 2,800 pages, a gain of 367 pages during the year. Of this increase, 108 pages were published in the twelve larger numbers, and 259 in the forty smaller issues—a gain in the latter of nearly 50% over the previous year."

HERE IS THE RECORD OF ANOTHER YEAR

The total number of pages of American advertising during 1903 amounted to 2,946 pages net; additional European advertising, 397; making in all 3,343 pages of net advertising for fifty-two consecutive issues.

This is a Gain of 543 Pages over 1902

What we said regarding the showing made a year ago is equally true now. It is as follows:

"These figures mean something. To our readers they mean that the *STREET RAILWAY JOURNAL*—whose advertising pages have always been the most valuable buyers' directory for the important industry which it represents—is becoming even more valuable in this respect from year to year. To our advertisers they mean that the *STREET RAILWAY JOURNAL* affords the most effective medium, not only for reaching their possible customers in the electric railway and tramway field when they are actually in the market for apparatus and equipment, but also for emphasizing in a convincing manner from week to week the advantages of the material advertised."

STREET RAILWAY JOURNAL
114 LIBERTY STREET NEW YORK

DIRECTORY OF STREET RAILWAY ASSOCIATIONS

American Street Railway Association.

President, W. CARVL FLY, President International Railway Company, Buffalo, N. Y.
 First Vice-President, BLWIN C. FOSTER, President New Orleans Railways Company, New Orleans, La.
 Second Vice-President, JOHN GRANT, General Superintendent St. Louis Transit Company, St. Louis, Mo.
 Third Vice-President, JAMES F. SPAW, President Boston & Worcester Street Railway Company, Boston, Mass.
 Secretary and Treasurer, T. C. PENNINGTON, 2020 State Street Chicago, Ill.
 Executive Committee: President Vice-President and JERE C. HURCHINS, President Detroit United Railway Detroit, Mich.; A. B. COLVIN, President Hudson Valley Railway Company, Genes Falls, N. Y.; G. TRACY ROGERS, President Binghamton Railway Company, Binghamton, N. Y.; W. A. SMITH, General Manager Omaha & Council Bluffs Railway Company, Omaha, Neb.; S. L. NELSON, Vice-President and General Manager Fort Wayne & Southwestern Traction Company, Ft. Wayne, Ind.

Street Railway Accountants' Association of America.

President, F. E. SMITH, Auditor for Receivers of Chicago Union Traction Company and of Chicago Consolidated Traction Company, Chicago, Ill.
 First Vice-President, F. K. HENNY, Auditor United Railways Company of St. Louis, St. Louis, Mo.
 Second Vice-President, C. O. SIMPSON, Auditor Birmingham Railway, Light and Power Company, Birmingham, Ala.
 Third Vice-President, J. J. MAGLTON, Auditor Schenectady Railway Company, Schenectady, N. Y.
 Secretary and Treasurer, W. B. BROCKWAY, 40 Morris Street, Yonkers, N. Y.
 Executive Committee: H. J. DAVIES, Cleveland, O.; S. C. ROGERS, Youngstown, O.; S. G. BOYLE, Louisville, Ky.; H. M. PEASE, Buffalo, N. Y.

American Railway Mechanical and Electrical Association

President, E. W. OLDS, Superintendent rolling stock the Milwaukee Electric Railway & Light Company, Milwaukee, Wis.
 First Vice-President, ALFRED GREEN, Master Mechanic Rochester Railway Company, Rochester, N. Y.
 Second Vice-President, C. F. BAKER, Superintendent motive power and machinery Boston Elevated Railway Company, Boston, Mass.
 Third Vice-President, W. O. MUNDY, Master Mechanic St. Louis Transit Company, St. Louis, Mo.
 Secretary and Treasurer, Walter Mower, Detroit United Railway Company, Detroit, Mich.
 Executive Committee: The above officers, and T. J. MULLEN, Master Mechanic Scranton Railway Company, Scranton, Pa.; H. H. ADAMS, Master Mechanic United Railways and Electric Company, Baltimore, Md.; D. F. CARVER, Chief Engineer North Jersey Street Railway Company, Newark, N. J.; H. J. LAKE.

The California Street Railway Association.

President, CHAS. F. CROCKER, San Francisco.
 Vice-President, S. B. MCLENGAN, San Francisco.
 Secretary and Treasurer, J. E. MORRIS.
 Executive Committee: E. P. VINING, San Francisco; F. W. WOOD, Los Angeles; L. WHEELER, Alameda.

Colorado Electric Light, Power and Railway Association.

President, J. F. VAIL, Pueblo.
 Vice-President, WM. MAYHER, Greeley.
 Secretary and Treasurer, GEO. B. TRIPP, Colorado Springs.

Connecticut Street Railway Association.

President, J. B. CARRINGTON, New Haven.
 Vice-President, A. M. YOUNG, Branford.
 Secretary, E. W. POOLE, Bridgeport.

Treasurer, E. S. GOODRICH, Hartford.
 Executive Committee: The above officers and J. E. SEWELL, Bridgeport; C. S. TREADWAY, Bristol; WALTER LEAKED, New London.
 Next annual meeting, November, 1903.

The Maine Street Railway Association.

President, W. R. WOOD, Portland.
 Secretary and Treasurer, E. A. NEWMAN, 471 Congress St., Portland.
 Executive Committee: WILLIAM R. WOOD, Portland; AMOS F. GERRARD, Waterville; J. MANCHESTER HAINES, Augusta; G. E. MACOMBER, Rockland.

Massachusetts Street Railway Association.

President EDWARD P. SHAW, Newburyport.
 First Vice-President, FRANCIS H. DEWEY, Worcester.
 Second Vice-President, ROBT. S. GOFF, Fall River.
 Secretary, CHARLES C. CLARK, 70 Kilby St., Boston.
 Treasurer, FRED H. SMITH, Quincy.
 Executive Committee: President, Vice-Presidents and P. F. SULLIVAN, Lowell; H. H. CRAPO, New Bedford; WILLIAM S. LOOMIS, Holyoke; R. T. LAFIN, Worcester; and W. W. SARGENT, Fitchburg.
 Auditing Committee: GPO. W. COOK, Springfield, CHARLES F. GROSVENOR, Palmer; H. C. PAGE, Pittsfield.
 Monthly meetings second Wednesday of each month excepting July and August.

Michigan Interurban and Street Railway Association.

President, J. D. HAWKS, Detroit.
 Vice-President, W. L. JENKS, Port Huron.
 Secretary and Treasurer, BENJAMIN S. HANCHETT, Grand Rapids.
 Executive Committee: Officers of the Association and STRATHEARN HENDRIE and JOHN WINTER, Detroit.
 Next meeting to be held at call of president.

New England Street Railway Club.

President, H. E. FARRINGTON, Chelsea, Mass.
 Vice-President, E. E. POTTER, New Bedford, Mass.
 Vice-Presidents for States, W. G. MELOON, Kittery, Me.; H. A. ALBIN, Concord, N. H.; A. J. CROSBY, Springfield, Vt.; H. W. YOUNG, Woonsocket, R. I.; J. S. THORNTON, Putnam, Conn.
 Secretary and Treasurer, J. H. NEAL, of the Boston Elevated Railway Company, 101 Milk St., Boston, Mass.
 Executive Committee: President, Vice-Presidents and Secretary-Treasurer; D. L. PRENDERGAST, Boston; A. J. PURINTON, Palmer; H. E. REYNOLDS, Quincy; P. W. DAVIS, Boston; FRANK J. STONE, Manager Electric Storage Battery Company, Boston; FRANKLIN HUNTRESS, Boston; JOHN C. SPRING, Boston.
 Finance Committee: J. F. WATTLES, Boston, Mass.; H. E. FARRINGTON, Chelsea, Mass.; PAUL WINSOR, Boston, Mass.
 Meetings are held the last Thursday of every month at various points in New England.

New York State Street Railway Association.

President, E. G. CONNETTE, Syracuse.
 First Vice-President, A. B. COLVIN, Glens Falls.
 Second Vice-President, J. L. HEINS, Brooklyn.
 Secretary and Treasurer, W. W. COLE, Elmira.
 Executive Committee: C. L. ALLEN, Utica; B. B. NOSTRAND, JR., Peekskill; W. H. POUCH, Newburgh; J. H. PARDEE, Canandaigua.

Ohio Street Railway Association.

President, S. L. NELSON, Springfield.
 Vice-President, JOHN F. FLOO, Steubenville.
 Secretary and Treasurer, CHAS. CURRIE, Akron.
 Executive Committee, A. A. ANDERSON, Youngstown; W. A. LYNCH, Canton.

Pennsylvania State Street Railway Association.

President, F. B. MUSSER, Harrisburg.
 Secretary, CHARLES H. SMITH, Lebanon.
 Treasurer, W. H. LANIUS, York.
 Executive Committee: The President, Secretary, Treasurer and B. F. MEYERS, Harrisburg; JOHN A. RIGG, Philadelphia.

Southwestern Gas, Electric and Street Railway Association.

Acting President, A. E. JUDGE, Tyler, Tex.
 Vice-Presidents, F. DYSTERUD, Monterey, Mexico; CHAS. F. YRAGER, Laredo, Tex.; H. F. MACGREGOR, Houston, Tex.
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 Executive Committee: Officers and Messrs. BROCA, Paris; GERON, Cologne; KESSELS, Brussels; KÖHLER, Berlin; LAVALARD, Paris; ZIFFER, Vienna.
 Next convention, Vienna, 1904 (date to be fixed by Executive Committee).

Municipal Tramways Association.

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 Executive Committee: Officers of the Association and Councillor WALTER PATTON, Glasgow; Councillor BOYLE, Manchester; Councillor SMITHSON, Leeds; C. J. SPENCER, Bradford; H. ENGLAND, Sunderland and P. FISHER, Dundee.
 Next meeting to be held in Liverpool in 1904.

Tramways and Light Railway Association (London, England).

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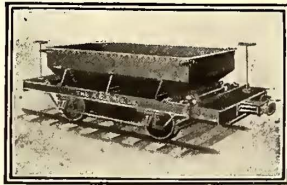
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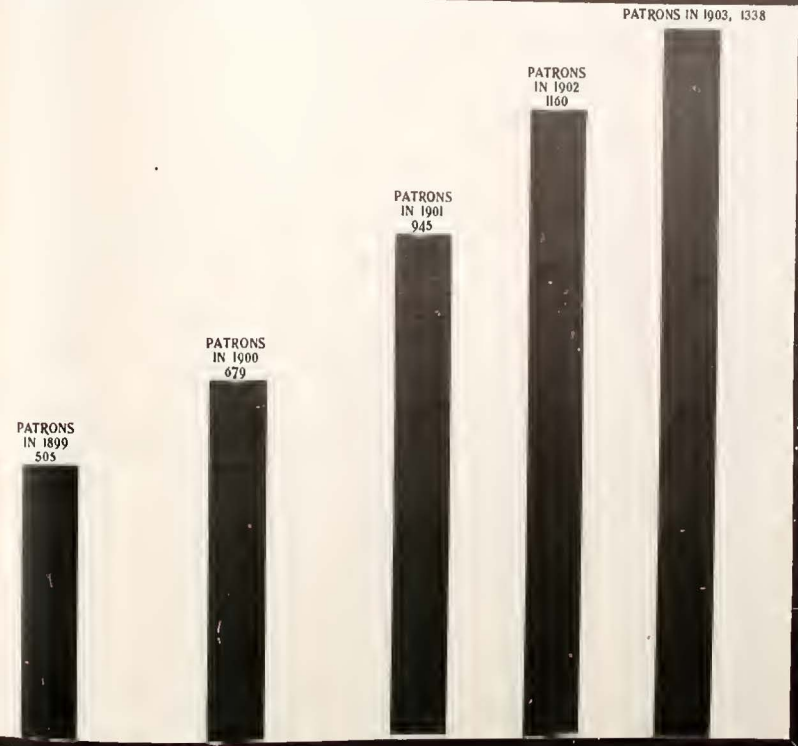
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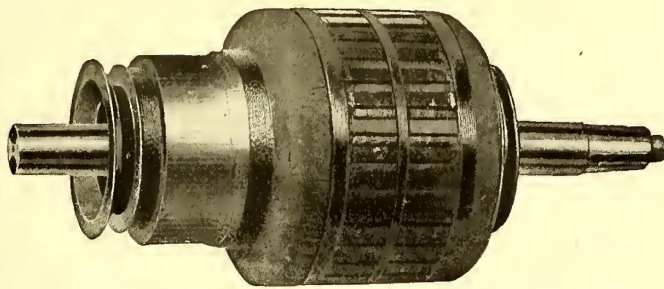
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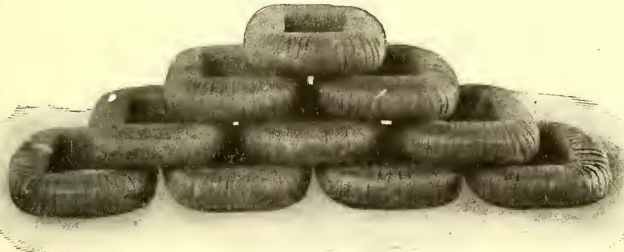
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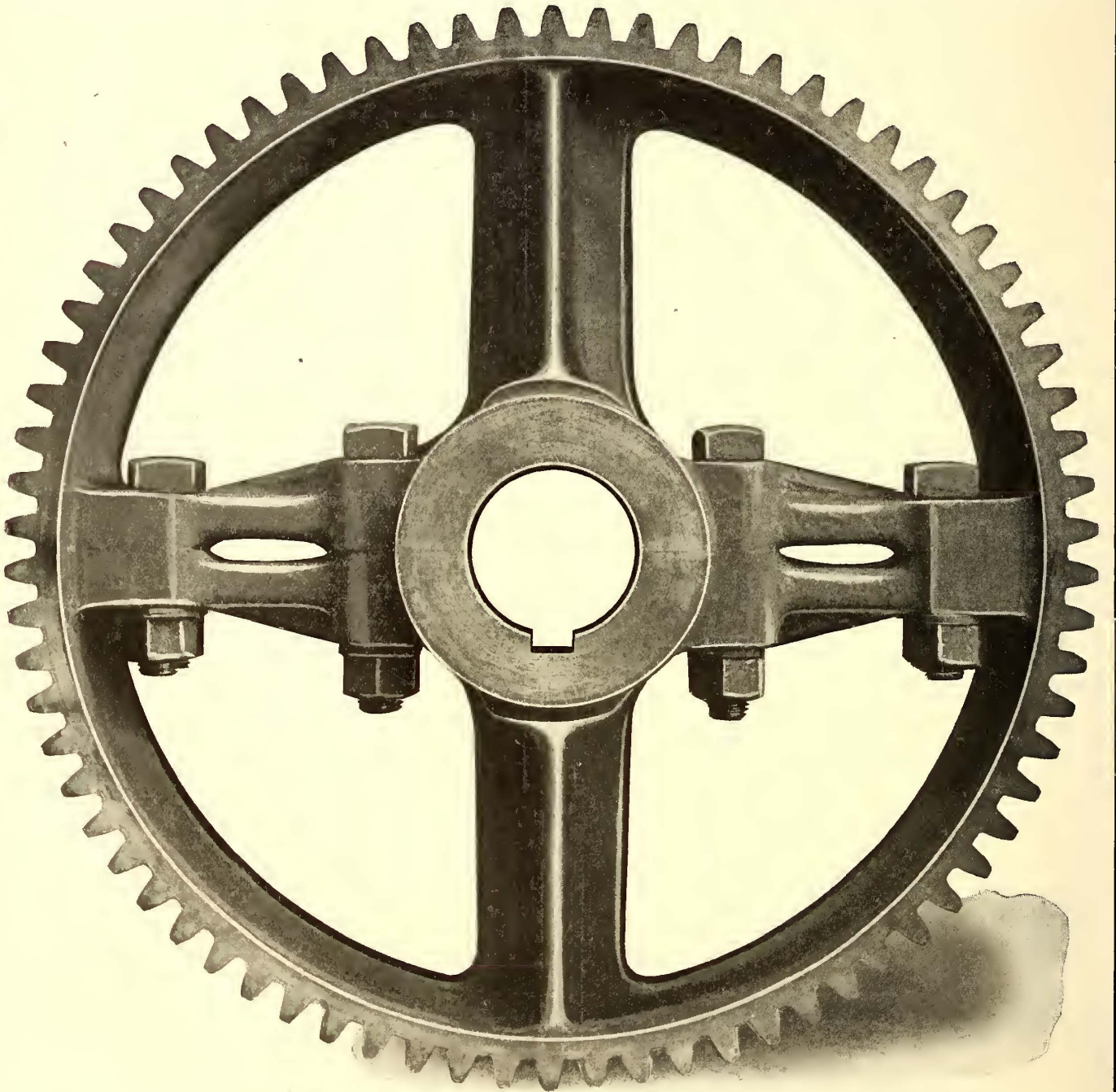
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- 1885—March, May, June.
- 1886—March, April, June, July, August, September, October, November, December.
- 1887—February, April, May.
- 1888—January, February, June.
- 1889—January, March, June, October, November.
- 1890—June.
- 1892—January.
- 1894—November, December.
- 1895—August.
- 1898—International Edition; September.
- 1900—American Edition; January 13; February 10; March 4; April 21; May 5; August 25; September 1; November 3.
- International Edition; April, June.
- 1901—American Edition; January 5; April 6, 20; May 4, 11; October 6.
- 1902—American Edition; May 3.

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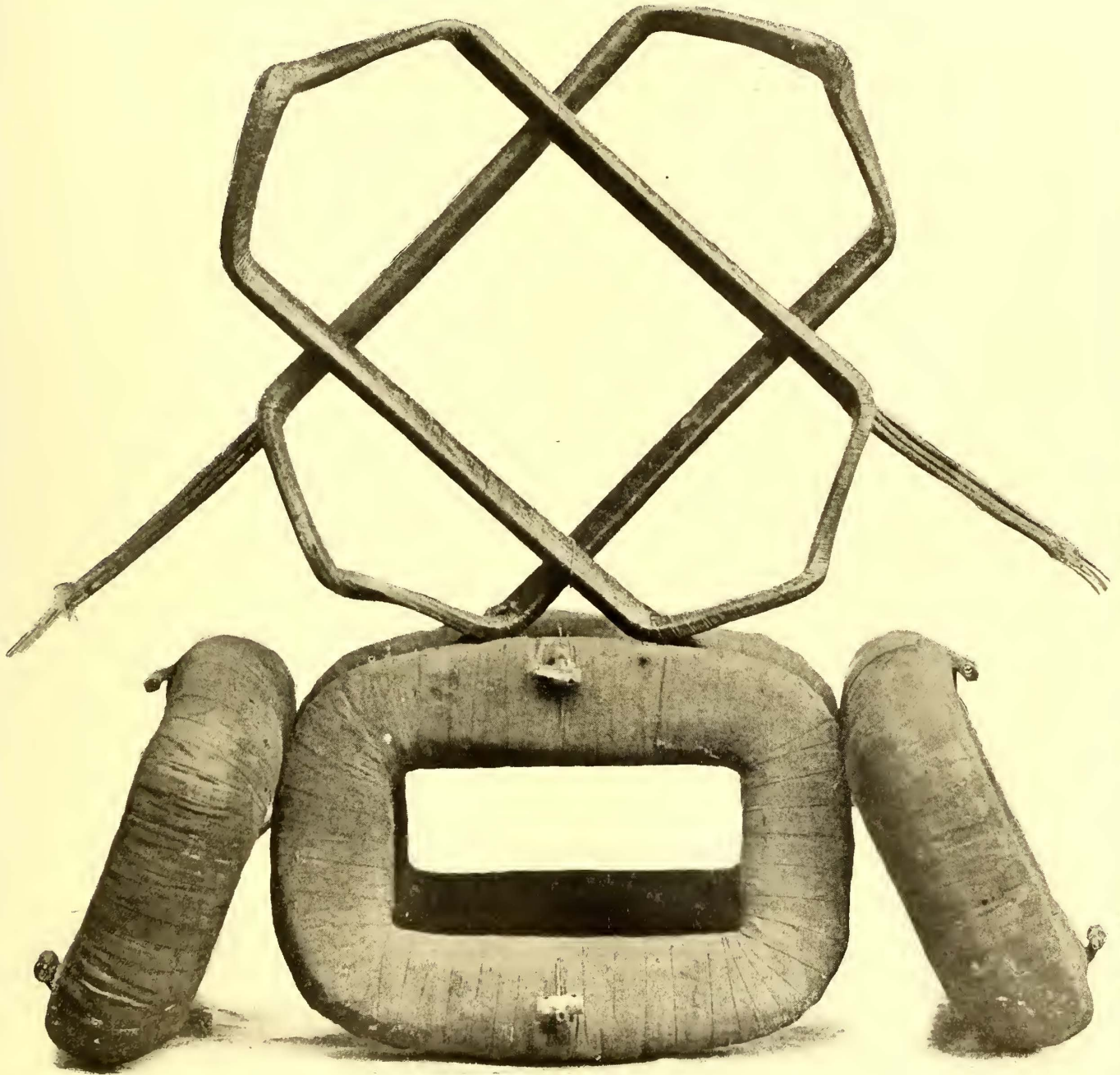
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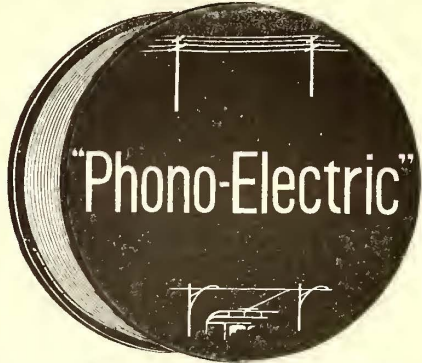
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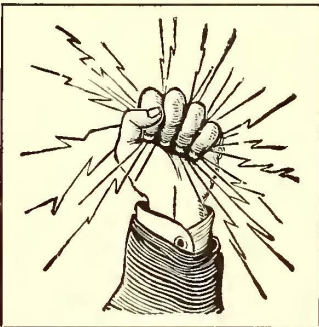
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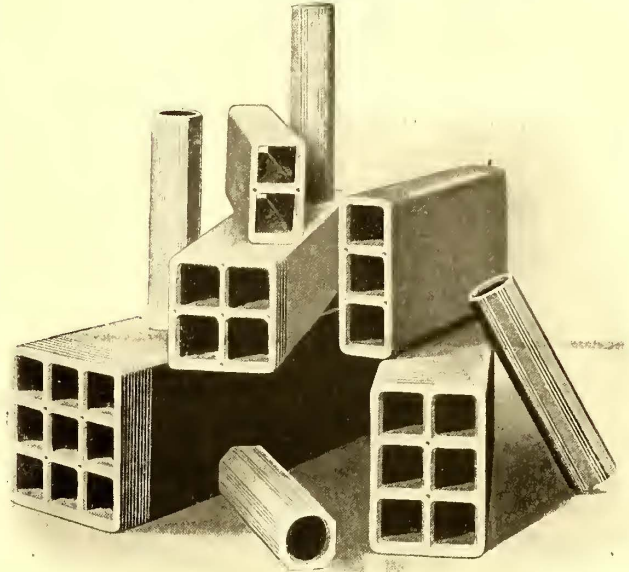
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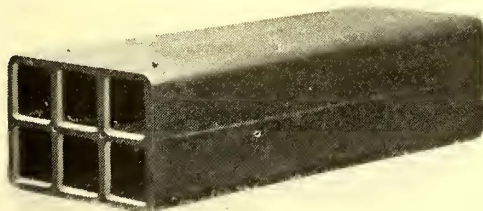
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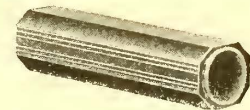
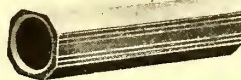
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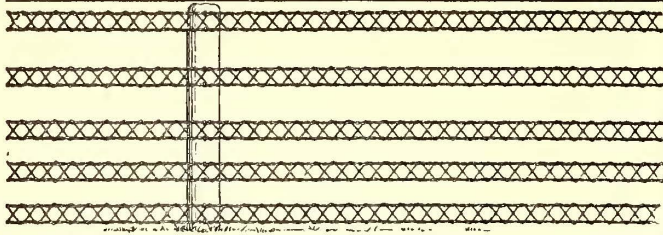
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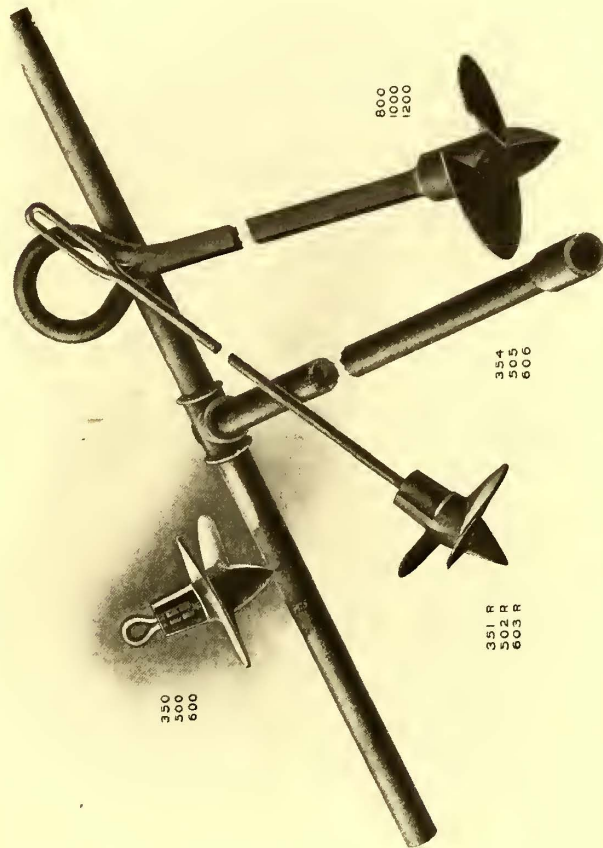
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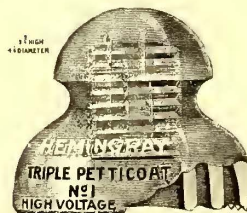


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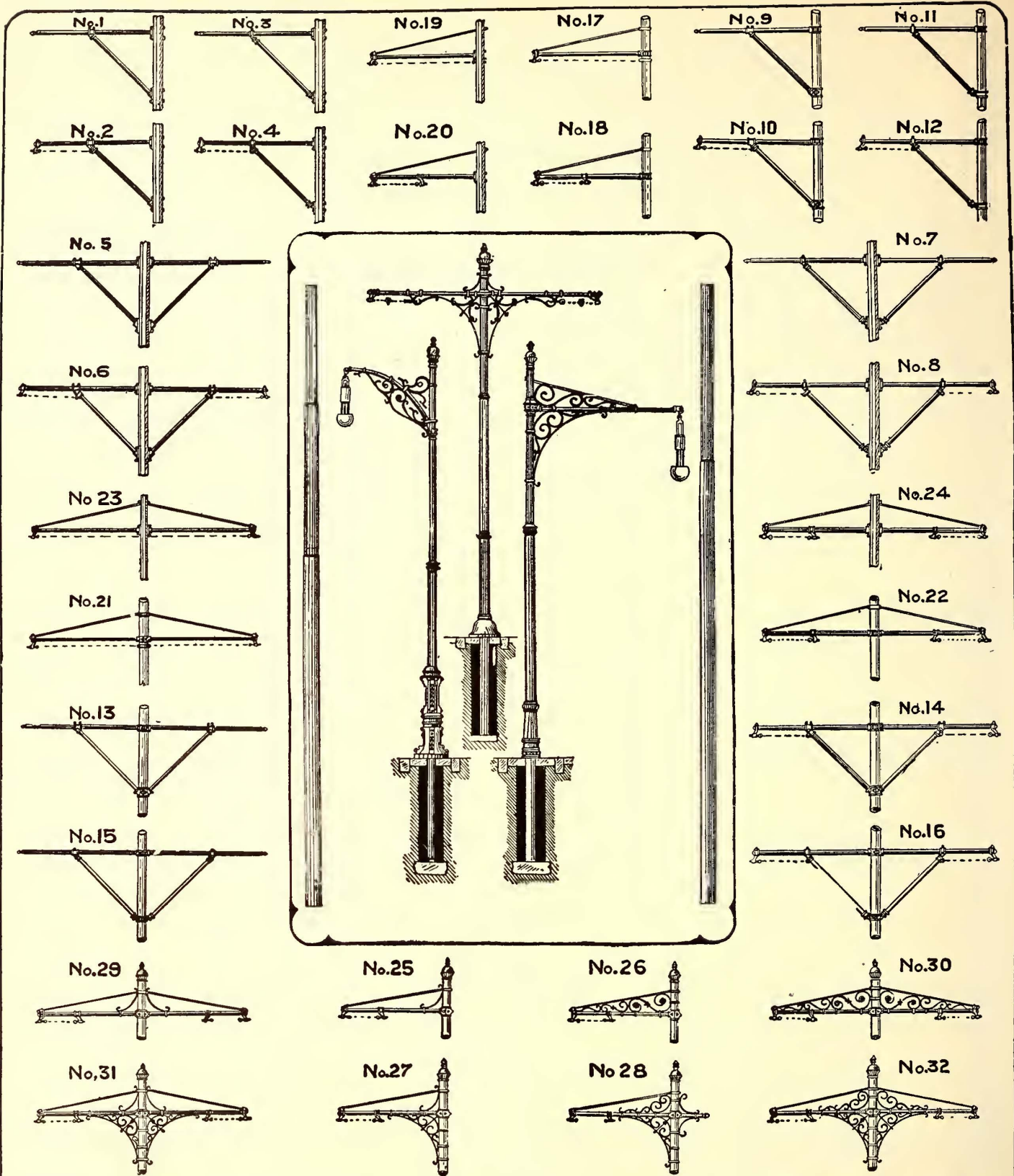


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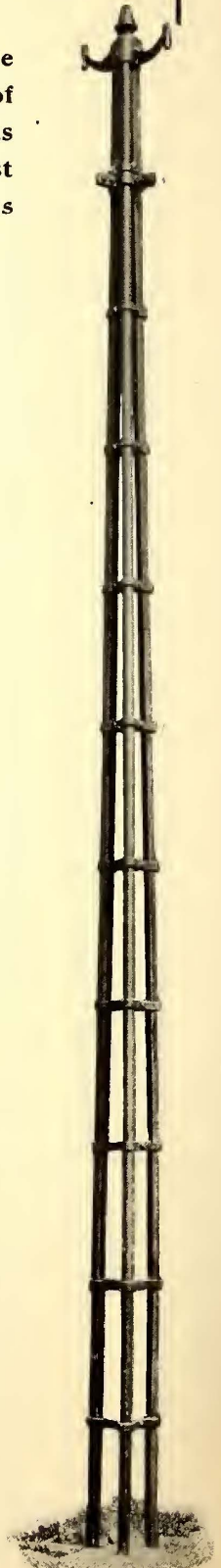
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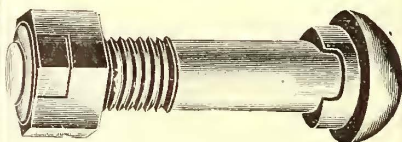
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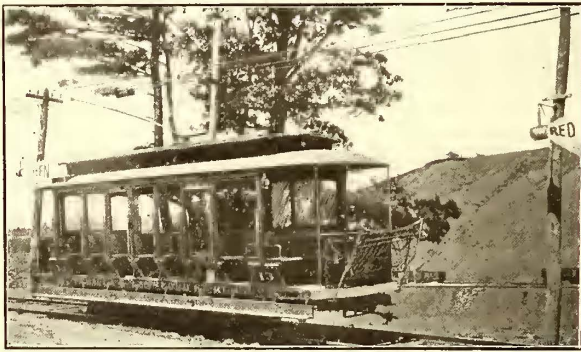
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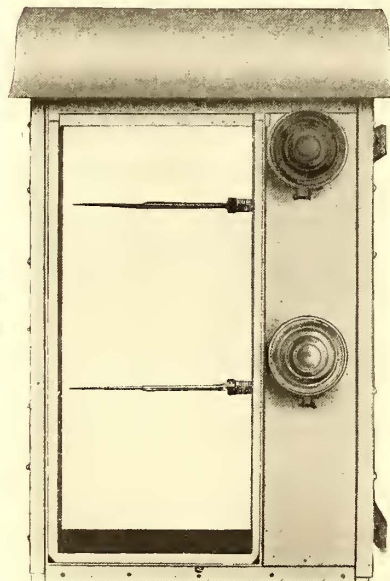
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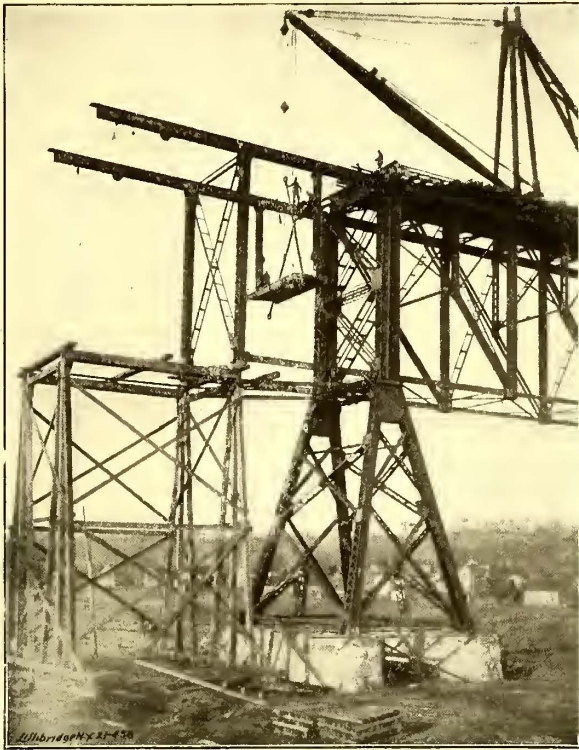
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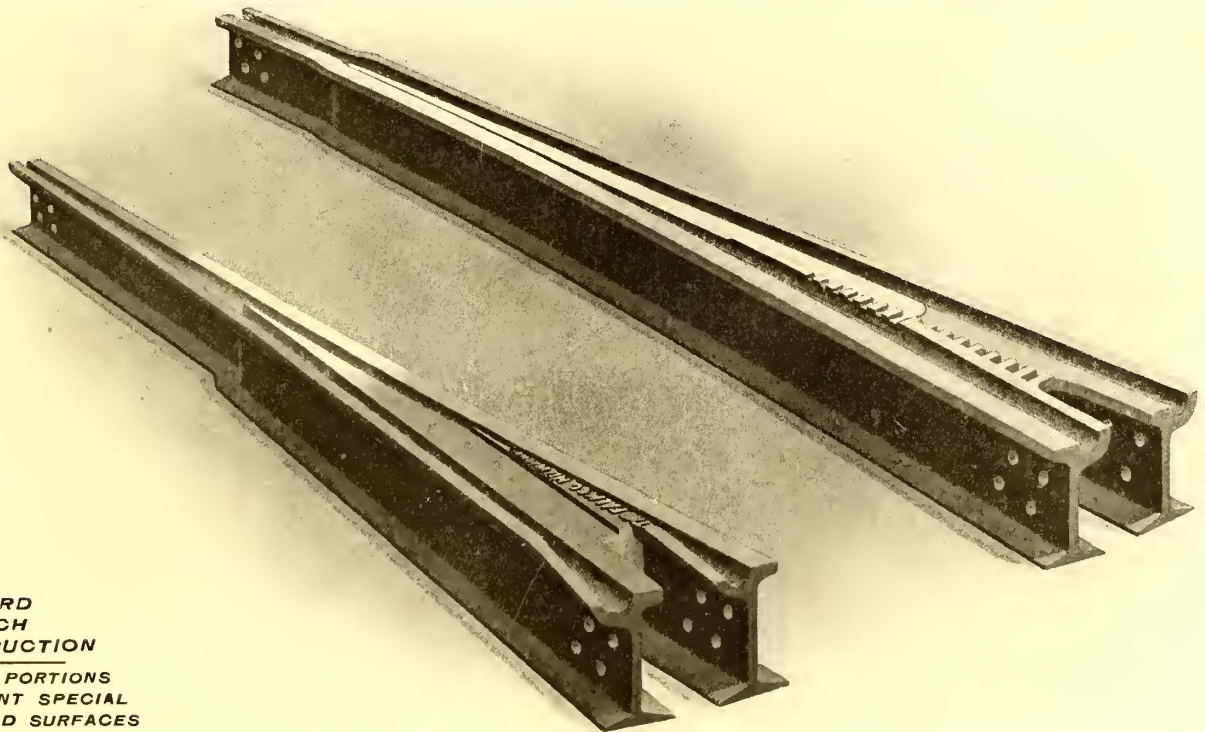
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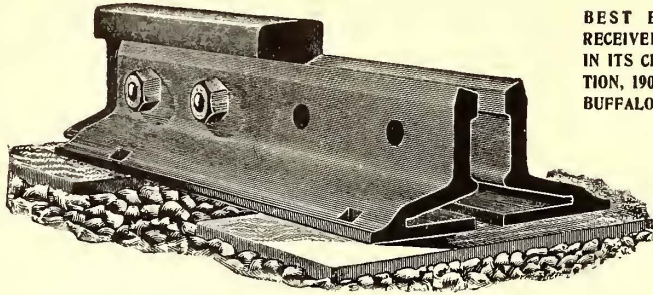
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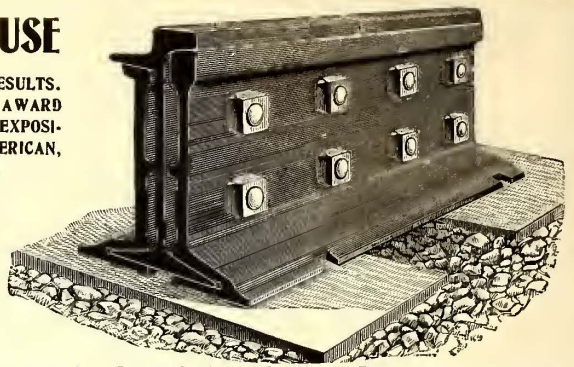
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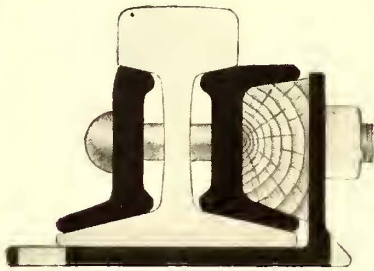
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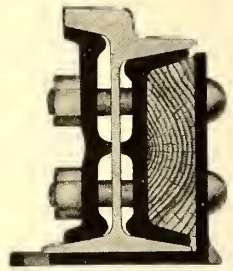
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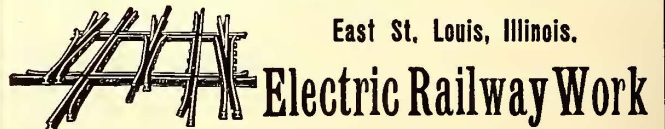
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Takes the place of oil
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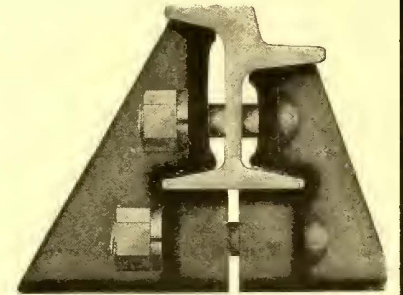
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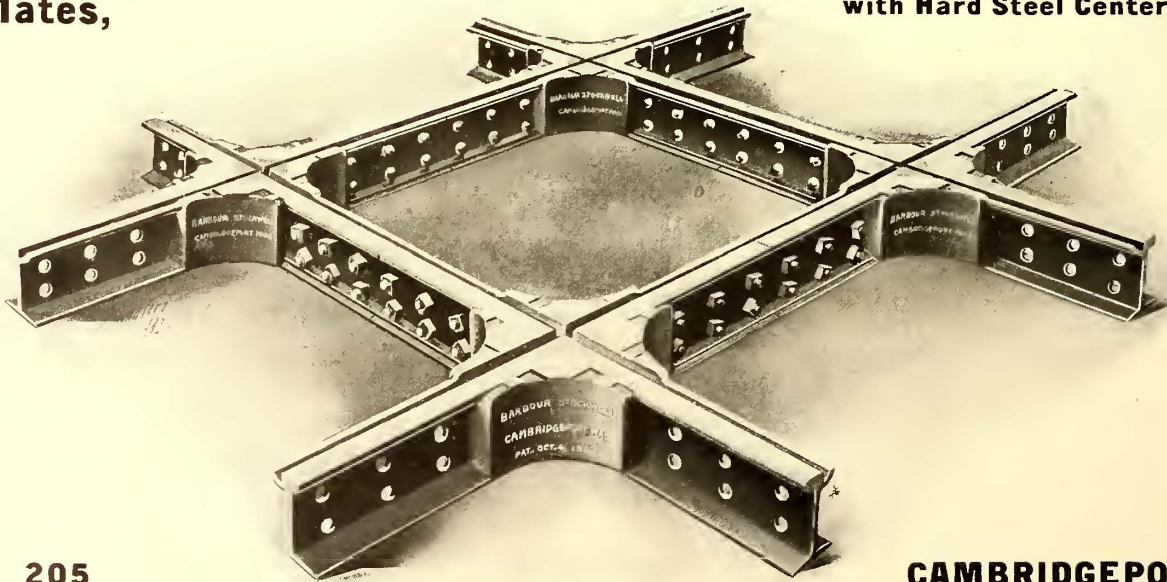


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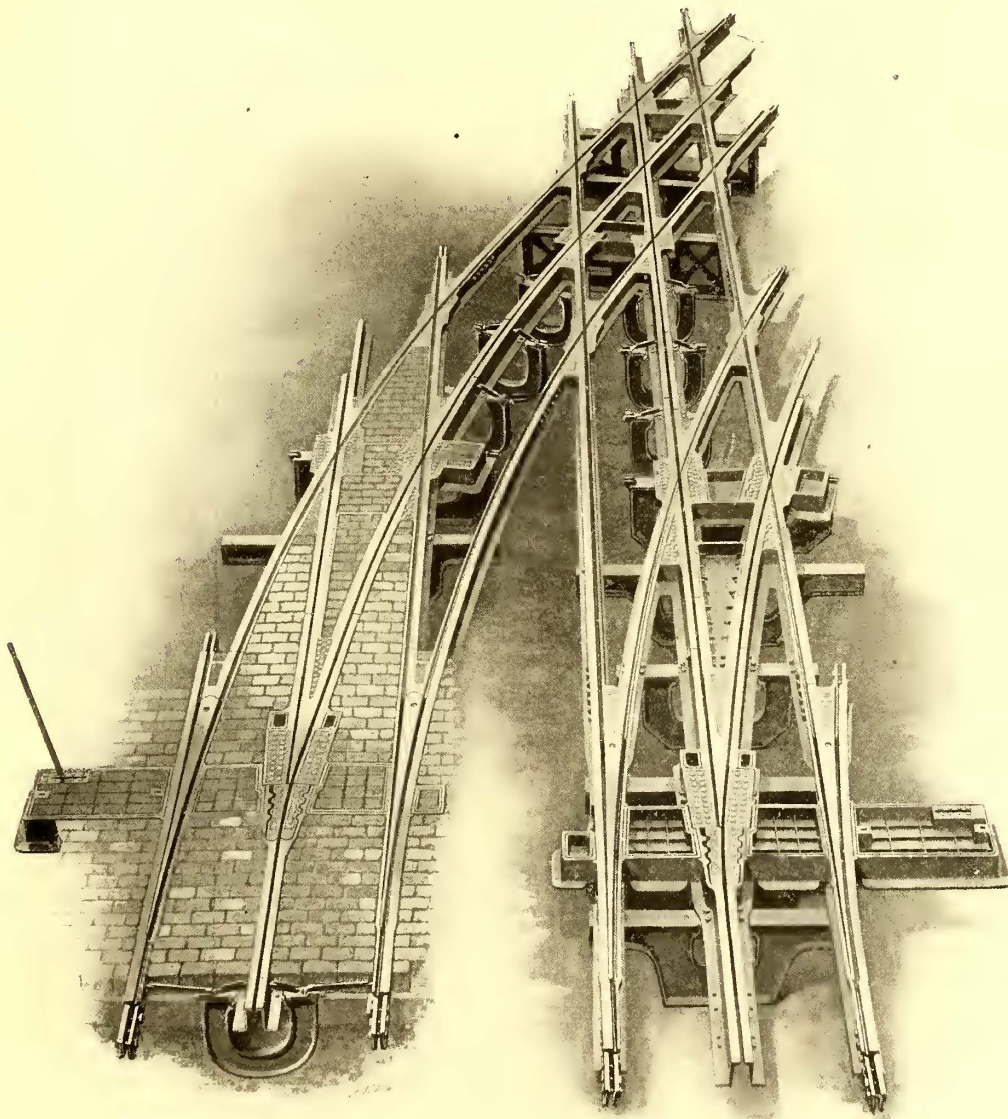
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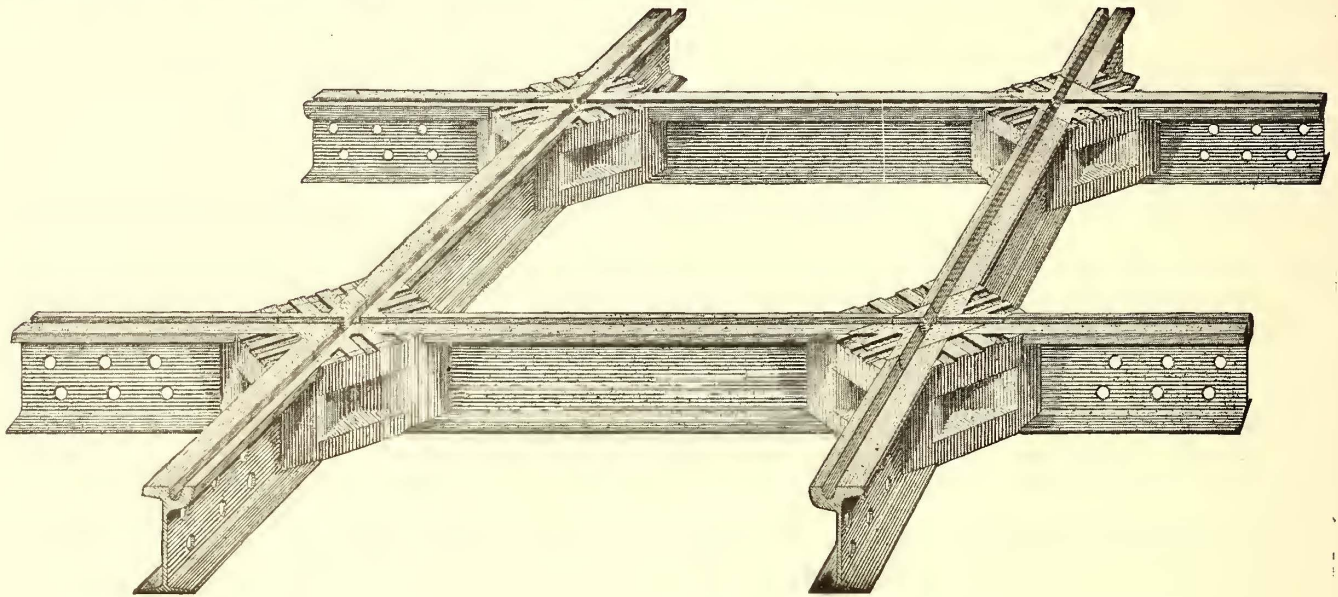
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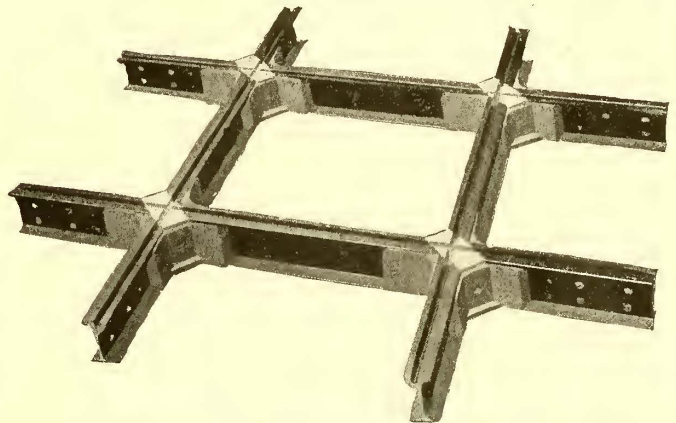
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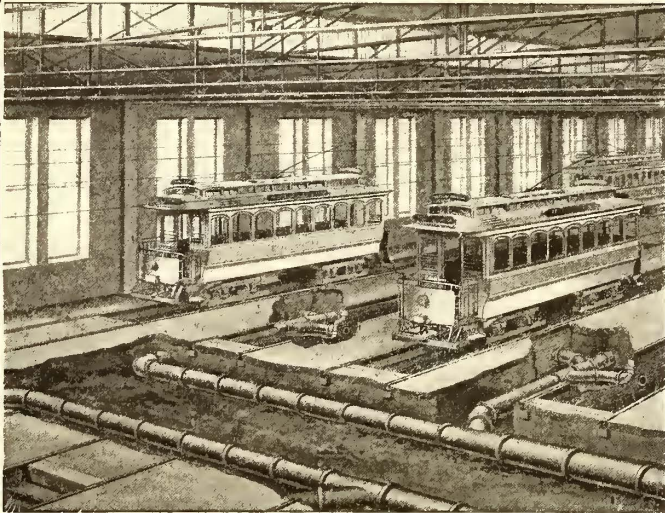
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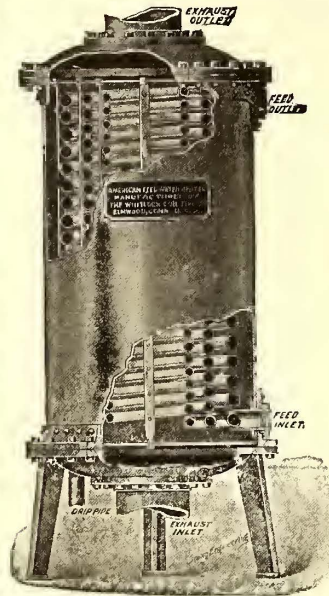
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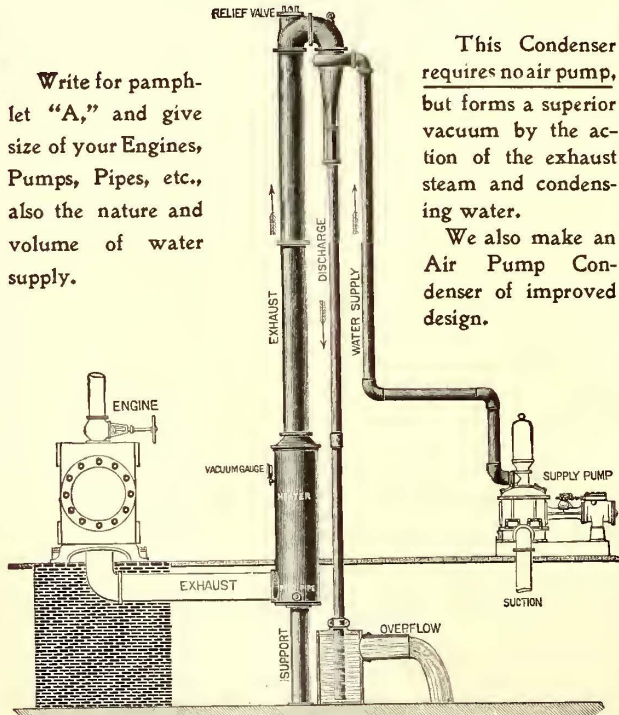
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Write for pamphlet "A," and give size of your Engines, Pumps, Pipes, etc., also the nature and volume of water supply.

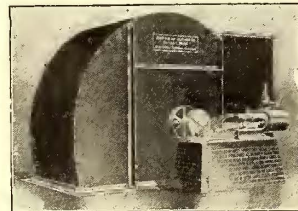


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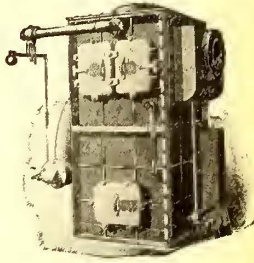


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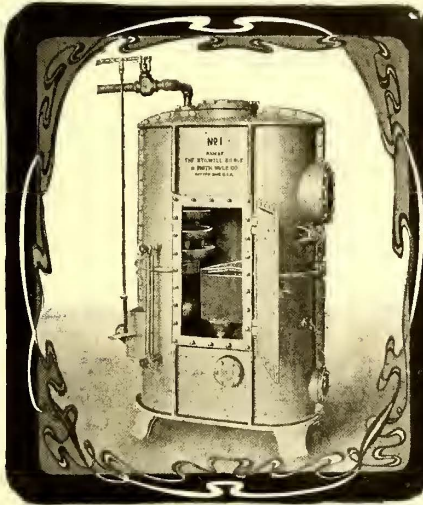
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A COCHRANE FEED WATER HEATER will increase the efficiency and economical operation of an electric railway or lighting plant, even though the plant is run condensing, and the auxiliaries—the pumps and small engines—are now driven by belts or motors. The best practice, as proven by actual installations and tests, is to run these auxiliaries *non-condensing*, utilizing the exhaust steam from them for heating the feed water in an "open" feed water heater. If the auxiliaries are run condensing, about 15 per cent. of the steam required by them will be converted into work; the remaining 85 per cent. will be carried away and wasted in the condensing water (except the very small part that is saved if the feed supply is taken from a hot well). On the other hand, if the auxiliaries are run non-condensing, only about 5 per cent. of the steam will be converted into work, but the remaining 95 per cent. will be saved and returned to the boilers if the exhaust from the auxiliaries is utilized in a Cochrane Heater. If you are interested, we shall be pleased to go into the whys and wherefores with you, and to submit a list of street railway plants in which Cochrane Heaters are used.



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MUCH WASTE AND DIRTY BOILERS,		NO WASTE AND CLEAN BOILERS

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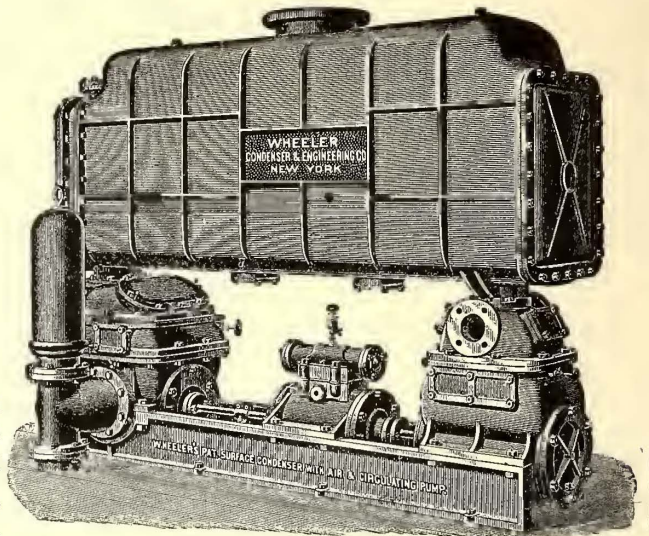
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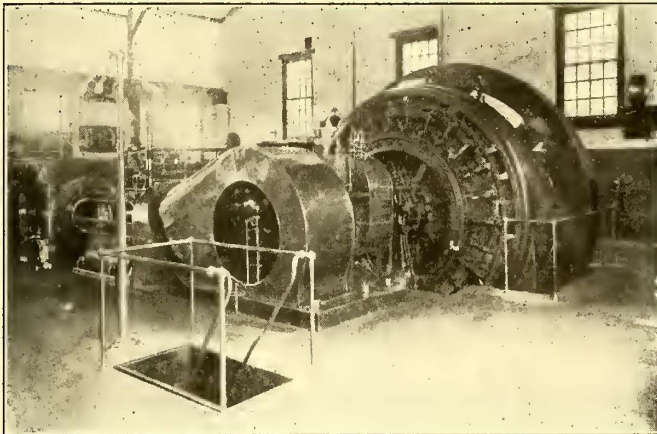
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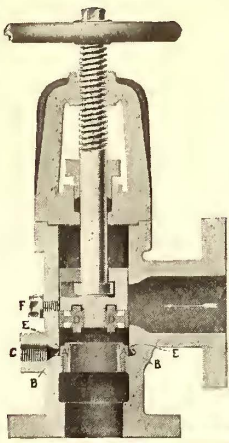
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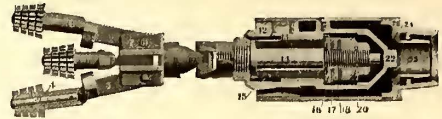


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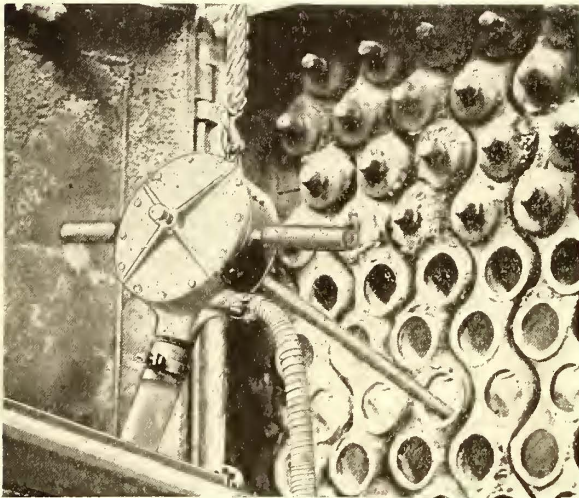


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Solves the Problem of Economical Boiler Cleaning

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We take special care in its preparation.

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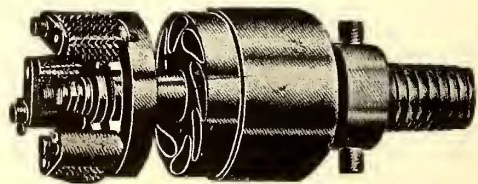
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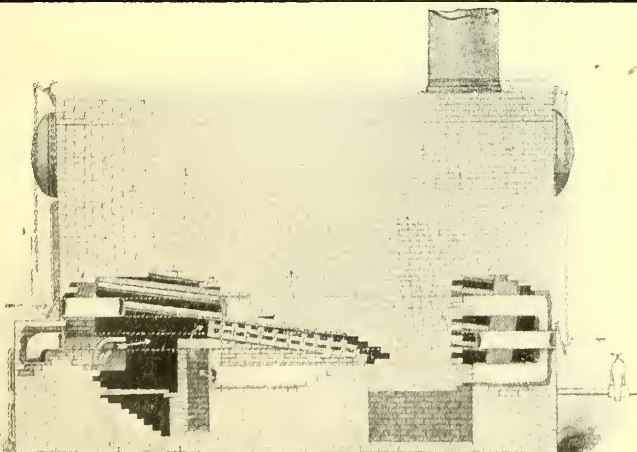
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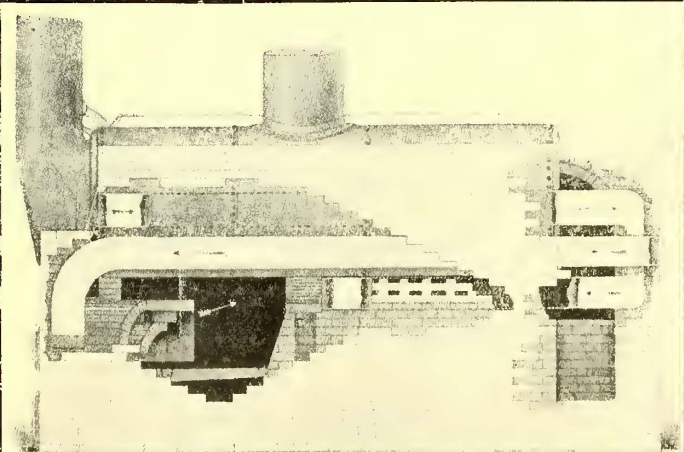
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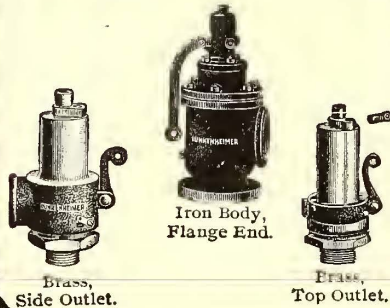
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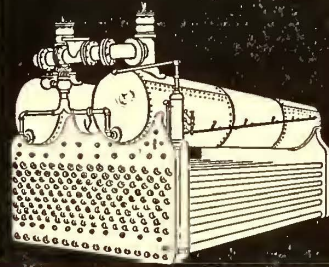
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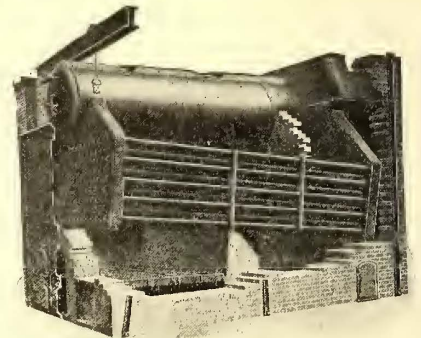
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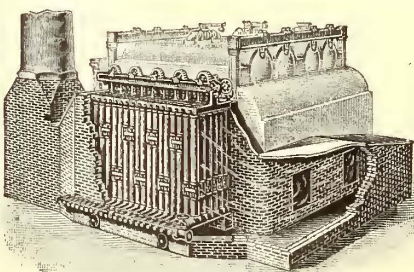
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167 CALLE DE LA HAVANA

Partial List of BABCOCK & WILCOX BOILERS Sold for Electric and Cable Railways.

	H.P.		H.P.
Metropolitan St. Ry. Co., New York.....	12 orders, '94-'00..	59,100	
Manhattan Elevated Ry. Co., New York.....	'99..	33,500	
Boston Elevated R. R. Co., Boston, Mass.....	12 orders, '89-'99..	22,500	
Union Traction Co., Philadelphia, Pa.....	9 orders, '93-'95..	21,675	
Brooklyn Rapid Transit Co., Brooklyn, N. Y.....	13 orders, '91-'97..	20,000	
Union Elevated R. R. Co., Chicago, Ill.....	1 order, '96..	6,400	
Northwestern Elevated R. R. Co., Chicago, Ill.....	1 order, '96..	6,400	
Metropolitan West Side Elevated R. R. Co., Chicago, Ill.....	2 orders, '94-'98..	6,000	
Consolidated Traction Co., Pittsburg, Pa.....	2 orders, '97-'99..	6,000	
North Jersey St. Ry. Co., Jersey City, N. J.....	6 orders, '93-'99..	6,000	
South Side Elevated R. R. Co., Chicago, Ill.....	2 orders, '97-'98..	4,800	
Metropolitan St. Ry. Co., Kansas City, Mo.....	6 orders, '86-'96..	4,696	
Buffalo St. Ry. Co., Buffalo, N. Y.....	3 orders, '90-'93..	4,500	
Louisville Ry. Co., Louisville, Ky.....	3 orders, '96-'00..	4,062	
United Rys. & Elect. Co., Baltimore, Md.....	1 order, '90..	4,000	
Lynn & Boston R. R. Boston, Mass.....	3 orders, '90-'92..	4,000	
Cincinnati St. Ry. Co., Cincinnati, O.....	5 orders, '90-'93..	3,300	
Citizens St Ry. Co., Detroit, Mich.....	3 orders, '95..	3,500	
Denver City Tramway Co., Denver, Colo.....	3 orders, '89-'91..	2,686	
United Traction Co., Pittsburg, Pa.....	2 orders, '99..	2,436	
Union Traction Co., Anderson, Ind.....	2 orders, '98-'99..	2,400	
Cleveland Elect. Ry. Co., Cleveland, O.....	2 orders, '98-'99..	2,378	
Market St. Cable Ry. Co., San Francisco, Cal.....	3 orders..	2,208	
Virginia Ry. & Dev. Co. Richmond, Va.....	1 order, '00..	2,080	
St. Joseph Ry. Light, Heating & Power Co., St. Joseph, Mo.....	3 orders, '98-'99..	2,057	
Union R. R. Co., Providence, R. I.....	2 orders, '92-'93..	2,000	
United Traction Co., Albany, N. Y.....	5 orders, '89-'99..	2,000	
Springfield St. Ry. Co., Springfield, Mass.....	4 orders, '94-'00..	2,000	
Columbus St. Ry. Co., Columbus, O.....	4 orders, '90-'93..	1,807	
Charleston Consolidated Ry., Gas & Elect. Co., Charleston, S. C.....	3 orders, '97-'00..	1,800	
N. Y. & Brooklyn Bridge, Brooklyn, N. Y.....	5 orders, '92-'96..	1,786	
Dayton, Springfield & Urbana St. Ry. Co., Dayton, O.....	2 orders, '99..	1,702	
Florence & Cripple Creek Ry. Co., Goldfield, Col.....	1 order, '98..	1,584	
Duluth St. Ry. Co., Duluth, Minn.....	4 orders, '90-'93..	1,312	
Richmond Passenger & Power Co., Richmond, Va.....	2 orders, '90-'00..	1,339	
Detroit, Ypsilanti & Ann Arbor St. Ry. Co., Ypsilanti, Mich.....	2 orders, '98..	1,380	
Pittsburg & Birmingham Traction Co., Pittsburg, Pa.....	2 orders, '90-'00..	1,528	
Rochester St. Ry. Co., Rochester, N. Y.....	3 orders, '91-'94..	1,143	
Atlanta Ry. & Power Co.....	2 orders, '00..	2,400	
Union R. R. Co., New York.....	2 orders, '91-'92..	1,500	

Note the number and size of the renewal orders.

BABCOCK & WILCOX Boilers sold for Street Railway Purposes amount in the aggregate to over 400,000 H.P.

"CAHALL"

VERTICAL and HORIZONTAL WATER TUBE BOILERS

Repeated Orders January 1st, 1894, to September 30, 1903. 264 Firms placed 1,002 orders for Cahall Boilers Aggregating 938,028 H. P. Nearly 2,000,000 H. P. in use.

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CAHALL SALES DEPARTMENT, Farmers' Bank Building, Pittsburg, Pa.



The STIRLING BOILER

The only Water-tube Boiler made which Combines Extreme Simplicity with Every Essential to Safety, Durability and Efficiency. Wrought Metal throughout. No gaskets or ground joints. *Four* Manholes give access to every tube. Peculiarly adaptable to the use of low grade fuels.

THE STIRLING COMPANY

General Offices: Pullman Building
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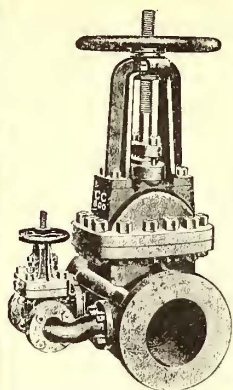
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Philadelphia

Boston
Cincinnati

Pittsburg
San Francisco

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Toledo

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CRANE HIGH PRESSURE VALVES

Recommended for 250 lbs. steam working pressure. Tested to 800 lbs. Hydraulic pressure. In Brass or Iron. Each one rigidly tested and inspected before shipment. Iron valves made screwed or flanged, with stationary or rising stems and hard metal seats. Sizes 7 inches and larger made with by-pass.

We take contracts from drawings for complete piping equipments for power plants, cut, fitted and tested, ready for erection.

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CRANE CO.
CHICAGO
ESTABLISHED 1855

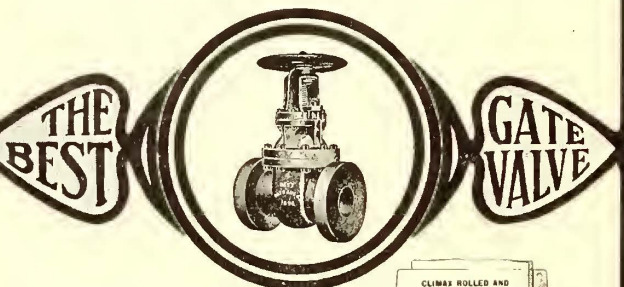
SEATTLE
ST. LOUIS
MINNEAPOLIS
LOS ANGELES

SAN FRANCISCO
SALT LAKE CITY
WATERTOWN, S. D.
PORTLAND, ORE.

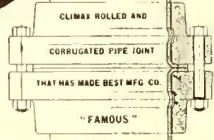
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PIPING "ENGINEERS"

FURNISH AND ERECT
STEAM, WATER AIR OR HYDRAULIC
PIPING SYSTEMS.



- Best Gate Valves.
- Climax Globe and Angle Valves.
- Climax 3 and 4 Way Hydraulic Valves.
- Gulland Float Valves.
- Gulland Non-Return Valves.
- Centrifugal Separators.



Valves, Fittings and Piping for Superheated Steam

PIPE BENDING A SPECIALTY.

PITTSBURG, PA.

Philadelphia,

New York.

TEMPERATURE AFTER LEAVING ECONOMIZER 300 DEGREES

"AMERICAN" FUEL ECONOMIZER

(Bromell's Patents)
(Burpee's Patents)

Manufactured by
Bromell, Schmidt and Steacy Co.
York, Pa.

THE PROFITS ARE NOT ALL GOING OUT OF THIS STACK

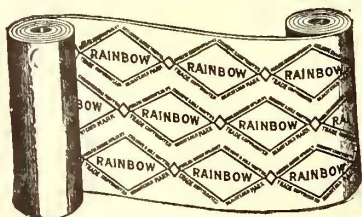
WATER ENTERING THE ECONOMIZER 150 DEGREES.

WATER TO BOILER'S 275 DEGREES

TEMPERATURE OF GASES FROM BOILER'S 300 DEGREES

A large body of very hot water always ready for use is of great advantage in keeping regular steam pressure. Boilers are supplied with purified water, fewer boilers are required and much less repairs—all from waste heat.

THE BEST FLANGE PACKING MADE



Rainbow Packing

MAKES A STEAM, FLANGE, AND HOT WATER JOINT INSTANTLY
Don't have to use wire and cloth to hold Rainbow. Can't blow it out. Thousands of imitators. No equal. Will hold highest pressure.

THE COLOR OF RAINBOW PACKING IS RED, three rows of diamonds extending throughout the entire length of each and every roll of Rainbow Packing.

Steam heating companies can make thousands of joints in new plants without the use of steam, with the assurance and guarantee that when steam is applied every joint will be perfectly tight, saving the labor of baking and following up, etc., as is the case when usudurian or plumbago packings are used, thereby saving from 100 to 300 per cent. of labor and time.

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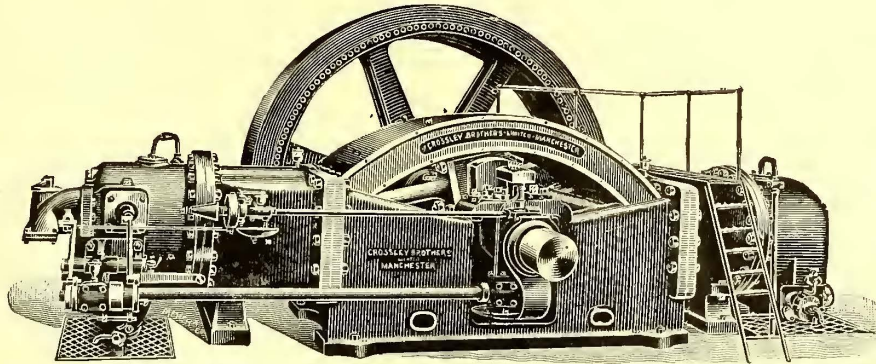
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LOOMIS-PETTIBONE GAS MACHINERY CO.

Gas Power
for
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Gas
for
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CROSSLEY GAS ENGINE, 500 BRAKE HORSE POWER

Loomis-Pettibone Gas Generating System Crossley Gas Engines

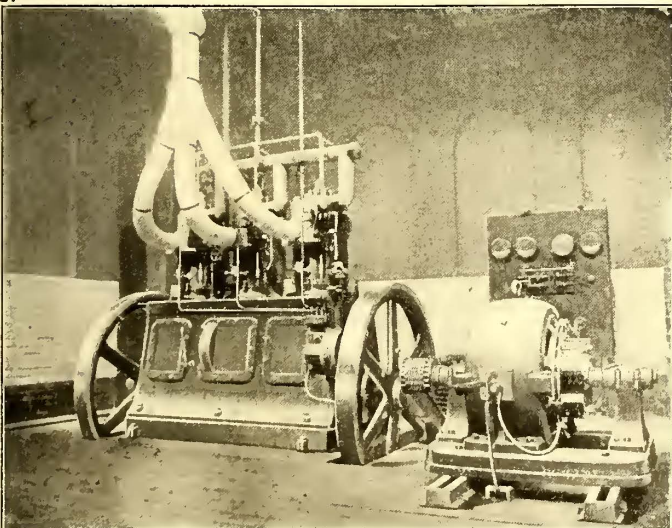
OUR GUARANTEE: ~~1 POUND OF COAL, OR~~
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46,000 Crossley Engines Now in Operation

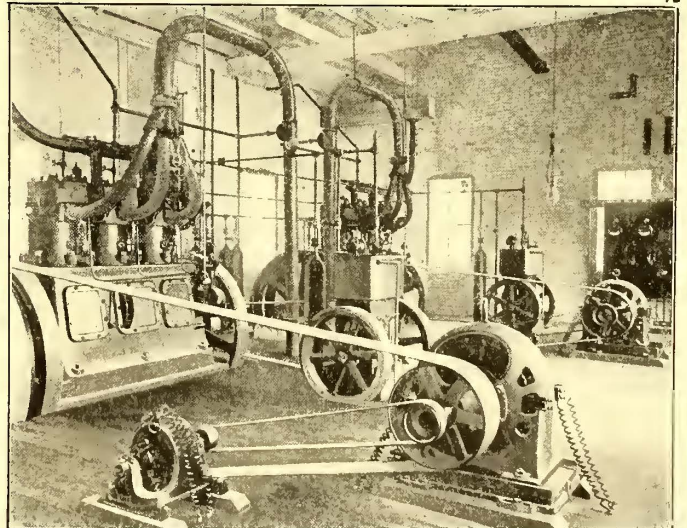
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DIESEL OIL ENGINES



75 HP. ENGINE OPERATING DYNAMO WITH CHAIN DRIVE.
GUARANTEED CONSUMPTION OF CRUDE OR FUEL OIL
NOT TO EXCEED 9 GALLONS PER 100 HP. HOURS.



2-75 HP. ENGINES, DRIVING 2-50 KW. GENERATORS.
COST OF POWER, FULL LOAD, 7.5 MILLS PER KW. HOURS
" " " 1-3 " 1.5 CENTS " " "
(Including labor and supplies)

FOR FURTHER PARTICULARS APPLY TO

AMERICAN DIESEL ENGINE COMPANY

11 BROADWAY, NEW YORK

The Warren Rotary Engine

An ENGINE—Not a Turbine

The New Prime Mover, "built around a Principle"

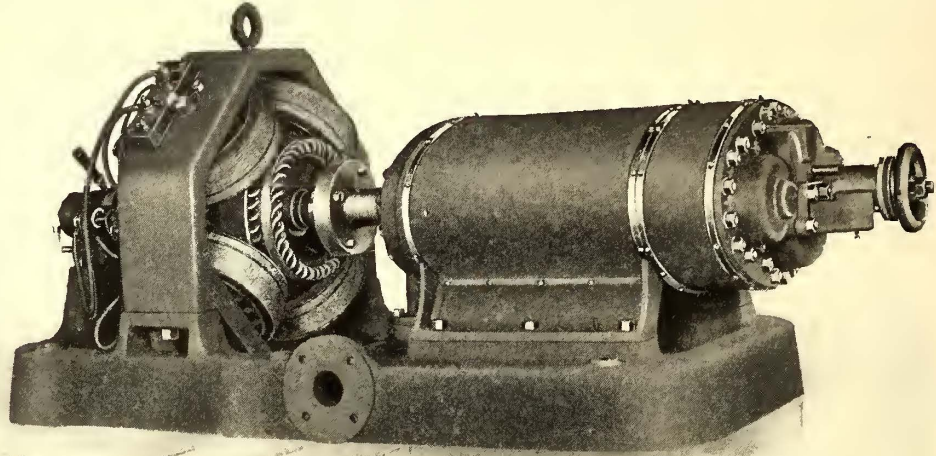
No such TIMELY occurrence as the present commercial introduction of the Perfected Rotary Engine has ever before marked the history of Steam Engineering.

The need for a "Rational" Prime Mover was never more imperative.

The Warren Engine furnishes the solution of the pressing problem of modern power generation.

We can now make early delivery of the "Rotary" Generating Units in all sizes from 12½ to 200 K. W. and will soon be prepared to enter the field of large powers.

We are mailing an interesting bulletin, which explains.

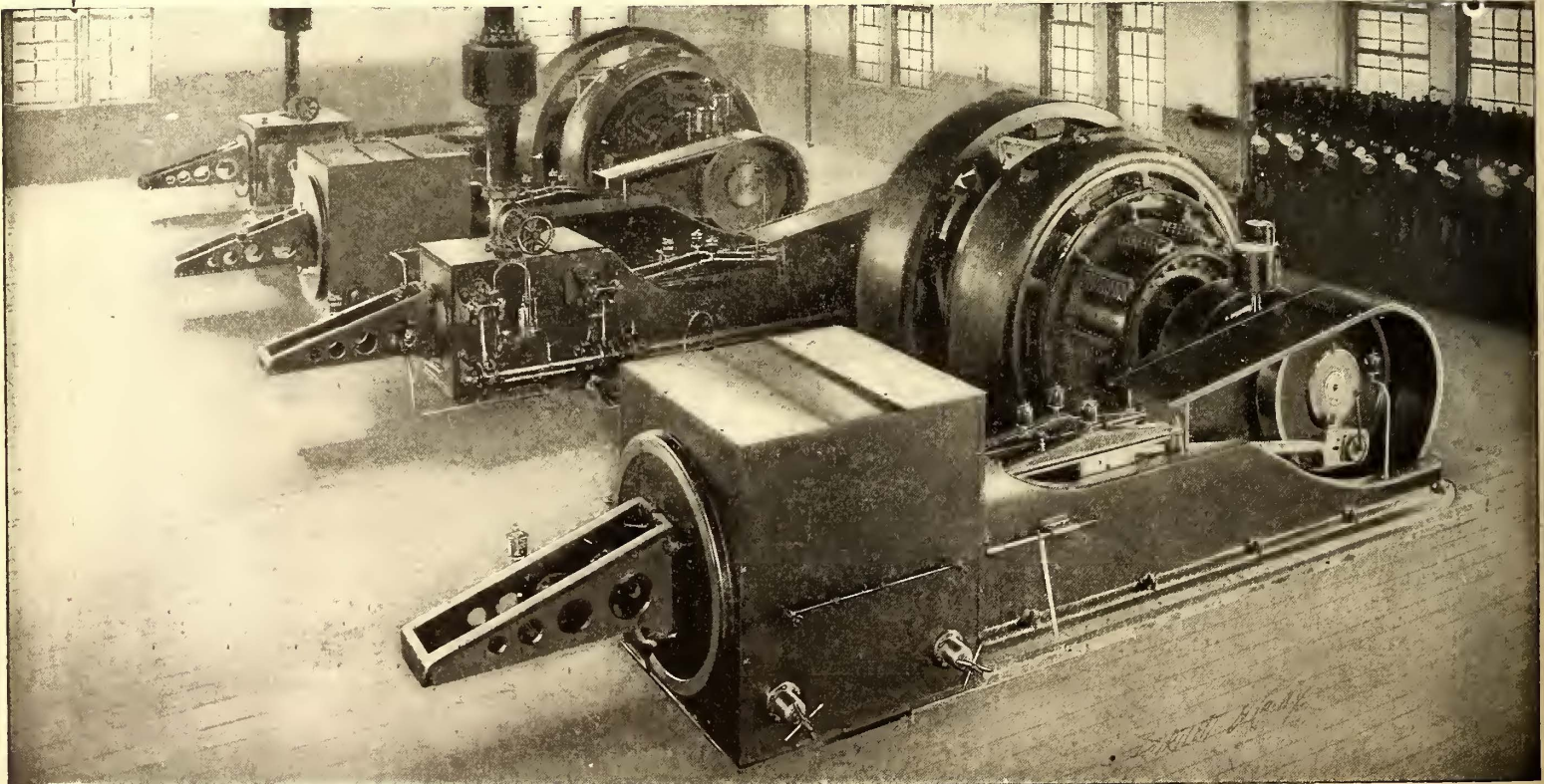


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Keystone Telephone Building, 135 South Second Street,

PHILADELPHIA

McINTOSH, SEYMOUR & CO., Auburn, N. Y.



All Sizes and Types SPECIAL
ENGINES to Meet Requirements

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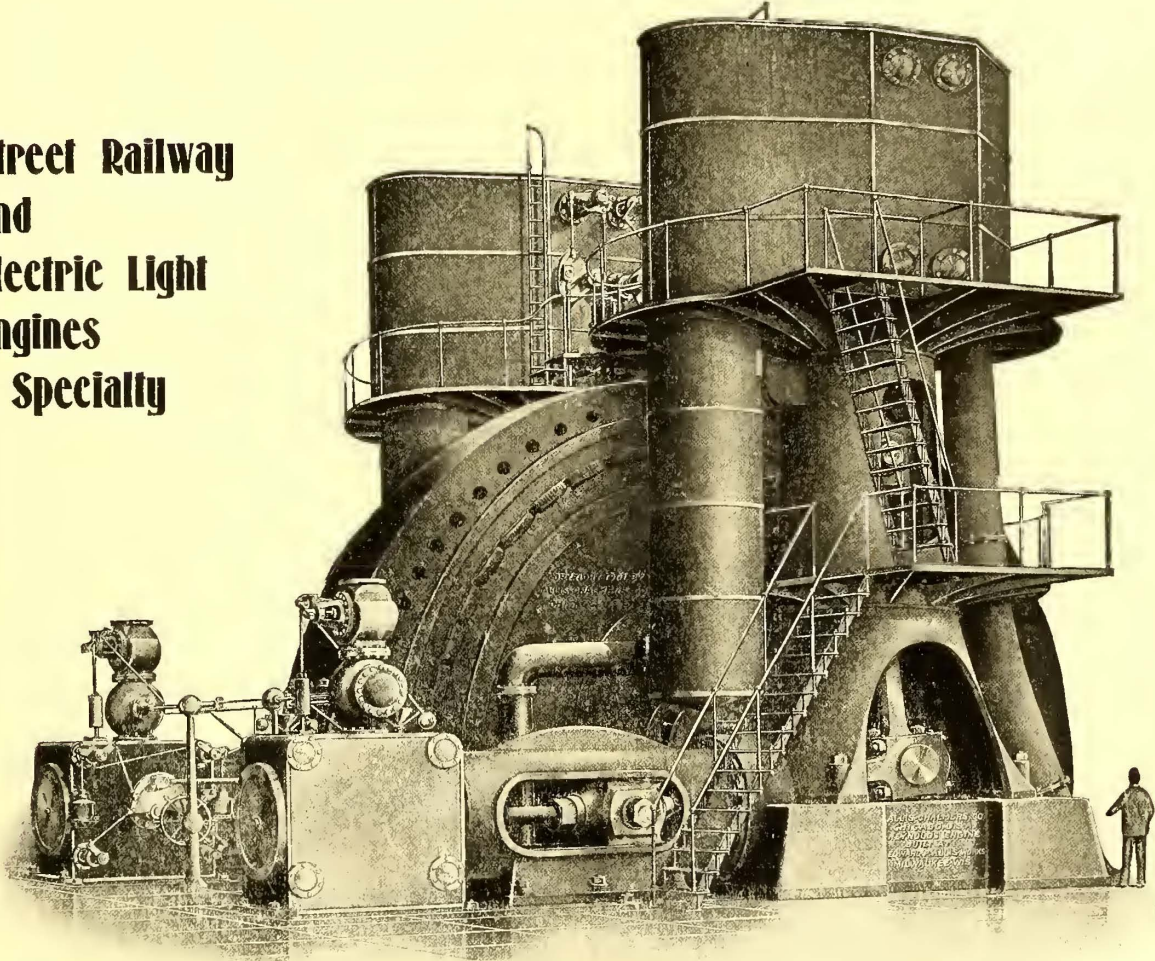
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FOR ALL POWER PURPOSES

Street Railway
and
Electric Light
Engines
a Specialty



Reynolds' Combined Vertical and Horizontal Electric Light and Street Railway Engine

We have furnished sixteen of the above engines for the Interborough Rapid Transit Co., New York, which company operates the Manhattan Elevated and Subway Systems. Each engine is rated at 8,000 H. P. for its most efficient load, and is capable of operating continuously under a load of 12,000 H. P. We have recently secured an order for an additional engine of this same type, making seventeen engines furnished the Interborough Rapid Transit Co. We have also furnished one engine of the above design to the Southern Electric Co., Philadelphia.

This design permits the installation of large units keeping the flywheel weight within reasonable limits for the reason that steam is taken four times during each revolution, but not having the usual objection of numerous journals and pins necessary with the ordinary three or four cylinder engine. It is particularly desirable for a high frequency generator.

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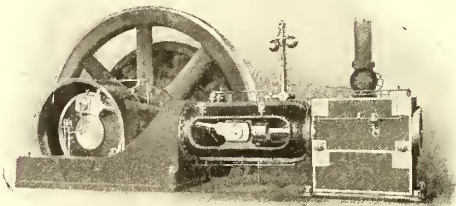
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High Grade Corliss Engines

ALL SIZES AND TYPES



**DIRECT-CONNECTED RAILWAY and
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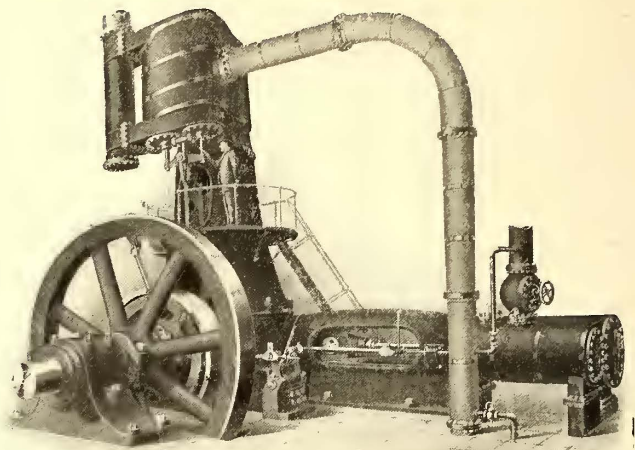
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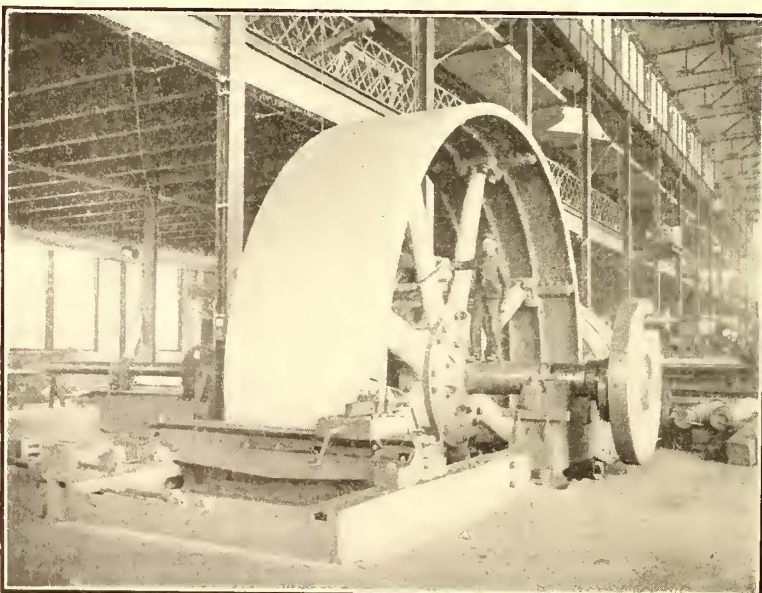
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BROWN CORLISS ENGINE CO.

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Builders of... **Heavy Duty and Girder Frame Corliss Engines**

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**A Full Line of
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Wilkin Gang, Band and Power Set
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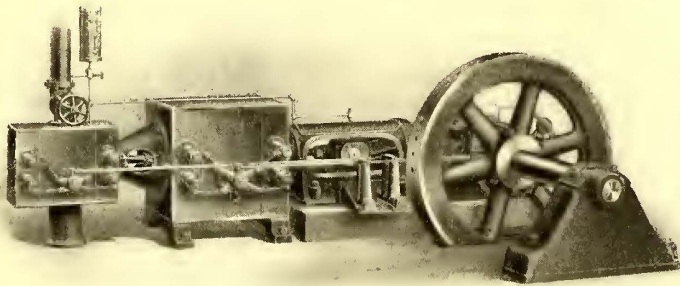
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All Sizes and Types. Especially Designed for Railway and Lighting Service



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A cut-off valve gear giving rapid cut-offs and wide opening of ports at all points from zero to three-quarter stroke. Simplicity and silence in operation.

Special adaptation to driving direct connected dynamos.

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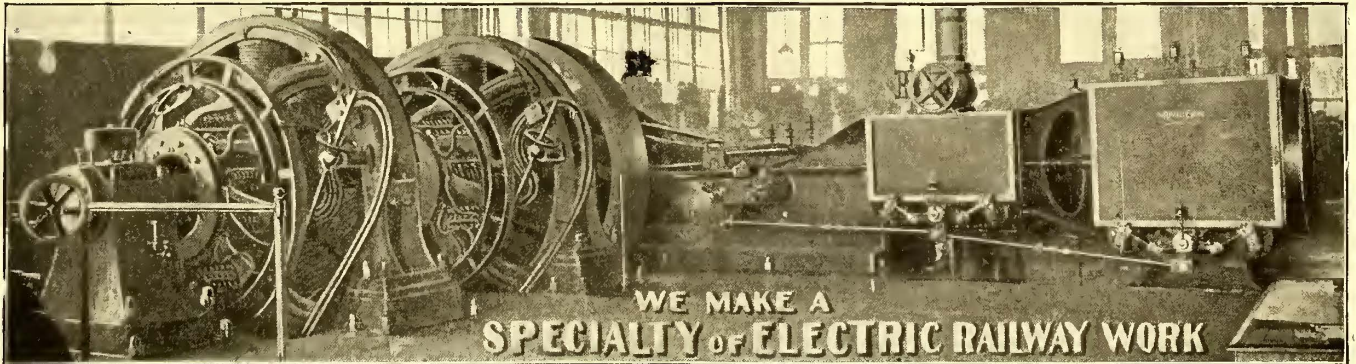
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Simple and Compound. BUILDERS OF ENGINES OF THE SINGLE AND FOUR VALVE PATTERNS. Belted and Direct Connected.

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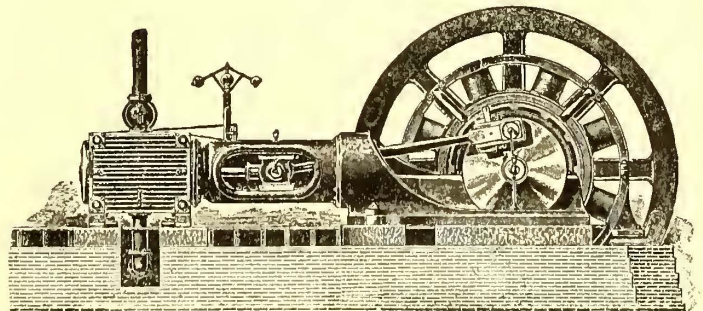
*Electric Railway
Power Plants...*

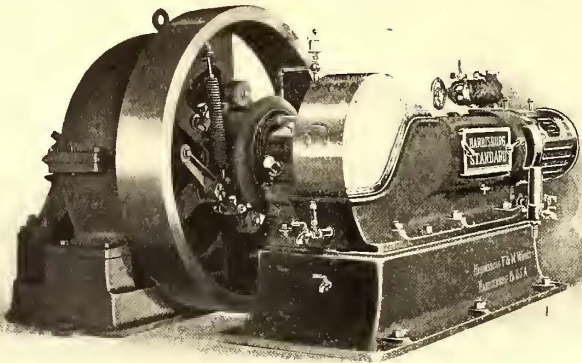
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SIMPLE STYLE DIRECT CONNECTED ENGINE.

Fleming Harrisburg Engines

BUILT 16 STYLES. 900 SIZES.

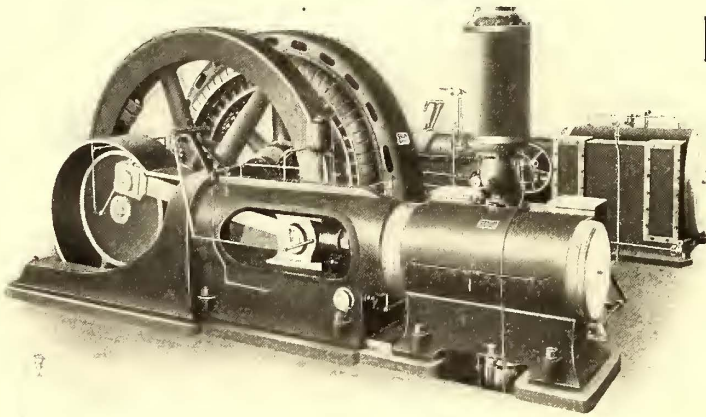
For driving Direct Connected or Belted Machinery at uniform speeds, high efficiency and with minimum attention and repair. Offered to discriminating purchasers who seek careful investment in steam power.

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Heavy Duty Engines for Street Railway Service

Modern in every detail. Regulation Unsurpassed.

Built in all sizes and styles.

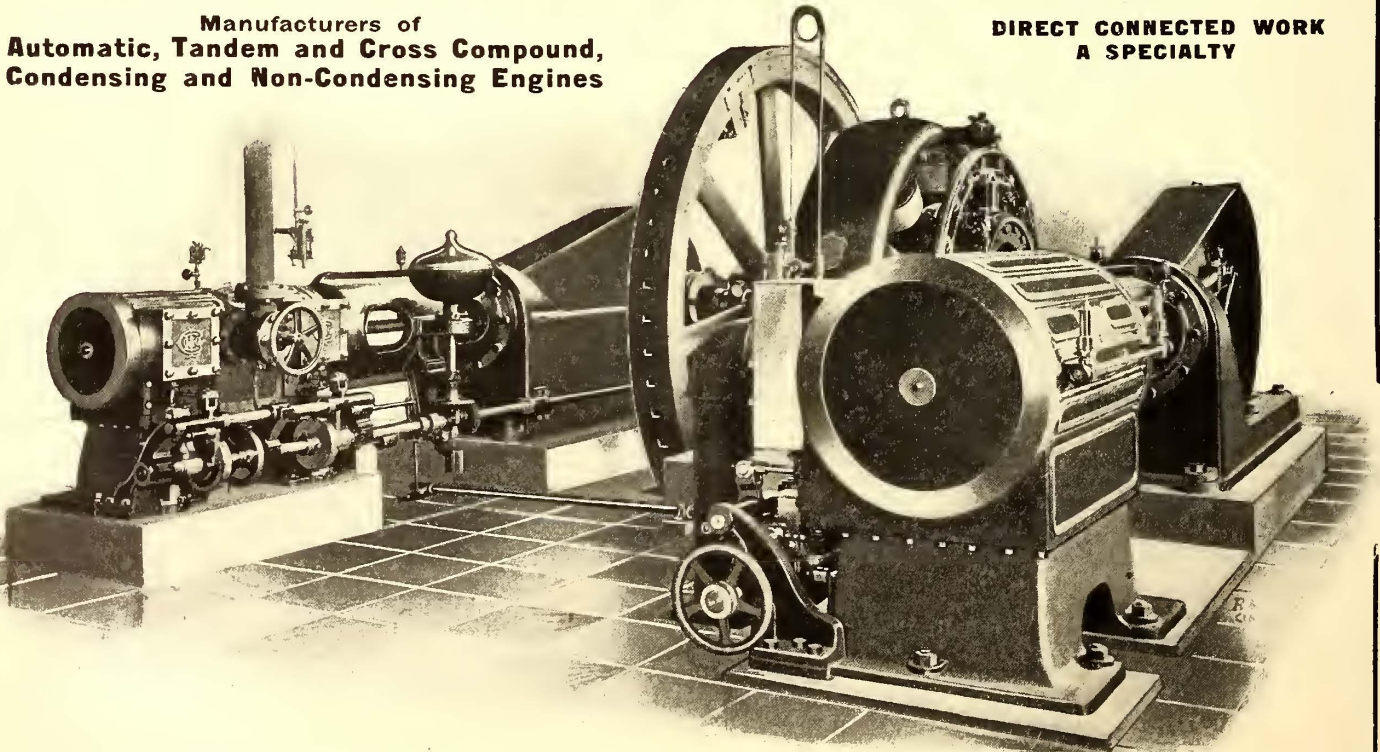
Operating Economy the highest and Guaranteed.

THE IRONTON ENGINE CO.
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THE I. & E. GREENWALD CO. CINCINNATI, OHIO, U. S. A. ESTABLISHED 1847

Manufacturers of Automatic, Tandem and Cross Compound, Condensing and Non-Condensing Engines

DIRECT CONNECTED WORK
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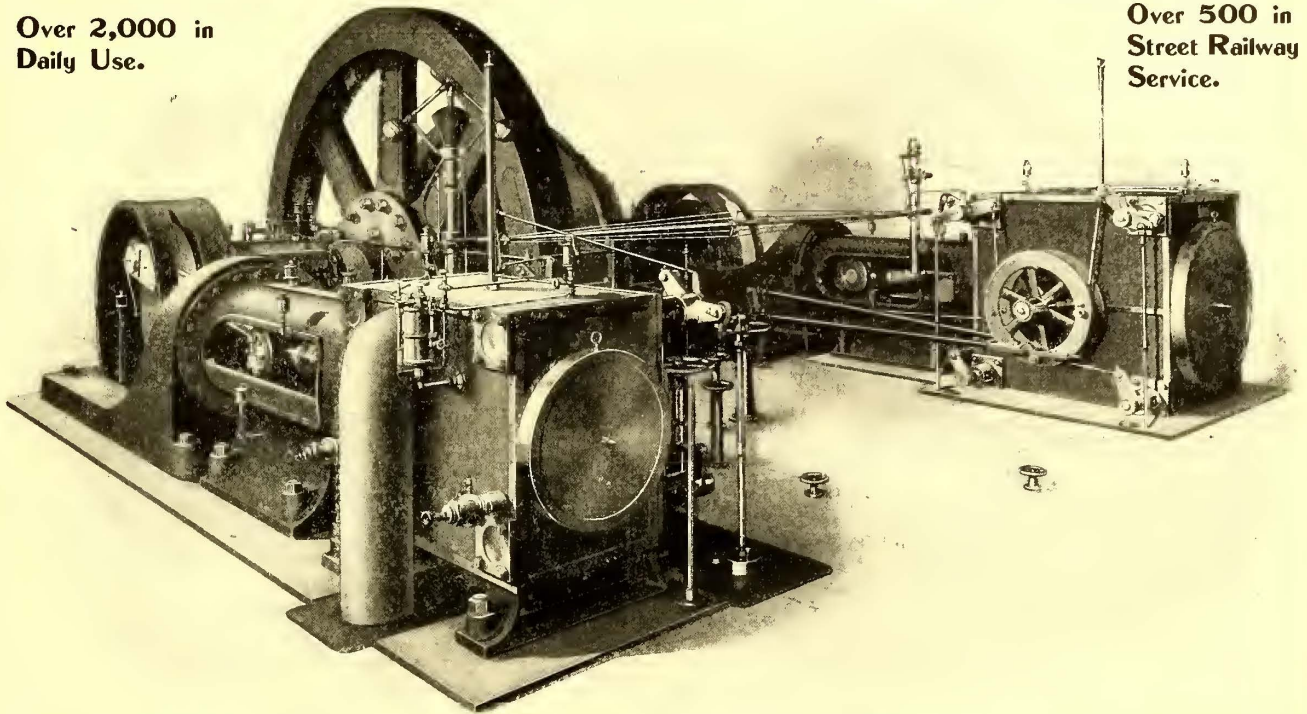
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We build these engines in direct connected units for electric service, also direct connected to centrifugal pumps for irrigation purposes. We build simple, tandem or cross compound, condensing or non-condensing engines. Write for prices and catalogue.

Hamilton Copliss Engines

Over 2,000 in
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Over 500 in
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FOR QUICK DELIVERY

Three Engines,	-	50 H. P.,	Delivery, 2 Weeks
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One Tandem Compound,		250 H. P.,	Delivery, 2 Weeks

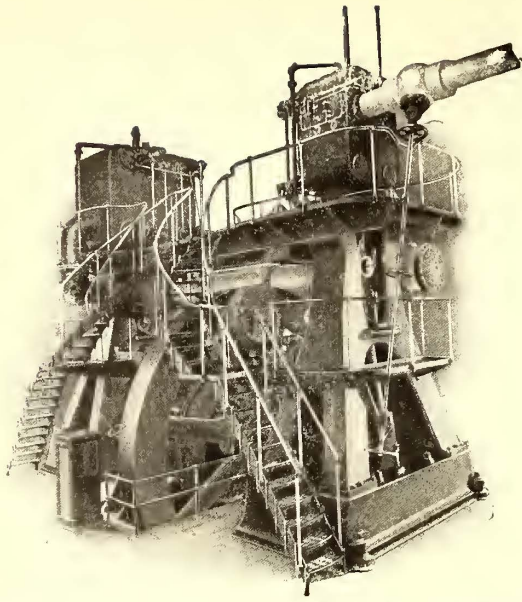
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We also have a 75 H. P. tandem compound non-condensing, second-hand belted engine, of our own make, in good running order.

Also a 20½ x 18 simple engine, designed to operate under 130 lbs. initial steam pressure, and develop 400 H. P. Prices furnished on application.

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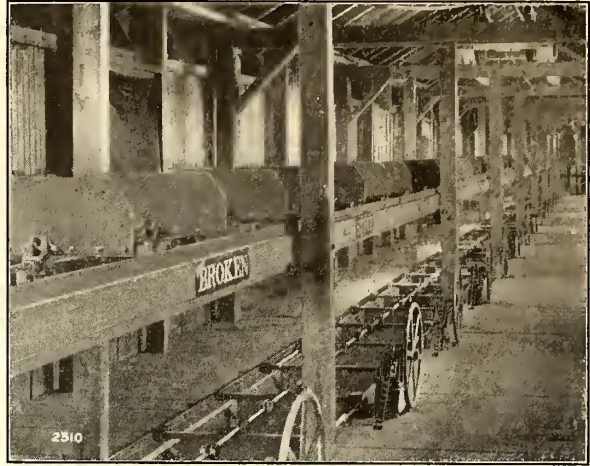


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IMPROVED GREENE ENGINES**

LEAD in results obtained on railway and electric light work.
EXCEL in the operation of direct and alternating current generators in parallel.
GUARANTEE unequalled speed regulation for textile and other plants. Revolutions from 80 to 150 per minute.

**PROVIDENCE ENGINEERING WORKS
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American Licensees for Schmidt System of Superheated Steam.
Great Economies Guaranteed.



MONOBAR COAL CONVEYOR—part of 3000-ton Wholesale Storage Pocket, designed and equipped for Baltimore Storage & Distributing Co., Baltimore, Md.

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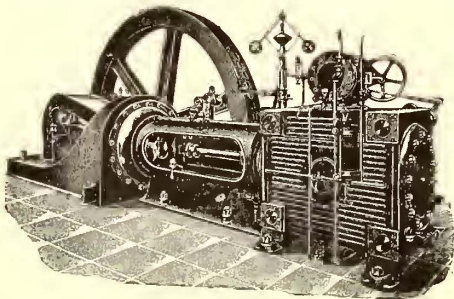
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of successful Link-Belt installations may help you to a quicker, cheaper, more efficient method. Give us a hint of your requirements—we'll gladly send some of our recent literature.

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ST. LOUIS CORLISS ENGINE



Special Heavy Duty Engines for Electric Railways,
Rolling Mills, etc.

For Direct Connecting or Belting, Simple or Compound
COMPLETE PLANTS DESIGNED, BUILT AND INSTALLED

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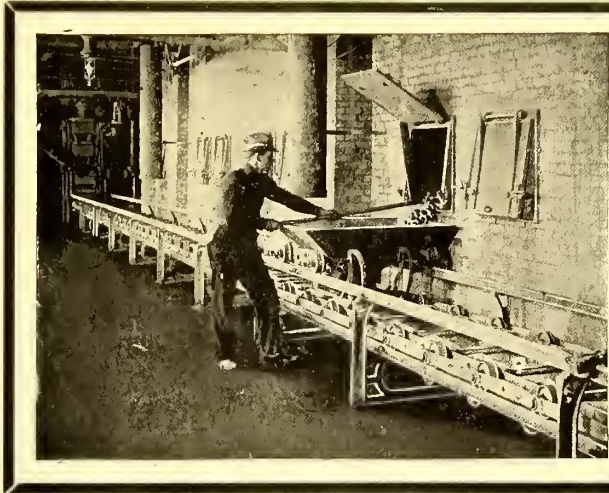


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|--|--|
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| Milwaukee Elec. Ry. & Light Co. | Union Traction Co. of Indiana. |
| Manhattan Elevated R. R., N. Y. | Toledo Traction Co. |
| St. Louis Transit Co. (3 Stations). | Denver Tramways Co. |
| Chicago City Railway Co. | St. Louis & Suburban Ry. |
| South Side Elevated, Chicago. | Twin City Rapid Transit Co. |
| Omaha & Council Bluffs Ry. | Metropolitan St. Ry. Co., Kansas City. |
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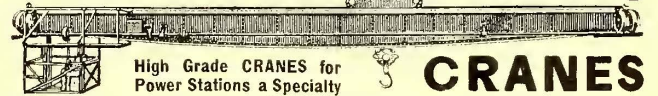
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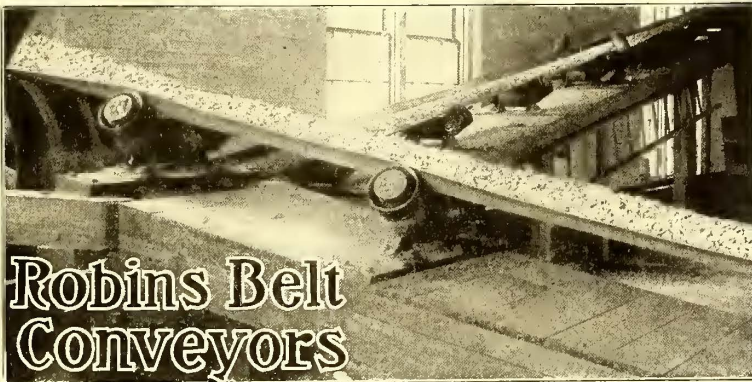


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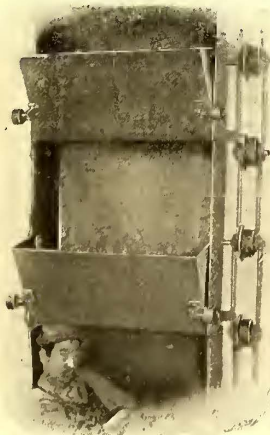
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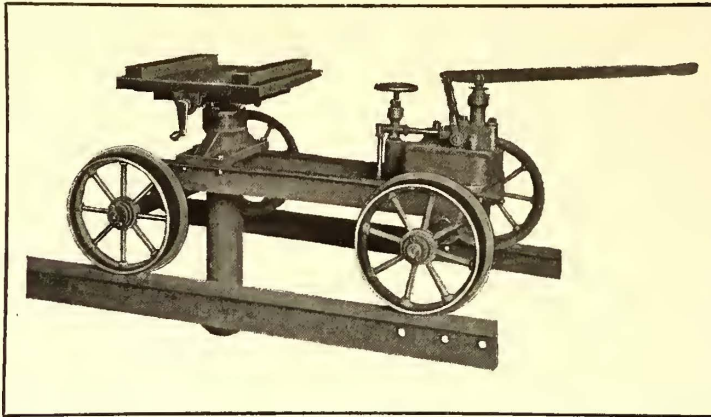
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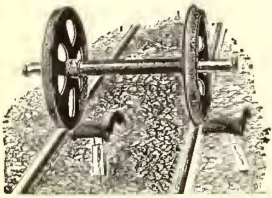
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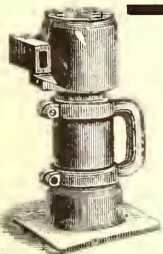
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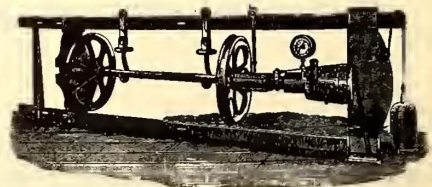
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THE CONSOLIDATED CAR FENDER CO., PLAINTIFF

VS.

TERRE HAUTE ELECTRIC COMPANY, DEFENDANT

THE PRESIDENT OF THE UNITED STATES OF AMERICA
TO

TERRE HAUTE ELECTRIC COMPANY, Defendant, its Officers, Clerks,
Attorneys, Agents, Servants and Workmen and each and every of them.

GREETING :

WHEREAS, it has been represented to us in our Circuit Court of the United States, for the District of Indiana, on the part of the complainant herein that letters patent of the United States, No. 502959 were issued in due form of law on the eighth day of August, 1893, to Millard F. Field, for improvements in Car Fenders, and that Letters Patent of the United States No. 574833 were issued in due form of law on the fifth day of January, 1897, to the Consolidated Car Fender Company, for Improvements in Life-Guards for Street Cars, and that the Consolidated Car Fender Company, the complainant, herein has become, and now is the proprietor of said Letters Patents, No. 502959 and No. 574833. And it being further represented to us that you, the said Terre Haute Electric Company, the said defendant, have infringed upon said Letters Patents, No. 502959 and No. 574833 by making, using, and vending to others to be used, Car Fenders containing, using and employing the above mentioned improvements, or substantial and material parts thereof without right or license and which are an infringement upon said Letters Patents, No. 502959 and No. 574833, and that your actions and doings are contrary to equity and good conscience.

WE, THEREFORE, in consideration of the premises, and the same appearing to us to be true, do strictly and fully command and perpetually enjoin you, the said Terre Haute Electric Company, the defendant, and your officers, servants, agents, attorneys, workmen and clerks, that each and every of you do henceforth entirely and perpetually desist and refrain from directly or indirectly making, constructing, using, vending, delivering, working or putting into practice, operation or use, or in any wise counterfeiting or imitating the said inventions, and improvements, or any part thereof, or any car fenders, containing, using or employing said inventions or improvements, or any part thereof, or made in accordance therewith, or like or similar to those which you have heretofore made, used, or sold, or cause to be made, used or sold, in infringement of said Letters Patents, No. 502959 and No. 574833 or the rights of the complainant under the same.

Witness the Honorable MELVILLE W. FULLER, Chief Justice of the Supreme Court of the United States, at the City of Indianapolis, in the District of Indiana, this 4th day of December, 1903.

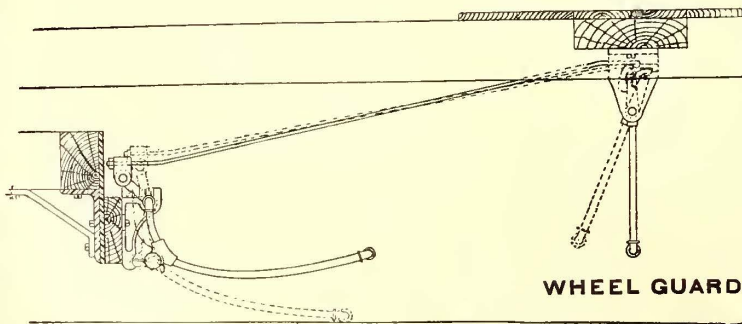
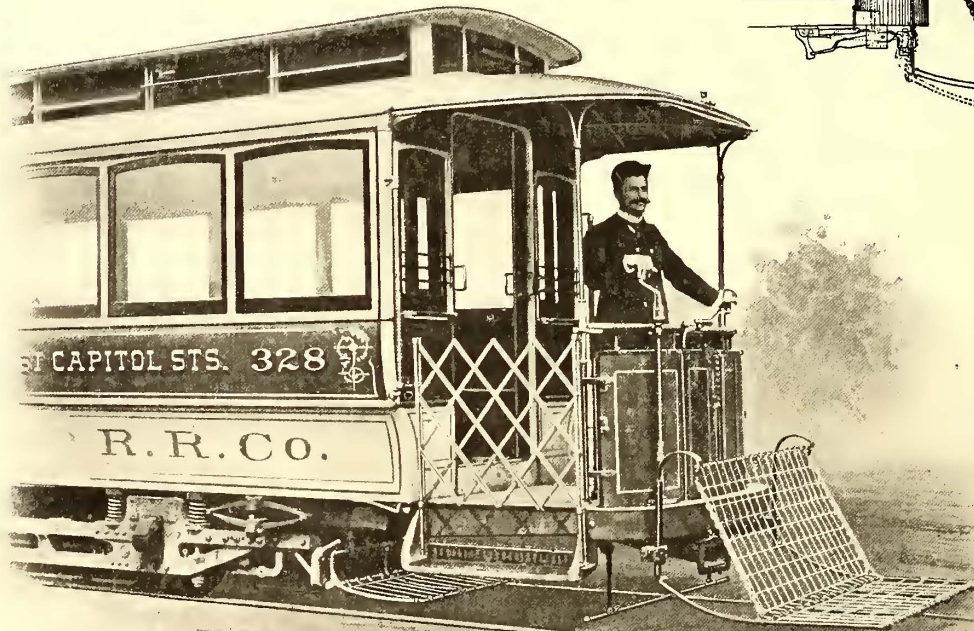
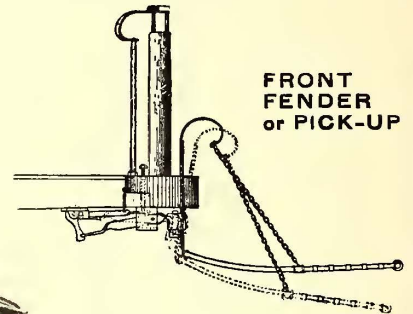
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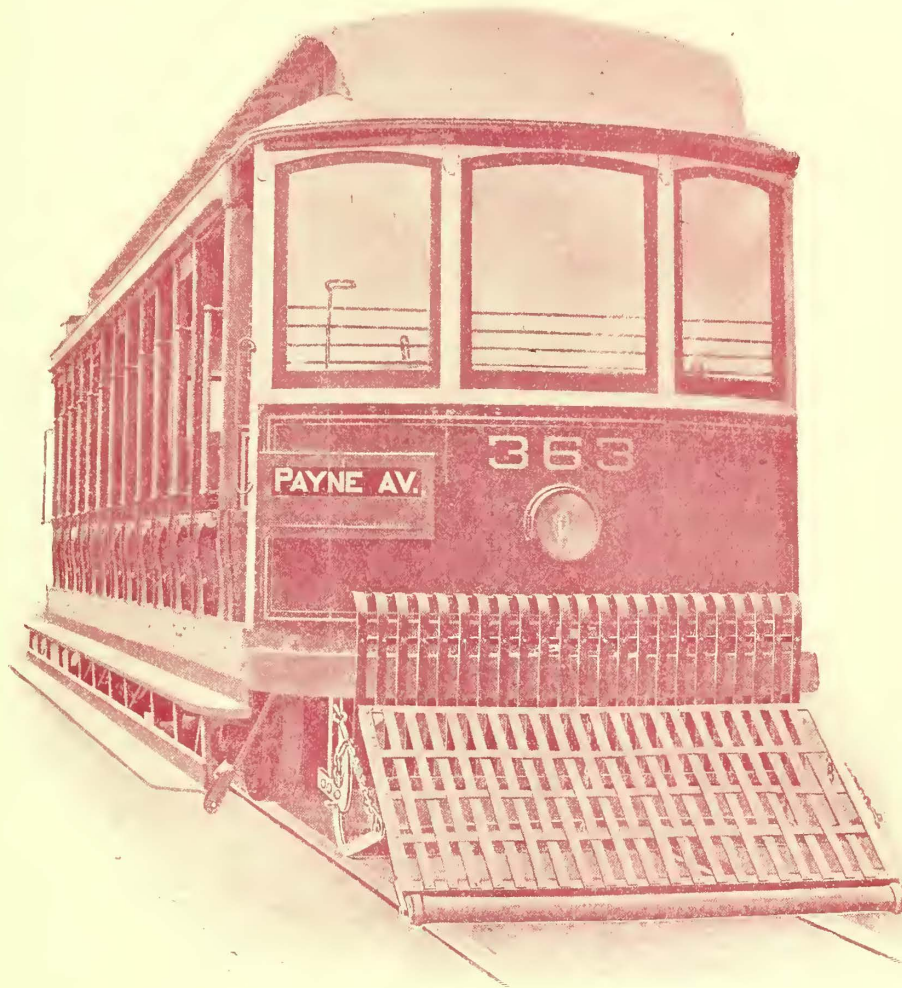
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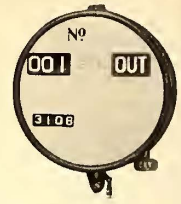
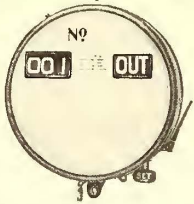
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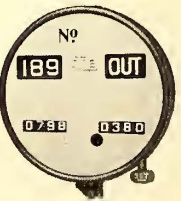
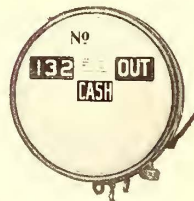
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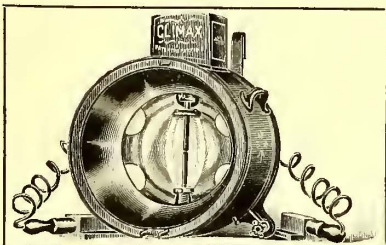
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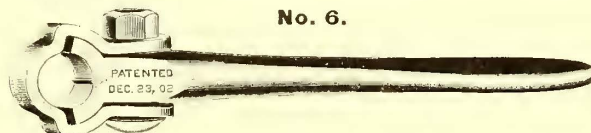
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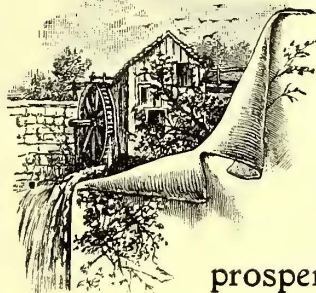
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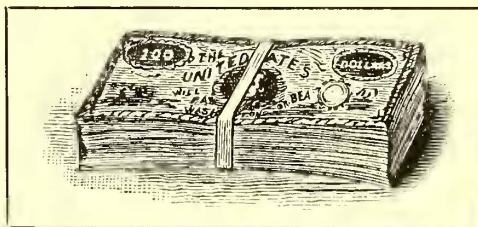


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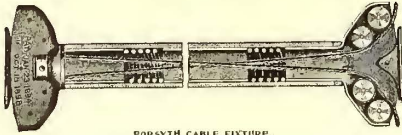
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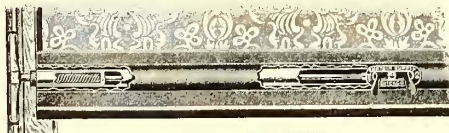
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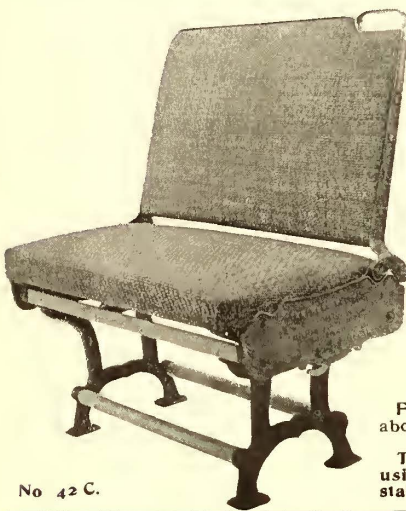


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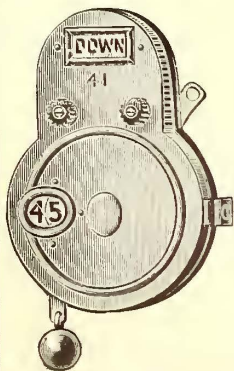
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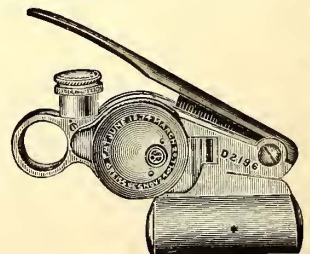
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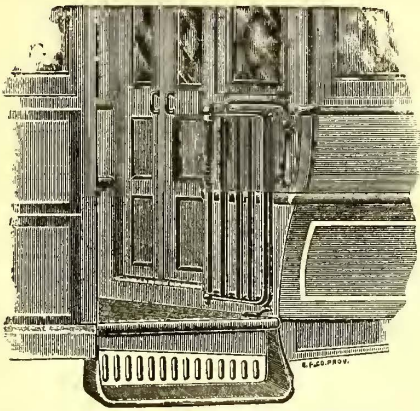
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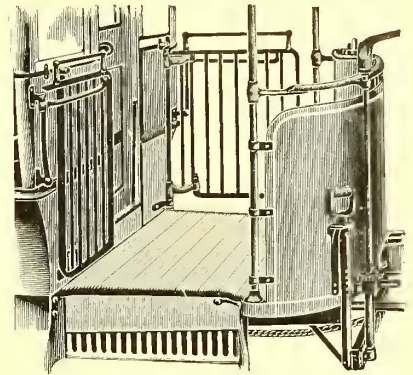
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IN compiling this manual, the pertinence of the material selected to the subject in hand has been carefully considered, and all matter not of vital importance has been excluded. It has thus been possible to produce a book which can be conveniently carried about, and yet, which will give to the street railway engineer an immense amount of valuable data, consisting of engineering facts, figures and dimensions, and showing appliances, structures and methods which have been adopted in practice by the electric railways of the United States. The section on testing will be found of particular value, many of the methods being new. One appendix treats of the storage battery in its power house applications; another contains details of underground conduit systems.

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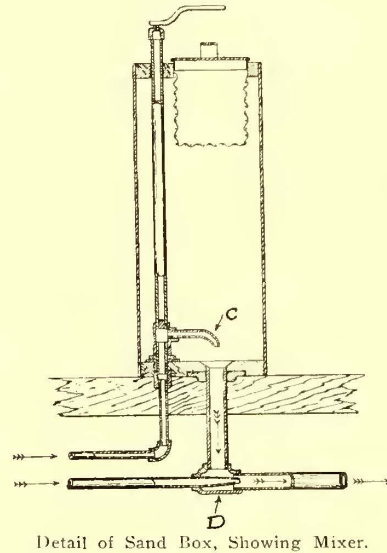
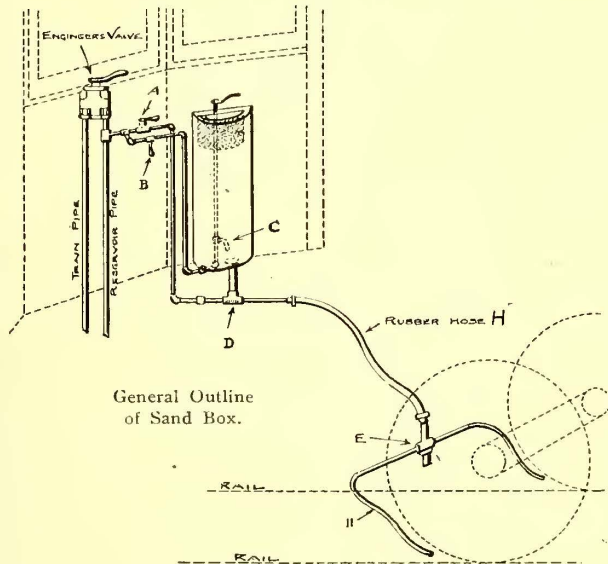


The Newark Air Sand Box Co.

MANUFACTURERS OF

THE DE FRANCE AIR SAND BOX

FOR ALL CARS EQUIPPED WITH AIR BRAKES



Another One of Our Many Testimonials

A Few of the Roads that are Using the DE FRANCE AIR SAND BOX

INDIANAPOLIS & NORTHWESTERN TRACTION CO.

CLEVELAND, PAINESVILLE & ASHTABULA RAILWAY CO.

COLUMBUS, BUCKEYE LAKE & NEWARK TRACTION CO.

COLUMBUS, NEWARK & ZANESVILLE ELECTRIC RY.

NEWARK & GRANVILLE ST. RAILWAY CO.

COLUMBUS, DELAWARE & MARION ELECTRIC RAILWAY CO.

INDIANAPOLIS, COLUMBUS & SOUTHERN TRACTION CO.

TOLEDO & INDIANA RAILWAY CO.

WASHINGTON & CANONSBURG RAILWAY CO.

THE
COLUMBUS, BUCKEYE LAKE & NEWARK
TRACTION COMPANY.

CITIZENS 233.
BELL, MAIN 142.

GENERAL MANAGER'S OFFICE.

NEWARK, O. 9/18/03.

W. E. Wingerter, Secy.,

Newark Air Sand Box Co.,

Newark, Ohio.

Dear Sir:-

In reply to your inquiry of the 16th inst. relative to your DeFrance Patent Sand Box, I am pleased to state that this Air Sander was installed on our care #50 on the Newark & Granville road, which runs between Newark and Granville. I have made inquiry from our Superintendent as to the satisfaction that it is giving, and he informs me that he is very much pleased with it in every way.

I can cheerfully recommend this Sander to street railway man, and will esteem it a privilege to furnish any further information that may be desired.

Yours truly

J. A. Harrigan

Gen. Mgr.

WRITE US TO-DAY FOR FULLER DETAILS

Newark Air Sand Box Co., Newark, Ohio, U. S. A.

THE KNUTSON TROLLEY RETRIEVER IS ABSOLUTELY AUTOMATIC

Look into all other catchers, and you will find that they require the touching of a button on machine, or some such scheme, before the locking device can be set—they are only partly automatic.

UNION TRACTION COMPANY OF INDIANA.
General Offices, Anderson, Ind.

August 1, 1903.

The Trolley Supply Co., Canton, Ohio.

Gentlemen—Yours 31st ult. We have approved the bills for the retrievers sent here for trial, and will hereafter specify "Knutson" on future orders.

Yours respectfully,

JOHN L. MATSON,
Supt. Motive Power.

The Knutson Trolley Retriever will unflinchingly catch the trolley pole as it leaves the wire, pull it down four to six feet, and hold it there out of harm's way.

Fuller information in our little booklet.



TROLLEY SUPPLY CO.

CANTON, OHIO
U. S. A.

THE MAYER & ENGLUND CO., Eastern Agents, Philadelphia, Pa.

THIS IS THE TIME SOMEONE ELSE TELLS OUR STORY

THE OLEAN STREET RAILWAY COMPANY.
OF OLEAN, NEW YORK.

WILSON R. PAGE,
ENGINEER AND TRAVELER
I. W. MILLER,
MANAGER AND REPRESENTATIVE

Olean, N. Y. 11/20/03.

Collins, Bouchard & Emery,
Bradford, Pa.

Gentlemen:-

We have had much trouble in finding a trolley wheel that would stand our work, and have made diligent effort to obtain the best - one that would stand the wear and not be too harsh on the trolley wire.

We take pleasure in advising you that after giving your self-oiling trolley wheels a thorough trial, we find them to be the best wheels that we have ever used, and have adopted them on our road. In a test which we recently made we found that when worn out, the bushing was as good as when put on.

We take pleasure in recommending your trolley wheels to other parties interested.

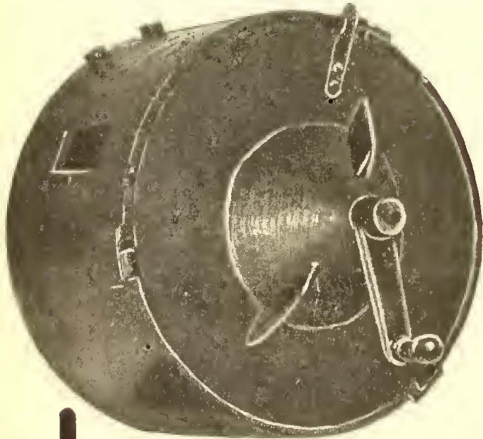
Yours,

I. W. Miller
Supt.

Need Any Trolley Wheels?

Will ship you quickly any quantity desired.

COLLINS, BOUCHARD & EMERY
41 Main Street, Bradford, Pa., U. S. A.



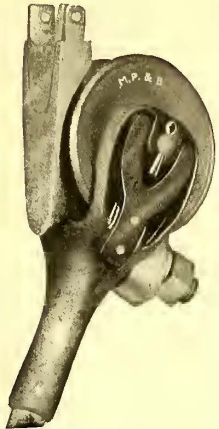
A Good Trolley Catcher At an attractive price.

THE superiority of the Simplest Trolley Catcher is founded upon facts that a trial will substantiate. It is the best because simplest—simplest because it consists of only a drum with teeth on one flange, a coil spring to keep the rope taut, and a stationary hook in the case above the drum rack. Because of its fewer parts it works better and wears longer than any other catcher made.

The drum rests by its own weight in the bearings. When the cord is jerked by the trolley wheel leaving the wire the drum, instead of paying out, is lifted in this bearing, and the teeth upon its rim engage the hook above it and prevent the cord from unwinding. Only one-half inch of cord is paid out before the trolley is caught, and it is held below the span wire.

We not only will consent to sending catchers on trial—we are anxious to be permitted to do so. Get a sample machine and our prices.

JOHNSON & MORTON, UTICA, N. Y., U. S. A.



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SNOW SWEEPER RATTAN
 TRACK BROOMS
 TRACK CLEANERS
 SAND BOXES
 AIR SANDERS
 BRAKE SHOES
 VESTIBULE SHADES
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 TROLLEY POLES and ROPE
 TROLLEY CATCHERS
 O. K. S. FEET CUTTERS
 MOTOR BEARINGS
 GEARS and PINIONS
 CARBON BRUSHES

PORTER & BERG
 309 Dearborn St., CHICAGO

“THEY not only save poles and cord, but prevent delays.” There’s a man who knows what the Wilson Trolley Catcher is for.

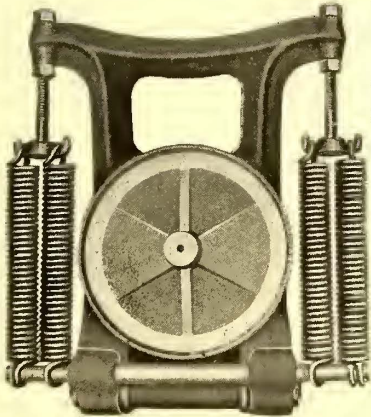
WILSON TROLLEY CATCHER Co., 200 Summer St., Boston, Mass.

THE
“Kalamazoo”
 IS THE BEST
 FOR ALL CITY and
 SUBURBAN LINES.



INVESTIGATE
 ITS
 MERITS

Milloy Low Trolley Base





In the first place it is only 4 inches high, the lowest base ever made, and weighs 85 lbs.

It is uniform in tension, produces the same tension on every location of the wire.

It requires no oiling or grease of any kind.

It has no fulcrum in its bearings, no friction of any kind

It is very active on curves and switches.

It looks very neat.

It is made of malleable iron.

The standard trolley base is similar to this except that it

has a dome in the center. The strength given by this dome is secured in the low trolley base by three ribs with reinforcements of metal.

The cable connection is under cover and all its fastening connections to the roof connections are under cover.

It can be adjusted to any bridge work.

It is a roller bearing base.

All the N. Y., N. H. & H. R. R. trolley cars equipped with it. Will pay for itself in a short time in the saving of current.

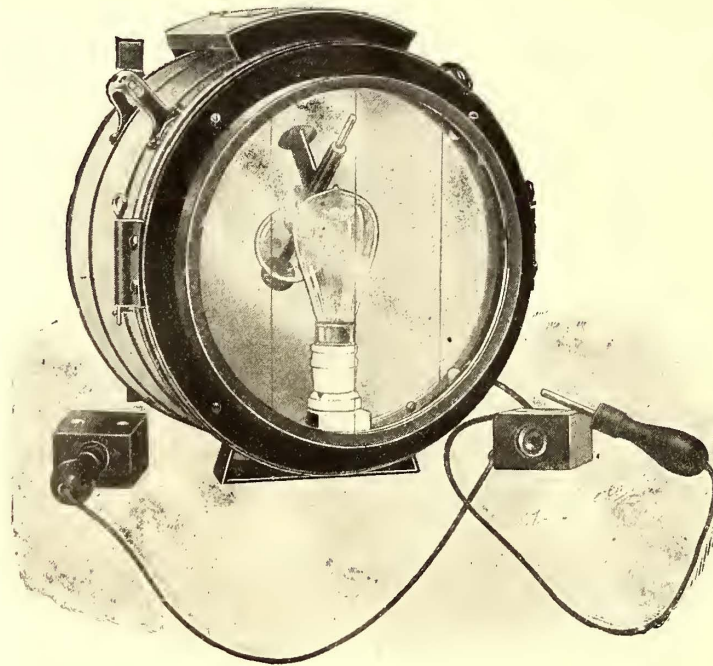
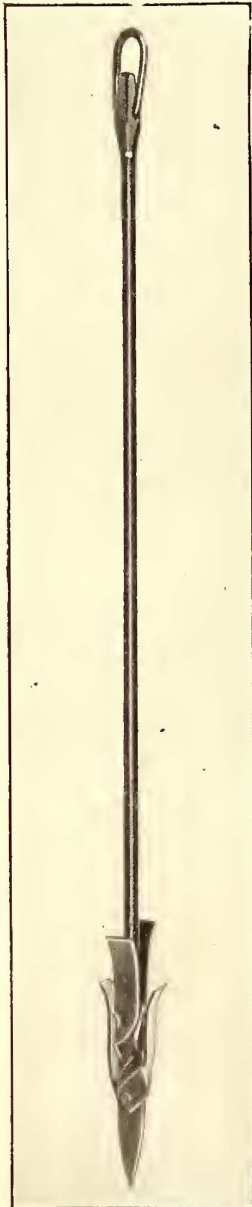
INTERNATIONAL TROLLEY CONTROLLER CO.
BUFFALO, N. Y.

CROUSE-HINDS CO.

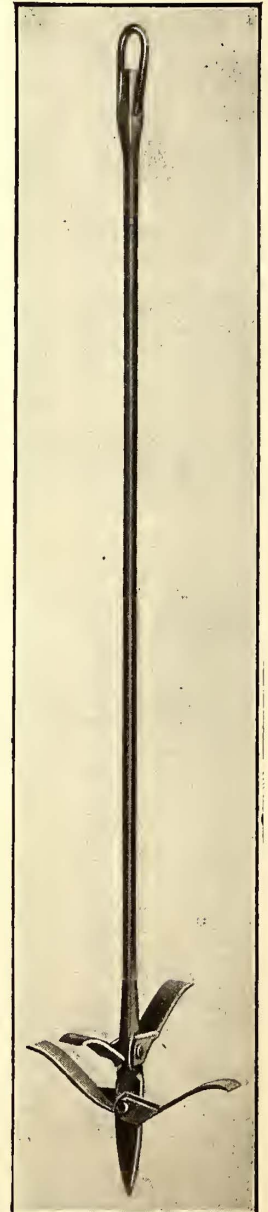
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IMPERIAL-ARC-HEADLIGHT

Guy Anchor
closed ready
to install



Guy Anchor
open after
being installed



MANUFACTURERS OF
Railway Switchboards
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Full Stock at All Branch Stores

MAY WE SEND YOU ONE FOR TRIAL?

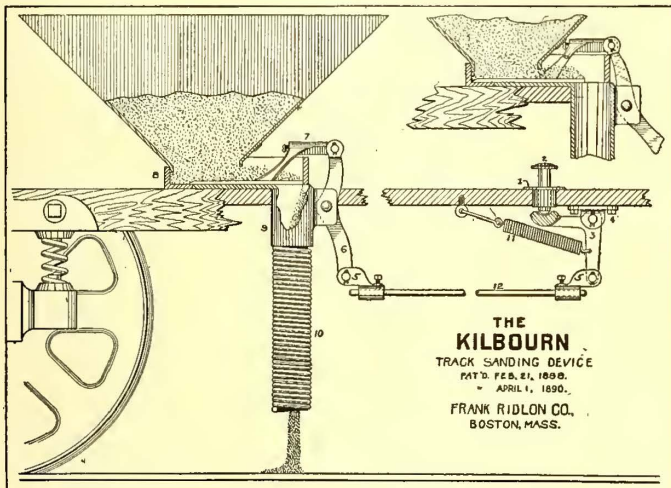
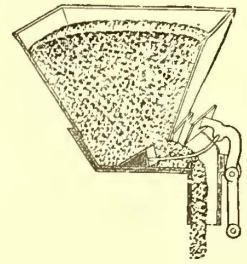
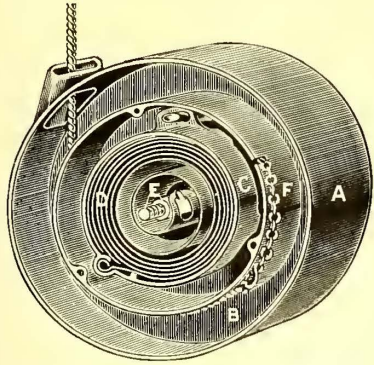
It will then cost you nothing to determine for yourself the truth or falsity of our statement that our

Sand Boxes and Trolley Catchers

are the most simple in construction and the most effective in service. The former has been in universal use for eight years and been adopted as standard by the leading street railways. The latter is rapidly following suit.

HAM SAND BOX COMPANY

TROY, N. Y., U. S. A.



DeWitt's

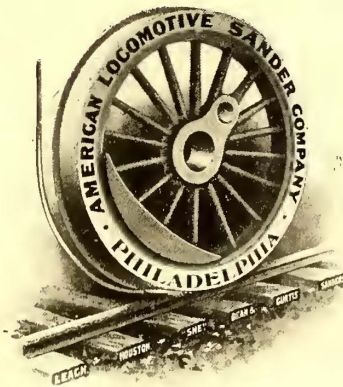
BEST MADE

A Sand Box That Will Work Every Time and Under All Circumstances.
 In use on roads for years and never a complaint, and the only repairs needed were pieces of hose.
 — SOLD NOW AT A LOW FIGURE —

DeWitt Sand Box Company,
 523-525 Fifth Ave., Troy, N. Y.
 C. J. Harrington, 15 Cortlandt St., New York, Eastern Agent

Pneumatic Track Sanders

Positive
and
Economical



Full Particulars
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On Application

American Locomotive Sander Co.

13th and NOBLE STREETS, PHILADELPHIA, PA.

CHICAGO: - - - - - 509 GREAT NORTHERN BUILDING

DAMP SAND

CAN BE

Put on the Track

BY THE USE OF THE

POSITIVE TRACK SANDER

ADDRESS

THE
Positive Railway Sander Co.
LANCASTER, PA.

SALES AGENCIES

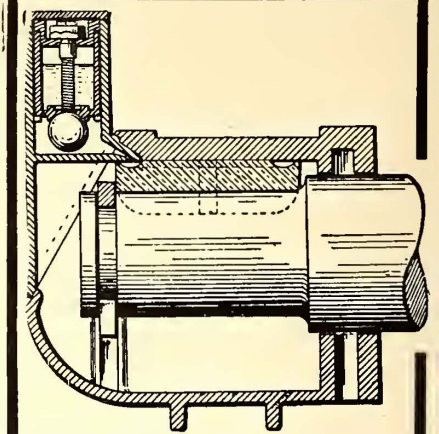
DOUBLEDAY HILL ELECTRIC CO., 919 Liberty St., Pittsburg, Pa.
H. F. SANVILLE, 710 and 711 Girard Trust Building, Philadelphia, Pa.
STANDARD RAILWAY MATERIALS CO., 406 Omaha Building, Chicago, Ill.

No Oil Wasted

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Life of Bearings Increased
THREE Fold

Oil Always Clean



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bearings have run over three years in constant service, with the lining still good. Boxes require filling once only in 60 to 90 days. Armature bearings have run over one year before requiring to be relined, thus showing perfect lubrication. No hot boxes have occurred where this system of lubrication is in operation. Defies comparison with any other mode of lubrication as to saving in cost of lubricant, bearings, axles and labor.

Standard Automatic Lubricator Co.

810 Arcade Building, Philadelphia, Pa.

Lieber's Standard Code

ENGLISH. FRENCH. SPANISH.

PRICE, \$10.00.

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The Ciphers are selected from the "OFFICIAL VOCABULARY," care having been taken to omit such DANGEROUS ciphers as "cheap," "charge," "collect," "bi-monthly," "eleventh," "eighteenth," "cargo," etc., which are found in other codes.

CONTENTS

The Code contains 800 pages of 75,000 Ciphers; 65,000 have sentences, and 10,000 are blank, enabling the addition of private phrases under their proper headings.

DIRECTORY OF USERS

LIEBER'S MANUAL, published every three months, contains a revised list of those using the code. NO OTHER CODE FURNISHES SUCH A LIST.

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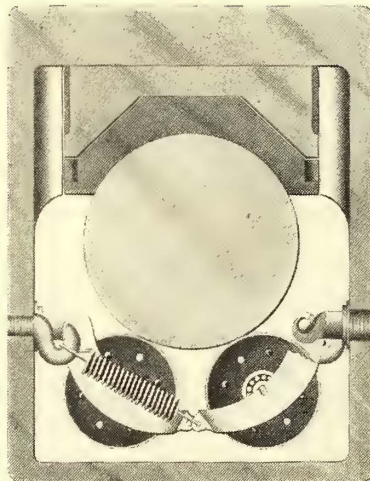
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PERFECT LUBRICATION

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Economy Journal Lubricators and Dust Guards

Prevents "Hot Boxes." Applicable to any Standard M. C. B. Box. Feeds any Oil. Doubles Life of Journal Brasses. 50 PER CENT. SAVING Guaranteed. No Waste Packing Used.

We will demonstrate our device on your road without expense to you.

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Journal Packing

NECESSARY FOR HIGH SPEED
HEAVY WEIGHT ROLLING STOCK



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There is no need to run flat wheels, nor to throw them away. Just use the Wheel Truing Brake Shoe

in place of the regular shoe until the wheel is true. No need to remove wheels or take the car out of service.

The trouble is less and the cost is less than by any other method.

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INGOTS, CASTINGS, WIRE RODS, SHEETS, ETC.
— DELTA METAL —
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Linotype, Stereotype, Monotype and Electrotype.
Prices consistent with quality and market.
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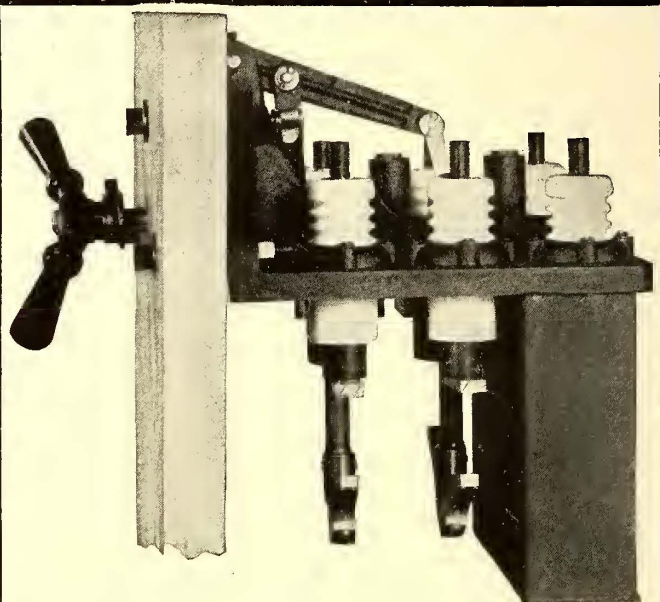
BRAKE SHOES

The Approved Standards of American Railway Practice for Steam and Electric Service



THE AMERICAN BRAKE SHOE & FOUNDRY CO.
NEW YORK
170 BROADWAY
CHICAGO
WESTERN UNION BLDG.
and "U" TYPES

Elevated and High Speed Interurban Equipments require Steel Back Brake Shoes
MISCELLANEOUS IRON AND STEEL CASTINGS



HARTMAN HIGH TENSION OIL SWITCHES and CIRCUIT BREAKERS

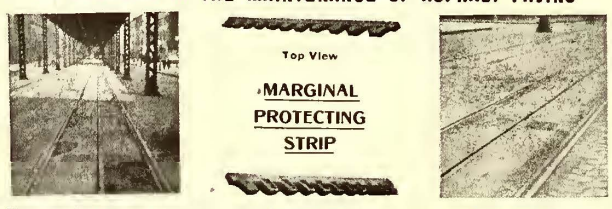
contain many points of advantage over similar apparatus now in use. They are described in Bulletin "D," which will be mailed on request.

We make a special direct current circuit breaker for the protection of railway feeder circuits. These circuit breakers may be installed on the back of the switchboard in the usual manner or they may be installed at points remote from the station, and can be closed or opened at will by means of our system of remote electrical control. Send for descriptive matter and prices.

**HARTMAN CIRCUIT BREAKER CO.
MANSFIELD, OHIO**

Marginal Protecting Strip

AN ECONOMY IN THE MAINTENANCE OF ASPHALT PAVING

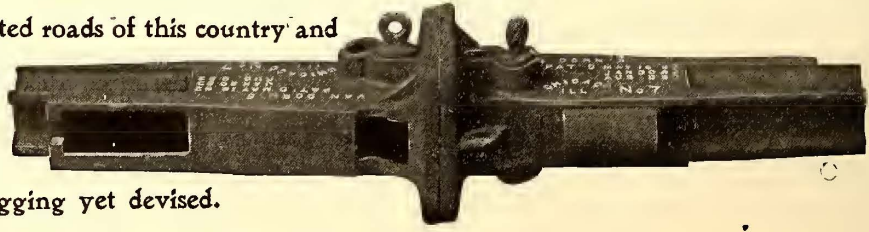


UNPROTECTED PAVING **MARGINAL PROTECTING STRIP** PROTECTED PAVING

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Bottom View

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Are now a standard on all of the elevated roads of this country and are being made a standard on all the leading surface, street and interurban roads. All couplings are machine fitted and we make sixteen sizes to meet any requirements. * * *



We build the most complete draft rigging yet devised.

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GEARS AND PINIONS

ACCURATE TOUGH DURABLE

OPEN HEARTH STEEL
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PATENT PRESSED
PINIONS

MADE OF HIGH-GRADE STEEL BY THE MOST APPROVED AND UP-TO-DATE MACHINERY
CAPACITY 60,000 PINIONS PER ANNUM
NO DELAY—WE SHIP FROM STOCK
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BROOKLYN, N. Y., U. S. A.

CABLE ADDRESS "BLISS-BROOKLYN"

The Very Fact

that the U. S. Sleet Cutter is light, strong, compact—easily attached without tools of any description and designed on practical lines, should commend it to all Street Railway Managers.

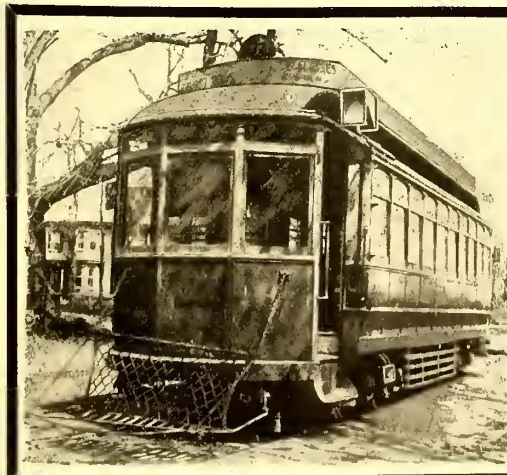
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MANUFACTURERS OF
GEARS AND PINIONS
CLEVELAND, O.

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Ventilating System for Trolley Car Motors

Covered by several broad and basic patents.

By its use motors are kept cool and clean—all the highly heated air, dust and foreign matter is expelled—armatures, field coils, bearings, etc., are saved from damage. Operating expenses of trolley roads largely reduced in the saving of repairs, labor and power. A well-known consulting engineer has said "that no trolley road could afford to do without it." Is applied at moderate cost without injury to car. In the cut, air collector is on top of car. May be used on dash or under platform as desired.

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L. C. NOBLE, Vice-Pres.

CAPITAL
\$500,000.00



SPRINGS

Springs for
Traction Cars
especially
adapted to
High Speed
Work; also
for Locomotives,
Freight, Coal
and Dump Cars

FOR EVERY PURPOSE

BEST MATERIAL USED.

ALL SPRINGS OIL TEMPERED

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Machinery
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of the
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Grade.

QUALITY AND WORKMANSHIP
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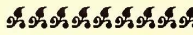
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Union Spring *and* Manufactur- ing Company,

GENERAL SALES OFFICE 
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Helical and Elliptical Springs
For Locomotives, Tenders, Coach, Freight Car
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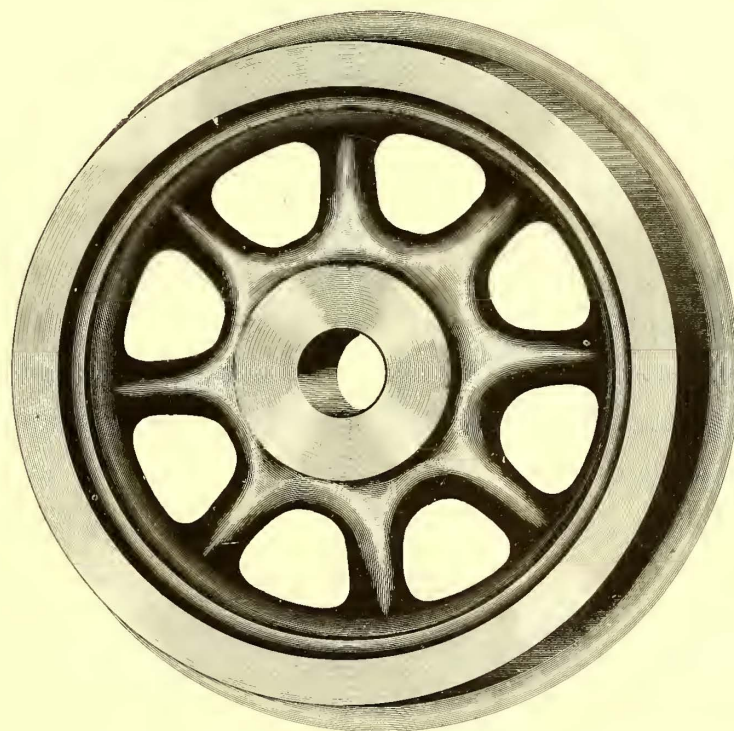
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Railway Steel-Spring Co.

STEEL TIRED WHEELS

Adopted
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Interurban
Roads



Safer,
More
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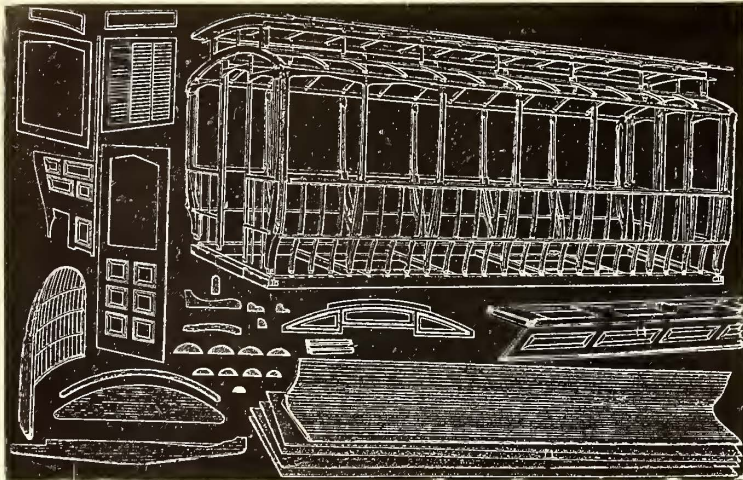
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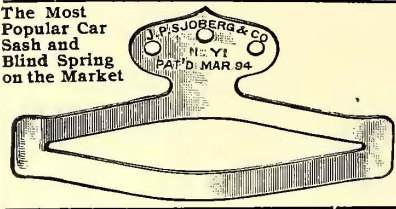
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533-539 West 32d Street, NEW YORK,

MANUFACTURERS OF

STREET CAR WOOD WORK

The Most Popular Car Sash and Blind Spring on the Market



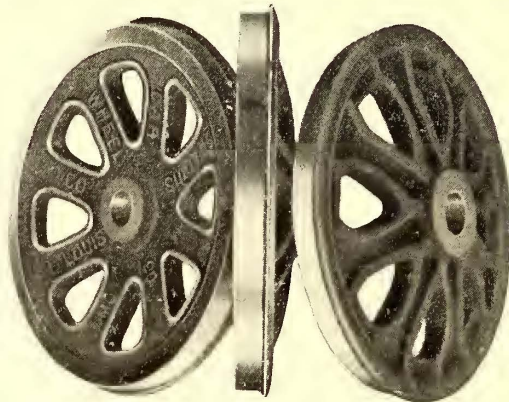
For Repairs Rebuilding and Stationary Vestibules

Also Portable Vestibule Fronts Complete

Re-enforced... Spoke Wheels For City Service

Stronger Spokes. Stronger Flange. Deep, Even Chill. Greater Mileage. Absolute Safety. A Sample Order will prove its superiority over the old style Spoke Wheel.

Write for Booklet on Wheels



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This Wheel is being substituted in place of the old style Plate Wheel because it does NOT rumble and roar when on paved City Streets.

The Only Spoke Wheel for Heavy, High-Speed Service

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SUCCESSFUL Gasoline Locomotives and Motors

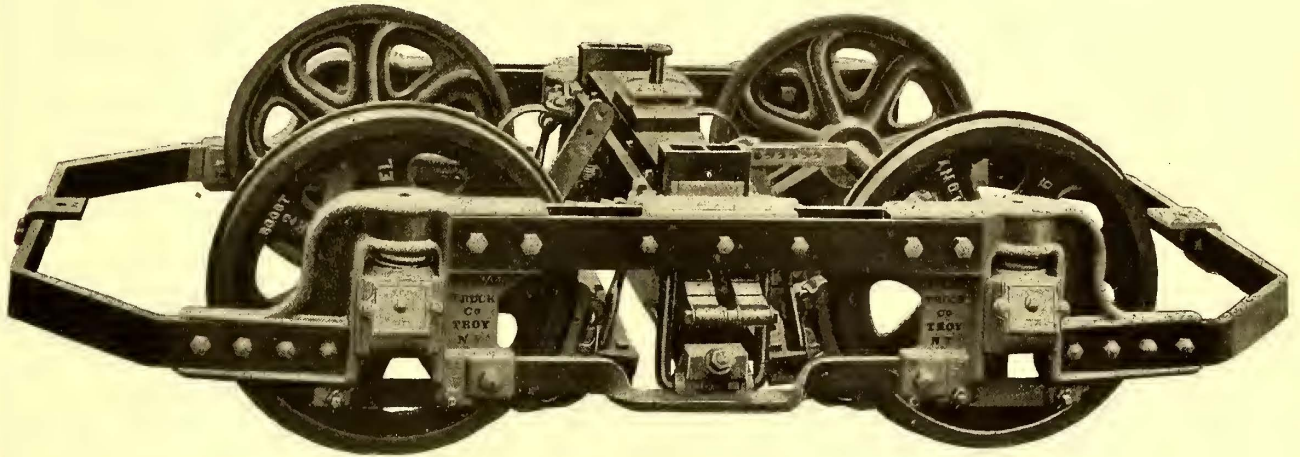
To lessen the cost of Suburban and Interurban Street Car and Railroad Service are being made by the

PROUTY-PIERCE LOCOMOTIVE MFG. CO.

STOCK YARDS STATION.

KANSAS CITY, KAN.

For Carrying Long Cars Around Curves of Short Radii, the Taylor Swing Motion Double Truck is Superior to All Others



Constructed to mount a car low down, and to accommodate long cars that are FRAMED NARROW on the sills. The wheel base is 4' 6'' with 33'' wheels, and 4' 3'' with 30'' wheels. The only short wheel base Double Truck on the market with swing motion and elliptic springs for the riding of the car body. Constructed on the best principles of Master Car Builders' standard practice. The brakes are of the live and dead lever system, made extra strong, so that air-brakes can be used if desired.

TAYLOR ELECTRIC TRUCK CO., Troy, N. Y., U.S.A.

Agents for Great Britain

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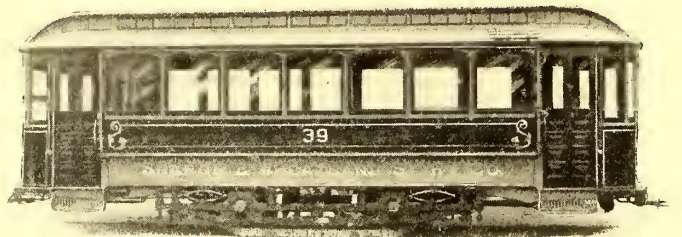
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J. M. JONES' SONS

WEST TROY, N. Y.

BUILDERS OF

High Grade Cars
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THE JEWETT CAR CO.

Builders of High Grade Cars
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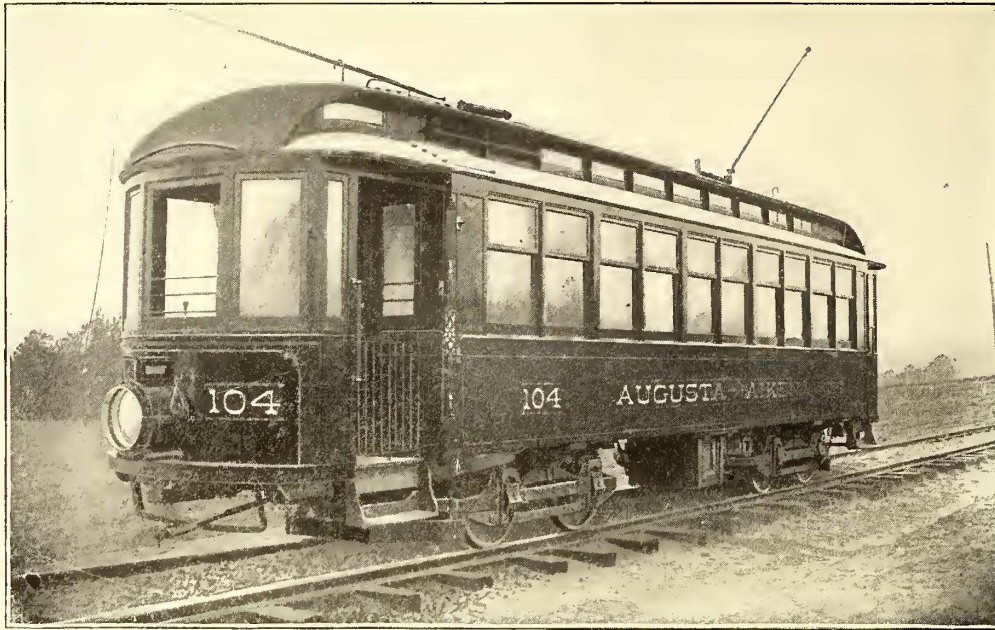
The Laconia Car Company Works

P. W. WHITTEMORE, Treas.

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J. C. SPRING, Vice-Pres.

Works: Laconia, N. H.



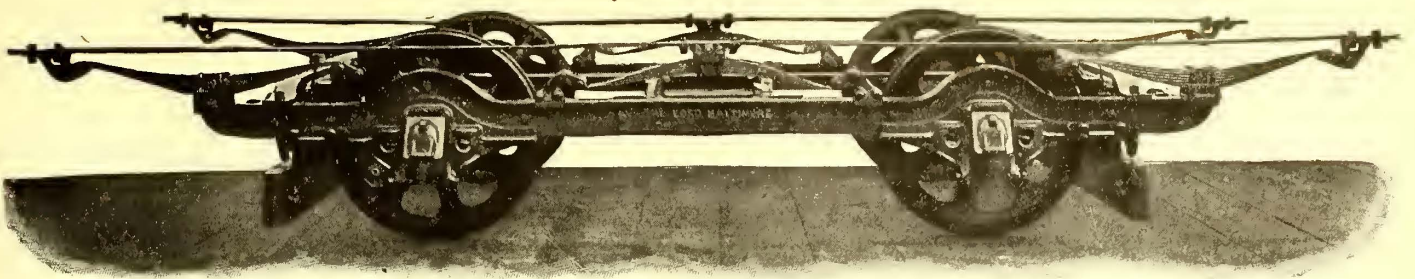
BUILDERS OF ELECTRIC CARS AND TRUCKS

MALLEABLE IRON CASTINGS FOR ELECTRICAL WORK

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AMERICAN CAR AND FOUNDRY CO.
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Builders of Any Type of Cars for Steam, Electric or Animal Traction for
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W. S. G. BAKER, *President and Treasurer*

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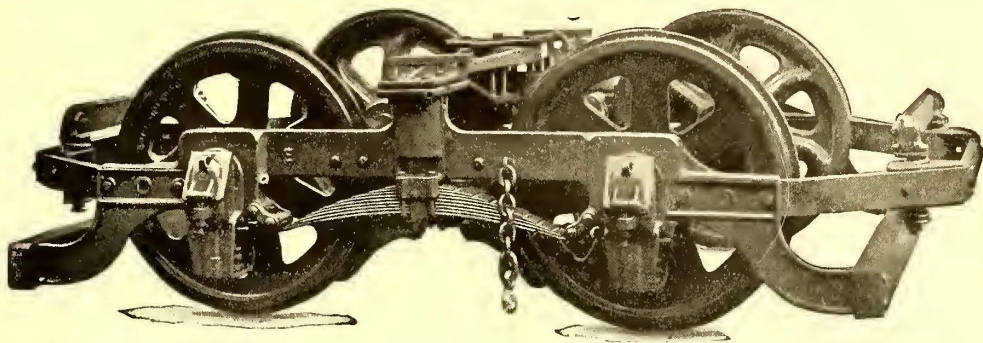
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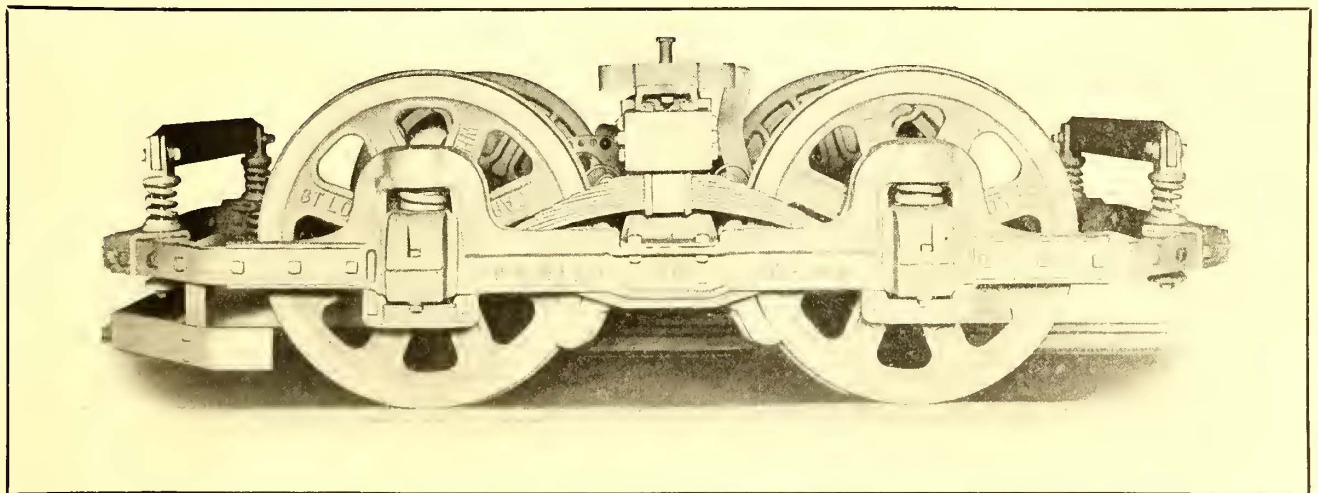
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CHILLED WHEELS OF ALL PATTERNS AND SIZES FOR EVERY SERVICE, WITH OR WITHOUT AXLES

The well-known Bemis Number 45 Electric Truck.

THIS truck has been adopted as the Standard Truck on some of the leading roads of the country and is especially adapted for City and Interurban Service. All of our Trucks are equipped with either M. C. B. or Bemis Dust-Proof Boxes.



BEMIS CAR TRUCK CO.

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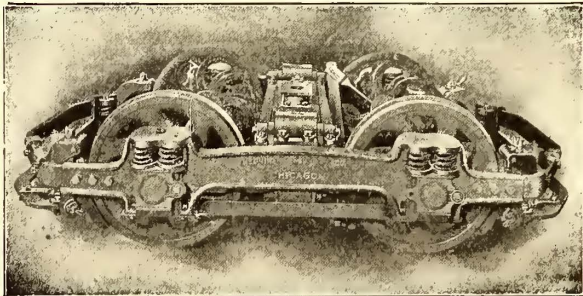
Factory: SPRINGFIELD, MASS.

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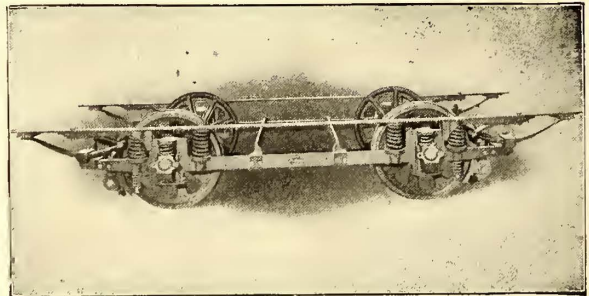
McGuire Manufacturing Co.



Pneumatic Sprinkler in Operation, Spraying Water 45 Feet on Each Side of Track



No. 39 Double Truck



Solid Steel Columbian



Snow Sweeper with Side Wing Plows

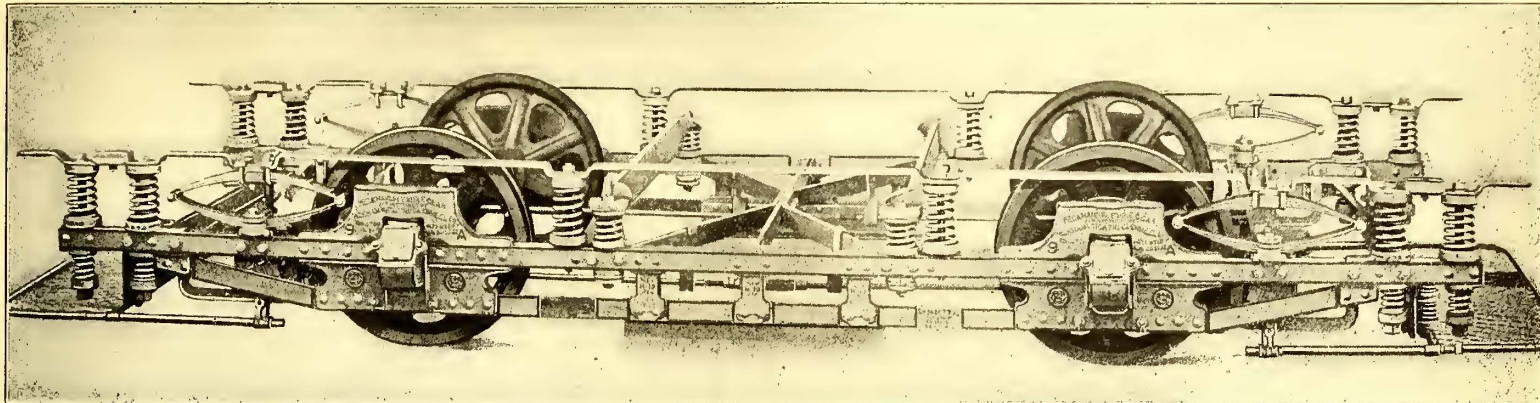
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PECKHAM'S system of Single and Double Electric Trucks

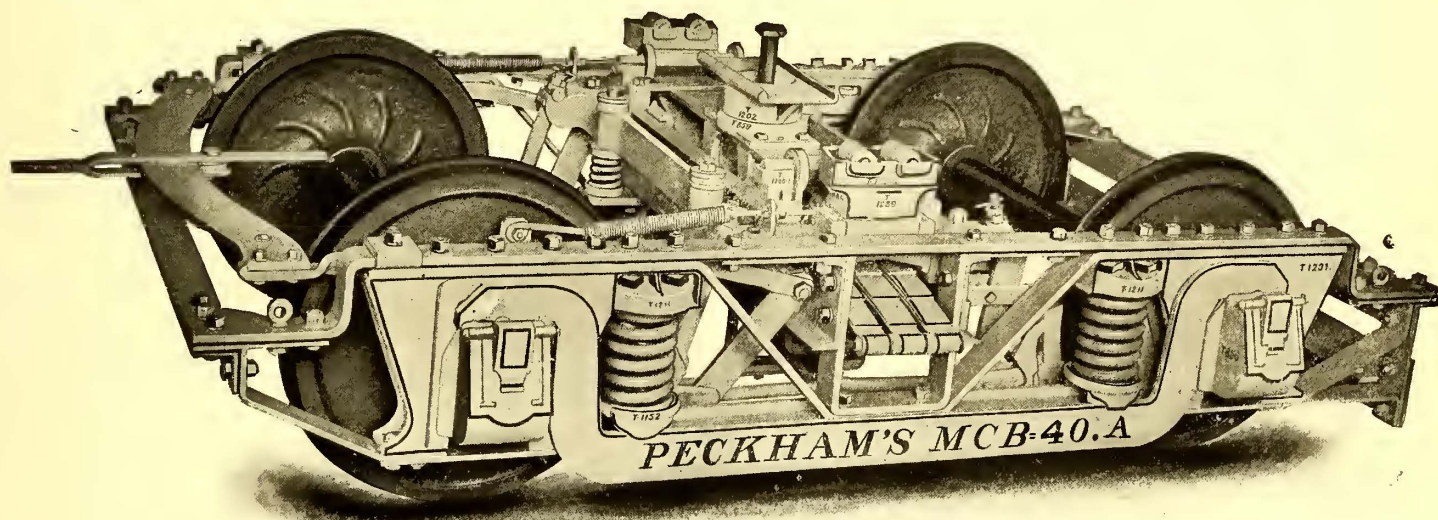
Adapted to any and all conditions of Electric Railway Service. The Largest and Most Complete System in the World.

"METROPOLITAN SPECIAL."



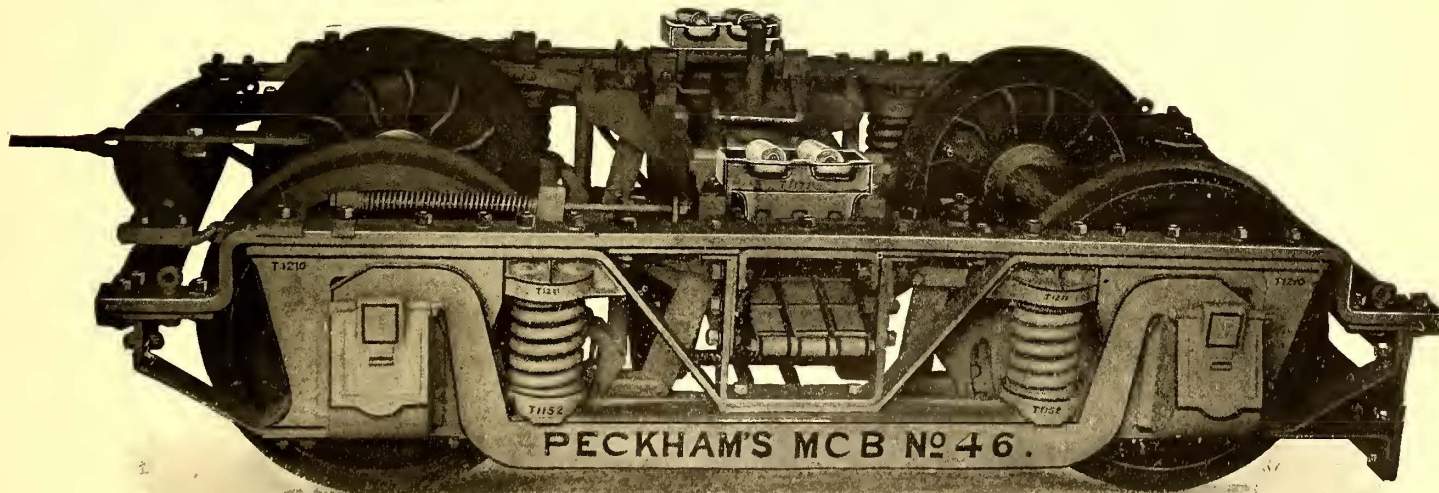
Designed for 20 and 22 ft. Closed and 30 to 32 ft. Open Electric Cars. Guaranteed to make a speed of 20 miles per hour without "Oscillation." Adopted as standard by the "Metropolitan Street Railway Co.," New York.

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"Extra Strong" "M. C. B. No. 46."



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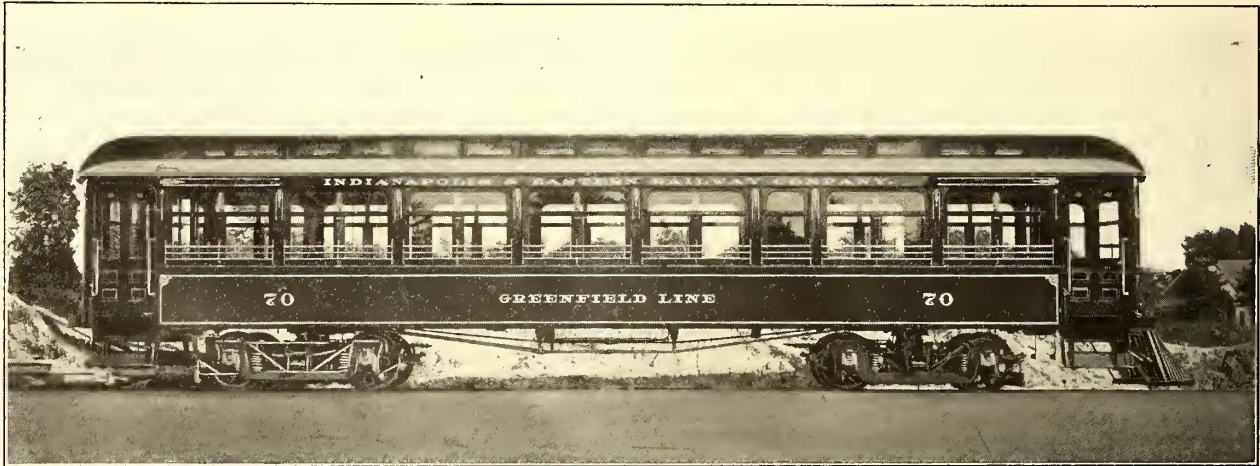
THE G. C. KUHLMAN CAR CO.

Office and Factory:
COLLINWOOD, O.

Car Builders

GEORGE S. HASTINGS & CO.
General Sales Agents
324 Electric Bldg., CLEVELAND, O.

Illustrating Beauty of Design.



WE have illustrated strength of construction by showing one of our cars that was thrown from the track, turned a somersault, and came out intact. We also illustrated durability by showing one of our cars that has run for six years without repairs and without sagging.

We wish now to call your attention to our claim of beauty in design on a car that was built by us for the Indianapolis & Eastern Railway Co., Indianapolis, Ind. We suggest, if you are in the market for a modern interurban coach, that you let us build you some like these. Write for specifications and photographs if you are in the market.

THE G. C. KUHLMAN CAR CO., CLEVELAND, O.

The Romünder "Comfort" Passenger Car

Patented and patents pending in the United States and foreign countries.

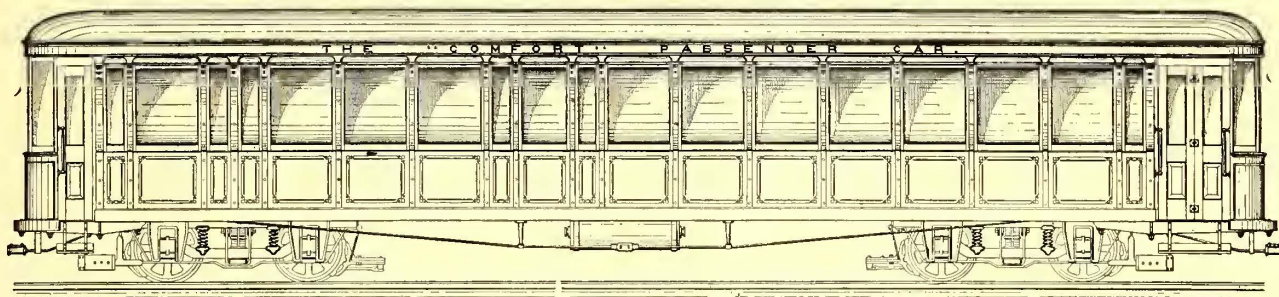
The Ideal Observation Car for Local, Interurban and Steam Roads

Covers every requirement sought for both in comfort and attractiveness, combined with greatest strength and wearing power at a price not exceeding the best production of a closed car as now built.



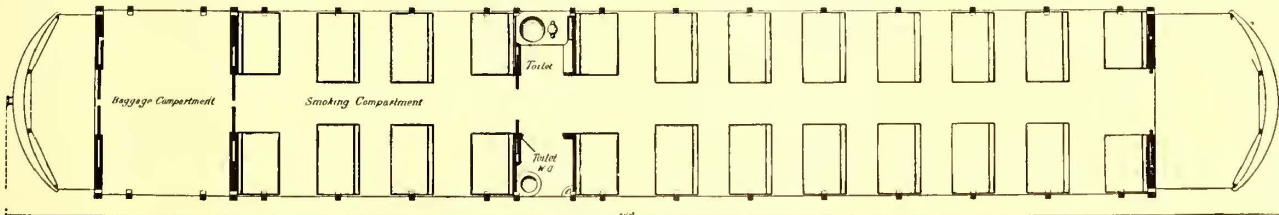
"Copyrighted 1903 by Hermann Romünder"

One continuous roof, extending from side to side and from end to end, overhanging the body of the car, producing a high and roomy interior of the car at a reduced total outside height, and obviating the monitor roof.
System of perfect ventilation through outer ventilators between the side posts, above the side windows and under the eaves of the overhanging roof, and inner ventilators in the ceiling of the car.



Interurban Combination Type of the "COMFORT" Passenger Car.

Steel construction, large curved windows, perfect ventilation, watertight wood casing



Patented and patents applied for

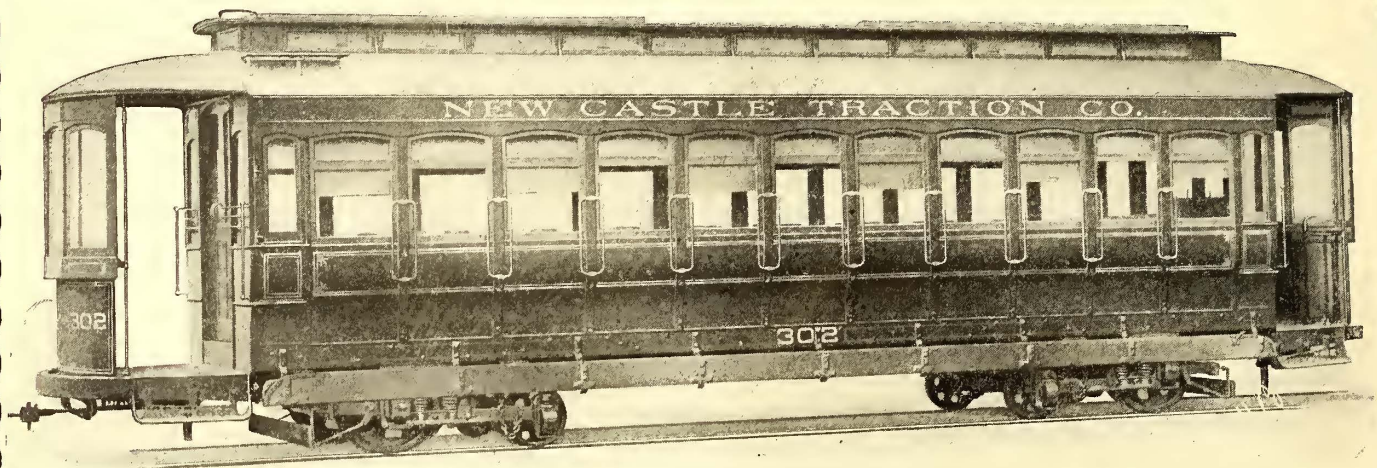
COMPANIES DESIRING THIS TYPE OF CAR CAN BUILD SAME OR HAVE SAME BUILT ON A REASONABLE ROYALTY SPECIFICATIONS AND CONSTRUCTION DRAWINGS WILL BE FURNISHED IN EACH CASE AT COST

For catalogue and further particulars, address

HERMANN ROMÜNDER, Patentee and Owner, 315 Garfield Ave., Milwaukee, Wis.
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Six Great Types

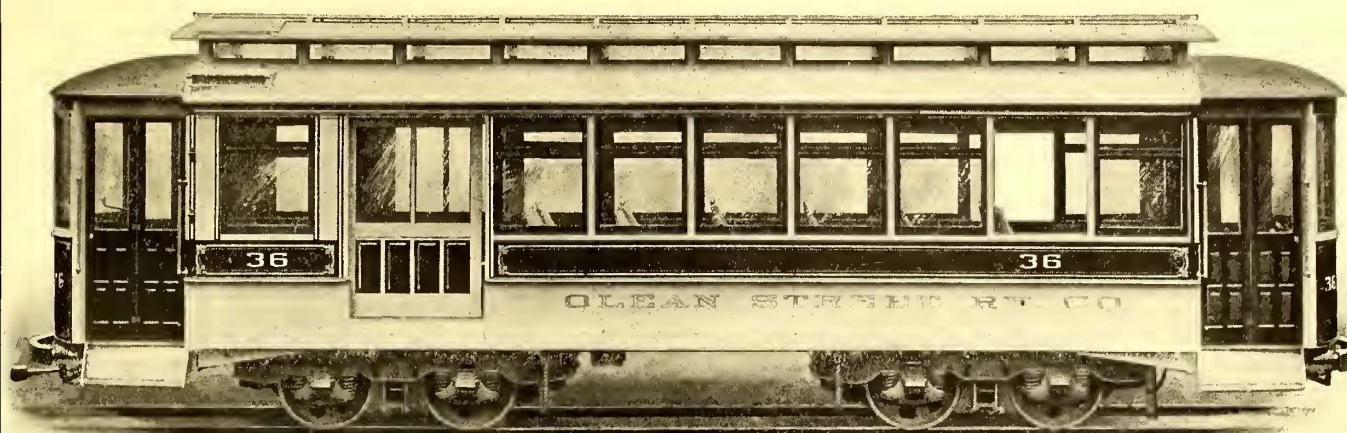
There are six patented types which have won their way into the large systems and have proved their entire suitability in such an unmistakable manner as to have a definite place in the car world of to-day, and these are the Convertible, Semi-Convertible, Narragansett and California types of the J. G. Brill Company, and the Accelerator and Semi-Accelerator types of the Brownell Patents Company. We feel particularly fortunate in having the right to build these cars, because each type meets all the most highly developed conditions of its special field and is being ordered and re-ordered by same companies, and the general demand



CONVERTIBLE CAR (Brill Patented) CLOSED

for each is increasing rapidly. Each type has all the good features of the standard car, or cars, it supersedes, avoiding the short-comings that have been revealed in general practice and including certain additional features which promote the greatest economy, comfort and safety. We of course build open and closed cars of all sizes in the standard styles, and also design cars to suit special conditions. Our supply department is ready to meet the requirements of Purchasing Agents regarding material and equipment of every kind for electric rolling stock.

AMERICAN CAR COMPANY
ST. LOUIS, MO.



Your passengers deserve first consideration—
but your express and freight service should
be properly handled also.

Perhaps some combination passenger and baggage cars such as illustrated on this page will meet your requirements. Or maybe you need special cars for express and freight service exclusively.

In either case, we are prepared to design a car that will meet your conditions, or to submit estimates on cars of your own design.

After you have given us the order you needn't worry about the workmanship. We won't take the contract unless we can build the cars in a manner that will sustain the Stephenson reputation.

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*The largest individual
Electric Car Plant
in the
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THE ST. LOUIS CAR COMPANY

wishes the Street Railway industry in general and its patrons in particular

A Happy and Prosperous New Year

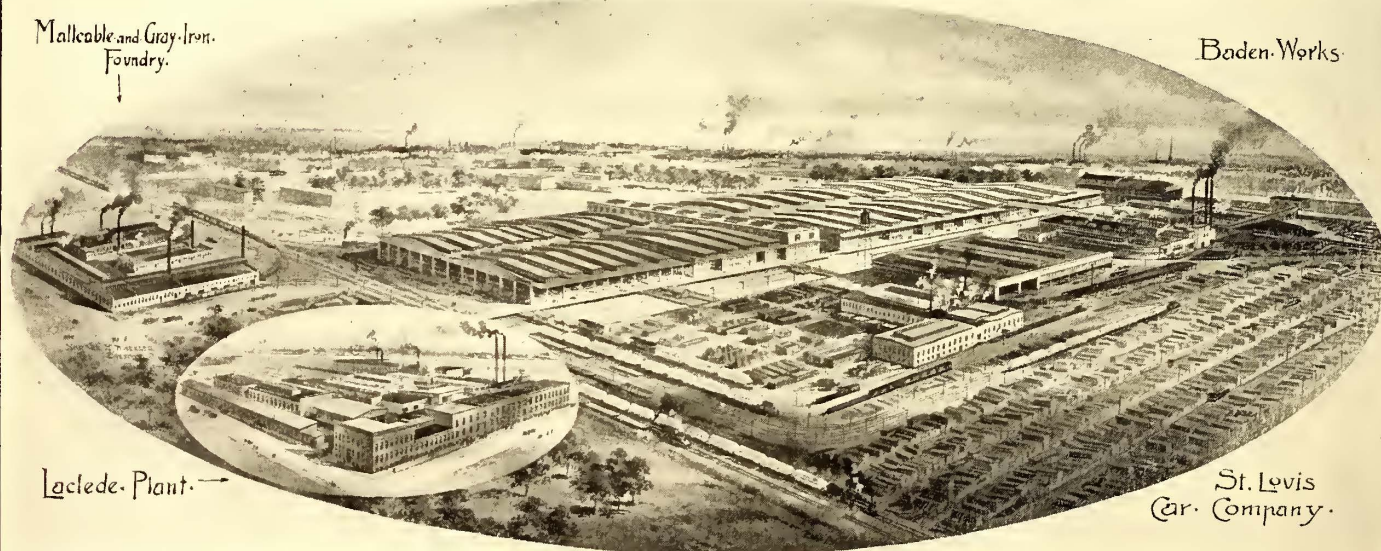
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*The largest individual
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QUICK AND EFFECTIVE

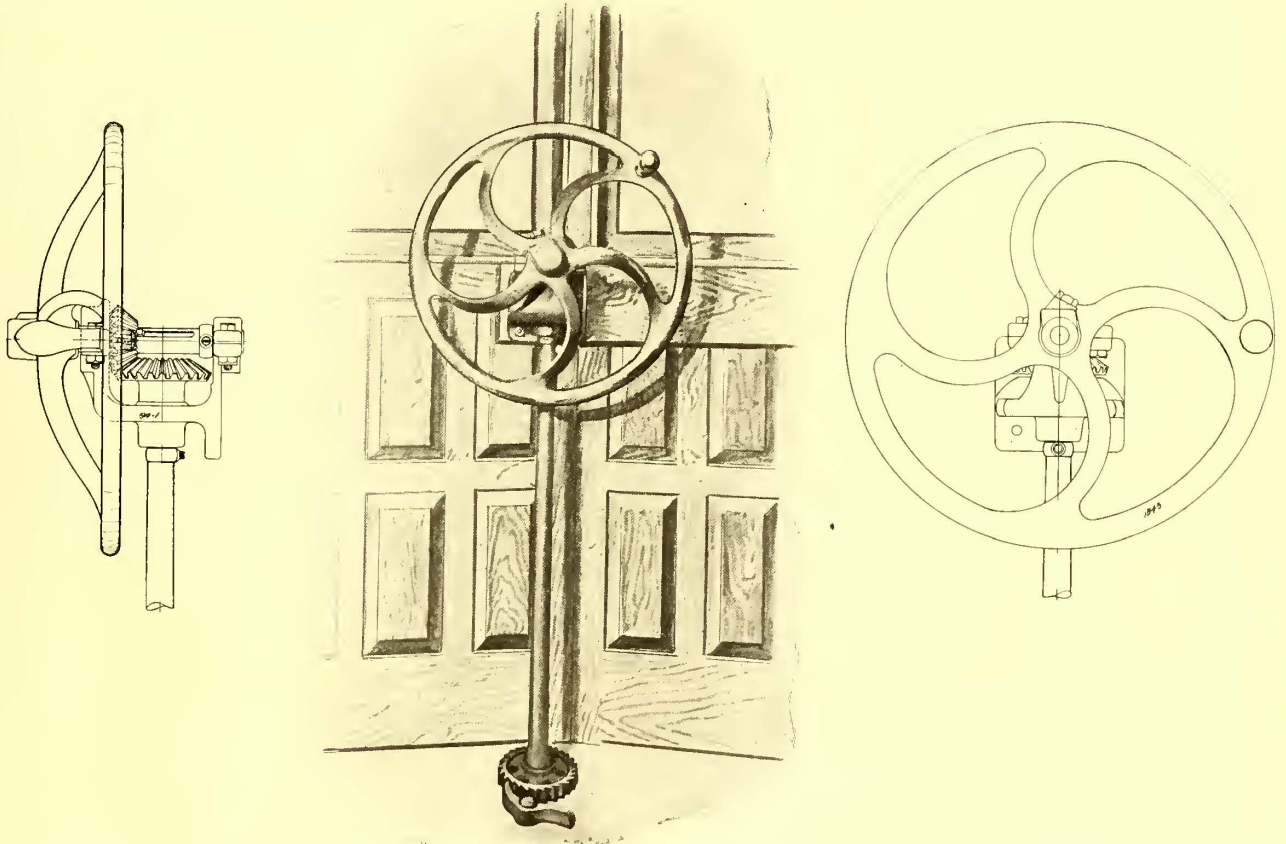
Our Patented Vertical Wheel Brake has many strong points—we submit the following for your consideration:

It is *easier* to operate than the handle, as motormen can use both hands in operation.

It is simple in construction, yet it is strong.

It saves platform space, and removes the danger of injuring passengers by flying brake-handle—a frequent occurrence.

It gives *quicker* and more *effective* action on the brakes than can possibly be obtained by the use of the brake-handle.



This wheel brake is fitted up against the dash. Dished wheel brake is geared to work staff perpendicular to dished wheel. Leverage of 20-inch wheel is equivalent to 14-inch handle. It will pay you to investigate.

ST. LOUIS CAR COMPANY
ST. LOUIS, MO.

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"Brill," Philadelphia
Telegrams
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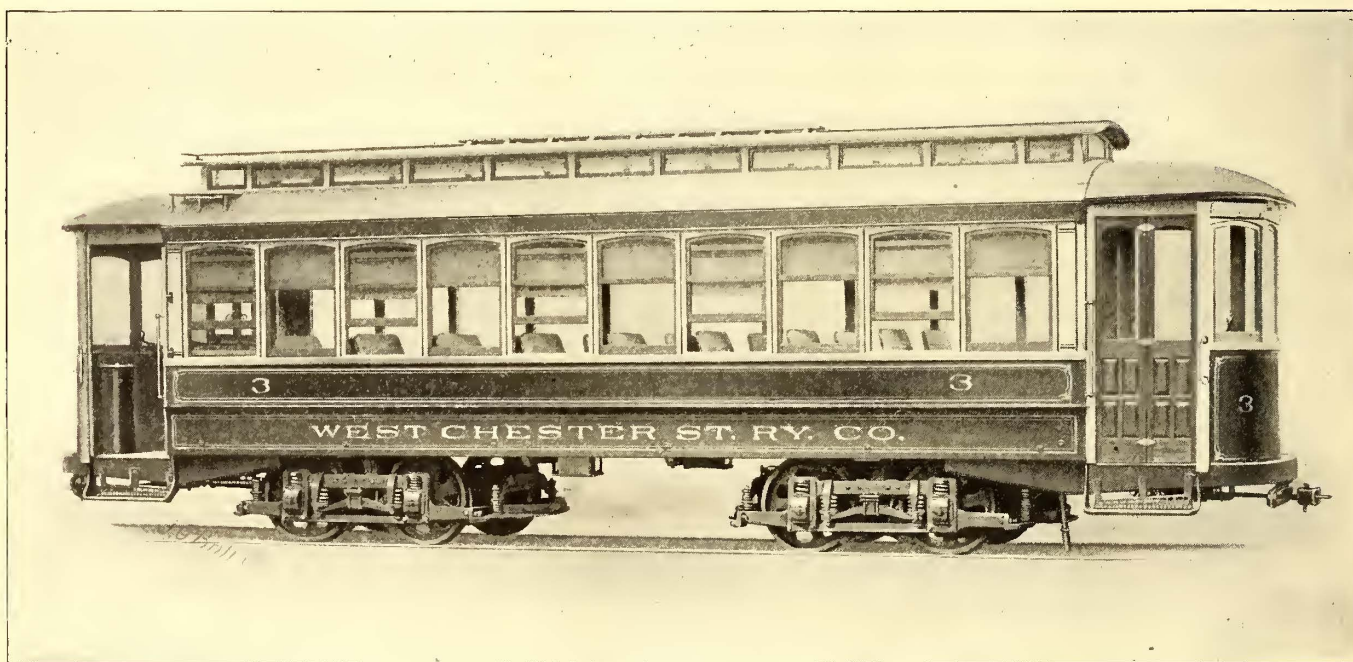
J. G. BRILL COMPANY

CARS AND TRUCKS

110 CANNON STREET
London, E. C. EnglandNOYES BROTHERS.
109 Pitt St., Sydney
Agents for Australasia

The Three Semi-Convertibles

What is there to be said in favor of the removable-window semi-convertible? It has no wall window pockets, and so the ends of the seats are brought between the posts and against the side lining, allowing the seats to be longer and the aisle wider. It costs something, however, to remove and replace the windows, and it is no easy matter to determine just when it should be done. When the windows are out the car must depend upon its curtains for protection. What can be said in favor of the wall window pocket semi-convertible? It is a self-contained car—that is about all that can be said in its favor, for the window pockets are in the wrong place. They take up much valuable space, and careless passengers use them as cuspidors and rubbish receptacles. The Brill Semi-



SEMI-CONVERTIBLE CAR (Patented)

Convertible has the good features of both these cars, and avoids the objectionable ones by having the window pockets in the side roofs. The manner in which the details have been carried out is singularly complete, and the operation is simply perfect. The lower sash is raised alone at first, and when the tops of both sashes are abreast the upper sash hooks itself on and is carried into the roof pocket. Only one runway in each post is required, and that is entirely of metal. There can be no sticking, as the trunnions at the corners of the sash, which move in the metal runways, are also metal. The ease with which the windows are operated is always astonishing to passengers. The system is of course just as applicable to straight-sided cars as curved. Another thing in favor of not having wall window pockets is that the window sills can be as low as desired.

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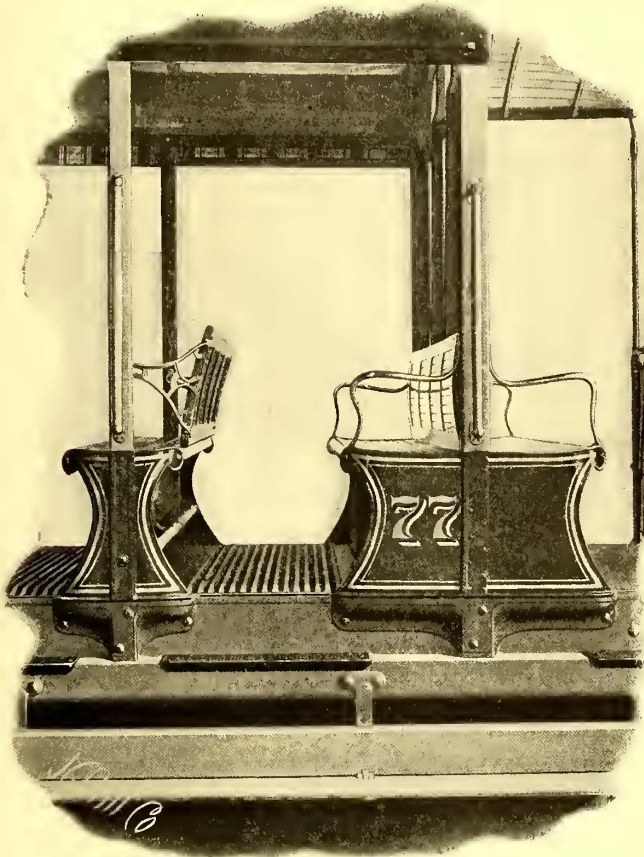
CARS AND TRUCKS

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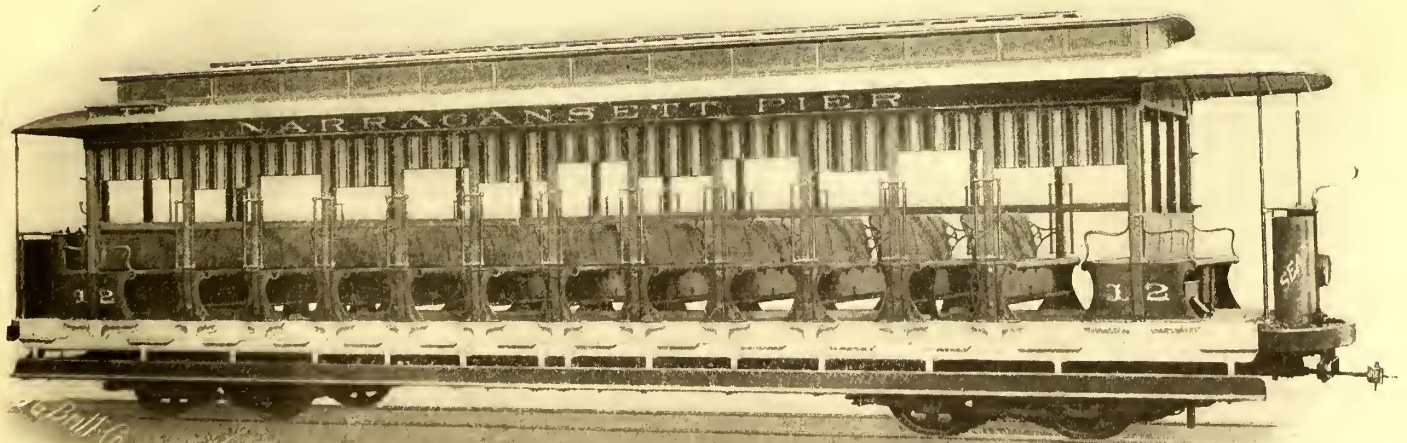
Long, Open Cars, with Easy Steps

The 19½ inches from the rail-head to the step, or running-board, of a single-step double-truck car

is much too high for women and children, and even awkward and unsafe for men, and the 17 inches from the step to the car floor is worse still, for the passenger must pull himself between the posts, a more difficult operation than drawing himself up in front of it as he does to reach the first step. Now it is impossible to have the car floor lower than 36½ inches, and the height of the single step mentioned is probably the best under the circumstances. The double step is therefore a genuine necessity, and we have it in the Narragansett without exceeding the width over all of the single-step car, for the upper step is on the lower flange of Z-bar sills, and the step heights respectively 16, 13 and 7½ inches. Z-bar sills are much stronger than timber, in fact the Narragansett is the strongest open car ever built. The posts have a deep setting in brackets bolted to the sills. The lower part of the posts are enclosed in Brill Patented Round-Corner Seat-End Panels, as the illustration shows. The seats are full standard length, and in every way the car has all the good features of standard construction, with the advantages of easier ingress and egress and greater strength. For summer excursion service it has no equal, and is the only practical open car for mounting on double trucks having equal-sized wheels.



SECTION OF "NARRAGANSETT" CAR



BRILL "NARRAGANSETT" CAR (Patented)

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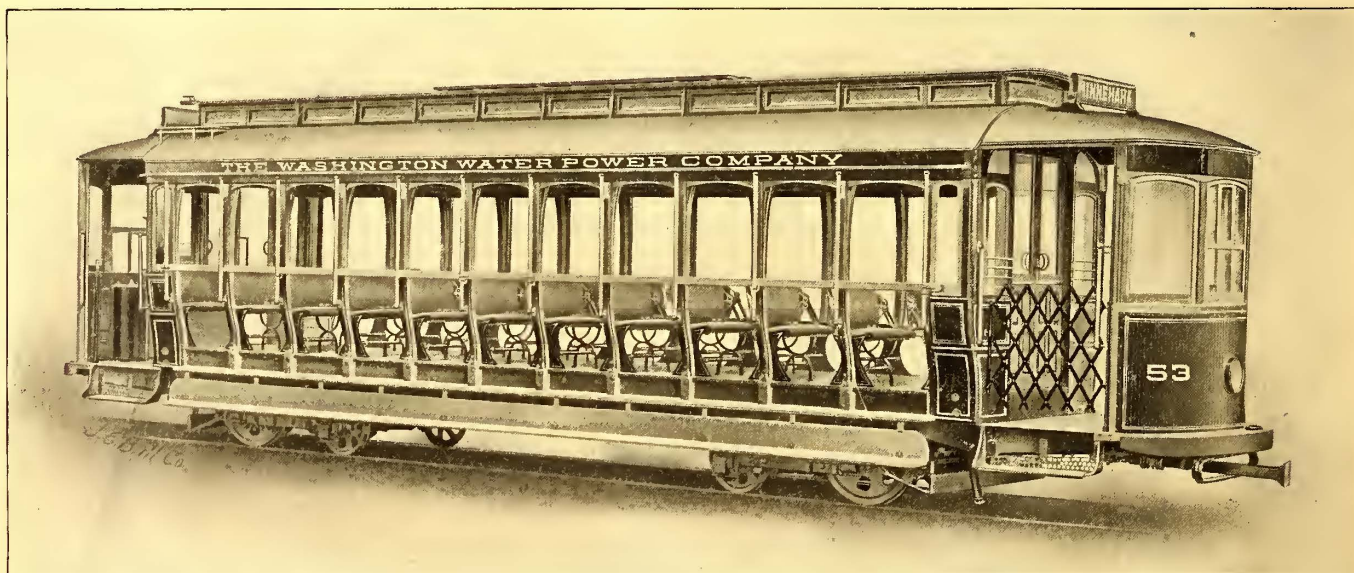
J. G. BRILL COMPANY

CARS AND TRUCKS

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The Car that Leads A Double Life

The Convertible not only does the work of two cars, but does it better, for it is always ready to meet any change of temperature. The large class of people who do not use street cars for business purposes want comfort and protection, and if it is not given them will not go out on threatening or stormy weather. Where ordinary cars are used many fares are lost because people who have but a short distance to go prefer to walk rather than suffer the discomforts of closed cars in warm weather or open cars on stormy or chilly days. It is little to be wondered at that the Convertible is a remarkably popular car, and one that people will wait for in preference to others, for the choice is with them whether it shall be open or closed. Managers are usually glad enough to be rid of the "weather-prophet" business. The sashes and panels are light enough for any one with moderate strength to raise into the roof-pockets, and the operation is simple enough for any one with ordinary



CONVERTIBLE CAR (Patented), Windows and Panels in Roof Pockets. "Narragansett" Sill Steps.

intelligence. A pair of sashes weigh fifteen pounds, and a panel eighteen pounds. The flexible double-sheet metal panels are thoroughly water-proof, and the air spaces in them enable the car to retain heat. The width of the monitor deck is not materially reduced by the pockets in the side roofs. In a car measuring eight feet over the posts, the clear interior width of the deck is forty-six inches. The cars of the Washington Water Power Company, shown above, include in their construction the Brill "Narragansett" type of double steps. This arrangement comprises Z-bar sills, with the upper sill on the outward-extending lower flange of the Z-bar, thereby utilizing the space ordinarily occupied by a timber sill. These cars are mounted on Brill "Eureka" Maximum-Traction trucks, which carry them low, but it will be readily seen that with this arrangement double trucks having equal-sized wheels may be used.

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Cablegrams
"Brill," Philadelphia
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J. G. BRILL COMPANY

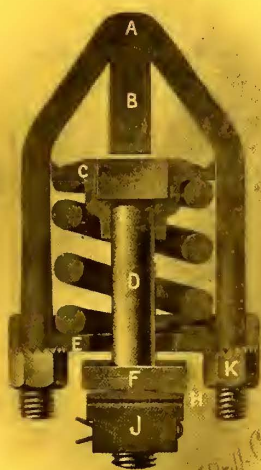
CARS AND TRUCKS

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Traits of Character

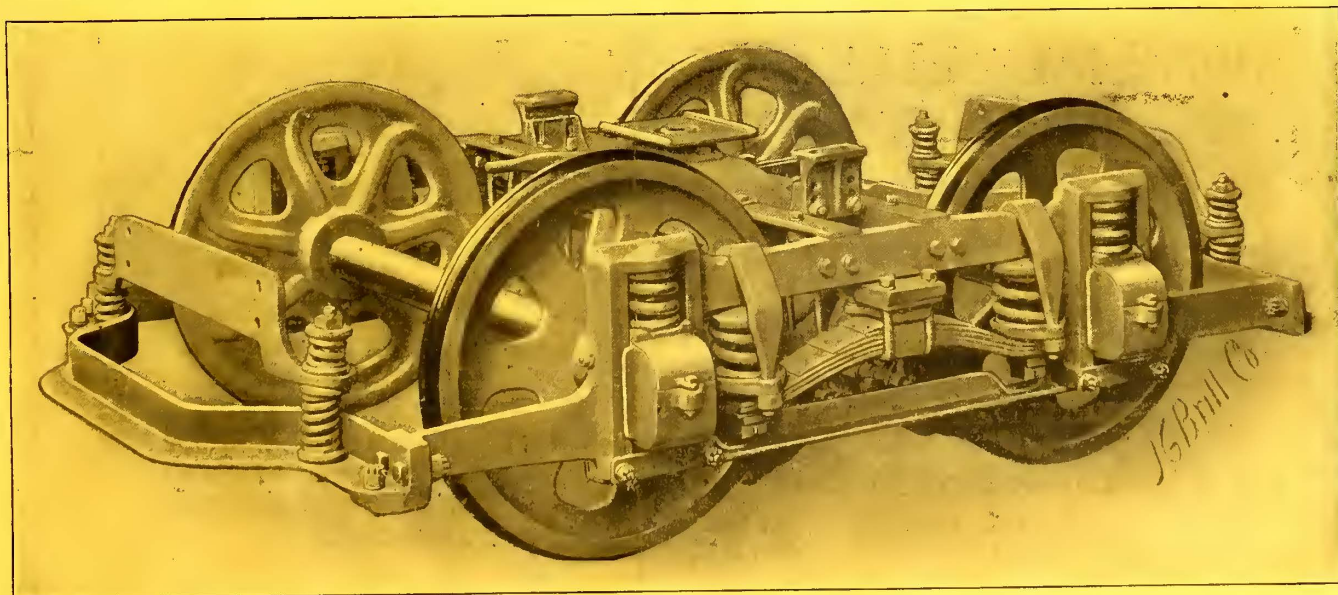
One of the finest traits of the No. 27-G truck is shown when it rounds a curve—there is no lurch nor jar to the car body, nor grinding of the wheel flanges against the rail heads, no matter

what the speed is. That is because the Brill patented system of equalization includes spring-links which perfectly cushion the side-swing of bolster. A good proof that the frame does not tilt is that the brakes retain their adjustment longer than with other trucks, and a non-tilting frame is extremely important in a truck having outside-hung motors, for the tendency is for the motors to bounce and cause the frame to oscillate. Our truck is good for thirty to thirty-five miles an hour without oscillation. The side frames of the truck are cast or solid forged in a single piece. We never use riveted or built-up work, as it is literally impossible for such frames to keep square. The solid forged frame is vastly better than the cast, because it cannot be crystallized by shocks or vibration. Solid forging, as we do it, is using metal with a fibre to it and toughening it by shaping it under 2,000 ton hydraulic presses. We are the only makers of solid forged frames for trucks—frames that are safe and sound for all time.



Sectional View of Equalizing Spring Link and Relative Parts

- | | |
|-------------------------------|------------------------------------|
| A—Equalizing Spring Link. | H—Rocker Casting. |
| B—Truck Side Frame. | I—Equalizing Spring Bolt Nut. |
| C—Equalizing Spring Cap. | (Top of Nut is shaped like top of |
| D—Equalizing Spring Bolt. | Rocker Casting, to which it is set |
| E—Equalizing Spring Seat. | at right angles). |
| F—Ends of Elliptical Springs. | K—Equalizing Spring Link Nut. |



Brill Truck 27-G (Patented). For City and Suburban Service

THE SPRAGUE- GENERAL ELECTRIC

SYSTEM OF MULTIPLE UNIT CONTROL

FOR ELECTRIC TRAINS

Has been adopted exclusively by The New York Underground Railway (Interborough Rapid Transit Company), after exhaustive and impartial tests, on account of its

- 1—Safety to Passengers and Employees
- 2—Reliability of Service
- 3—Comfort to Passengers
- 4—Economy of Power
- 5—Low Cost of Maintenance
- 6—Simplicity

GENERAL ELECTRIC COMPANY

GENERAL OFFICE

Schenectady, N. Y.

New York Office: 44 Broad Street

SALES OFFICES IN ALL LARGE CITIES

FOR GREAT BRITAIN AND IRELAND:

The British Thomson-Houston Co., Ltd.
Rugby and 83 Cannon St., London, E. C.

THE FOLLOWING ELECTRIC RAILWAY COMPANIES ARE OPERATING OR HAVE ORDERED THIS FORM OF EQUIPMENT:

Athens & Piræus Railway, Athens, Greece.
Aurora, Elgin & Chicago Railway, Chicago, Ill.
Baltimore & Ohio Railroad, Baltimore, Md.
Boston & Albany Railroad, Boston, Mass.
Boston Elevated Ry., Boston, Mass.
Boston & Maine R. R., Concord, N. H.
Boston & Worcester Street Ry. Co., Boston, Mass.
Boston & Worcester Electric Railway, Worcester, Mass.
Brooklyn Rapid Transit Co., Brooklyn, N. Y.
Butte Electric Railway, Butte, Mont.
Canton & Akron Railway, Canton, Ohio.
Central London Railway, London, England.
Chemin de Fer de L'Ouest, France.
Chesapeake Transit Co., Chesapeake, Md.
Chicago, Burlington & Quincy R. R., Deadwood, S. D.
Columbus, Buckeye Lake & Newark Railway, Columbus, Ohio.
Columbus, London & Springfield Railway, Columbus, Ohio.
Columbus, Delaware & Marion Railway, Columbus, Ohio.
Dayton, Lebanon & Cincinnati Railway, Dayton, Ohio.
Denver & Northwestern Railway, Denver, Col.
Detroit & Chicago Railway, Detroit, Mich.
Henry A. Everett, Cleveland, Ohio.
Fonda, Johnstown & Gloversville Railway, Gloversville, N. Y.
Great Northern & City Railway, London, England.
Houghton County Railway Co., Hancock, Mich.
Indianapolis & Northwestern Traction Co., Indianapolis, Ind.
International Railway Co., Buffalo, N. Y.
Interborough Rapid Transit Co., New York, N. Y.
Kobu Railway, Kobu, Japan.
Lake Shore Electric Railway, Toledo, Ohio.
Louisiana Purchase Exposition, St. Louis, Mo.
Manhattan Railway Co., New York City.
Mediterranean Railway Co., Italy.
Milwaukee Electric Railway Co., Milwaukee, Wis.
National Railway Construction Co., Boston, Mass.
New Albany Railway, New Albany, Ind.
Newark & Zanesville Railway Co., Newark, Ohio.
N. Y., N. H. & Hartford Railway, New Haven, Conn.
Northeastern Railway, England.
North Shore Railway Co., San Salito, Cal.
Northwestern Elevated Railway, Chicago, Ill.
Oakland Transit Consolidated Ry., Oakland, Cal.
Paris Metropolitan Tramway Co., Paris.
Paris-Orleans Railway, Paris, France.
Prussian Government Railway, Berlin, Germany.
Rochester & Eastern Railway, Rochester, N. Y.
Saginaw Valley Traction Company, Saginaw, Mich.
Schenectady Railway Co., Schenectady, N. Y.
Scioto Valley Pool Co., Columbus, Ohio.
Seattle & Tacoma Interurban Railway, Seattle, Wash.
South Side Elevated Railway Co., Chicago, Ill.
Underground Electric Railways Ltd., London, England.
Union & Glens Sps. Railway, Union, S. C.
Wilkes-Barre & Hazelton Railway, Wilkes-Barre, Pa.

This makes a total of Fifty-four roads with 2,470 equipments up to December Fifteenth, nineteen hundred and three.