

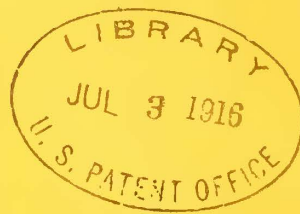
ELECTRIC RAILWAY JOURNAL

Volume 48
Number 1
July 1, 1916

McGraw
Publishing
Co., Inc.

Has a distinct field
In addition, is a valuable
Supplementary Process

Prest-O-Lite **PROCESS**

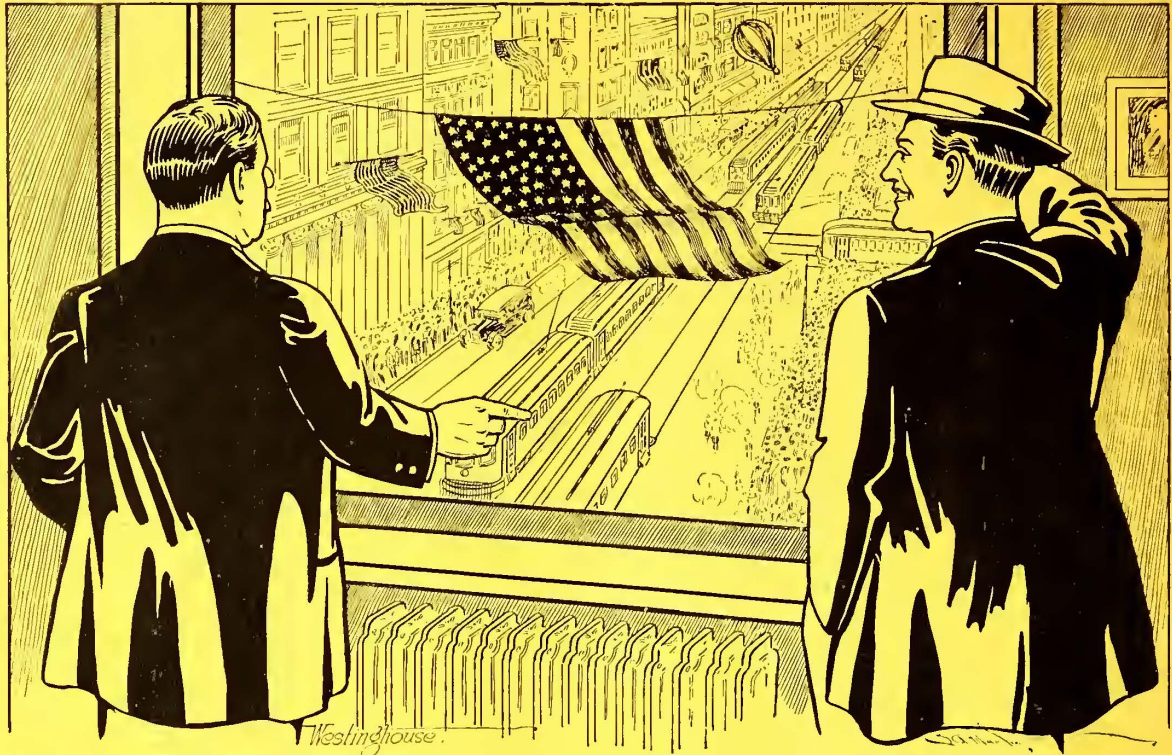


*Welding defective brasses in
Lebanon Shops of Terre
Haute, Indianapolis & East-
ern Traction Co.*

No matter what other welding methods you may now be using, the Prest-O-Lite Process offers additional savings, through the wide range of additional work made possible. In many instances, the added quality, economy of labor and materials so easily effected are entirely outside the range of other welding processes. The perfect portability of the outfit makes it

decidedly superior to any stationary plant on a wide variety of jobs, outside or inside the shop. You may be using other welding processes profitably, but you should learn how the Prest-O-Lite Process will also pay back its small cost quickly. Write for data.

The Prest-O-Lite Company, Inc.
805 Speedway, Indianapolis, Ind.



“The Glorious Fourth”

“JOE,” said the General Manager to the Superintendent, “we can now enjoy the glorious Fourth, and celebrate Independence Day like other patriotic people, as we should, instead of fretting the whole day about equipment failures and exasperating delays.”

“Westinghouse HL Control and light-weight motors have certainly brought about a wonderful improvement in transportation, especially with two- and three-car trains to handle the crowds. Multiple-unit train operation solves the problem of handling holiday crowds.”

“There’s surely a big difference, Boss,” answered Joe, “two years ago we had several cars that we could not get ready for the Fourth, and three other cars went bad before the day was over. Last year with Westinghouse equipment every car was on the job, and there wasn’t a failure or delay during the day. It will be the same this year. We know now what the equipment will do, and not a man is held in the shops. They are all celebrating the ‘Fourth.’”

Westinghouse Electric & Manufacturing Company

Sales Offices in All
Large American Cities



East Pittsburgh,
Pennsylvania

Electric Railway Journal

New York, July 1, 1916

Volume XLVIII No. 1

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Electrification of an English Freight Line 4

Electric operation of freight trains has been introduced on the Shildon-Newport branch of the North Eastern Railway in England. Locomotives of 74 tons weight are used, direct current at 1500 volts being supplied from an overhead catenary system.

ELECTRIC RAILWAY JOURNAL, July 1, 1916. 11¼ cols. Ill.

Current Tendencies in the Railway Business 10

Dr. Thomas Conway, Jr., discusses effect of jitneys on financing and earnings. Danger of jitneys in strikes. According to analogy based on 1907, revival in gross and net earnings is to be expected.

ELECTRIC RAILWAY JOURNAL, July 1, 1916. 4½ cols.

Axle-Mounted Armatures 10

Discussion of the Master Mechanics' report on electric locomotives centered on the influence of axle-mounted armatures on the track.

ELECTRIC RAILWAY JOURNAL, July 1, 1916. 1¼ cols.

B. J. Arnold Reports on Bay State Street Railway 13

Transportation expert concludes that economies in operation amounting to nearly \$700,000 per year can be attained, but that when all the savings estimated are considered, with an adequate depreciation allowance, the gross revenue cannot return 5 per cent on the property.

ELECTRIC RAILWAY JOURNAL, July 1, 1916. 4¾ cols. Ill.

Relations of the N.Y.E.R.A. to the Problems of the Industry 15

J. J. Dempsey, president of the New York Electric Railway Association, shows why railway operation is difficult.

ELECTRIC RAILWAY JOURNAL, July 1, 1916. 1¼ cols.

Electric Railways and Mobilization 16

An army officer and railway managers present concrete plans for electric railway co-operation in military mobilization at the annual meeting of New York Electric Railway Association this week. Other topics considered included standardization.

ELECTRIC RAILWAY JOURNAL, July 1, 1916. 14¼ cols. Ill.

Boat Trip of C.E.R.A. 23

Four days' cruise was successfully begun. Impromptu talks were given on Wednesday morning. Special cars were run to the place of embarkation.

ELECTRIC RAILWAY JOURNAL, July 1, 1916. 2 cols.

Equipment and Its Maintenance 27

Recording Second-Hand Special Work—*By C. Benham, Jr.* Welding Manganese Steel—*By Way Engineer.* Blasting Pole Holes in Clay—*By J. H. Squires.* Sealed Fuse Cabinet Guarantees Supply—*By H. A. Mullett.* Renewal of Collector Rings on 400-kw. Rotary Converters—*By James W. Brown.* Rail-Grinding Practice of the Bay State Street Railway. Steel Terminal Casing Increases Strength of Rail Bond.

ELECTRIC RAILWAY JOURNAL, July 1, 1916. 10 cols. Ill.

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Manufacturers and the Association.
Elastic Limit Defined.
City Parallel to "Exclusive Franchise."
Everyday Law—and Duty—for Women.
Electric Railway Prospects.
Electric Railways in Preparedness.

Progress on Large Viaduct in Texas 9

Chicago Loop Cleared for Preparedness Parade 9

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

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No back volumes for more than one year, and no back copies for more than three months.

Circulation of this issue 8000 copies.



Perfect Safety

*Hudson & Manhattan Train equipped with Westinghouse
Electrically operated Air Brakes*



The American Museum of Safety has awarded the Traveler's Insurance Company's gold medal to The Hudson & Manhattan Railroad for "Achievement in accident prevention among its personnel and for promoting safety for the travelling public." In eight years four hundred million passengers were carried without a single fatality.

Ten years ago the constructors of the Hudson and Manhattan Railroad faced a braking problem of unequalled complexity which demanded certain essential features not possessed by any type of brake in existence at that time.

The road was a combination of elevated, surface and subway characteristics. There were $5\frac{1}{2}\%$ grades and curve of 90 ft. radius. High train speeds were called for and stops must be frequent and accurate. Headway of trains was unusually short.

Our Engineers solved the problem with the electrically-controlled air brakes. During the period covered by the medal of award approximately two hundred million brake operations were had without a single failure so far as is possible to know.

The Westinghouse Air Brake is the greatest contributor to railway safety records.

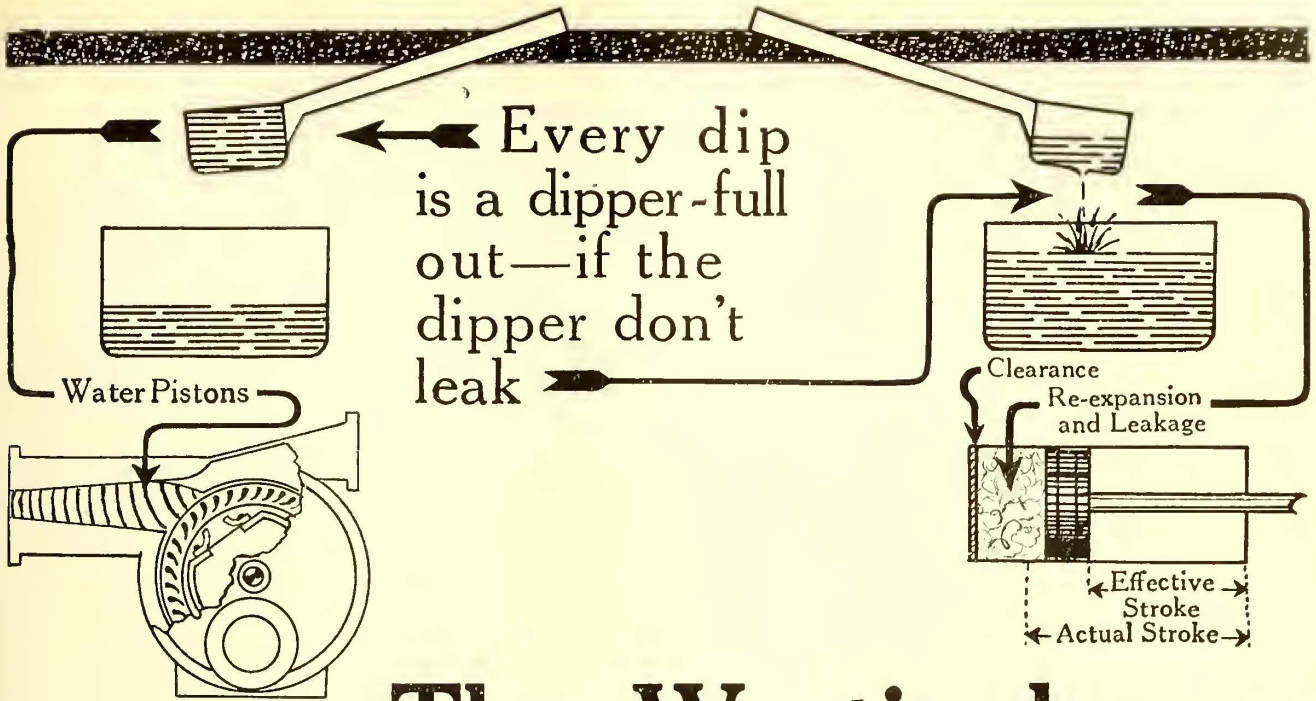
Westinghouse Traction Brake Company

General Office and Works, Wilmerding, Pa.

Pittsburgh: Westinghouse Building
Chicago: Railway Exchange Building



New York: City Investing Building
St. Louis: Security Building



The Westinghouse Leblanc Air Pump

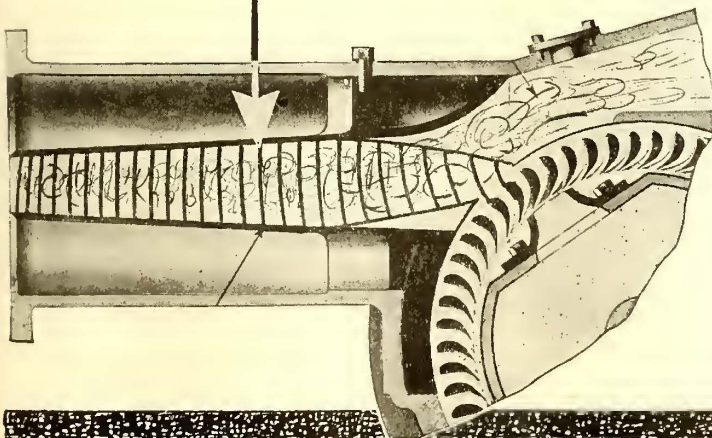
with which all Westinghouse Condensers are equipped, is like a bright, new dipper in its operation. Every water piston is a dipper-full out— with no back drip. The water pistons follow each other in such rapid succession that the removal of air is as sure and as constant as the law of gravitation.

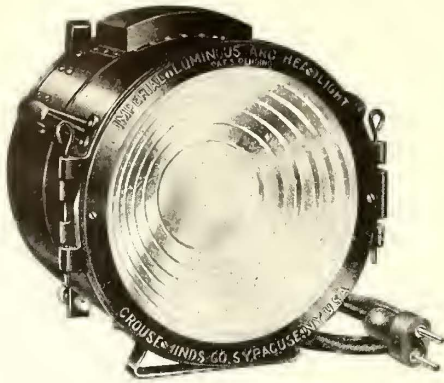
This is one of the “secrets” of the

High Vacuum

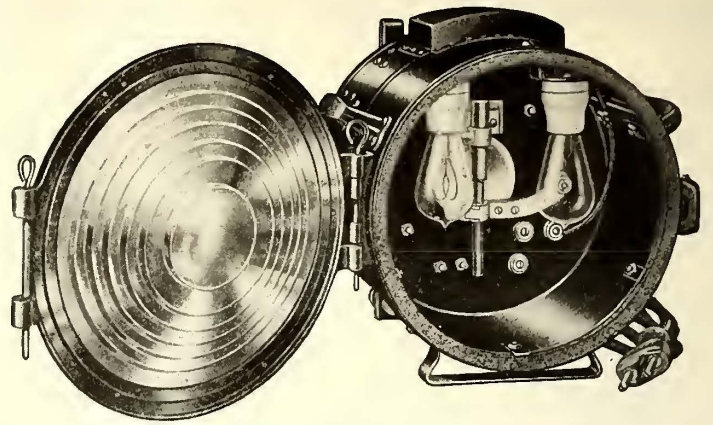
and the satisfactory operation of our Condensers.

**Westinghouse
Electric & Mfg. Co.**
East Pittsburgh, Pa.

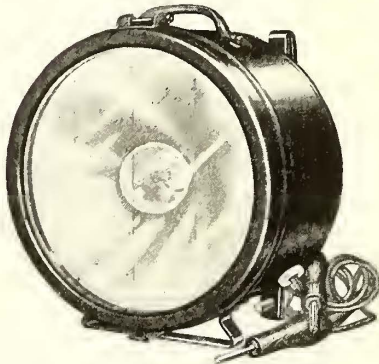




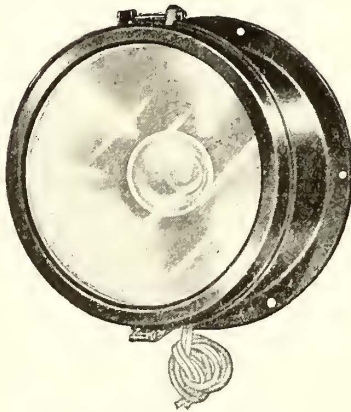
Luminous Arc and Incandescent



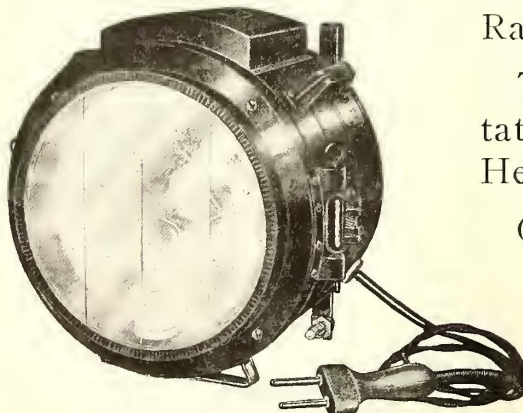
Luminous Arc and Incandescent



Incandescent



Incandescent



Carbon Arc and Incandescent

Crouse-Hinds Imperial Headlights Sold Under New Plan

After July 1, The Ohio Brass Company will act as General Sales Agents in the United States for this complete line.

It is a line which covers every requirement of Electric Railway Service.

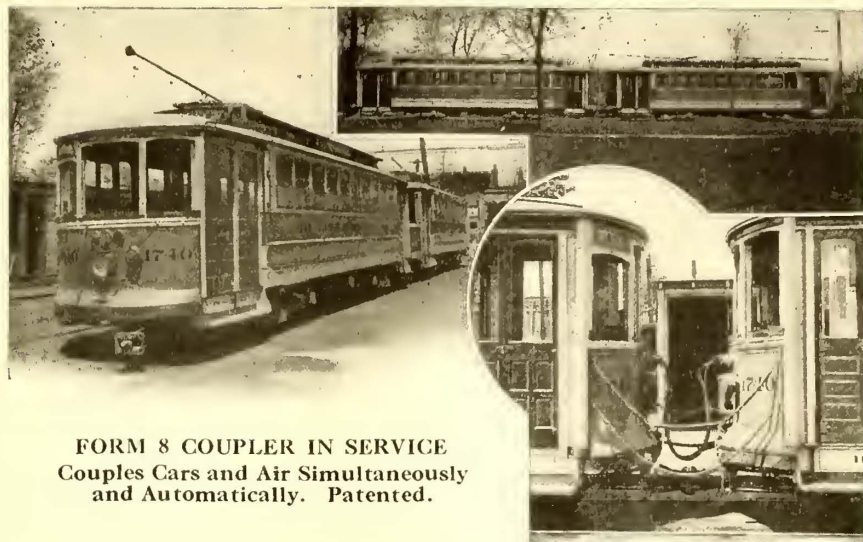
The incandescent type, by means of different lenses and reflectors, may be furnished to produce three kinds of illumination—Crystal Ray, Sterling Ray or Gold Ray.

The Luminous Arc and Carbon Arc Headlights may be furnished with Gold Ray if desired.

The illustrations show a few representative designs of Crouse-Hinds Imperial Headlights.

Orders for Headlights should be sent to

The Ohio Brass Co.
Mansfield, Ohio



FORM 8 COUPLER IN SERVICE
 Couples Cars and Air Simultaneously
 and Automatically. Patented.

Tomlinson Couplers for Safety First

The trainman need not go between the cars in coupling or uncoupling Tomlinson Couplers.

The cars come together with a slight bump. The coupler hooks engage and the cars are ready to go.

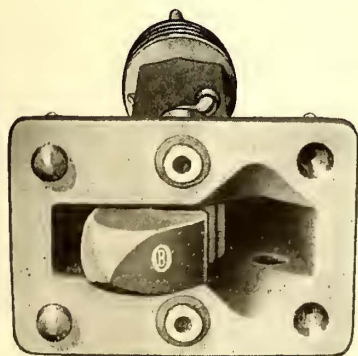
To uncouple, a pull on the chain at the side releases the hooks.

The Spring Drawbar Carrier and its Radial Support take care of the most severe breaks in grade and sharp curves.

Tomlinson Couplers may be adapted to any kind of service and intercoupling.

The Tomlinson Form 8 Coupler does away with dangling air hose. It may also be equipped to couple the electric lines.

Complete information on request.



End view of Form 8 Coupler showing
 air connecting gaskets

The Ohio Brass Company
 Mansfield, Ohio

The Annual Convention Number

Date of Issue

Will Mean Much to Every Electric Railway Operator

The greatest problem before the electric railway industry today is to meet the demand of the public for better and better service despite a decrease in the returns per passenger and in the purchasing power of the dollar.

Amelioration of this problem through the economic education of the public is a possibility of the future.

Amelioration of this problem by means of more efficient equipment and operation is a fact of the present.

The Annual Convention Number of the Electric Railway Journal for 1916 will be of the most immediate and important value to the electric railway operator because of the data it will present on what is being done or what can be done to please the public at a profit.

The new date of issue, Sept. 30, will place the Convention Number in the hands of practically every delegate before he leaves home, thus enhancing the value of both the editorial and advertising matter.

Electric Rail

of the Electric Railway Journal

Sept 30, 1916

Will Mean Much to Every Electric Railway Manufacturer

An issue of such compelling interest to the men who buy equipment must be of top-notch advertising value to the men who sell equipment.

Every manufacturer belongs in the advertising pages of the Annual Convention Number if he wants the biggest return from his efforts in advancing the standards of electric railway operation and service.

If you can demonstrate that **your** apparatus improves service, creates traffic or saves money, your advertising message will get the earnest attention of the men who are trying to make both ends meet in the management of electric railways.

Make your advertisement worthy of your audience. Give facts and figures derived from actual operation.

Let us co-operate *now* so that we can lay out your advertisement in the Annual Convention Number to best advantage.

way Journal

The Annual Convention Number

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Let us co-operate *now* so that we can lay out your advertisement in the Annual Convention Number to best advantage.

way Journal



Arch and
19th Sts.
Philadelphia

Phono-Electric

The Lineman's Favorite

"Why don't you say something about the true gage of Phono-Electric Trolley Wire when you advertise it?" suggested one line superintendent recently.

"Of course, we install Phono-Electric mainly to get long wear, but it's no small satisfaction to find that it is always drawn so accurately to gauge.

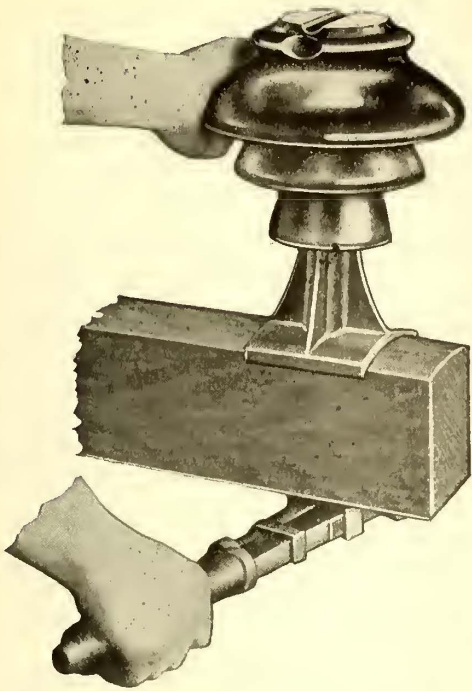
"Seldom does a Phono-Electric wire show any roughness or inequality.

"The linemen like a wire that is so easy-fitting and that won't be injured by accidental nicking."

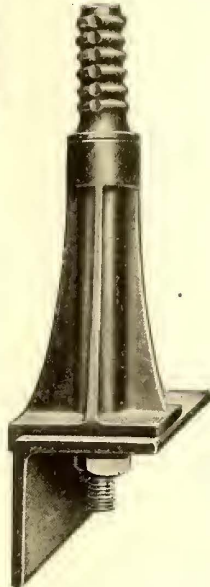
BRIDGEPORT BRASS CO.
BRIDGEPORT CONNECTICUT

Everything For Pole Tops

Keystone Truss Pins
Locke Insulators
Keystone Triangle Arms



Installing a Keystone Truss Pin and Locke Insulator



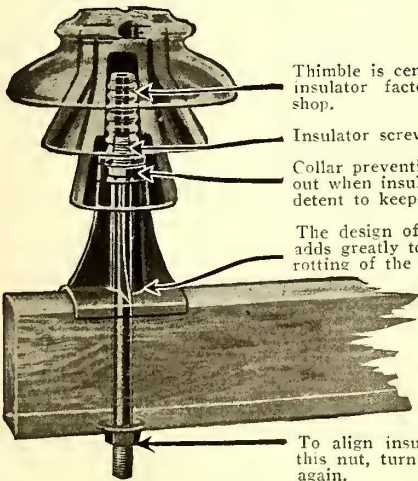
Keystone Truss Pin Angle Iron Type

By using our broad line of pole top specialties you can exactly meet any requirements your service demands. These shown are but a few of the hundreds shown in our catalogs, each of which has many distinct advantages.

Make up your pole top equipments from these specialties and you will knock out a lot of kinks in service that you have heretofore put up with.

Write for full information.

Keystone Truss Pin Advantages



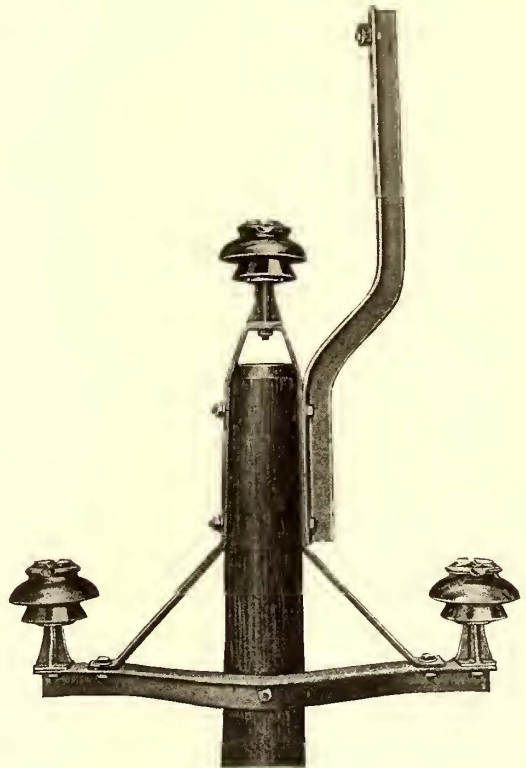
Thimble is cemented into insulator at the insulator factory, or in the customer's shop.

Insulator screws to stud bolt here.

Collar preventing stud bolt from dropping out when insulator is removed and having detent to keep bolt from turning.

The design of the base prevents turning, adds greatly to the strength, and prevents rotting of the wood at the bolt hole.

To align insulator with the wire, loosen this nut, turn insulator; then tighten nut again.



Keystone Triangle Arm

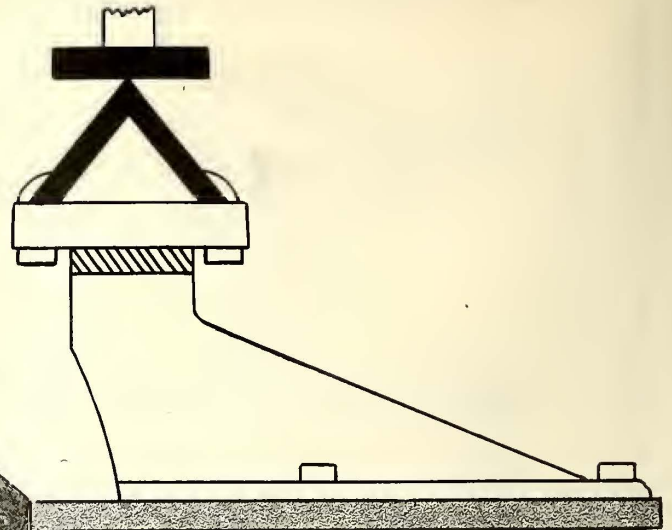
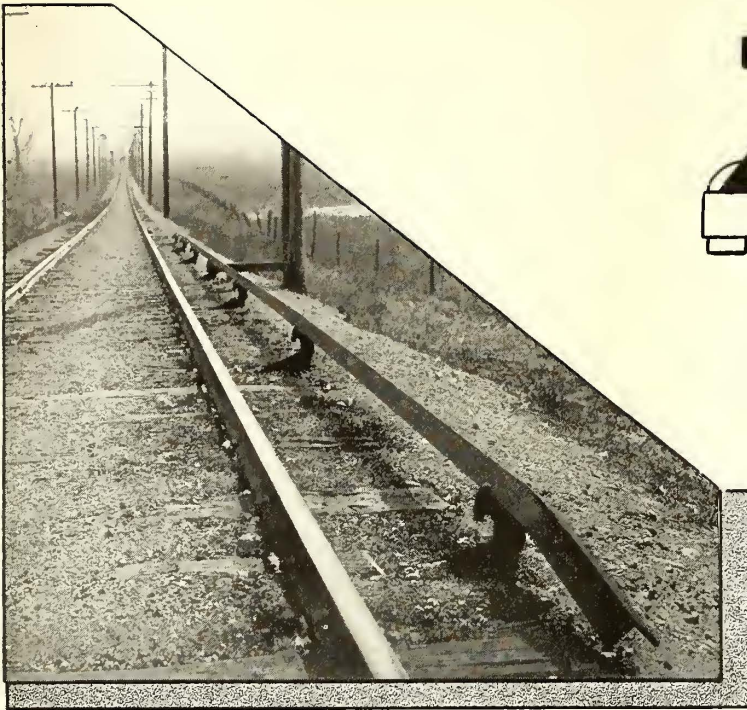
ELECTRIC SERVICE SUPPLIES CO.

Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA
17th and Cambria Sts.

NEW YORK
50 Church St.

CHICAGO
Monadnock Bldg.



**Only One Contact
with a 70-foot ramp
is required by the**

SIMMEN SYSTEM

Of Continuous Cab Signals

A great many people associate the idea of continuous cab signals with a continuous third rail. We presume that it is but natural to confuse the two ideas. The fact is that the third-rail equipment for a block consists of only four sections of ramp, each 70 feet long.

A west bound train makes contact with a "distant" rail 2000 feet from the siding and receives the dispatcher's orders. If a "meet" is to be made the cab light changes from green to red. The motorman has ample braking distance, and the red light continues to burn. He can't miss it or misinterpret it.

An east bound train also makes contact with a "distant" and "home" rail. The "inferior" train takes the siding, and when it is in the clear the dispatcher changes the signal in the cab of the "superior" train from red to green. After the

"superior" train has left, the dispatcher reverses the control lever for that siding, and the "inferior" train then receives a clear signal as soon as its contact shoe touches the ramp.

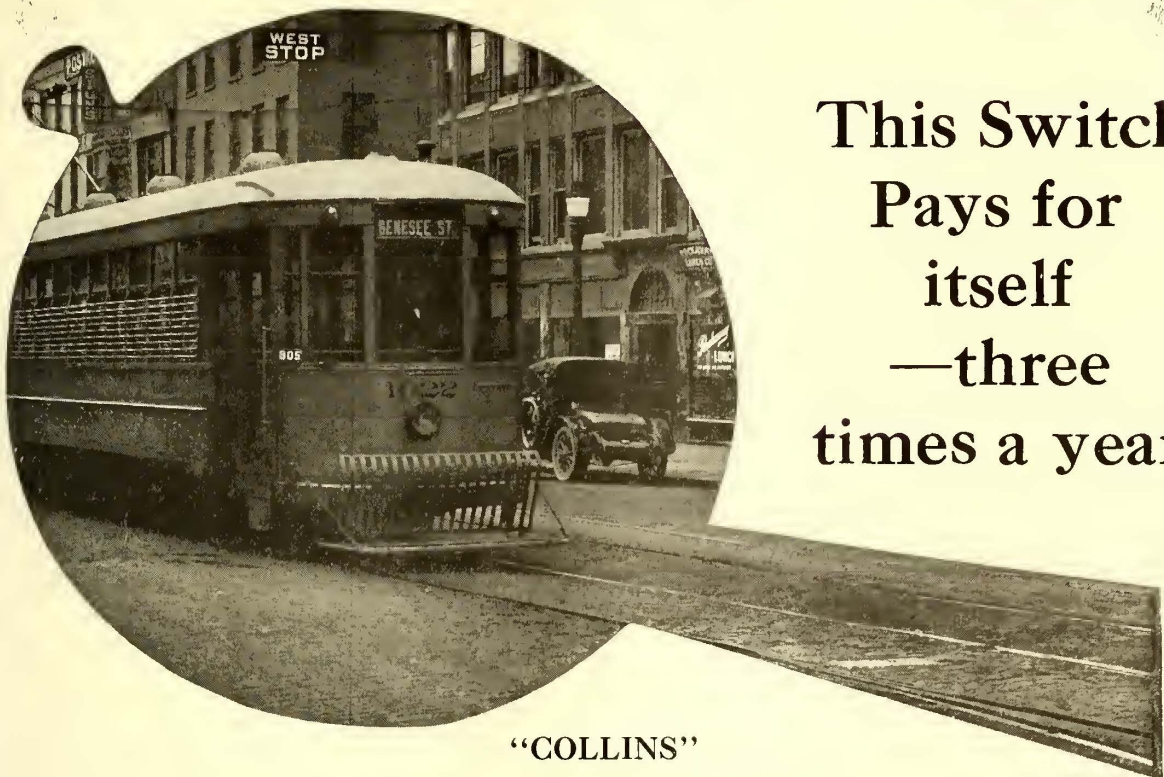
There is no occasion to change the signal until the next block is approached, for the dispatcher's interlock makes lap orders impossible. The cab signal remains green and the motorman knows he has "right of way." We may also add that only one wire is necessary for all four contact rails. Positive current signals the east bound and negative current the west bound train.

Simmen Automatic Railway Signal Co.

1575 Niagara Street

Buffalo, N. Y.

Pacific Coast Representative—W. H. CRAWFORD, 609 Spalding Building, Portland, Oregon.



This Switch
Pays for
itself
—three
times a year

“COLLINS”

Non-Splitting Electric Track Switch

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

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

ceived from this particular type of switch.

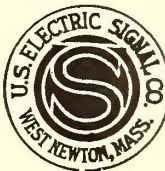
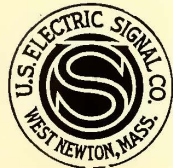
They have a switch that cannot be thrown between the trucks of a car by a following movement under the contactor.

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

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

Write us for full details.

United States Electric Signal Company
West Newton, Massachusetts

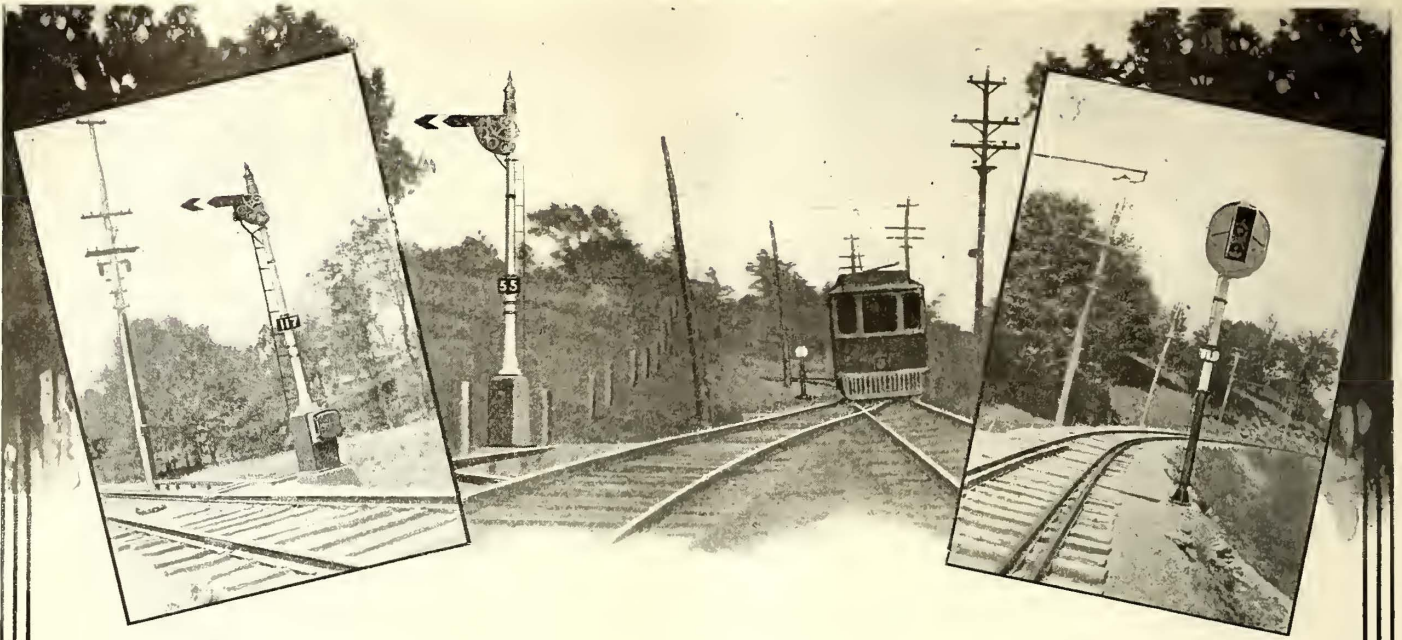


Representatives

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

Chicago: Warren Moore Osborn, McCormick Bldg.

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



Traffic Direction Block System

Scranton & Binghamton Railroad

This system is especially designed for the operation of interurban railroads. It combines the maximum of safety and efficiency with the least amount of apparatus.

The Union Switch & Signal Co.

Founded by Geo. Westinghouse 1881

SWISSVALE, PA.



Hudson Terminal Bldg.
NEW YORK

Peoples Gas Bldg.
CHICAGO

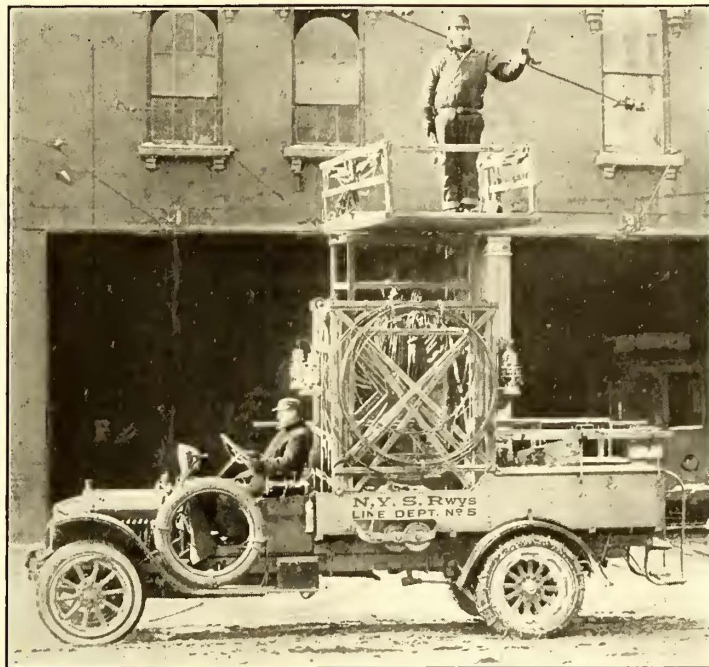
Canadian Express Bldg. Candler Annex
MONTREAL ATLANTA

Railway Exchange Bldg.
ST. LOUIS MO.

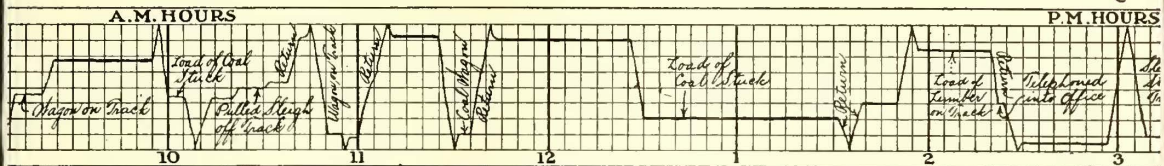
Pacific Bldg.
SAN FRANCISCO



Represented by the GENERAL ELECTRIC CO. in Australasia, South Africa and Argentina.



WHITE TRUCKS IN ELECTRIC RAILWAY SERVICE



SECTION OF RECORDING TAPE SHOWING TRUCK OPERATIONS

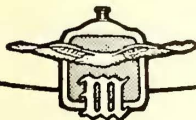
SOME months ago one of the large electric railways equipped their White Emergency Truck with a time recording meter to make comparisons with the horse-drawn tower wagons which the White Truck replaced. The results were interesting as shown by a typical section of the recording tape reproduced at the top of this page.

One of the most striking features to be noted is the added usefulness of the White gasoline driven truck over the horse-drawn wagons in quickly clearing the tracks of obstructions.

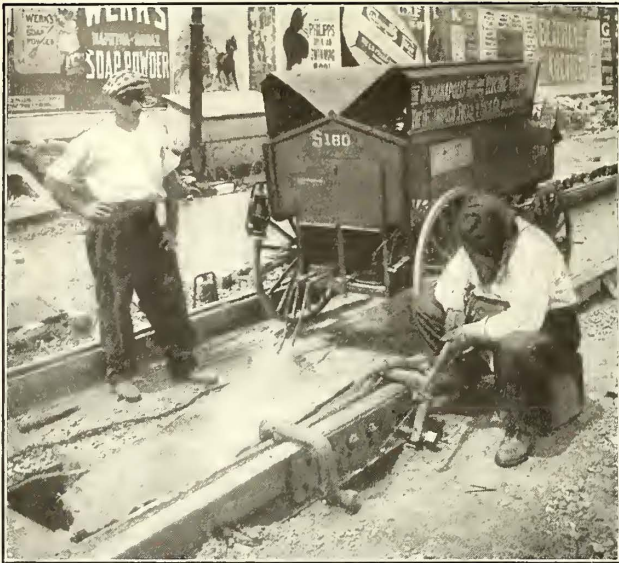
Another obvious feature of the truck is the speed in answering calls. The most important advantage, however, is the increased mileage. Fifty-six miles were made on the day for which we show the section of the recording tape and the monthly mileage averaged about thirty miles per day.

It was found that one White Truck answered all the calls that two horse-drawn wagons previously answered, besides doing work which horse-drawn wagons could not do owing to their lack of power. The White Truck was always ready to start the instant the call was received.

THE WHITE COMPANY CLEVELAND



Largest Manufacturers of Commercial Motor Vehicles in America



***Smith does it
for \$3.75
per joint!!***

How much does it cost you to weld a joint? Mr. R. J. Smith, Construction Engineer of the United Light & Railways, Davenport, Iowa, does it for \$3.75. Here are his figures:

Cost of one pair of plates.....	\$2.05
Cost of two bolts.....	.07
Cost of power.....	.60
Cost of labor.....	.65
Cost of welding metal.....	.18
Overhead charges, interest, depreciation, etc.....	.20
	3.75

These low costs were made possible through the use of

“Simplex” Joints and the Indianapolis Portable Electric Welder

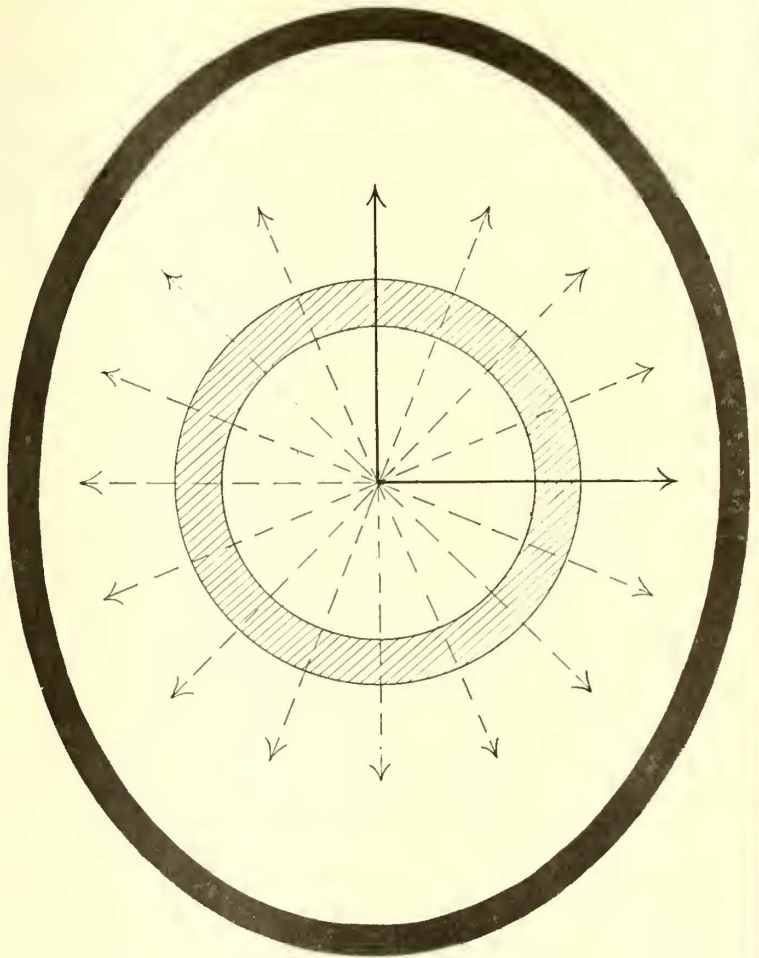
The figures above were compiled during the welding of several hundred joints. The price per joint of \$3.75 is certainly cheap but there is nothing cheap about the quality of the work. Fifty pairs of “Simplex” plates which were applied by the Davenport Company to a 7 in. tram girder section with a rather poor foundation have been in service nearly two years. Mr. Smith considers they have complied with a satisfactory mechanical test and are electrically perfect.

If you want to emulate Mr. Smith's practice write us for particulars.

**Indianapolis Switch
& Frog Company**
Springfield, Ohio

ELRECO Tubular Poles

Show same deflection
under load applied in
any direction



Because of its circular form, the Elreco Tubular Pole is the only pole that can be installed without regard to the direction or strain of load to be carried.

You know how important this feature is whenever you want a pole to take strains from several different directions. Elreco Poles simplify installation and construction engineering work.

Why should you install two poles of other shapes for corners or curves when one Elreco Tubular Pole would serve?

Elreco Tubular Poles also have much reserve strength. The extra tension from a span wire which has been struck violently by a car pole produces no permanent set. Actual service under all conditions show that Elreco Poles excel in this regard.

Catalog No. 16 contains most valuable and useful data on "Pole Engineering." Write for your copy.

Applying a given load to a Tubular Steel Pole at right angles to its length produces same stress regardless of the direction in which the load may be applied.

Elreco Tubular Poles

Combine
Lowest Cost
Lightest Weight
Least Maintenance
Greatest Adaptability

Electric Railway Equipment Co.

Cincinnati, Ohio

New York: 30 Church Street



The Thermit Insert Weld

*Is Giving
The Rail Weld of Least Breakage*

The Thermit Insert Weld has now been placed on so many railways under so many conditions that we know it will make good for you.

There's San Antonio with about 5000 welds. Two breaks in 2 years. Putting in 1500 more on LS 74/326, 87/381, 93/92, 92/430 and 98/365.

There's Kansas City with 1385 welds made in 1915 on section LS 91/375—two breaks reported up to March 13, 1916.

There's Los Angeles with 300 welds made in 1913 on PS 116/292 rail. Report of October, 1915, reads: "No breaks; no cupping—no pounding—perfect condition." This report of no breaks was officially confirmed March 13, 1916.

There's Boston with 384 welds made during 1912-1913 prior to the final development of the insert weld, under traffic conditions ranging from 4700 tons every 24 hours over section LS 132 440 to 7700 tons every 24 hours over section LS 116/434. Six breaks reported to March 13, 1916, in a *special composition* rail containing 0.60 to 0.90 manganese, silicon not over 0.20, carbon 0.60 to 0.75, phosphorus not over 0.04.

There's Milwaukee with 100 test welds in high T-rails, PS 95/272. No breaks reported up to March 13, 1916.

And there are other installations with equally good records to prove that

*The Thermit Insert Weld is Nearest
the Ideal of "First Cost is Last Cost."*

GOLDSCHMIDT THERMIT CO.

120 BROADWAY, NEW YORK

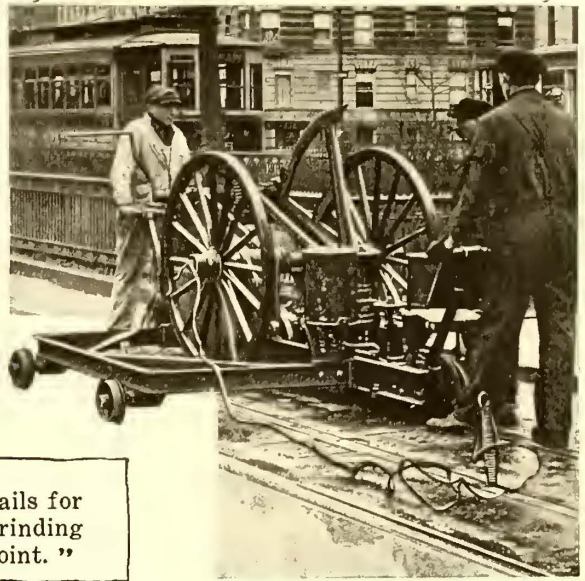
329-333 Folsom St., San Francisco

103 Richmond St., W., Toronto Ont.

7300 So. Chicago Ave., Chicago



Grinding is a Necessity in Splicing New Rails



“Foremost among refined methods of splicing rails for modern service to-day, stands the necessity for grinding off the surfaces of the rails after applying the joint.”

Rails cannot be rolled with precise cross-section, and slight differences in the surfaces of the rails at joints usually exist when laid new.

If these differences at the joint are allowed to remain a constant hammering is going on. The load not supported on springs, as nearly as can be determined, is delivering blows which in some cases vary directly as the square of the velocity of the car, and inversely as the diameter of the wheel. A portion of this variable force is taken up and the energy wasted through the resiliency of the rail and wheels. In addition to this blow we have the impact at a joint delivered by the load supported on springs, which for ordinary differences in rail heights remains approximately constant.

If plates and rails are not resilient enough to provide for these differences in height, and if joint construction cannot take care of all the dissipated energy the remainder will be transmitted to the tie and substructure of the track and wasted there. If the wooden ties are laid on a rigid base, the tie will become badly damaged. If the tie is a steel one laid on concrete, the concrete will eventually disintegrate.

“Foremost among refined methods of splicing rails for modern service today, stands the necessity for grinding off the surfaces of the rails after applying the joints.”

Good words and true, written by Mr. R. H. Findley, Supt. of Track and Roadway Omaha & Council Bluffs Street Railway. There is a lot of food for thought in his paper presented at the Iowa Association general meeting of May 10. Read why Mr. Findley considers grinding a necessity in laying new track.

Next week we will tell you the sad experience Mr. Findley's company had some years ago because they neglected to grind the surfaces of the joints smooth.

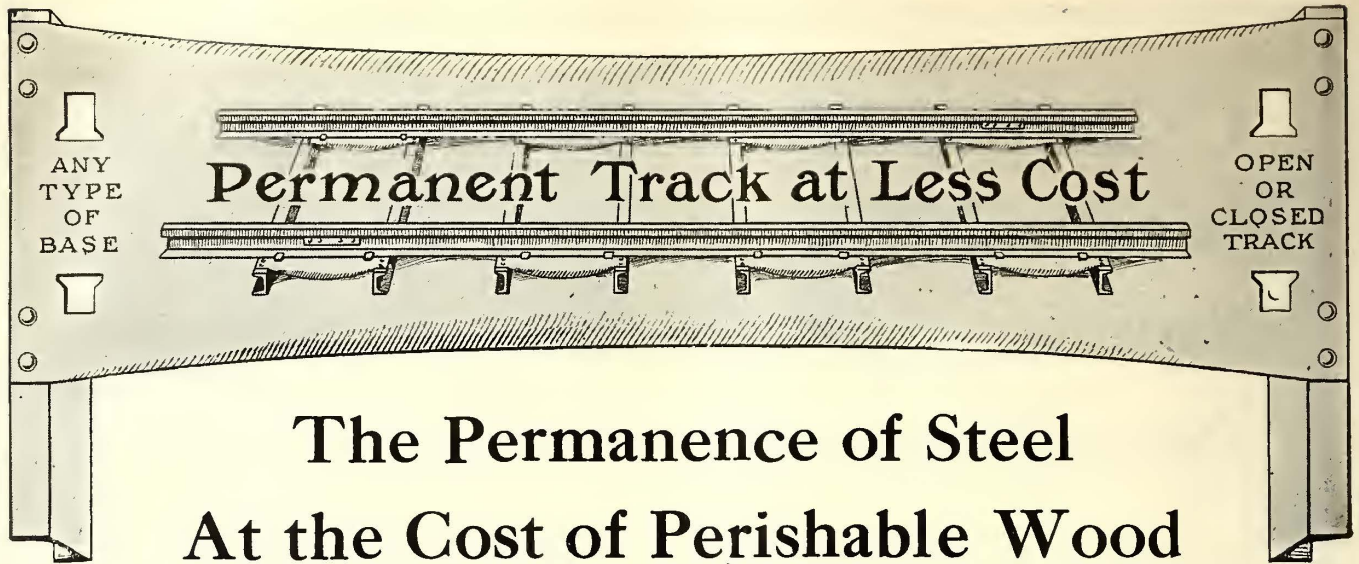
In the meantime write for catalogs and facts about the

Reciprocating Track Grinder

the “foremost among refined methods” of grinding rails. The grinder that gives exact results, in the least time, at the lowest ultimate cost.

Railway Track-work Company

30th and Walnut Streets, Philadelphia, Pa.



The Permanence of Steel At the Cost of Perishable Wood with **INTERNATIONAL STEEL TWIN TIES**

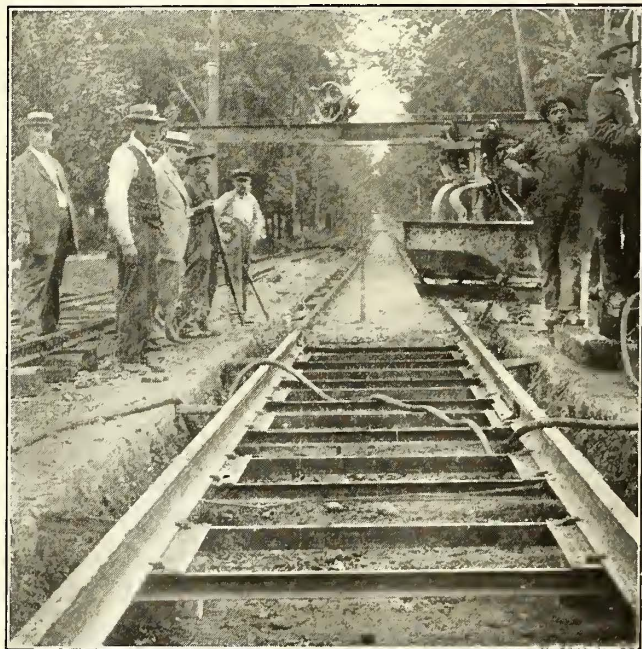
Five years ago the Cleveland, Southwestern & Columbus Ry. tried Steel Ties as a substitute for white-oak.

The construction cost of 3825 feet of track in a paved street, covering the steel ties, excavating and concreting was \$6,121.70, or \$34.55 less than it would cost to put in the same number of feet with white oak ties. The other labor cost, in either case being about the same.

The big saving has been the absence of maintenance on the Steel Ties since their installation.

This road now uses Steel Ties entirely in six miles of track in paved streets.

The joints installed five years ago are still in perfect condition.



Cleveland, Southwestern & Columbus Railway

*Write for the facts. Do it before
you put down another foot of track*

We have a stock of steel on hand and can make prompt shipment of ties.

The International Steel Tie Company General Sales Office and Works: Cleveland, Ohio

REPRESENTATIVES

Western Eng'g Sales Co., San Francisco, Cal.,
Los Angeles, Cal., Seattle, Wash.

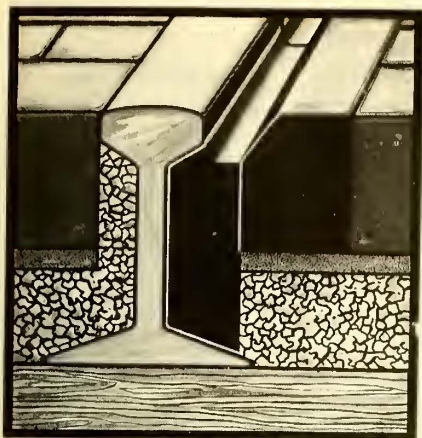
R. J. Cooper Co.,
Salt Lake City, Utah.

J. E. Lewis & Co.,
Dallas, Texas.

Maurice Joy,
Philadelphia.

William H. Ziegler,
Minneapolis, Minn.

These Special Rail Bricks Solve Your Paving Problem



Note the construction of the two blocks used in connection with the T-rail. See how ample space for the flanges of car wheels is allowed in the groove formed by the filler brick between the rail and the stretcher brick.

The ungrouted joint between these two special bricks prevents any "kick ups" in pavement due to rail vibration and the projection under ball of rail of the old-fashioned "nose-brick."

Nelsonville Filler and Stretcher Brick

are made from the finest quality of clay for this purpose and as a result are tough and durable.

The saving they effect on maintenance of track paving and the use of T-rail instead of girder-rail means a nice profit for your company.

Let us send you samples of these brick and also our descriptive booklet—"Rail Brick of the Right Sort."

The Nelsonville Brick Co.

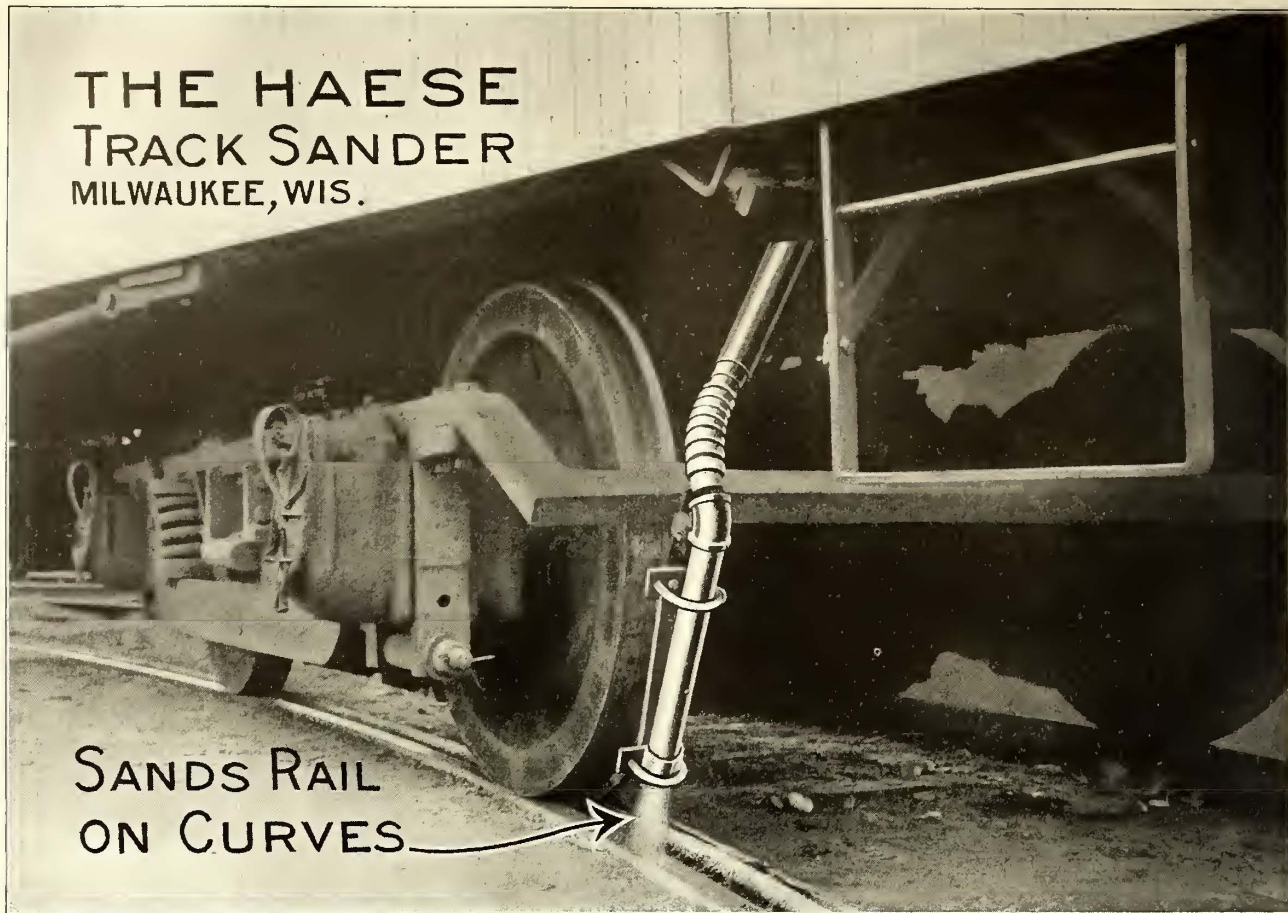
Nelsonville, Ohio



This ungrouted joint protects paving from rail vibrations.

Nelsonville Stretcher Brick
Nelsonville Filler Brick

THE HAESE TRACK SANDER MILWAUKEE, WIS.



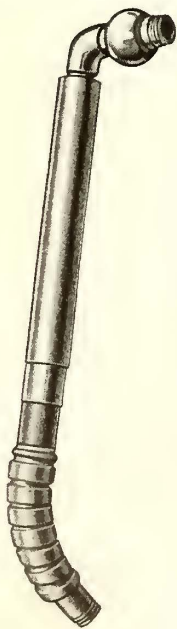
SANDS RAIL
ON CURVES

THE "HAESE" SANDS THE CURVE

It supersedes the old-fashioned sand spout that swings the sand outside the curves. It makes hand-sanding unnecessary anywhere.

The "Haese" Sander makes the motor-

man master of the curve situation. He need no longer fight car momentum with hard braking. The Haese helps to reduce accidents at curves and flat wheels caused by sliding with the brakes set.



The Flexible Telescoping Spout Does It

It is fastened at one end to the car body and at the other to the lower end of the truck itself.

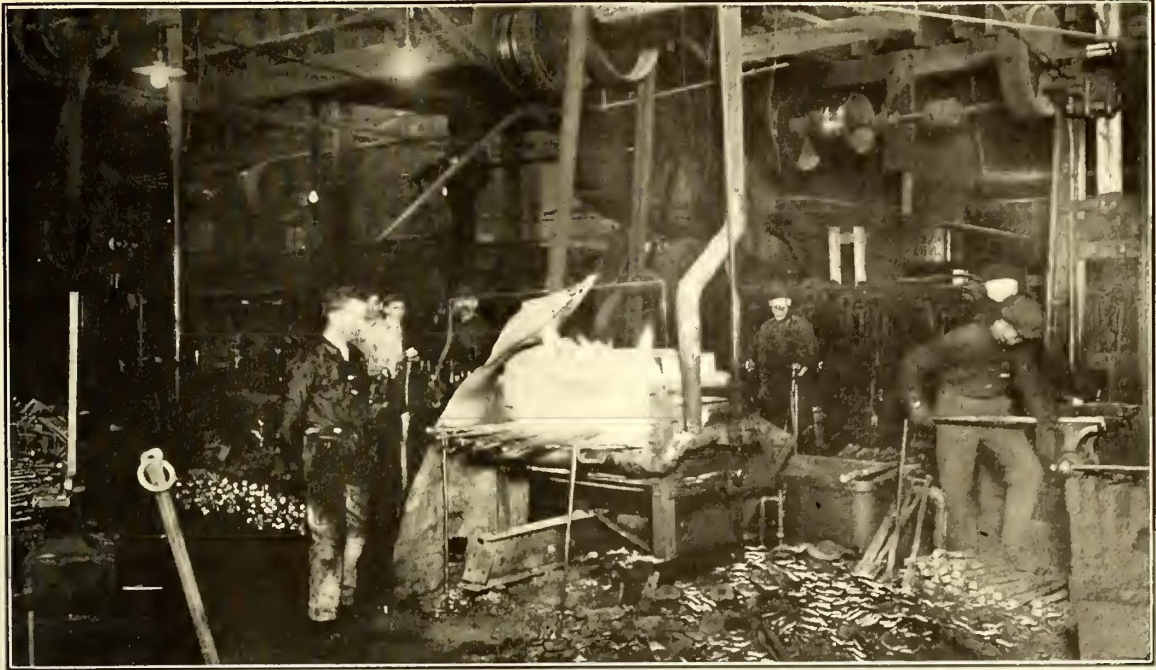
The Haese is always exactly over the rail.

The "Haese" is strong and durable. Water or slush cannot interfere with its working.

Prepare for winter conditions by equipping your cars with Haese Sanders NOW.

Write for the Literature. DO IT TO-DAY

The Haese Track Sander Co. MILWAUKEE WISCONSIN



We Have Many Irons in the Fire

But each kind of iron (or product) is watched by a specialist.

That's at the bottom of Columbia success, for our organization has a Jack for each trade.

The department for turning out trolley poles, for instance, is just as

distinct from the gear cases as the hardware is from the silks in a high-class department store.

Therefore, when you order any of the following products you are assured that they will be made by specialists:

TOOLS

Armature and axle straighteners
 Armature buggies and stands
 Babbitting molds
 Banding and heading machines
 Car hoists
 Car replacers
 Coil taping machines for armature leads
 Coil winding machines
 Pinion pullers
 Pit jacks
 Signal or target switches
 Tension stands

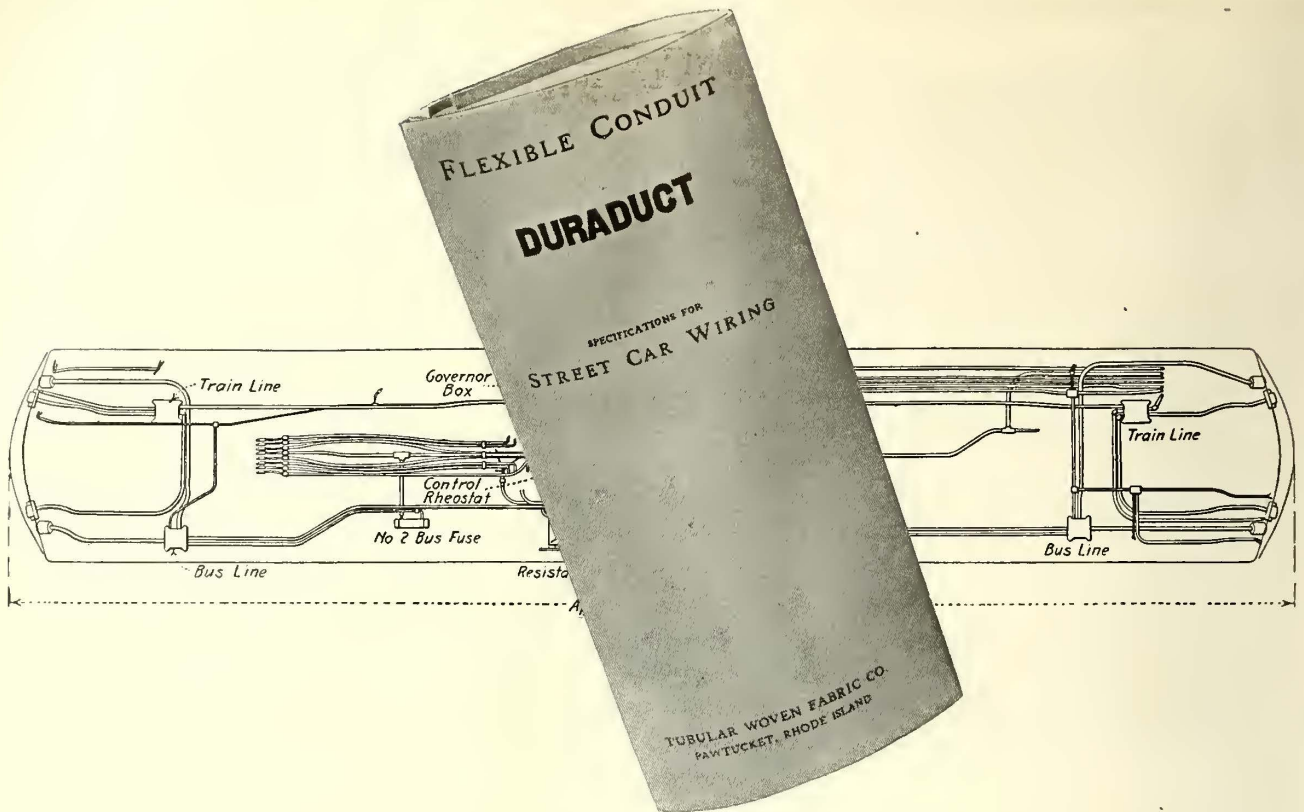
CAR EQUIPMENT

Armature and field coils
 Brush-holders and brush-holder springs of all types
 Brake, door and other handles
 Brake forgings, rigging, etc.
 Car trimmings
 Commutators
 Controller handles
 Forgings of all kinds
 Gear cases (steel or mall. iron)
 Grid resistors
 Third-rail contact-shoe beams and accessories
 Trolley poles (steel) and wheels



Columbia Machine Works & Malleable Iron Co.

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



HAVE YOU THIS BOOK ABOUT DURADUCT?

To master mechanics, superintendents of car equipment, engineers and purchasing agents—this pamphlet will be mailed free of charge. It contains plans and specifications for car wiring of a number of the most modern cars built during the past two years.

TUBULAR WOVEN FABRIC CO.

MANUFACTURERS

PAWTUCKET, R. I.

A. HALL BERRY, General Sales Agent

97 Warren St., New York

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Distributors for Canada: NORTHERN ELECTRIC COMPANY, Ltd.

This Fine Albany Car Has NEVASPLIT HEADLINING



Therefore, it has a ceiling that is waterproof; that does not warp, crack or blister; that remains neat with practically no attention; that enhances the car lighting and that has valuable insulating qualities, too.

The Keys Products Company

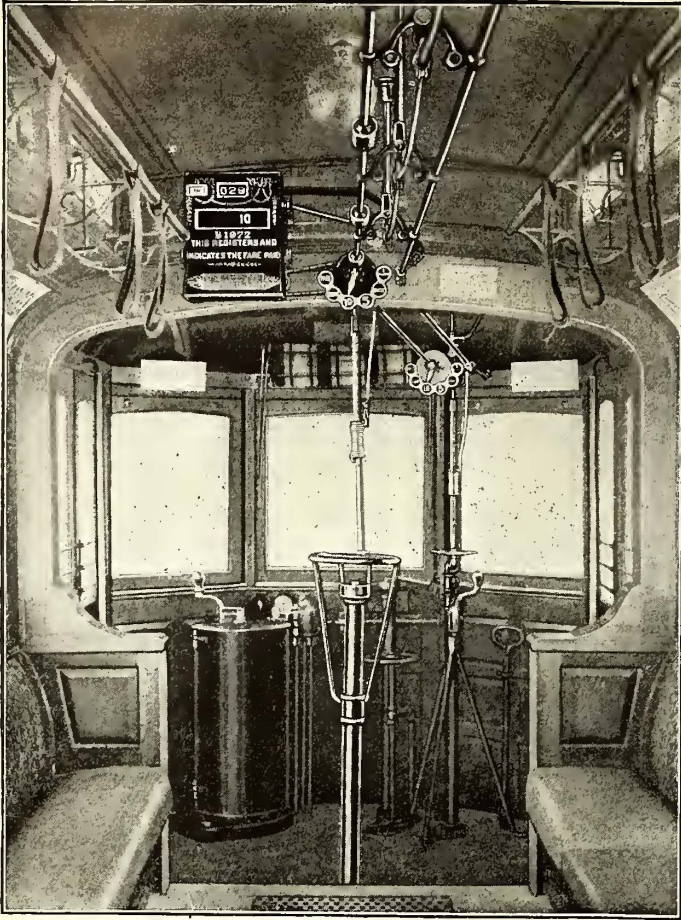
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A combination Ohmer Equipment for one-man, two-man, pay-as-you-enter or pay within operation.

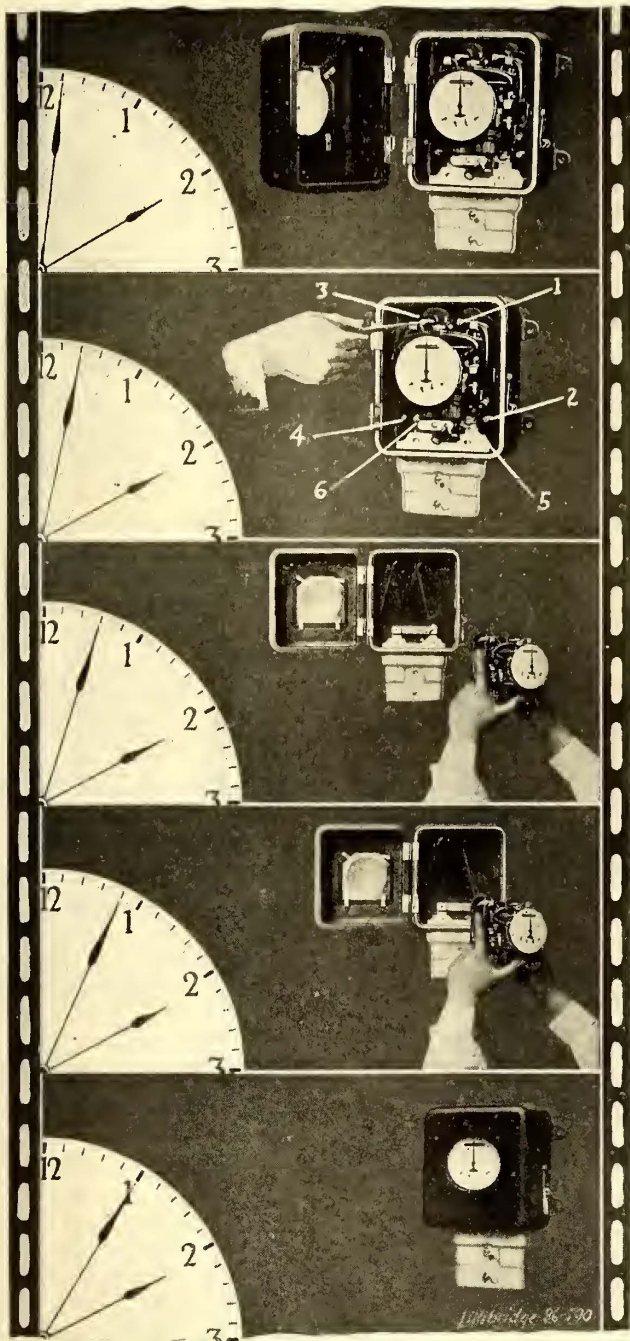
OHMER Operating Equipments for All Kinds of Service

One of the great advantages of the Ohmer System of fare protection is the adaptability of the operating equipment. For example, we can equip your cars so you can use them interchangeably for one-man operation, as ordinary two-man pay-as-you-enter, or as pay-within cars. This enables you to try out various plans of operation, or to use different plans on different divisions, or at different hours of the day to meet the changing traffic conditions.

The Ohmer System is not dependable upon any particular type of car, or upon any particular set of operating conditions for its successful application. It is based upon correct principles, and its efficient application to all existing conditions is an additional proof that it is the method of fare protection which will endure.

OHMER FARE REGISTER COMPANY
Dayton, Ohio

Five Minutes and a Screw Driver



When it becomes necessary to calibrate a Sangamo Economy Meter, or to clean the mercury, the car need not be laid up and time lost. It is not even necessary to run into the house. Five minutes' time and one tool (a screw driver) and the car is ready to proceed. The meter itself need not be removed from the car. See how easy it is:

1. Remove the padlock, which holds the cover to the case to prevent tampering. Swing the cover back on its hinges, lift it off and the interior is exposed.
2. Unscrew the four studs which hold the meter element to the case and the two screws which clamp the motor element circuit leads to the shunt terminals. The studs are brought forward almost flush with the dial—no need to grope around with fingers or tool. Remove the studs and the meter element is free. Note that the power circuit through the shunt is never touched—it remains continuous.
3. The entire meter element is now removed—motor, coils, magnets, dial—all in one unit. A construction like that of the invertible ink well (see Economy meter advertisement, page 3, Electric Railway Journal, June 24th) holds the mercury safely within its chamber; the meter element may be laid down in any position (and later calibrated in the shop).
4. A complete new meter element is inserted in the case and the screws replaced. The base lugs and holes are all template drilled—the elements are perfectly interchangeable mechanically and electrically. The new element has the same drop as the old; no calibration on the car is necessary.
5. The cover is now replaced and locked. One man with no special tools has made the complete change in five minutes and the car is ready to proceed on its run.

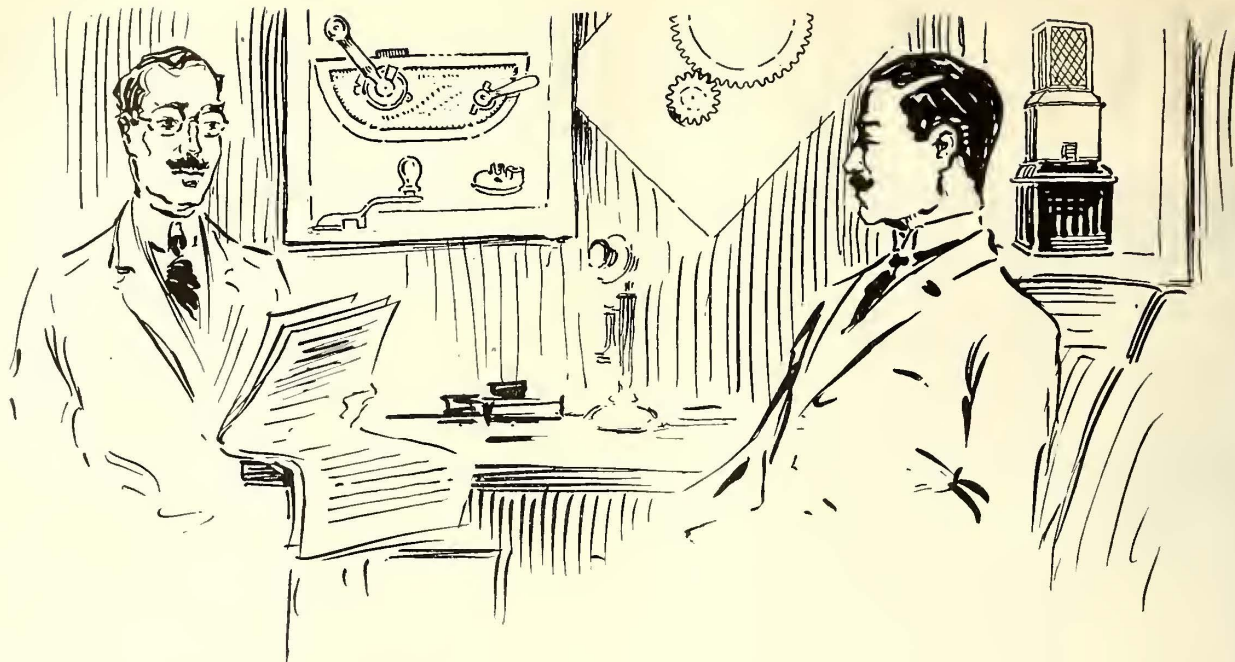
Rapid interchangeability is only one of the many features which distinguish the Sangamo Economy Meter. We would like to tell you of the others. Write for details.

ECONOMY

 BUILT LIKE A WATCH
METERS

Sangamo Electric Company
 Springfield, Illinois

Specialist in Electrical Meters for every need



If you Asked the
Maintenance Man About

The International Motor-Driven Coin Register

“Generally, we shop fellows get a scare every time a new batch of machinery is put on the cars.

“Well, you’d suppose that we’d be badly feazed on getting the International Coin Registers.

“Not a bit of it!

“We’ve been handling International clock registers for so many years that we knew anything the International bunch put out would be right mechanically, no matter how new.

“Why, if you’d see their factory testing room where they ring up each new register thousands of times, you’d get wise to why.

“We Don’t Worry About International Coin Register Upkeep.”

THE INTERNATIONAL REGISTER COMPANY

15 South Throop Street, Chicago, Ill.

Manufacturers of Coin Registers, Fare Boxes, Double and Single Car Registers and Fittings,
Conductors’ Punches and exclusive agents for Heeren Enamel Badges.

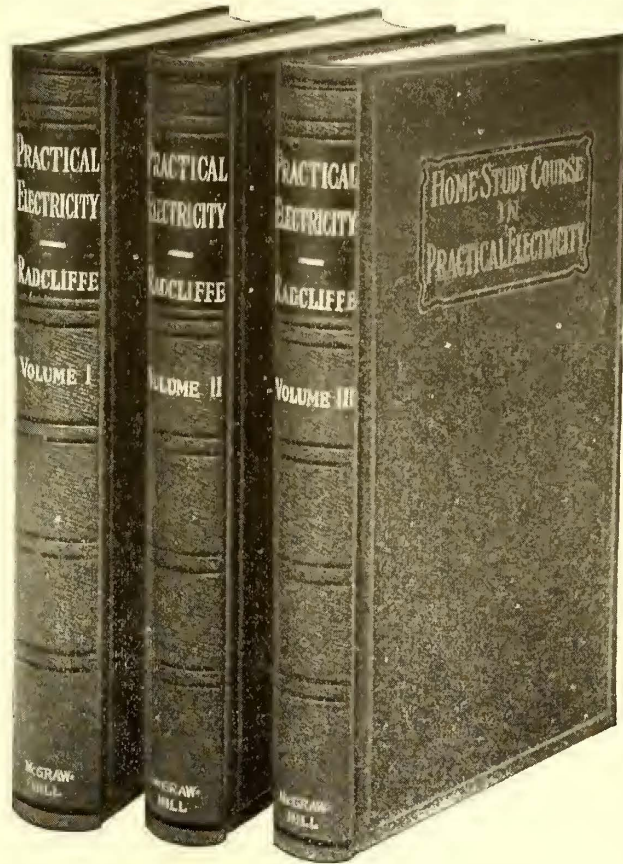
Home Study Course in Practical Electricity

1400 Questions in practical electrical work now correctly, quickly and comprehensively answered.

Many of these questions you have asked—all of them interest you.

Just Out

A Complete Home Study Course **\$ 6**



An innovation in electrical literature—700 pages of information taken from practice by an electrical engineer.

No Money Down

\$1 per month

Taking into consideration both the reference value and their worth as a course of study for the student, we believe we have completed a work which will appeal strongly to practically every individual interested in electricity.

In the first place, the 1400 questions answered in these volumes are questions that you or anyone else would be likely to ask about problems in electrical practice. It is a work which grew, page by page, out of many years' experience in practical electrical work.

The fact that it is entirely free from higher mathematics and that its system of indexing is wonderfully complete, will commend it to the electrical worker or the engineer requiring ready information on the many intricate details that are met with in electrical practice of today.

Volume number one deals with the principles and sources of electricity. Naturally the subjects under this heading are electrical units, conductors and insulators, calculation of resistance, electrical circuits, primary battery cells, storage battery cells, magnetism, electromagnetic induction, direct-current generators, alternating currents, and alternating-current generators.

Volume two covers electrical control, measurement and wiring in practically a new way, in that the most complicated problems under these headings are worked out in language and figures which will puzzle no one. Transformers, switchboards, switchboard wiring and operation and station wiring are brought out in the clearest possible fashion in this particularly interesting volume.

Volume three treats of direct-current motors, alternating-current motors, motor-generators, dynamotors and rotary converters, incandescent lamps, arc lamps, substations and management of electrical stations. The author's electrical education at the Lawrence Scientific School at Harvard University and his subsequent years of experience as electrical expert with the General Electric Company have fitted him to write one of the most important expositions of the right and wrong in these consequential subjects.

The three volumes, in paper, printing and binding, are truly a work of art. It is seldom one sees a more beautiful or a more substantially bound set of books.

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Are Steel Interior Mouldings Worth While for Surface Cars?

It is acknowledged that steel cars are colder and harder to heat than composite ones, that steel interior finish is not as light, comfortable and handsome as polished mahogany. Then why this craze for "all steel" cars for ordinary surface traffic?

Except in subway or tunnel service danger from fire through the use of mahogany interior mouldings is negligible.

The most practical construction for interurban and city cars consists of a steel frame throughout and the use of steel in all parts on which we depend for strength and stiffness, but experience has proved:—

That at least the top layer of the floor should be of wood. If protection from fire be considered necessary a lower layer of sheet steel provides it.

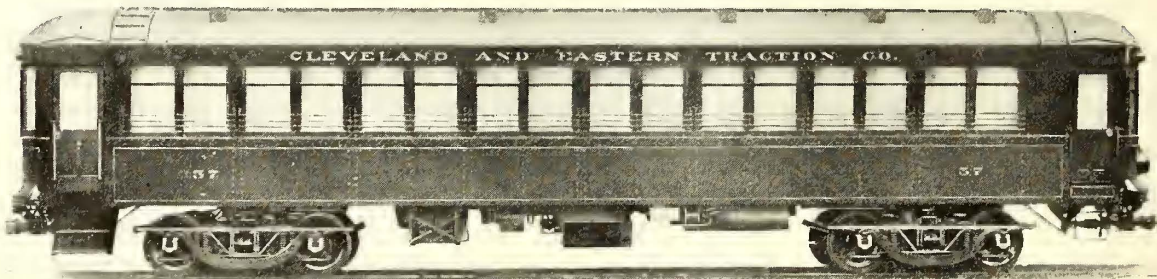
That at least the outside sheathing of the roof should be of wood and canvas for protection against trolley currents and heat. Steel interior ceiling affords all the fire protection necessary in surface traffic.

That the outside and inside steel side walls should be separated by compressed cork board or equal insulation against heat, cold and noise.

That doors, sashes and interior mouldings of wood are better than steel, as wood holds its polish and paint surface better, does not rust and may be replaced by ordinary repair men.

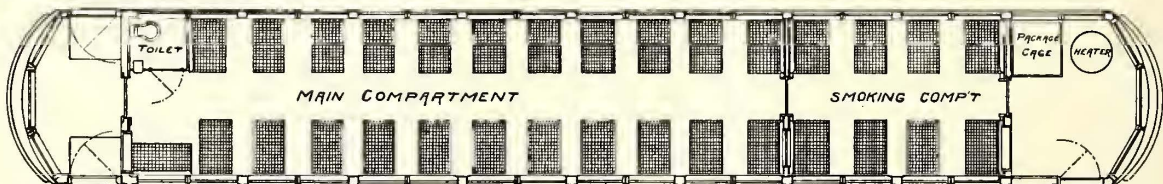
That polished brass should not be used for inside finish, as it causes eye strain when new and turns black and dirty when scratched.

That steel panels should be of flat sheets, which may be obtained from warehouse stock and replaced promptly by railway shopmen with ordinary tools. Pressing from special dies should not be accepted.



Car No. 704—Two-compartment, passenger and smoking steel interurban car with single end control, mounted on Baldwin Class A trucks.

Length over vestibules 53' 2 1/4". Seating capacity 62. Aisle 26 3/8". Weight car body without appliances 23,526 lbs.



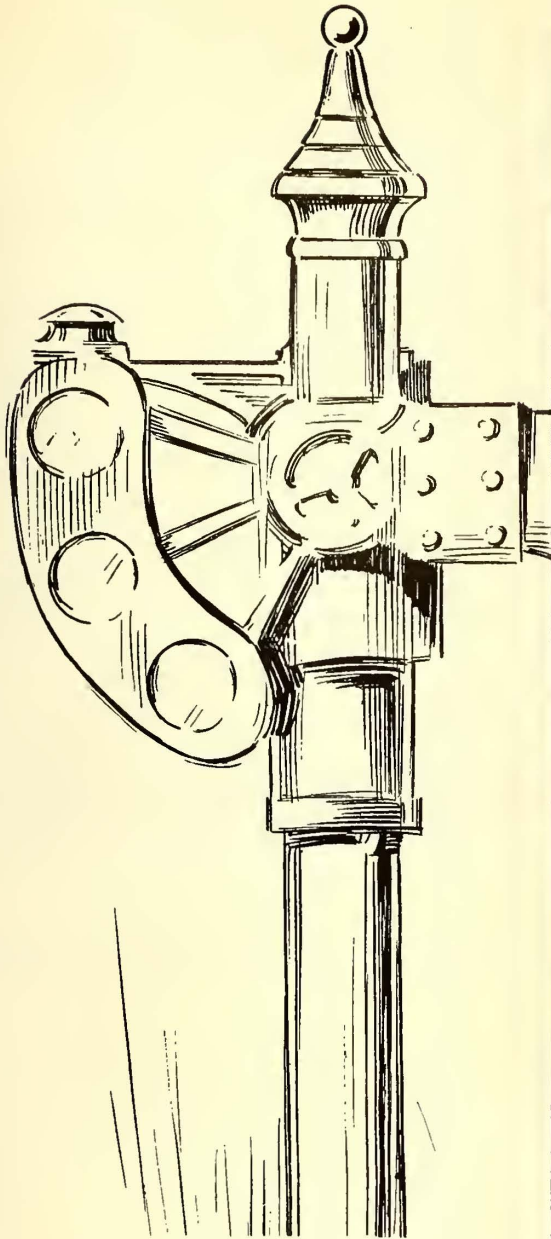
The purchaser of this car wished to afford conductors and standing passengers an outlook from either side without stooping, therefore upper side sashes with clear glass and curtains to raise full height were provided.

The car has steel frame and outside sheathing for structural strength. All corner and alternate side posts are double with panels for stiffness. Bulk heads, ceiling and waist panels are of flat steel. Floor is double wooden with water proof tar felt between and covered in aisles with battleship linoleum. Roof is wood and canvas on top with steel inside ceiling. Doors, sashes and interior mouldings are of polished mahogany.

Fittings include Tomlinson car and air couplers, Hale & Kilburn stationary back rattan seats, Smith hot water heater, Lintern ventilators, continuous enameled rod parcel racks, wiring for twenty-five 36-watt lamps, Lintern air sanders, Hedley anti-climbers, Golden Glow headlight, mail and package cage in front vestibule, Westinghouse motors and air brakes are supplied by Purchaser and installed by Car Builder. Baldwin Class 79-25-A trucks with Standard 34" rolled steel wheels are supplied by Car Builder.

We make this car of any length and width desired

The Niles Car & Mfg. Co., Niles, Ohio



The light furnished by

Galena Signal Oil

is as clear and strong with
the last drop—
as with a full fount

Its candle power is constant.

It does not crust the wick.

It does not smoke the chimneys.

Investigation of its merits is such
an easy matter—

(simply write us and demand par-
ticulars)

—that is if you are at all interested
in continuity of signal service
coupled with economy of oil—
you should get that letter off to-
day.

Galena-Signal Oil Co.

Franklin, Pa.





Smith-Ward Shim Slack Adjusters

NOW AT

New Haven, Hartford and Bridgeport

Smith-Ward shim slack adjusters have been placed on the latest ninety-two cars of the Connecticut Company as a part of *standard* equipment.

The advantages of the Smith-Ward shim slack adjuster have been demonstrated so decisively that it is long beyond the "On Test" stage.

A device that assures correct brakeshoe application at all times; that makes the period between brakeshoe inspections equal the life of the shoe; that eliminates hasty brakeshoe adjustment by hand at the end of long interurban runs; that avoids the possibility of inspectors slighting brakeshoe adjustment in disagreeable weather; that saves its cost many times over in less carhouse labor and less brakeshoe cost.

THAT'S THE SMITH-WARD SHIM SLACK ADJUSTER!

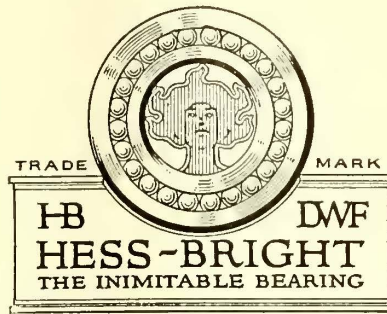
Smith-Ward Brake Company, Inc.

17 Battery Place, New York

W. R. Kerschner Co.

Eastern Sales Agents

50 Church St., New York



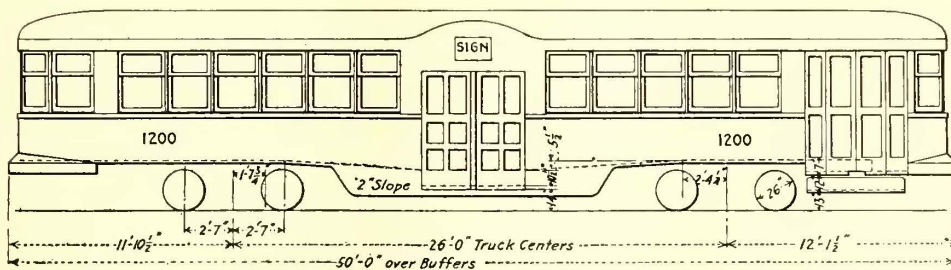
Selecting Hess-Bright Ball Bearings at Rochester

The New York State Railways-Rochester Lines installed Hess-Bright ball-bearings on a trial car early in 1911 at a time when the value of anti-friction bearings for electric railway service was little appreciated.

The Rochester and other tests have enabled us to become thoroughly acquainted with the demands peculiar to electric railway conditions, particularly in producing a railway bearing of

LONG LIFE AND RELIABILITY

The selection of Hess-Bright Journal Ball Bearings for the fifty new pay-as-you-pass cars of the New York State Railways-Rochester Lines is significant as an indication that anti-friction bearings are now being considered as a *standard* part of car equipment.



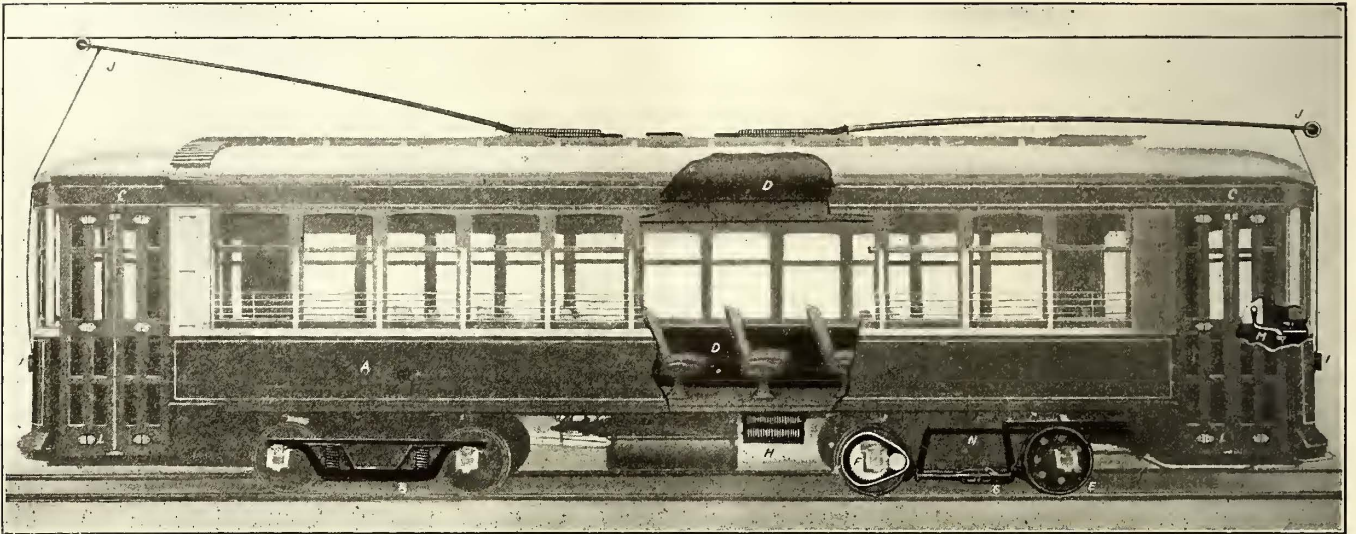
One of the Fifty Cars to be equipped with Hess-Bright Ball Bearing Journals

HESS-BRIGHT MANUFACTURING CO.

Front St. & Erie Ave., Philadelphia, Pa.

Hess-Bright Conrad Patents are Thoroughly Adjudicated

The All-Kerschner Car From Trolley Wire to Rail

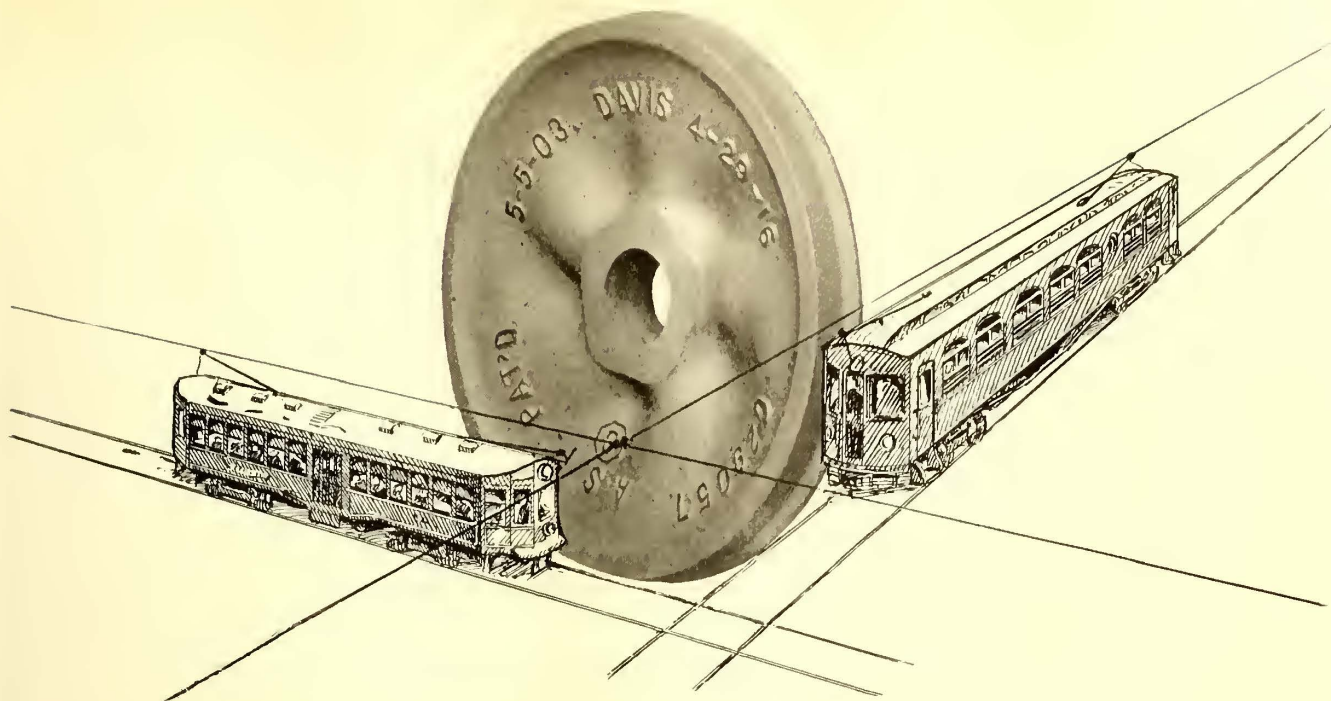


A	Car body.....	Cincinnati Car Company	H	Grid resistors.....	Columbia Machine Wks. & Malleable Iron Co.
B	Trucks.....	Cincinnati Car Company	I	Catchers and retrievers..	C. I. Earll
C	Door Operating Mechanism.....	Cincinnati Car Company	J	Poles, harps and wheels..	Columbia Machine Wks. & Malleable Iron Co.
D	Headlining and panels..	Nevasplit (Keyes Product Co.)	K	Gear cases.....	Columbia Machine Wks. & Malleable Iron Co.
E	Car Wheels (chilled)....	Albany Car Wheel Co.	L	Car Trim.....	Cincinnati Car Company
F	Gears and pinions.....	Catskill Foundry & Machine Works	M	Controller and brake handles.....	Columbia Machine Wks. & Malleable Iron Co.
G	Brake-slack adjusters....	Smith-Ward Brake Co., Inc.	N	Brake rigging.....	Columbia Machine Wks. & Malleable Iron Co.

As Eastern Representative for the Cincinnati Car Company We Received Recent Orders for Steel Cars as Follows:

PITTSBURGH RAILWAYS COMPANY.....	100	CARS
WEST PENN RAILWAYS.....	16	"
MANHATTAN & QUEENS TRACTION CORPORATION	7	"
MORRIS COUNTY TRACTION COMPANY.....	10	"
NEW YORK STATE RAILWAYS-ROCHESTER	50	"
NEW YORK STATE RAILWAYS-UTICA.....	12	"
BINGHAMTON RAILWAY COMPANY.....	52	"
SCHENECTADY RAILWAY COMPANY.....	16	"

W. R. Kerschner Company, Inc.
50 Church Street, New York



DAVIS STEEL WHEELS

FOR

ELECTRIC RAILWAY SERVICE

The Davis Steel Wheel is a one-wear, one-piece, cast steel wheel. The flange and tread are of tough manganese steel which blends into a soft, ductile plate and hub.

The Davis Wheel is the only steel wheel which requires no turning to give *satisfactory* mileage.

The manganese tread and flange of the Davis Wheel are especially adapted to resist the shock incident to frequent cross-overs and the abrasion caused by sharp curves. The flange strength is eight times that of the cast iron wheel. It is pre-eminently a "safety-first" wheel.

Davis Steel Wheels save approximately 20% in weight over the cast iron wheel, for electric railway service, and at the same time provide greater strength. This saving in weight means conservation of energy at the power house.

Rims of Davis Wheels are ground to contour, insuring rotundity of wheels. Slid-flat spots are

therefore greatly reduced. Furthermore, a perfectly round wheel produces less vibration in the car body and track, and easier riding cars.

Thorough tests have shown that the co-efficient of friction of the Davis Wheel and the steel rail is from 9 to 48% higher than that of other wheels. Therefore, with high starting accelerations, there is less slippage with the Davis Wheel than with any other type of wheel in electric railway service.

Records of electric lines using Davis Steel Wheels show that the cost of maintenance is lower than that of any other type of wheel.

Davis Steel Wheels under your equipment will insure absolute wheel safety, give greater mileage and decrease wheel costs.

We will cheerfully furnish you with an estimate and design of a Davis Wheel to fill your requirements. Write for data.

AMERICAN STEEL FOUNDRIES

1100 McCormick Building

Chicago

“I Read Your Paper as a Buyer,”

said a Southern purchasing agent recently to one of our representatives.

Do you know that hundreds of purchasing agents are using the Electric Railway Journal for exactly the same purpose?

Some products, of course, are ordered by name only; but a large portion of the every-day supplies is ordered by specification only.

What better guide can the purchasing agent find to the *active* bidders for electric railway patronage than the Electric Railway Journal?

Don't *you* want to be on the Purchasing Agent's list *every* time he's in the market?

If you do, let us explain how you can be represented with a strong selling message **IN EVERY ISSUE** of the Electric Railway Journal at minimum expense. Tell us about your product and we will submit a proposition.

Electric Railway Journal

239 West 39th St., New York

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\$3 Domestic, \$4.50 Canadian, \$6 Foreign



One of a number of Agasote Roofed cars in use by Public Service Co., New Jersey

Are You Roofing Cars As You Did Ten or Fifteen Years Ago?

There's a better way—a cheaper way—a more durable way. Use

Agasote Roofing

Like all other Pantasote Company products, Agasote Roofing has *made good*.

It is not only giving satisfactory roofing service on hundreds of cars, used in all climates, but it has been giving such service on some cars for upwards of five years.

In this service it has completely demonstrated that it

Has Great Strength
Is Absolutely Waterproof
Requires No Auxiliary Coating
or Covering Such as White Lead and Canvas
Grows Stronger in Service
Makes a Cheaper Roof than Wood
Is an Absolute Non-conductor of Current
Has High Insulation Value Against Temperature
Holds Paint as Well or Better Than Wood or Steel

Get out of the rut in roofing construction. Investigate this modern material.

We will gladly refer you to officials of companies who have used and are using Agasote roofing in the sure knowledge that their reports will fully confirm the above statements.

Ask us to "show you," whether you're from Missouri or any other state.

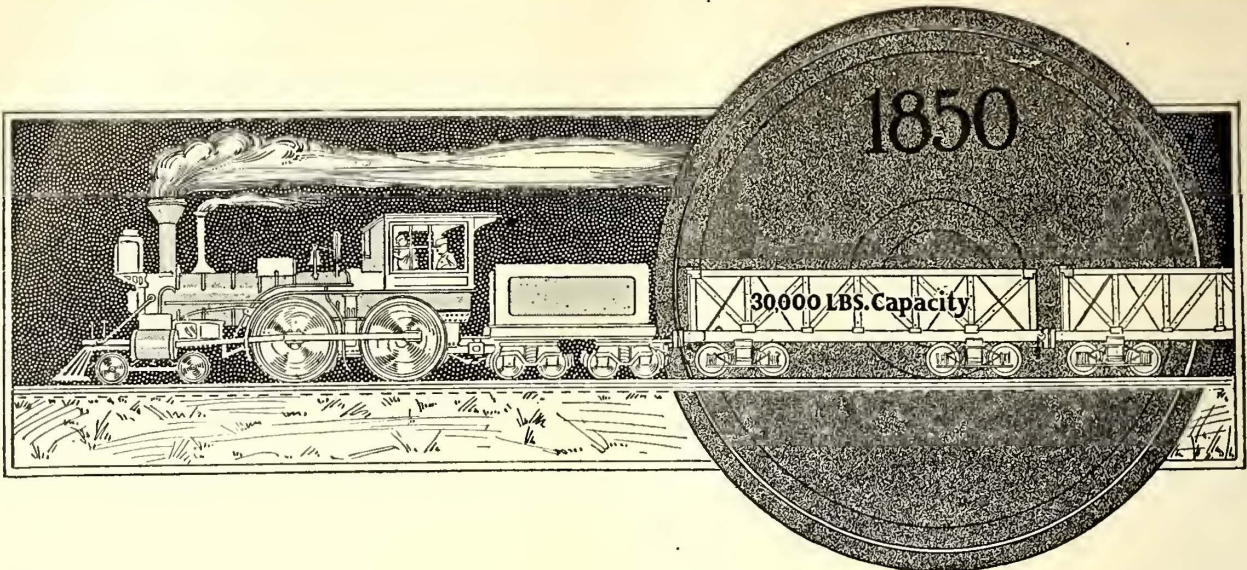
The Pantasote Co.

Manufacturers also of Pantasote—the most widely used and highly standardized railway car curtain material on the market.

11 Broadway, New York

People's Gas Bldg., Chicago, Ill.

797 Monadnock Bldg., San Francisco, Cal.



The Wonderful Single Service Chilled Iron Wheel

The tread or running surface of the Chilled Iron Wheel is its most important factor.

Chilled Iron Wheel Treads are harder than tempered steel and give the maximum amount of wear per unit of metal worn away.

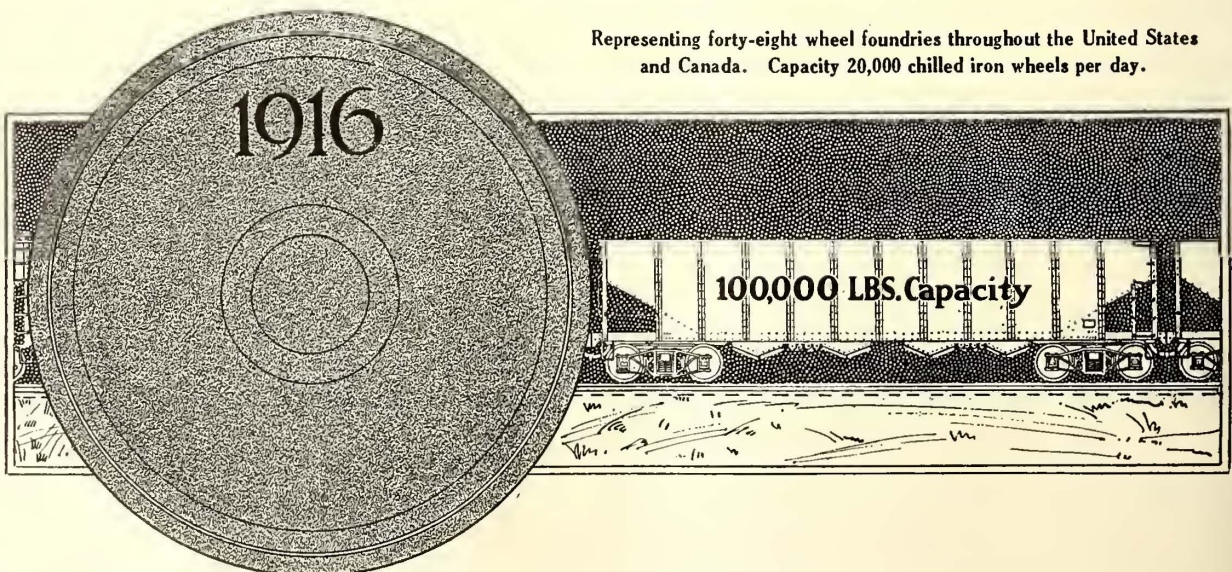
It is not necessary to re-turn the treads because Chilled Iron Wheels are Single Service or one Wear Wheels and will give a greater mileage than any other type of wheel between turnings because of their hardness. No expensive lathe investment is necessary.

25,000,000 now running.

In One Hundred Cities of the United States and Canada ninety per cent of the Street Car Companies operating one hundred cars or over use Chilled Iron Wheels.

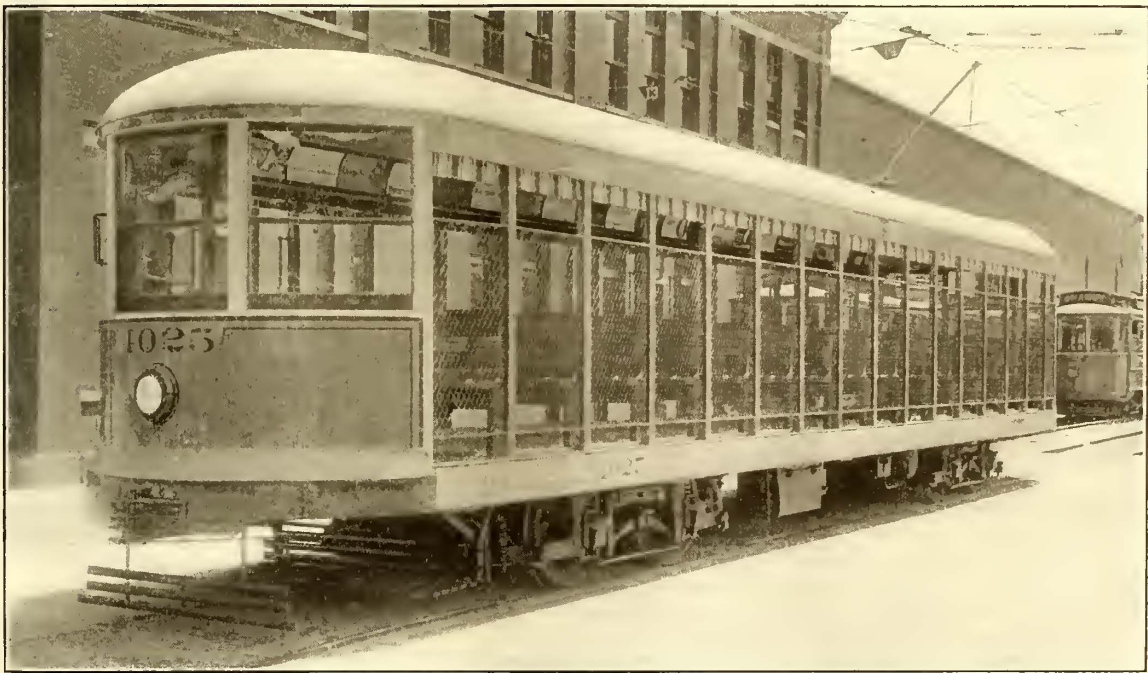
ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS
1228 McCormick Building, Chicago, Ill.

Representing forty-eight wheel foundries throughout the United States and Canada. Capacity 20,000 chilled iron wheels per day.



127 New Cars

of this type being built
by the



Public Service Ry. Co.

are being equipped with

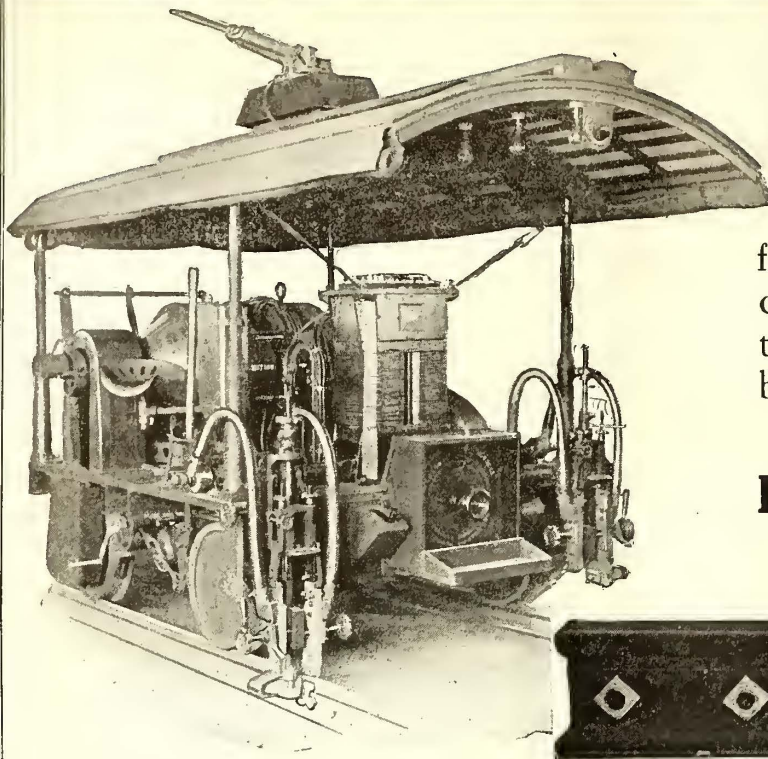
H-B Life Guards

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

Manufacturers of The Providence Fender and H-B Life Guard

Wendell & MacDuffie Co., 61 Broadway, New York

General Sales Agents



Here's the Bond That Gives—

full 8 to 1 contact area. The car welds the whole side of the terminal to the rail. Don't be satisfied with less.

Electric Weld Rail Bonds



The Electric Railway Improvement Co.
Cleveland, Ohio

Big Results from Little Ads

The advertisements in the Searchlight Section are constantly bringing together those who buy and sell, rent and lease or exchange. They convert idle commodities into useful cash, idle cash into useful commodities, and that which you have but don't want into that which you want but don't have. The cost is a trifle, the results considerable.

**Get your Wants
into the Searchlight**



McGuire-Cummings Truck Equipped

These Bearings Saved \$3.06 Per Car Per Day



Recent careful comparative tests on a large Eastern electric railway showed that cars equipped with Perry-Hartman side and center bearings consumed 17 KW less per car than those with plain bearings.

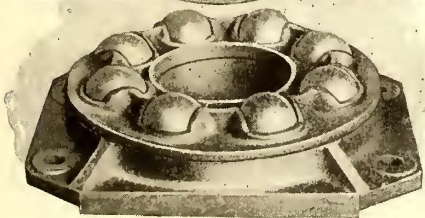


On an average run of 12 hours per day the total saving per car was 204 KWH, and at 1½ cents per kilowatt hour the net saving amounted to \$3.06 per car per day. On that basis alone the car equipment of bearings paid for themselves in 14 days and earned for that company over \$1,000 per car per year.

This saving was in power only, by eliminating truck nosing, reducing flange pressures on curves and straightaways, and in decreasing friction between body and trucks. It does not include the vast saving in wheel flange wear, rail wear, car maintenance, nor damage from derailments due to binding trucks.

Truck nosing on straightaways costs nearly 30% in wasted power, and friction on curves not only consumes excessive current but also causes wheel flange waste of from 50 to 80%.

Perry-Hartman are the only bearings which provide an absolutely anti-friction, free-radial, self-centering truck. Catalogue Free.



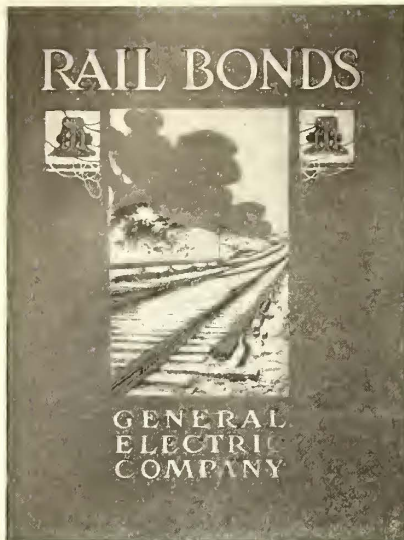
Holden & White

Electric Railway Distributors for The Joliet Railway & Supply Company
1508 Fisher Building, Chicago

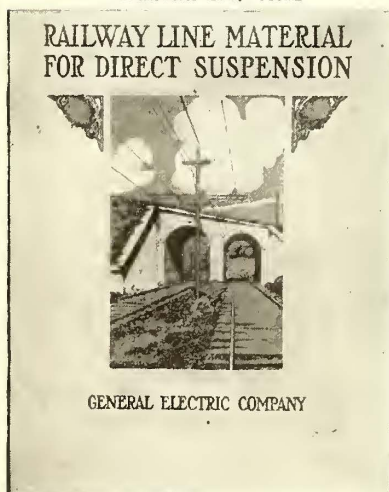
U. S. Metal & Mfg. Company, New York
Alfred Connor, Denver
Brown & Hall Supply Company, St. Louis

C. F. Saenger & Company, Cleveland
C. E. A. Carr, Toronto
F. F. Bodler, San Francisco
O. H. Davidson Equipment Co., Salt Lake City

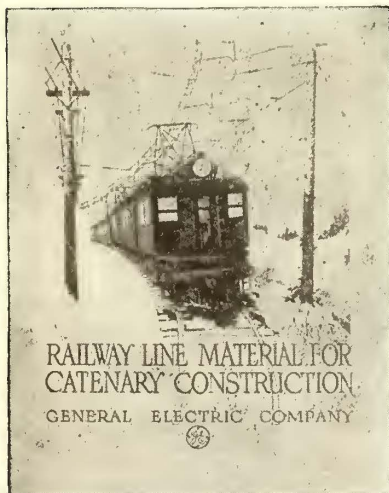
W. M. McClintock, St. Paul
W. F. McKenney, Portland, Ore.
S. I. Wailes, Los Angeles



Bulletin No. 44002



Bulletin No. 44004



Bulletin No. 44006

Have You These Bulletins on Your "Five-foot Shelf"?

Complete information and data
for placing orders for

G-E Railbonds and Line Material

are to be found in the three
bulletins illustrated here. Every
electric railway engineer and pur-
chasing agent will find these use-
ful in making up specifications.
Order all three for your "li-
brary"—they are free. Ask for

Bulletin 44002—Railbonds

**Bulletin 44004—Direct Suspen-
sion Line Material**

**Bulletin 44006—Line Material for
Catenary Construction**

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



Danger Zones

The danger zone due to the wand of the stage magician is purely imaginary.

The danger zone due to an ineffective, inefficient brake is very real.

Look over the records of your claim department and see how many lives and dollars would have been saved if the danger zone in front of the moving car had been a few feet shorter.

The remarkably short stops which can be made so readily with a Peacock Brake in both regular and emergency service have demonstrated that

**PEACOCK BRAKES ASSURE
MINIMUM DANGER ZONES**



The Eccentric
Drum

National Brake Co.
Buffalo, N. Y.

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Electric Railway Lighting and Power Company Bonds

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ELECTRICAL - CIVIL - MECHANICAL
105 SOUTH LA SALLE STREET
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Arthur D. Little, Inc.

An organization prepared to handle all work which calls for the application of chemistry to electric railway engineering—such as the testing of coal, lubricants, water, wire insulation, trolley wire, cable, timber preservatives, paints, bearing metals, etc.

Correspondence regarding our service is invited.

93 Broad Street, Boston, Mass.

ALBERT S. RICHEY

ELECTRIC RAILWAY ENGINEER

WORCESTER POLYTECHNIC INSTITUTE
WORCESTER, MASSACHUSETTS

**Specialist in the Application of Engineering Methods to the
Solution of Transportation Problems**

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SAMUEL STEPHENSON SONS & CO. Buy Entire Issues of Electric Railway, Light and Power Bonds

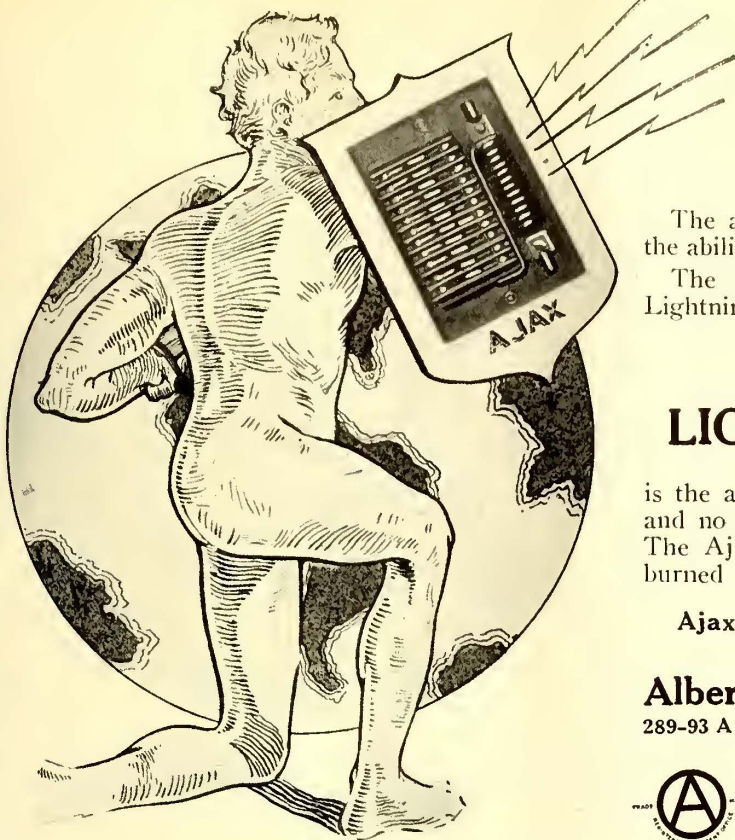
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ELECTRICAL TESTING LABORATORIES
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Mechanical Testing.
80th Street and East End Ave., New York, N. Y.

ROOSEVELT & THOMPSON
71 Broadway ENGINEERS New York
Report, Investigate, Appraise, Manage Electric Railway,
Light and Power Properties.

GULICK-HENDERSON CO.
Inspection Railway Equipment & Materials
PITTSBURGH CHICAGO NEW YORK

THE P. EDW. WISCH SERVICE
Suite 1710 DETECTIVES Suite 715
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Atlas May Uphold the World, but Ajax PROTECTS It

The ancient Greeks credited the god Atlas with the ability to uphold the world—that's fable. The modern American knows that the Ajax Lightning Arrester protects the world—that's fact.

THE AJAX LIGHTNING ARRESTER

is the arrester of small air gap, prompt discharge and no mechanically or electrically operated parts. The Ajax will protect against the re-ordering of burned out apparatus.

Ajax is fully described in Bulletin No. 25

Albert & J. M. Anderson Mfg. Co.
289-93 A Street Established 1877 Boston, Mass

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The Coal & Iron National Bank of the City of New York

Capital, Surplus & Profits \$1,635,000
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Offers to dealers every facility of a New York Clearing House Bank.

ENGINEERS and CONSTRUCTORS

A purely engineering organization with nothing to sell except services.



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The wide scope of W. C. K's. activities makes their organization available for every kind of engineering and construction work.

WESTINGHOUSE CHURCH KERR & CO.

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NEILER, RICH & CO., INC. Engineers
Manhattan Building, CHICAGO, ILL.
Reports, Appraisals and Valuations, Railway and Lighting Properties

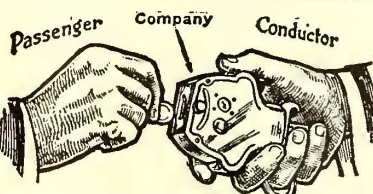
H. L. BROWNELL, Public Safety Engineer
Makes survey of accidents. Organizes Safety Campaigns. Lectures to public and employees with films. Conserves earnings and lives. Has addressed over a million persons. 5826 Winthrop Ave., Chicago

Scotfield Engineering Co. Consulting Engineers
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POWER STATIONS GAS WORKS
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VALUATIONS AND FINANCIAL REPORTS,
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76 West Monroe St CHICAGO, ILL.



Direct Automatic Registration By the Passenger

Rooke Automatic Register Co. Providence, R. I.

COLLIER SERVICE

YOU
are cordially
INVITED
to **INSPECT**

our

**NEW
CENTRAL
PLANT**

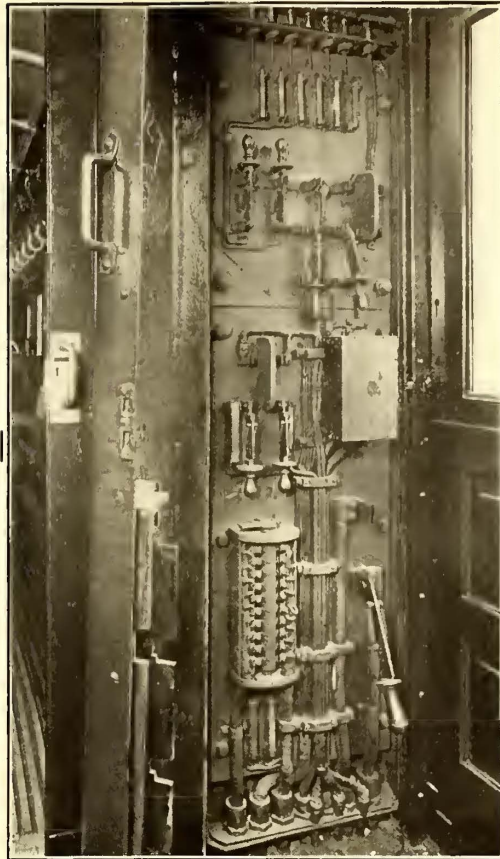


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**CAR
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INCORPORATED



Panel board of D & W Fuses on latest type of Interborough Subway Car

100 Per Cent Confidence in D & W Fuses

The Interborough Rapid Transit Company, New York, operates the fastest subway and elevated system of the world.

The fuses installed on its cars vary in capacity from 1 amp. for the coasting clock circuit to 600 amp. for the third-rail collector shoes.

The number of fuses installed on each class of passenger car and the number of each class of cars follow:

23 fuses on each of 1023 electric motor cars.....	23,529
9 fuses on each of 751 elevated trailers	6,759
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17 fuses on each of 291 high-voltage control subway trailers	4,947
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15 fuses on each of 62 low-voltage control subway trailers	930
60,252 Fuses	

And Every One a D & W!

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Providence, R. I.

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TRADE MARK
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The STANDARD for RUBBER INSULATION

Railway Feed Wires insulated with OKONITE are unequalled for flexibility, durability, and efficiency, and are in use by the leading Electric Street Railway Companies. OKONITE is preferred above any other insulation for Car Wiring, Telegraph and Telephone Purposes.

OKONITE WIRES—OKONITE TAPE—
MANSON TAPE—CANDEE WEATHER-
PROOF WIRES—CANDEE PATENTED
POTHEADS.

Samples and Estimates on Application

THE OKONITE COMPANY,

253 Broadway, New York

CENTRAL ELECTRIC CO., Chicago, Ill., General Western Agents

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

Novelty Electric Co., Philadelphia, Pa.

Pettingell-Andrews Co., Boston, Mass.

TROLLEY WIRE

Round Grooved and Figure 8

If you will agree that one make of trolley wire is able to give longer service than another make—

That one is more economical than another—

Then investigate our trolley wire with a view to cutting your wire costs.



Weatherproof Wires and Cables

Star Brand

Star Brand Wires are made with long service as the most prominent feature.

Because of their ability to render long service they cut wire costs.

Read the words in the cut of the star.

American Electrical Works

NEW YORK: 165 Broadway
CHICAGO: 112 West Adams Street
BOSTON: 176 Federal Street

Phillipsdale, R. I.

CINCINNATI: Traction Building
SAN FRANCISCO: 612 Howard Street
SEATTLE: 1002 First Avenue South

The On-Time Advertiser

who gets his copy and cuts to us well before the day his advertisement should go to press, gets better type composition, better location and a better opportunity to make necessary corrections on the proofs which can then be submitted before publication.

The Last-Hour Advertiser

whose copy and cuts come in at the last minute or even later, gets the best attention we can possibly give him. We work overtime to do what we can for him. But the lack of sufficient time makes it physically impossible to do as well for him as for the advertiser whose instructions come in well before the last hour.

Get Your Copy and Cuts in Early

Do this, not on our account, but for the sake of your own advertising. We want to serve all advertisers equally well—but we can't put more hours into a day, and the advertiser who gives us the most time gets the best results.

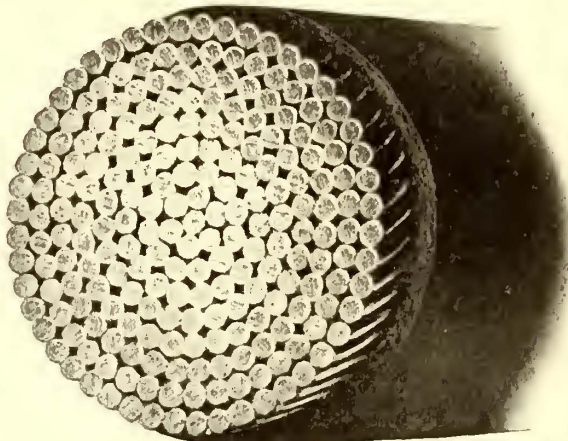
Copy and cuts should be in our hands by Thursday of the week preceding the date of issue. This means that Thursday is the *last* day on which copy can be handled normally.

After that we cannot promise proofs, and we cannot insure classification.

For good advertising, get your cuts and copy in every week *before* Thursday.

Electric Railway Journal
239 West 39th Street, New York

Ever try to Join a Cable like This by Hand?



If you did you know the time and money lost in separating the individual strands, snipping each to the right length to get the proper dovetail fit, winding the bunched strands with binding wire, and properly soldering the splice. Then there are the items of the helper, the gasoline for the blow torch or furnace, solder, flux—all at war prices.

Think how quickly, economically and with what mechanical strength a connection can be made by one man by using

Dossert Connectors

Cut back the insulation, insert the ends of the conductor in the connector, tighten up the nuts. That's all there is to Dossert Connectors or

Dossert Terminals

No solder, no flux, no binding wire, no monkeying around with a lot of tools that half the time are in the storeroom instead of on the job. And don't forget Dosserts stay put and prevent the uncertain contact that leads to overheating.

Dosserts are made in every necessary size and form for all conceivable connections from No. 14 to 2,500,000 CM. conductors. Special types for switchboard connections, rheostats, cable bends, and high tension joints.

A post card will bring our Tenth Year Catalogue.



Dossert & Company

H. B. Logan, President

242 West 41st St. New York



You Can Minimize Overhead Repair Work

and successfully cut maintenance costs if you turn to

The Macallen Line

of strain insulators, hangers, splicing ears, crossings, and other overhead material.

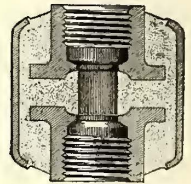
They are "specialty" products, designed and built to make "Macallen" the standard on American railways.

It will pay you to write for information and prices.



The Macallen Insulating Joint

Adopted by principal air brake manufacturers as part of their standard equipment. Also insulates steam pipes, etc. Shell is seamless drawn steel, nipples are machined from steel rod, and insulating material is Macallen Vulcanite Compound, not affected by heat or oil—practically indestructible.



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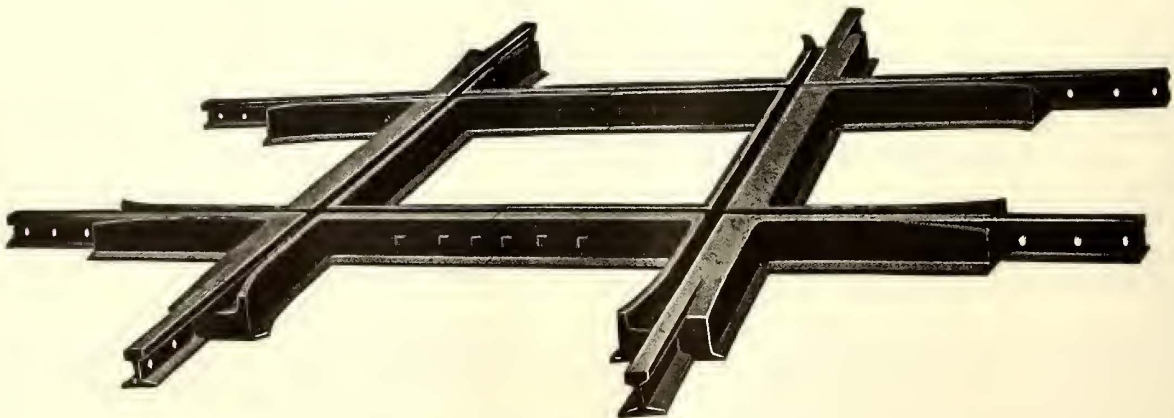
The Macallen Company
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Frogs, Crossings, Switches and Mates for Electric Railway Service

Products of the Highest Grade Workmanship and Material.

May we Estimate on Your Requirements?



BARBOUR-STOCKWELL CO.

205 Broadway, Cambridge, Mass.

Atlas "A" Method of Chemical Weeding Saves Costly Track Labor



No need to tell you track engineers how hard it is to get track labor at anything like old wages.

Why not then avoid human labor when there is a better and cheaper way available?

Hand-pulling of weeds is worse than costly—it's useless.

Atlas "A" Method—the Atlas expert plus the Atlas compound plus the Atlas machinery—saves labor cost and **KILLS THE WEEDS**

ATLAS PRESERVATIVE COMPANY OF AMERICA (Inc.)
95-97 Liberty Street, New York, N. Y.

The Lincoln Bonding System

makes this possible despite the prevailing high prices of material and labor. Here are the figures.

Two men with a combined wage of 60c. per hour on straightaway work can easily install 250 bonds in a 10-hour day (not over 40 sec. is required to weld the bond to the rail).

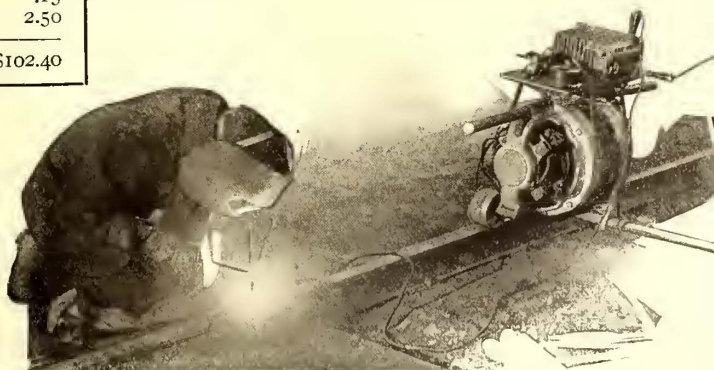
Less than 41 Cents Per Bond

Cost of Installing 250 Lincoln Bonds

250 bonds at \$35.50 per hundred (price based on present price of copper)	\$88.75
2 men at \$6.00 per 10-hr. day	6.00
Scrap copper for fill in of head, at 22c. per lb..	5.00
Power at \$0.01 per kw.-hr.....	.15
Molds, etc.	2.50
	<hr/>
	\$102.40

This brings the cost per bond down to the very modest figure of \$.4096.
Can you beat it?
If not write for our proposition.

The Lincoln Bonding Co.
636 Huron Road
Cleveland, Ohio





For All-around Usefulness
there is no grinding wheel superior to

NORTON ALUNDUM

Whenever in machine shop, tool room or repair shop a general purpose grinding wheel is demanded, a Norton Alundum Wheel fills the need. While its greatest usefulness—and reputation—is found in grinding steel and steel alloys (such as lathe and planer tools), it will successfully grind a wider range of materials than any known wheel.

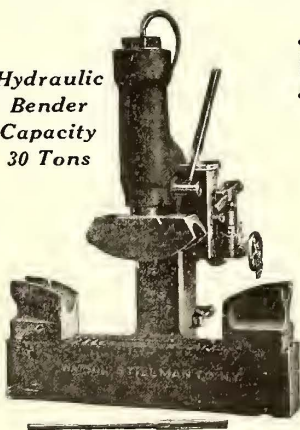
NORTON COMPANY
Worcester, Mass.

Chicago Store, 11 No. Jefferson St.

710

New York Store, 151 Chambers St.

*Hydraulic
Bender
Capacity
30 Tons*



HYDRAULIC MACHINERY

FOR THE ELECTRIC RAILWAY SHOP

We show here two hydraulic benders, one for bending and straightening trolley poles, conduit pipe, bars and other light bending; the other for bending I-beams, conductor rails and rails. They are built to withstand the rough handling of unskilled labor.

This pipe bender is built in standard sizes of thirty to forty tons' capacity, sufficient to bend one inch to six-inch pipe.

This rail bender is an improvement over similar forms, being stronger and equipped with formed bending blocks. It will be seen that the yoke swings back for the rail to be inserted sideways.

We build many other hydraulic tools for the car shop, such as shears, jacks, pit jacks, journal jacks, car jacks, presses, etc., all as carefully designed as the above to give the user the best service.

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THE WATSON-STILLMAN COMPANY



46 CHURCH STREET, NEW YORK

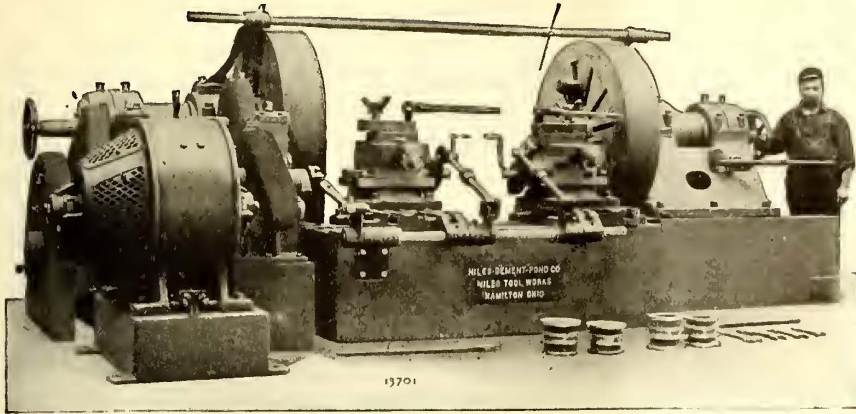
CHICAGO: McCORMICK BLDG.



*Portable
Hydraulic
Rail Bender*



Complete Machinery Equipment



Car-Wheel Lathe

The machine that will remove the flat spots, true up the wheels and return the cars to service in the shortest possible time. It is turning 12 to 18 pairs every day in several of the largest street railway shops. Provided with convenient calipering device, "Sure-Grip" drivers and patented tool clamps operated by a single screw.

For Electric Railway Repair Shops

Full line of high grade machines for the special requirements of such shops as well as all types of standard machine tools, steam hammers and electric traveling cranes.

Niles-Bement-Pond Co.

111 Broadway, New York City
25 Victoria St., London, S. W.

SALES OFFICES AND AGENCIES—**Boston:** 93-95 Oliver St. **Philadelphia:** 405 N. 21st St. **Pittsburgh:** Frick Bldg. **Cleveland, O.:** The Niles Tool Works Co., 730 Superior Ave. **Hamilton, O.:** The Niles Tool Works Co. **Cincinnati:** The Niles Tool Works Co., 336 W. 4th St. **Detroit:** Kerr Machinery Bldg. **Chicago:** 571 W. Washington Blvd. **St. Louis:** 516 North Third St. **Birmingham, Ala.:** 2015 First Ave. **San Francisco:** 16 to 18 Fremont St. **For Colorado, Utah, Wyoming and New Mexico:** Hendrie & Bolthoff Mfg. & Supply Co., Denver. **For Seattle:** Hallidie Machinery Co. **For Canada:** The John Bertram & Sons Co., Ltd., Dundas, Montreal, Winnipeg, Vancouver.



THE SHERWIN-WILLIAMS CO.
RAILWAY
PAINT AND VARNISH MAKERS

1916							JULY							1916						
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SHERWIN-WILLIAMS OLD DUTCH RAILWAY ENAMEL

and remember that it possesses the following advantages

1. It will wear longer than any finishing varnish or any other kind of enamel.
 2. Reduces material costs to a minimum. Two coats only are required over proper under-coatings in place of the usual two coats of color and two coats of varnish. When a car so finished is reshipped, only one coat of Old Dutch Railway is necessary after thoroughly cleaning and preparing the old surface.
 3. Reduces labor costs to a minimum. Requires only sufficient labor to apply two coats.
 4. A film produced by one coat of Old Dutch Railway Enamel is heavier and more durable than a coat of color and a coat of varnish.
 5. Requires renewal less often than any other finish, thus reducing shopping expense for painting.
- No other railway finish combines these features.

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THE SHERWIN-WILLIAMS CO.
RAILWAY PAINTS AND VARNISH MAKERS
782 Canal Road, Cleveland, Ohio

The Sherwin-Williams Co.,
782 Canal Rd.,
Cleveland, Ohio.

Kindly put us on your mailing list for monthly calendars.

Name

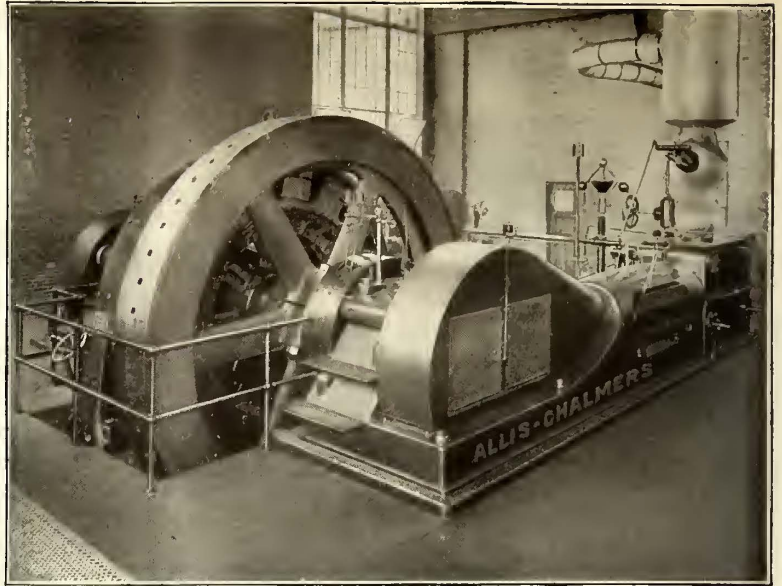
Concern

City

State

**WE HAVE BUILT
6,000,000 HORSE POWER
STEAM ENGINES
GAS ENGINES
OIL ENGINES**

We also build
Steam Turbines
Condensers
Generators
Motors, Etc.



Cross-Compound Direct-Connected Corliss Engine Unit.

Our 40 years experience is at your service

**ALLIS-CHALMERS MANUFACTURING CO.
MILWAUKEE, WIS., U. S. A.**



Oxweld Welding Unit Portable. All sizes of plants to meet any conditions

Unlimited Usefulness

The value of any equipment depends on its range of usefulness.

Here's apparatus that can be used in your shop, in the yards, at the scrap pile or out on the line; to repair and build up broken castings and forgings; to build up worn rails; to repoint broken switches and frogs; for bonding; anywhere and everywhere welding and cutting can be employed.

The OXWELDING UNIT

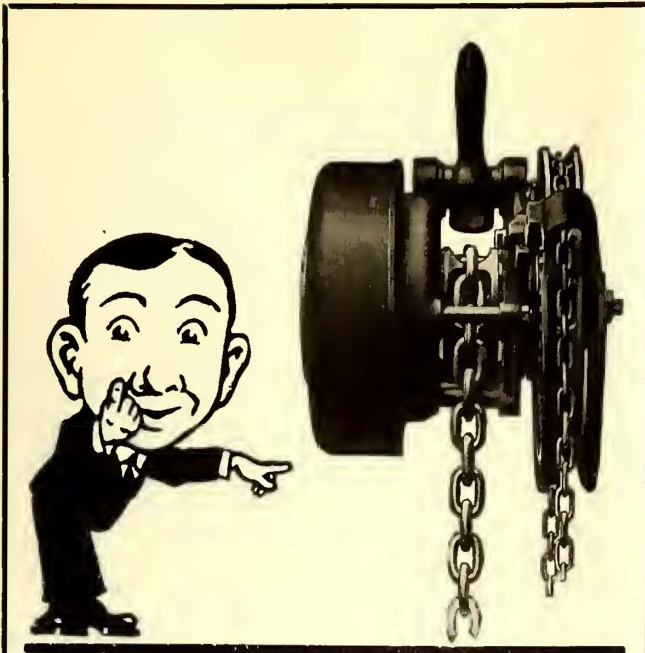
It would be impossible to list the many uses for this apparatus. Thousands have been discovered already and hundreds of new ones come up as the occasions arise. You'll be surprised at the number of applications *you* will find.

The whole unit is mounted on a strong steel truck and can be moved anywhere. This portable feature gives an unlimited area of operation.

We can give you some idea of the range of usefulness of an OXWELD Outfit through our Bulletins, Series 700. Every man interested in electric railway shop practice and maintenance should have one. Send for yours today.

**Oxweld Acetylene Co.
Newark, N. J. Chicago Los Angeles**

*Largest Makers of Welding and Cutting Equipment
and Supplies in the World*



Yes, that's the hoist

that the big railroads and machine shops are buying, and meeting the demand is keeping us hustling every day, and nights, too, sometimes.

It's the

Ford Tribloc

CHAIN HOIST

the hoist with steel parts, planetary gears and the highest kind of efficiency.

It's the Hoist that has the famous Ford Loop Hand Chain Guide that keeps the chain from gagging, enables you to operate it at any angle and at any speed you wish to.

The Loop Hand Chain Guide makes the Ford Tribloc superior in both speed and safety. We back our faith in it with a five years' guarantee.

Catalogue? Surely.
You will be glad to have it
and we will be glad to send it



Ford
of Philadelphia

FORD CHAIN BLOCK & MANUFACTURING COMPANY

140 Oxford Street,

PHILADELPHIA, PA.

*Get All Your
Electrical Supplies
From One Concern.
Save Expenses.
Hasten Shipment.*

Western Electric

Supplies for Electric Railroads

are held ready at all convenient shipping points.

You order yours from our nearest distributing house and get them promptly.

Our electrical supply lines include everything used in connection with electrical work and are of the best quality at fair prices.

Send Your Entire Order to Our Nearest House

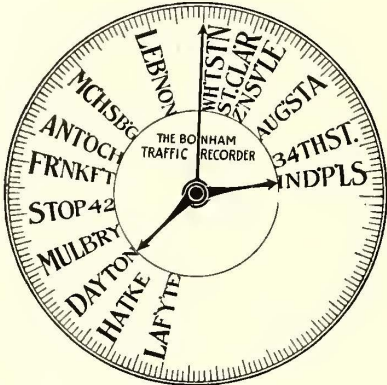
Western Electric Company

INCORPORATED

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

EQUIPMENT FOR EVERY ELECTRICAL NEED
Member Society for Electrical Development. "Do it Electrically"

Auditing Expenses are Lower



Because the complete record afforded by the Bonham Traffic Recorder needs no compilation or checking. It is ready to be placed on your company's books.

BONHAM Traffic Recorders

keep tab on the traffic while on the road. They do away with the need for elaborate computations. When a Public Service Commission calls on you for data as to "Earnings per Passenger Mile," YOU HAVE THE FACTS—if your cars are BONHAM-Equipped.

The Bonham Recorder not only records cash but it keeps tab on passenger-mileage—the unit needed in computing operating costs and earnings.

Write for the Illustrated Book "Earnings Per Passenger Mile."

THE BONHAM RECORDER CO.

Hamilton, Ohio, U. S. A.

1

B-V Ticket Punches

The punches that enable your conductors to perforate their transfers quickly, in large numbers and in a way that will not encourage time-limit abuse.

They are standard because:

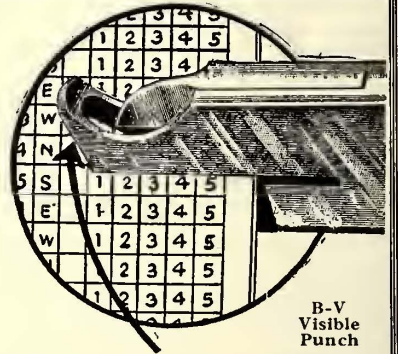
DESIGN: Open Sight (if desired)—Strong—Easily Handled.

WORKMANSHIP: Made by expert workmen and guaranteed free from all defects.

MATERIALS: Only the finest used throughout, thus insuring perfection in service.

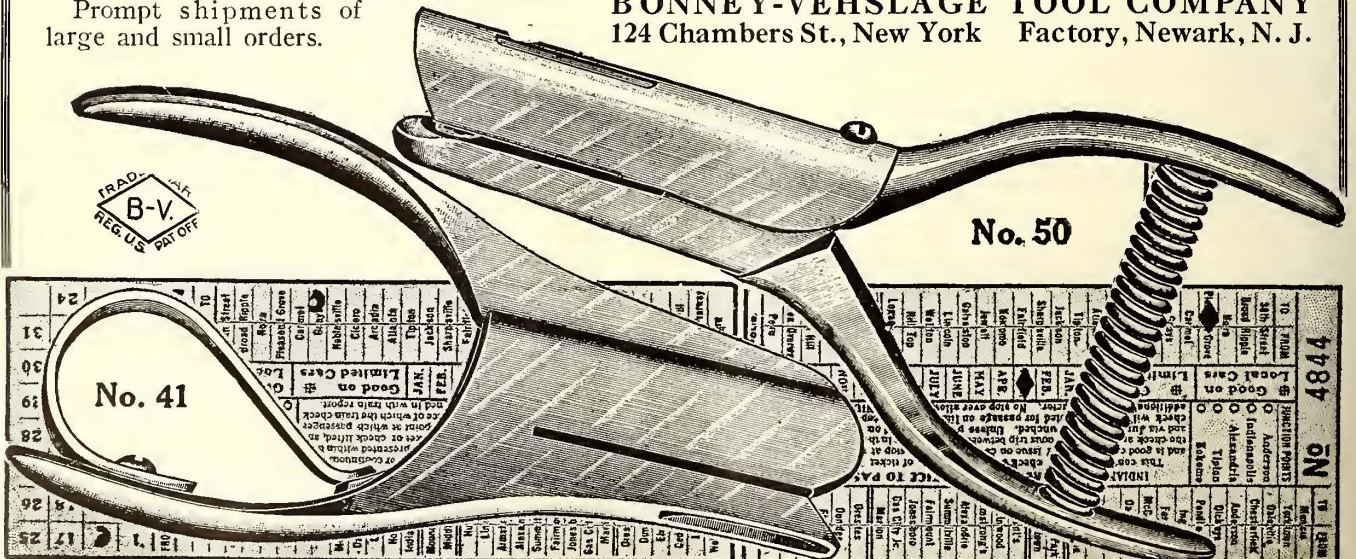
They cost no more than other punches.

Prompt shipments of large and small orders.



B-V Visible Punch

BONNEY-VEHSLAGE TOOL COMPANY
124 Chambers St., New York Factory, Newark, N. J.

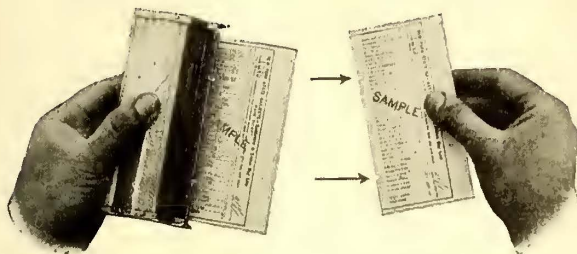


No. 50

No. 41

No. 4844

Macdonald Ticket Box Makes Dubious Tear-Offs Impossible



Did the passenger get a 35 cent or a 40 cent ride; a 50 cent ride or a 55 cent ride; a 70 cent ride or a 75 cent ride?

Are you sure that your present duplex receipt system answers these questions correctly?

City Ter.—Rochester	Rochester—City Ter.	NEW YORK STATE RAILWAYS—Rochester & Sudas Bay Line Good for the continuous trip between points mentioned for this day and train only. Retain this receipt for the auditor's stub at the point. PATENTED, THE MACDONALD TICKET BOX CO., CLEVELAND, OHIO GEN. PASS AGT.
City Line—Rochester	Rochester—City Line	
Glen Haven Jct	Glen Haven Jct	
Otis Stop	Otis Stop	
Power House Stop	Power House Stop	
DAYTON'S COR'S	DAYTON'S COR'S	
Glen Edith	Glen Edith	
WEST WEBSTER	WEST WEBSTER	
5 Mile Line	5 Mile Line	
Hard Road Crag	Hard Road Crag	
Siding No. 10	Siding No. 10	
WEBSTER	WEBSTER	
Newham's Stop	Newham's Stop	
Lawrence's Stop	Lawrence's Stop	
UNION HILL	UNION HILL	
Ritz's Stop	Ritz's Stop	
FRUITLAND	FRUITLAND	
Blythe's Stop	Blythe's Stop	
ONTARIO CENTER	ONTARIO CENTER	
ONTARIO	ONTARIO	
Maple Road Stop	Maple Road Stop	
Pease Road Crag	Pease Road Crag	
Ridge Chapel Stop	Ridge Chapel Stop	
Fish's Stop	Fish's Stop	
WILLIAMSON	WILLIAMSON	
Milham's Stop	Milham's Stop	
E. WILLIAMSON	E. WILLIAMSON	
Bell's Siding	Bell's Siding	
Moody's Stop	Moody's Stop	
SODUS	SODUS	
Pullman's Siding	Pullman's Siding	
Barclay's Stop	Barclay's Stop	
WALLINGTON	WALLINGTON	
Glover's Stop	Glover's Stop	
Morley's Stop	Morley's Stop	
Seamon's Stop	Seamon's Stop	
SODUS POINT	SODUS POINT	
HALF FARE	HALF FARE	
EXPRESS	EXPRESS	

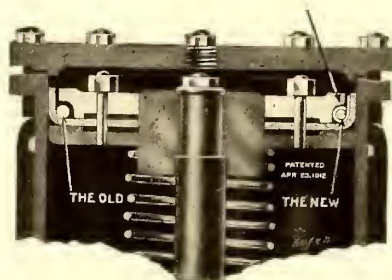
Look at this tear-off of a duplex ticket from a Macdonald Ticket Box. There is no doubt what the passenger paid for. The conductor must turn in the fare between Glen Edith and Pullman's Siding, for the auditor's stub is beyond manipulation.

The Macdonald Ticket Box is a mighty simple device, but it gets the money—for the company.

**The Macdonald Ticket
& Ticket Box Co.**
Cleveland, Ohio

J-M Expander Rings Make every Pound of Air Work

Consider the fact that the J-M ring gives a greater wearing or bearing surface of the pack-



J-M Expander Rings

ing leather against the walls of the brake cylinder, thereby making a **tight** piston and reducing leather wear. Inexpensive but efficient.

Over half a million in use and being applied on 90% of all equipment built.

Serves more people in more ways than any other Institution of its kind in the world.



Boston
Chicago
Cleveland
New York
Philadelphia
Pittsburgh
St. Louis
San Francisco
Seattle
Toronto

H. W. JOHNS-MANVILLE CO.
EXECUTIVE OFFICES
256 Madison Avenue, New York City



Ucha Moo

Lower Congo women have their front teeth removed as a slight assistance to nature in enhancing personal charm or ucha moo.

But it's mighty small charm as viewed through eyes that have Broadway training.

The poor deluded, denuded woman has actually *hindered* her beauty when she really thought she was *helping* it.

And in just the same way the power house operator *hinders* commutation rather than *helps* it by using a lubricant to help out the brushes.

If he feels that brushes need lubricant let him notify a Morgan brush engineer, who will prescribe a proper type of Morganite to provide commutation without gumming things up.

Incidentally that process saves money—

Ask a Morgan engineer to look over *your* machines—and to state what he can save by a Morganite prescription.

At the same time ask him how he can cut your motorbrush cost per car mile.

This is a suggestion.



Factory, Brooklyn, N. Y.

AGENTS:

Lewis & Roth Co., 312 Denckla Bldg., Philadelphia

Electrical Engineering & Mfg. Co.
First National Bank Bldg., Pittsburgh

W. L. Rose Equipment Company, La Salle Bldg.
St. Louis, Mo.

Herzog Electric & Eng'g Co., 150 Stuart St.,
San Francisco, Cal.



Use DIXON'S GRAPHITE BRUSHES

and keep your motors or generators running silently and at maximum efficiency.

Commutator surfaces improve under the action of these brushes.

Losses by friction are thus minimized; and sparking and chattering are avoided.

Upkeep costs are decreased.

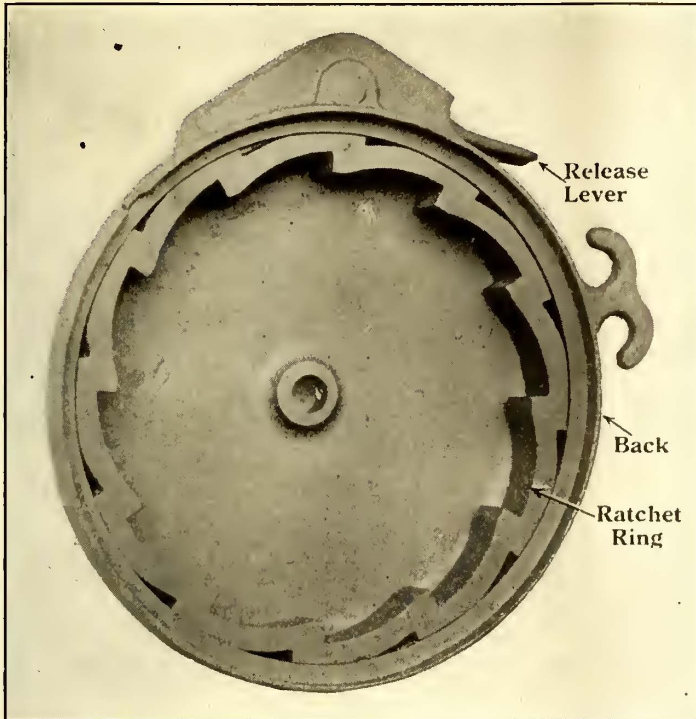
Our electrical service department is at your command.

Write for
Graphite Brush Booklet No. 108-M

Made in JERSEY CITY, N. J., by the
Joseph Dixon Crucible Co.

Established 1827





WHAT IS THE Emergency Release of the Earll Retriever?

First, it's a time saver and helps maintain the schedule, because with it the trolley can safely be run up to the wire without waiting to reset Retriever and without stopping the car.

Second, it's a safety *operating* device because the rope cannot become clogged or locked. The failure or breakage of any part of the operating mechanism cannot interfere with immediately running up the trolley when the release lever is held down. Ponder the advantage of this feature to a car stalled on a steam road crossing.

It is a safety *shop* device. It is safe and quick to trip the retriever by a sharp jerk on the rope and then to withdraw the rope by means of the emergency release without rewinding the retrieving spring before taking the retriever from the car. A man doesn't have to climb to the roof to detach the rope.

Just one feature of Earll Retrievers

Some others are: It has the ratchet set, and winds up like a watch; does not require long, continuous pull because the retrieving spring is locked at short intervals while it is being wound up; quickest action because it has twelve teeth in the back so that the retriever works in one-twelfth of a revolution of the drum; "Free-Winding" tension spring which cannot be overwound, and always takes in a wet rope with a minimum pull on the pole.

C. I. EARLL

Offices: 11 Broadway, N. Y. Factory: York, Pa.

The JOHN S. BLACK CO.
New Orleans, La.

W. R. KERSCHNER CO., Inc.
Eastern Sales Agts. 50 Church St., New York

BROWN & HALL
St. Louis, Mo.

IF YOU WANT PROOFS

of your advertisements, and time to return them with corrections

Copy Must Be in Our Hands Two Weeks in Advance of Publication Date

Copy Changes. If no proofs are desired your advertisements should be in our hands Wednesday of the week preceding date of publication, otherwise your latest advertisement in accordance with schedule will be repeated.

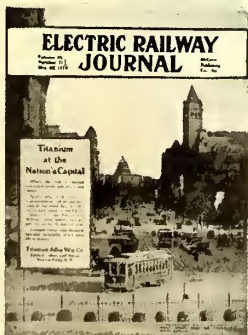
New Advertisements (not changes of copy) can usually be accepted up to noon Wednesday of the week of publication, but no guarantee can be given as to location or proofs or indexing.

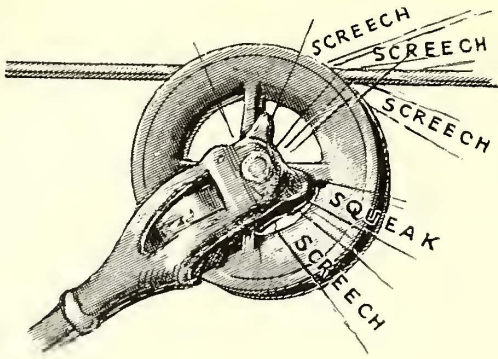
Searchlight Advertisements (Proposals, Wants, For Sale, etc.) received as late as 10 A. M. Thursday will be published if there is space available in the pages that go to press last. The paper is dated and mailed Saturday.

THESE are not arbitrary rules. We do our best to give our advertisers what they want—work overtime if necessary—but each advertising form has to be on the press at a specified time. That is why we cannot guarantee proof or location unless we have copy on time. We want our advertising space to work at maximum efficiency for our advertisers.

The Paper is dated and mailed Saturday

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





Trolley wheels should be seen, not heard

Chattering, screeching trolley wheels do more than annoy the public, they annoy the railway man who O. K.'s the trolley wheel bills. When he *hears* a trolley wheel it is an audible sign that the wheel is going to an early grave and taking the trolley wire with it.

There is one sure way to eliminate trolley bushing friction troubles, and that is by the use of

“Bound Brook” Bushings

The alternate layers of graphite and bronze assure symmetrical wear, little wear and noiseless wear.

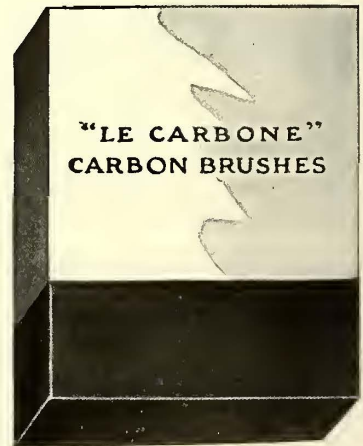
All genuine “Graphited Oil-less Bearings” have always been made at Bound Brook, N. J., in the United States of America, by the



Bound Brook Oil-Less Bearing Company

FORMERLY
GRAPHITE LUBRICATING CO.
Bound Brook, N. J.

“Le Carbone” Carbon Brushes Always Uniform



There may be other carbon brushes that are just as good as “Le Carbone” brushes some of the time. There probably are. But brushes are a thing you use always—you require uniformity all of the time. “Le Carbone” Carbon Brushes are always uniform in quality and results.

Specify them.

Pittsburg Office:
636 Wabash Building

W. J. Jeandron
173 Fulton Street
New York City

Canadian Distributors
Lyman Tube & Supply Co., Ltd.
Montreal and Toronto

For High Speed Operation

—Large Diameter Kalamazoo Trolley Wheels



As a solution to arcing and short wheel life on high speed electric railway work, two new Kalamazoo Wheels have been designed.

They are (No. 20) 11½ inches and (No. 21) 10 inches in diameter. An ample increase of width, depth of groove and length of hub insures a well-balanced wheel in each case.

Tests covering considerable mileage at high speeds show that these two new "Kalamazoo" greatly decrease sparking, while offering longer wheel life. There is more bearing on the wire, with consequent greater contact and current carrying capacity.

The patented Kalamazoo Harps have been enlarged to carry these wheels.

Try several on your lines. Compare their service with that of smaller wheels.

Write Today.



STAR BRASS WORKS

KALAMAZOO, MICHIGAN



Holding the Bag!

And he won't let go, because it contains Boyerized case-hardened pins and bushings!

Wherever you travel among car equipment men you will find that Boyerized products are becoming the standard in every class of electric railway operation—wherever a long-wearing part can replace a short-wearing part

With Greater Profit and Greater Safety

The case-hardened brake pins, bushings, nuts and bolts originated by us have made good because they are absolutely reliable and uniform in quality while low in price. The same facts apply to our manganese brake heads, transom plates, center plates and body bushings.

Reduced Maintenance

is absolutely certain with our products, for they extend the life of truck and rigging parts tremendously. Bear in mind that a car must go to the shop because of a defective pin just as quickly as for a broken side frame.

**Boyerized Products Keep
Your Cars Out of the Shop.**

Bemis Car Truck Company
Springfield, Mass.

Steel for Service



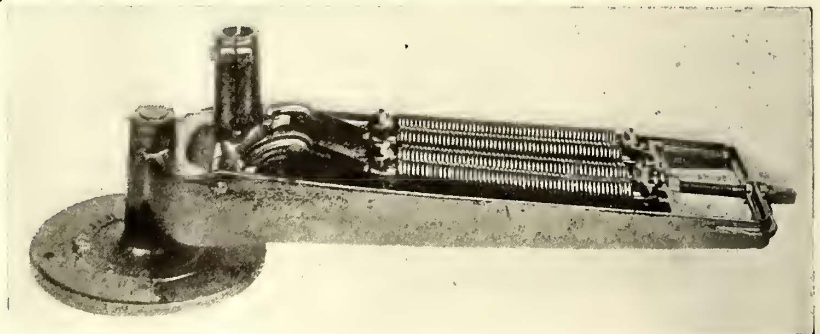
In your "SAFETY FIRST" crusade do not neglect the safety insured by tracks laid with Steel Cross Ties.

Carnegie Steel Company

General Offices: Pittsburgh, Pa.

48-T

THESE Old Timers were built by us twenty-five years ago.



YOU can buy new trolleys or interchangeable repair parts for them today.



IF you could buy repairs for certain trolleys now in your scrap heap they wouldn't be there.

NUTTALL—PITTSBURG

It's the little things that count



If you hold the "public be pleased" attitude interest yourself in

EDWARDS Car Window Fixtures

They are little things, but they count big in begetting good-will.

Edwards fixtures make the windows rattle-proof, hold them tightly in any position, but do not bind. Your passengers can work them without smashing fingers or "cussing." Your conductors can spend all their time in fare collection and platform duty—not in janitor duty.

Big service for little things at a small price. Write for Catalog E.

The O. M. Edwards Co., Inc.

Metal Extension Platform Trap Doors
Top, bottom & side Weather-stripping
Railway Devices

Syracuse, N. Y.

Window Fixtures
All-Metal Sash Balances and Shade Rollers
Metal Sash and Mouldings

Recent shipment of semi-steel trailer cars for Salt Lake & Ogden Railway

THE JEWETT CAR COMPANY

Newark, Ohio

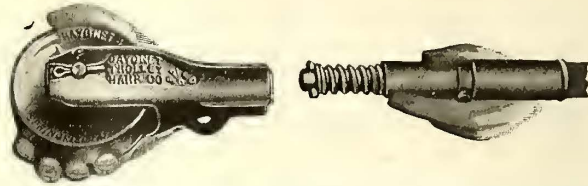
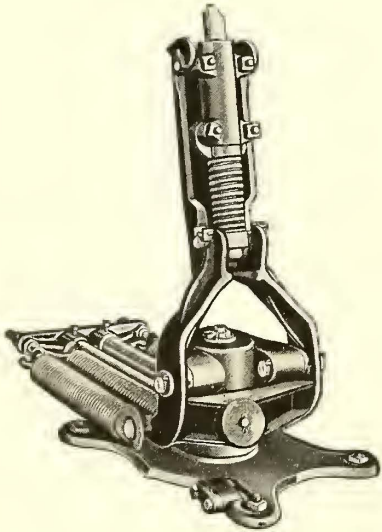


High Trolley Maintenance Costs Flee Before the Bayonet

A Bayonet Harp will run continuously for four or five years. Our first Base, made ten years ago, is still giving perfect service. All wearing parts are renewable at very small cost.

BAYONET EQUIPMENT COSTS NO MORE than the old antiquated equipment that delays your cars a half hour or more to change a damaged trolley wheel or pole. Accidents seldom happen with our easy system of daily inspection.

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



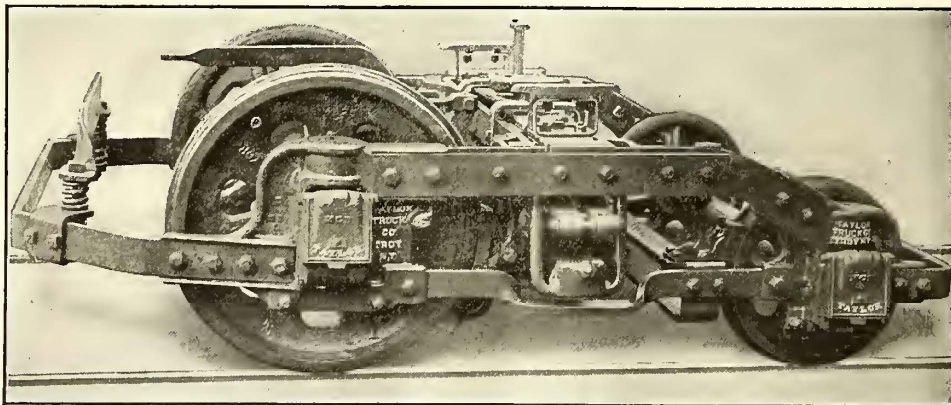
ONLY TWENTY SECONDS AND YOUR HANDS ARE REQUIRED TO CHANGE A HARP HEAD AND WHEEL

if you use BAYONET HARPS AND BASES. All repair work, lubricating and aligning done at the work bench, the only place it can be done right. Perfect alignment and lubrication saves wheels. Trolley axles have extra long bearings and are held more firmly than any other harp on the market. This feature with the extra large contact washers insures a true running wheel and perfect conductivity. We have the evidence that **WHEELS IN BAYONET HARPS WEAR A THIRD LONGER** than in other harps.

You can get the evidence in your own service by **60 DAYS' TRIAL**. It costs you nothing if we don't make good.

Bayonet Trolley Harp Co.
Springfield, Ohio, U. S. A.

TAYLOR MAXIMUM TRACTION TRUCK



12 FACTS REGARDING "TAYLOR-MADE" TRUCKS

ABSOLUTELY SAFE
RIDE LIKE PULLMANS
SIMPLE IN CONSTRUCTION
REDUCE WEAR OF MOTORS
WILL INCREASE DIVIDENDS
REDUCE COST OF MAINTENANCE

SAVE POWER
SAVE ROAD BED
LIGHT IN WEIGHT
OVERCOME FLANGE WEAR
BRAKES DO NOT CHATTER
PREVENT SIDE OSCILLATION OF CARS

TAYLOR ELECTRIC TRUCK CO.

Established 1892

SPECIFICATIONS ON REQUEST

TROY, N. Y.

SEND FOR PORT-FOLIO



The demand for our material is so great that we earnestly recommend our customers to anticipate their needs as much as possible.

**STANDARD
STEEL WORKS CO.**
Morris Building Philadelphia

New York	Portland
Chicago	Havana, Cuba
St. Louis	London, Eng.
Pittsburgh	Melbourne, Aust.
San Francisco	Monterey, Mex.
Richmond	Mexico City

Standard Steel Works Co.
Morris Building, Philadelphia, Pa.



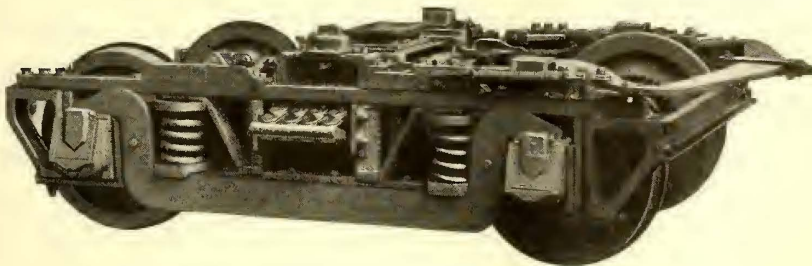
USE BALDWIN TRUCKS

BECAUSE

They are built by a Company that has been solving motive-power problems for 85 years.

They are correctly designed, the parts being proportioned for the work they have to do.

They are built of the best materials, and the parts are machine fitted and are held together by turned bolts.



Built for Michigan Ry. Co.

They are equipped with non-chattering, bolted brakes. There are no pins to work loose and cause accidents by allowing parts of the brake-work to fall on the track.

They are as light as is consistent with the required strength, hence a minimum amount of power is needed for their propulsion.

And there are other reasons; let us tell them to you.

THE BALDWIN LOCOMOTIVE WORKS

Philadelphia, Pa.

REPRESENTED BY

F. W. Weston, 120 Broadway, New York, N. Y.
Charles Riddell, 627 Railway Exchange, Chicago, Ill.
C. H. Peterson, 1210 Boatmen's Bank Bldg., St. Louis, Mo.

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

THE LINDSLEY BROTHERS CO.

Western "Good Poles Quick" Northern

Quick Shipments
from our
Minneapolis Yard

Minneapolis
Spokane - St. Louis

Butt Treating
Open Tank and
"Hot and Cold" Processes

TREATED

**POLES, CROSS ARMS, TIES,
TIMBERS, PAVING BLOCKS.**

CAPACITY 100,000,000 FEET B. M. PER ANNUM
SEND FOR PAMPHLET

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

The Celebrated
**TRENTON
TROLLEY WAGON**

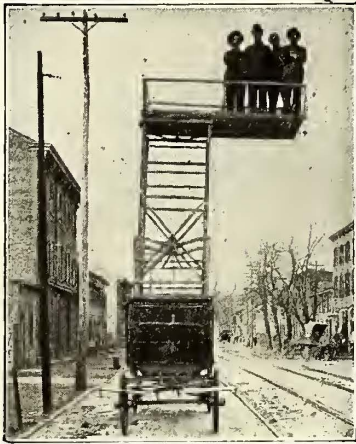
J. R. McCARDELL & CO.


Patentees and
Sole Manufacturers

TRENTON, N. J.

Correspondence Solicited

It meets every
requirement.



Barrett's 
**Grade One
LIQUID
Creosote Oil**

**CUTS WOOD
PRESERVING BILLS
IN HALF**

Write for booklet

The *Barrett* Company
NEW YORK
Branches in Principal Cities

Railroad and Tram Car Specialties

New inventions developed, perfected
and worked for the English market

Messrs. G. D. Peters & Co., Ltd.

Moorgate Works, Moorfields, LONDON, E. C.

Prolong the Life of Poles—



Reeves Wood Preserver
costs little - easy to apply
Write for Sample to Test

THE REEVES CO.
New Orleans, La.



"WHALEBONE"

Fibre Track Insulation

DIAMOND STATE FIBRE CO.

Flsmere, Del. Bridgeport, Penna. Chicago, Ill.

FEDERAL SIGNAL CO.

Manufacturers } for { Automatic } either { A.C. }
Engineers } for { Signaling } or { D.C. }
Contractors } for { Interlocking }

No Interlocking Switches Are Safe Without
Federal Switch Guards

MAIN OFFICE and WORKS - - ALBANY, N. Y.

52 Vanderbilt Avenue, New York Monadnock Block, Chicago
118-130 New Montgomery St., San Francisco, Cal.

POLES WESTERN CEDAR PILING

We brag about the SERVICE we give

B. J. CARNEY & CO.

F. B. BRANDE, Manager M. P. FLANNERY, Manager
819 Broad Street, Grinnell, Ia. Spokane, Wash.

Commit us to memory

Chapman Automatic Signals

Charles N. Wood Co., Boston



TOOLS

for all classes of electrical construction and repair
work. Write for catalog.

Mathias Klein & Sons Canal Station Chicago
25

The New Drew Cable Insulator and Splicing Sleeve
is only one of many of our
economy devices.



It will pay you to investi-
gate them

Write for 200-page illustrated catalog

Drew Electric & Mfg. Co., 1016 E. Mich. St., Indianapolis, Ind.



Ramapo Iron Works

Main Office, Hillburn, N. Y.
New York Office: 30 Church St.

Automatic Switch Stands,
T-Rail Special Work,
Manganese Construction,
Crossings, Switches, Etc.

Packard



Insulating Materials

Varnishes, Impregnating Compounds, Varnished Tape, Insulating Cloth, etc.

We couldn't buy them good enough for our purposes so we make them

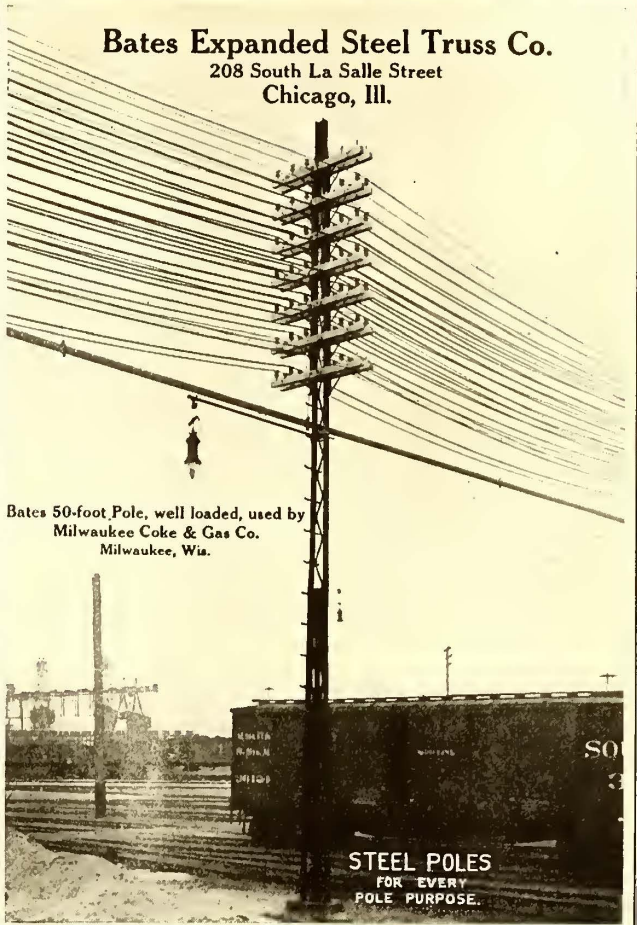
Write for bulletins and prices

The Packard
Electric Company

Warren, Ohio

Bates Expanded Steel Truss Co.

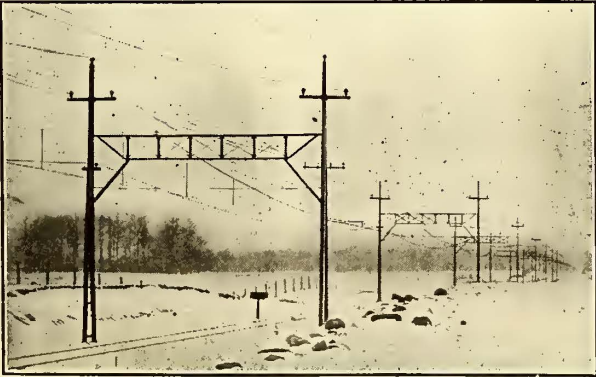
208 South La Salle Street
Chicago, Ill.



Bates 50-foot Pole, well loaded, used by Milwaukee Coke & Gas Co. Milwaukee, Wis.

STEEL POLES FOR EVERY POLE PURPOSE.

Permanent Overhead Construction



If you find it necessary to rebuild your interurban overhead construction on account of the decay of your wooden poles, write us and we will give you an estimate as to what permanent reconstruction would cost you.

Archbold-Brady Company

Engineers and Contractors
Syracuse, N. Y.



Soldered Splices are Dangerous

Overload comes — solder runs — cable parts — TROUBLE!

Get Posted → on the modern cable splicing method



FRANKEL SOLDERLESS CONNECTORS

MAKERS OF THE BEST ONLY
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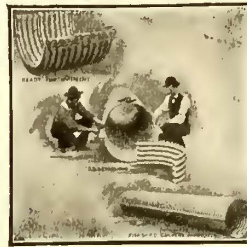
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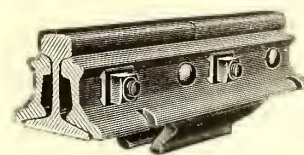


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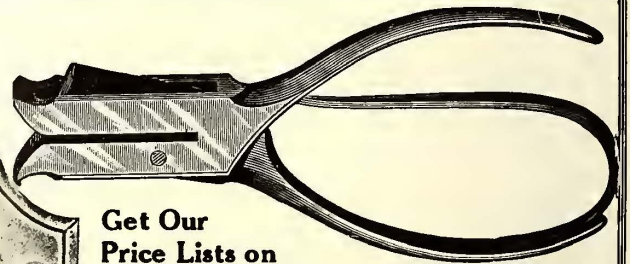
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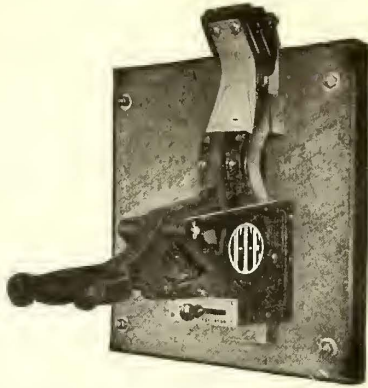
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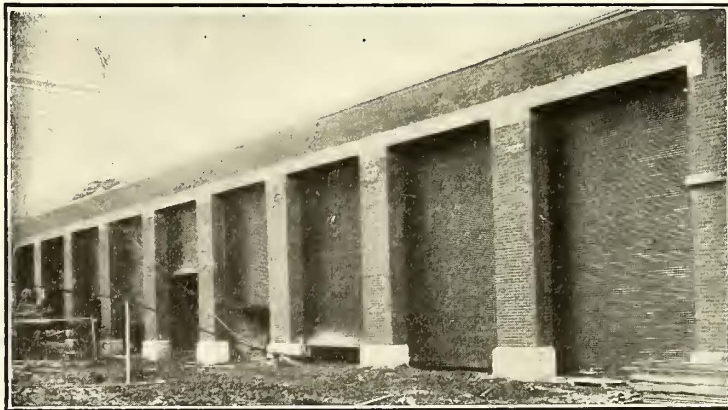
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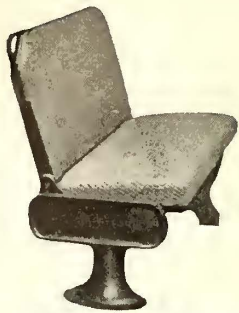
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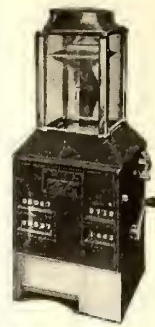
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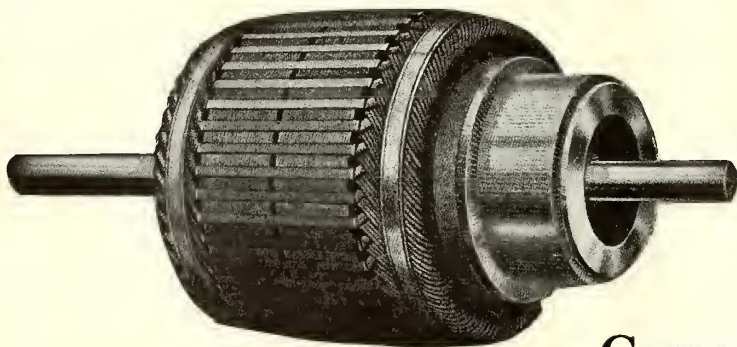
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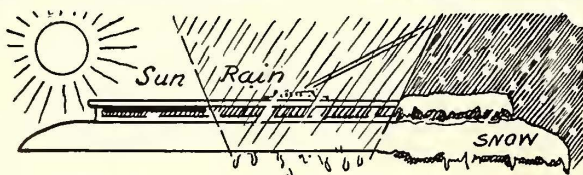
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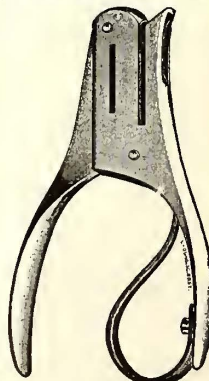


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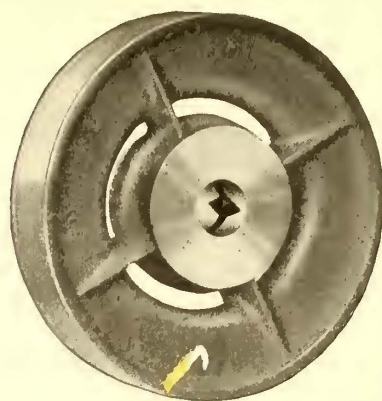
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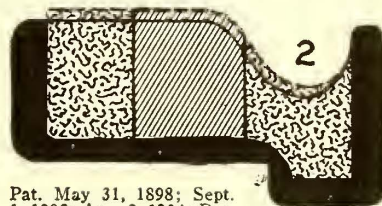
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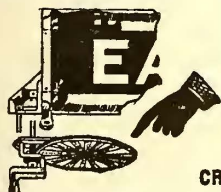


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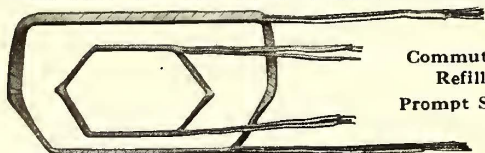
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Philadelphia, Pa.

Do You Want a Salesman or Other Assistant?

If so, send us copy for a card under "Positions Vacant" in the Searchlight Section. The cost will be slight and the result will be both quick and satisfactory.

Get your Wants into the Searchlight

ELECTRIC RAILWAY JOURNAL, 239 West 39th St., New York

THE ART OF BUYING

is as much a reality as is the Art of Selling. Advertising of the right kind helps the *buyer* as much as it does the seller.

The Electric Railway Journal Service Department helps advertisers prepare advertising copy of real interest and use to Journal readers.

The Service Department is ready to serve you, Mr. Manufacturer.

ELECTRIC RAILWAY JOURNAL

239 West 39th Street, New York

SEARCHLIGHT SECTION

FOR SALE

Poles for Sale

Juniper Southern white cedar poles for electric light and telephone lines. Can make prompt shipment. For prices, write or wire, Austin McCormick, Sanford, N. C.

FOR SALE

- 200—4/0 Type A Twin Terminal Bonds,
- 40—4/0 Form G.S. Soldered Bonds,
- 40—4/0 60" Type C.P. Solid Cross Bonds,
- 2—Type No. 22 Four Spindle Hand Operated Drills,
- 1—Type No. 22-M Four Spindle Motor Operated Drill.

Connecticut Valley St. Ry. Co.
Greenfield, Mass.

FLAT BRIDGE OR TRAM RAILS

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

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

ZELNICKER IN ST. LOUIS
CARS AND EQUIPMENT

Immediate Shipment
1200 Kegs of 6 x 5/8 Standard

RAILROAD SPIKES

\$2.00 per cwt. Pittsburgh.

Also, large tonnage of

RELAYERS

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



Armature Coil Taping Machine

Saves Time, Labor and Money

A boy can tape 40 coils for Westinghouse 12A Armature in an hour. Further particulars gladly furnished.

Geo. M. Griswold Machine Co.
New Haven, Conn.

Get your Wants into the Searchlight

ADVERTISING RATES

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

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

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

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

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

FOR SALE

Generators for Sale

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

Rails for Sale

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

Trucks for Sale

- 20 Dorner No. 18. Prefer to sell without wheels and axles, \$75 each. 6 ft. wheel base 5" axle. Union Traction Co. of Ind., Anderson, Ind.

Generators for Sale

- Three new Western Electric 200 KW. 200 R.P.M. 500/550 volt compound wound D.C. Generators. Never been used; good as new. Address T. S. Duncan, Purchasing Agent, H. C. Frick Coke Company, Carnegie Building, Pittsburgh, Pa.

Electric Traveling Crane

- For Sale—One 40-ft. span, 15-ton electric traveling crane, D. C., 220 volts, hoist 12 hp., trolley 7 hp., bridge 10 hp. This crane has just been removed to make way for a new one. Hoisting motor should be renewed. Murray Iron Works Company, Burlington, Ia.

70-lb. A.S.C.E. A-1 Rails

- For Sale—1000 tons 70 lb. A.S.C.E. T rails, Pennsylvania section No. 245. This rail has been slightly used and is in A-1 condition. Box 1113, Elec. Ry. Jour.

POSITIONS WANTED

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

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

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

ENGINEER wants position; 9 years' experience in central and substation construction and operation. Three years with present railway company as chief. Good references, including present employer. Box 1110, Elec. Ry. Jour., 1570 Old Colony Bldg., Chicago, Ill.

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

LIVE wire executive, 15 years' experience, stores, purchasing and auditing departments steam and electric lines; record of reducing office payroll \$16,000, wants new connection as purchasing agent with transportation or manufacturing company where ability will be rewarded. Box 1109, Elec. Ry. Jour., 501 Rialto Bldg., San Francisco, Cal.

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

MASTER mechanic. Have had 20 years' experience as such in city and interurban railway shops. Can keep things up and get results. A hustler for work. Box 1081, Elec. Ry. Jour.

MOTORMAN—Do you want accidents reduced and dozens of other matters improved? Experienced motorman or conductor, efficiency man. Box 1106, Elec. Ry. Jour.

SUPERINTENDENT wants position as Transportation or General Freight and Passenger Agent, or both. Forty-eight years old. Twenty years' experience. Box 1096, Elec. Ry. Jour.

POSITIONS VACANT

MAN wanted, capable of handling twenty-mile interurban; must be practical. Give reference. Box 1107, Elec. Ry. Jour., 1570 Old Colony Bldg., Chicago, Ill.

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

READY - REFERENCE INDEX

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

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

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

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

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

- Acetylene Apparatus.**
(See Cutting Apparatus, Oxy-Acetylene.)
- Acetylene Service.**
Oxweld Acetylene Co.
Prest-O-Lite Co., Inc., The.
- Advertising, Street Car.**
Collier, Inc., Barron G.
- Air Cleaners.**
Lord Mfg. Co.
- Alloys, Steel and Iron.**
Titanium Alloy Mfg. Co.
- Alloys and Bearing Metals.**
(See Bearings and Bearing Metals.)
- Anchors, Guy.**
Holden & White.
Ohio Brass Co.
Western Electric Co.
Westinghouse Elec. & M. Co.
- Automobiles and Busses.**
Brill Co., The J. G.
White Co., The.
- Axle Straighteners.**
Columbia M. W. & M. I. Co.
- Axles.**
Hadfields Ltd.
Niles Car & Mfg. Co.
Taylor Elect. Truck Co.
- Axles, Car Wheel.**
Bemis Car Truck Co.
Brill Co., The J. G.
Carnegie Steel Co.
Cincinnati Car Co.
St. Louis Car Co.
Standard Steel Works Co.
Westinghouse Elec. & M. Co.
- Babbitting Devices.**
American General Engrg. Co.
Columbia M. W. & M. I. Co.
- Badges and Buttons.**
American Ry. Supply Co.
International Register Co., The
Western Electric Co.
Woodman Mfg. & Supply Co.
- Banks and Brokers.**
Coal & Iron National Bank.
Halsey & Co., N. W.
- Batteries, Dry.**
Western Electric Co.
- Batteries, Storage.**
Electric Storage Battery Co.
Western Electric Co.
- Bearings and Bearing Metals.**
American General Engrg. Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Kerschner Co., Inc., W. R.
Long Co., E. G.
St. Louis Car Co.
Taylor Elect. Truck Co.
Westinghouse Elec. & M. Co.
- Bearings, Center.**
Baldwin Locomotive Works.
Holden & White.
- Bearings, Oilless, Graphite, Bronze & Wooden.**
Graphite Lubricating Co.
- Bearings, Roller and Ball.**
Gurney Ball Bearing Co.
Hess-Bright Mfg. Co.
Railway Roller Bearing Co.
- Bearings, Roller Slide.**
Holden & White.
- Bells and Gongs.**
Brill Co., The J. G.
Electric Service Supplies Co.
St. Louis Car Co.
Western Electric Co.
- Benders, Rail.**
Niles-Bement-Pond Co.
Watson-Stillman Co.
Zelnicker Sup. Co., W. A.
- Blasting Powder and Equipment.**
Du Pont De Nemours & Co., E. I.
- Blow Torches for Soldering and Brazing.** (See Cutting Apparatus, Oxy-Acetylene.)
- Blowers.**
General Electric Co.
Westinghouse Elec. & M. Co.
- Bollers.**
Babcock & Wilcox Co.
- Boiler Cleaning Compounds.**
Dearborn Chemical Co.
- Bond Clips.**
Electric Railway Improve. Co.
- Bond Testers.**
American Steel & Wire Co.
- Bonding Apparatus.**
Electric Railway Improve. Co.
Ohio Brass Co.
Oxweld Acetylene Co.
Prest-O-Lite Co., Inc., The.
- Bonding Tools.**
American Steel & Wire Co.
Electric Railway Improve. Co.
Electric Service Supplies Co.
Ohio Brass Co.
- Bonds, Rail.**
American Steel & Wire Co.
Electric Railway Improve. Co.
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Western Electric Co.
Westinghouse Elec. & M. Co.
- Book Publishers.**
McGraw-Hill Book Co., Inc.
- Boring Tools, Car Wheel.**
Niles-Bement-Pond Co.
- Braces, Rail.**
Kilby Frog & Switch Co.
- Brackets and Cross Arms.** (See also Poles, Ties, Posts, Etc.)
Bates Expanded Steel Truss Co.
Craghead Engineering Co.
Electric Railway Equipment Co.
Electric Service Supplies Co.
Int'l Creosoting & Constr. Co.
Lindsay Bros. Co.
Ohio Brass Co.
Western Electric Co.
- Brake Adjusters.**
Kerschner Co., Inc., W. R.
Smith-Ward Brake Co., Inc.
- Brake Shoes.**
Amer. Brake Shoe & Fdy. Co.
Barbour-Stockwell Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Long Co., E. G.
St. Louis Car Co.
Taylor Elect. Mfg. Co.
Wheel Truing Brake S. Co.
- Brakes, Brake Systems and Brake Parts.**
Ackley Companies, G.
Allis-Chalmers Mfg. Co.
Brill Co., The J. G.
British Westinghouse Elect. & Mfg. Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Holden & White.
Long Co., E. G.
Lord Mfg. Co.
National Brake Co.
St. Louis Car Co.
Taylor Elect. Mfg. Co.
Westinghouse Trac. B. Co.
- Brooms, Track, Steel or Rattan.**
Western Electric Co.
Zelnicker Sup. Co., W. A.
- Brush Holders.**
Anderson Mfg. Co., A. & J. M.
- Brushes, Carbon.**
Dixon Crucible Co., Jos.
General Electric Co.
Jeandron, W. J.
Morgan Crucible Co.
Western Electric Co.
Westinghouse Elec. & M. Co.
- Buckets, Grab.**
Beaumont Co., R. H.
- Bumpers, Car Seat.**
Electric Service Supplies Co.
Imperial Rubber Co.
- Bunkers, Coal.**
Beaumont Co., R. H.
- Bunting.**
Boyle & Co., Inc., John.
- Bushings, Fibre.**
Diamond State Fibre Co.
- Bushings, Graphite and Wooden.**
Graphite Lubricating Co.
- Bushings, Case Hardened and Manganese.**
Bemis Car Truck Co.
- Bushings, Rubber.**
Imperial Rubber Co.
- Buttons.** (See Badges and Buttons.)
- Cables.** (See Wires and Cables.)
- Carbon Brushes.** (See Brushes, Carbon.)
- Car Equipment.** (For Fenders, Heaters, Registers, Wheels, etc.—see those headings.)
- Car Trimmings.** (For Curtains, Registers, Doors, Seats, etc. See those headings.)
- Cars, Passenger, Freight, Express, etc.**
American Car Co.
Brill Co., The J. G.
Cincinnati Car Co.
Jewett Car Co.
Kuhlman Car Co., G. C.
Niles Car & Mfg. Co.
St. Louis Car Co.
United Electric Car Co., Ltd.
Wason Mfg. Co.
- Cars, Self-Propelled.**
British Westinghouse Elect. & Mfg. Co.
Electric Storage Battery Co.
General Electric Co.
- Castings, Brass.**
Frankel Connector Co.
- Castings, Composition or Copper.**
Anderson M. Co., A. & J. M.
- Castings, Gray Iron and Steel.**
Amer. Brake Shoe & Fdry. Co.
American Gen'l Eng'g Co.
American Steel Foundries.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Hadfields, Ltd.
Long Co., E. G.
St. Louis Car Co.
St. Louis Steel Foundry.
Standard Steel Works Co.
Union Spring & Mfg. Co.
- Castings, Malleable and Brass.**
Amer. Brake Shoe & Fdry. Co.
American Gen'l Eng'g Co.
Bemis Car Truck Co.
Earll, C. I.
Hadfields, Ltd.
Long Co., E. G.
St. Louis Car Co.
- Catchers and Retrievers, Trolley.**
Eclipse Railway Supply Co.
Electric Service Supplies Co.
Holden & White.
Kerschner Co., Inc., W. R.
Long Co., E. G.
Lord Mfg. Co.
Ohio Brass Co.
Wood Co., Chas. N.
- Ceiling, Car.** (See Headlining.)
- Chain & Belt Machinery**
Beaumont Co., R. H.
- Charging Sets, Storage Battery.**
General Electric Co.
- Checks, Employees.**
American Ry. Supply Co.
- Cheese Cloth.**
Boyle & Co., Inc., John.
- Chemists.**
Little, Inc., Arthur D.
- Circuit Breakers.**
Cutter Electrical & Mfg. Co.
General Electric Co.
Western Electric Co.
Westinghouse Ele. & M. Co.
- Clamps.**
Frankel Connector Co.
- Clamps and Connectors for Wires and Cables.**
American Gen'l Eng'g Co.
Anderson M. Co., A. & J. M.
Dossert & Co.
Electrical Engrs. Equip. Co.
Electric Service Supplies Co.
General Electric Co.
Klein & Sons, Mathias.
Ohio Brass Co.
Western Electric Co.
Westinghouse Elec. & M. Co.
- Cleaners and Scrapers, Track.** (See also Snow - Plows, Sweepers and Brooms.)
Brill Co., The J. G.
Cincinnati Car Co.
Ohio Brass Co.
Van Dorn & Dutton Co.
Western Electric Co.
- Cleats, Car Wiring.**
General Electric Co.
- Clusters and Sockets.**
General Electric Co.
- Coal and Ash Handling.** (See Conveying and Hoisting Machinery.)
- Coil Banding and Winding Machines.**
American Gen'l Eng'g Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Griswold Machine Co., Geo. M.
Kerschner Co., Inc., W. R.
Western Electric Co.
- Coils, Armature & Field.**
Cleveland Armature Works.
Coil Mfg. & Repair Co.
Columbia M. W. & M. I. Co.
D & W Fuse Co.
General Electric Co.
Western Electric Co.
Westinghouse Elec. & M. Co.
- Coils, Choke & Kicking.**
Electric Service Supplies Co.
General Electric Co.
Westinghouse Ele. & M. Co.
- Coin-Counting Machines.**
International Register Co., The
Johnson Fare Box Co.

Precise Electrical Measurement Assured!

Weston

**Single-Phase and Direct Current Portable
Electrodynamometer Wattmeter, Model 310**



An Instrument of Precision guaranteed to an accuracy of $\frac{1}{4}$ of 1% of full scale value on the working part of the scale, whether used on D. C. circuits or A. C. circuits of any frequency up to 133 cycles per second and on circuits of any wave form.

Double ranges are provided for both current and voltage circuits. All current ranges can be used for 100% overload indefinitely without introducing error.

The movable system has an extremely low moment of inertia and is very effectively damped. Indications are independent of room temperature and the instrument is shielded from external magnetic influences. The scale, $5\frac{1}{4}$ inches long, is uniform throughout the entire length, a characteristic of great value. It is hand-calibrated and provided with a mirror, over which the knife-edge pointer travels, and the pointer may easily be adjusted to zero by means of a zero-correcting device.

For complete information regarding Model 310 Wattmeters (illustrated) and Model 329 Portable Polyphase Wattmeters, write for Bulletin No. 2002. Other Models in this group are Model 341 A.C. and D.C. Portable Voltmeter, described in Bulletin No. 2004; and Model 370 A.C. and D.C. Portable Ammeter, described in Bulletin No. 2003.

**Weston Electrical Instrument Company
21 Weston Ave., Newark, N. J.**

- | | | | |
|--------------|-----------|---------------|--------------------------|
| New York | Chicago | San Francisco | Montreal |
| Philadelphia | Boston | Detroit | Vancouver |
| Pittsburgh | Denver | St. Louis | Berlin |
| Cleveland | Buffalo | Toronto | London |
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U. S. Metal & Mfg. Co.

165 BROADWAY, NEW YORK CITY
Chicago Washington, D. C.

RAILWAY SUPPLIES

SELLING AGENTS FOR

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

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 Tool Steel Gear & Pinion Co.
 Johnson Fare Box Co.
 C. & C. Electric & Mfg. Co.
 Holden & White

General Agents for Ango-American Varnish Co.
 Eastern Agents for Union Fibre Co.
 Southern and New England Agents for Thayer & Co.



**These Coils Have More
Than a Scrap Value**

There is a potential profit in these coils for you. When properly rejuvenated they will save you from buying new coils at the present high market price.

For proper rejuvenation at the lowest price you can depend on us. Under our new process we will fashion for you coils of the same size, shape and number of turns as the old ones, at the mere cost of the insulation.

Salamander Pure Asbestos

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

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

Correspondence solicited.

Independent Lamp & Wire Co., Inc.

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

READY-REFERENCE INDEX

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

- Commutator Slotters.**
American General Eng'g Co.
General Electric Co.
Westinghouse Elec. & M. Co.
Wood Co., Chas. N.
- Commutator Truing Devices.**
American General Eng'g Co.
General Electric Co.
- Commutators or Parts.**
American General Eng'g Co.
Cameron Electrical Mfg. Co.
Cleveland Armature Works.
Coil Mfg. & Repair Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Long Co., E. G.
Mica Insulator Co.
Western Electric Co.
Westinghouse Elec. & M. Co.
- Compressors, Air.**
Allis-Chalmers Mfg. Co.
Curtis & Co., Mfg. Co.
General Electric Co.
Westinghouse Trac. B. Co.
- Condensers.**
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Elec. & M. Co.
- Conduits.**
Standard Underground Cable Co.
Western Electric Co.
- Conduits, Flexible.**
Tubular Woven Fabric Co.
- Connectors, Solderless.**
Frankel Connector Co.
- Controller Fingers.**
Lord Mfg. Co.
- Controller Handles.**
Lord Mfg. Co.
- Controller Regulators.**
Electric Service Supplies Co.
- Controllers or Parts.**
Allis-Chalmers Mfg. Co.
American General Eng'g Co.
British Westinghouse Elect. & Mfg. Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
General Electric Co.
Kerschner, W. R.
Westinghouse Elec. & M. Co.
- Controlling Systems.**
General Electric Co.
Westinghouse Elec. & M. Co.
- Converters, Rotary.**
Allis-Chalmers Mfg. Co.
General Electric Co.
Western Electric Co.
Westinghouse Elec. & M. Co.
- Conveying and Hoisting Machinery.**
Beaumont Co., R. H.
Green Engng. Co.
Hadfields, Ltd.
- Cord, Bell, Trolley, Register, etc.**
Brill Co., The J. G.
Electric Service Supplies Co.
Imperial Rubber Co.
International Register Co., The
Long Co., E. G.
Roebbling's Sons Co., John A.
Samson Cordage Works.
- Cord Connectors and Couplers.**
Electric Service Supplies Co.
Samson Cordage Works.
Wood Co., Chas. N.
- Cotton Duck.**
Boyle & Co., Inc., John.
- Couplers, Car.**
Brill Co., The J. G.
Cincinnati Car Co.
Long Co., E. G.
Ohio Brass Co.
Van Dorn Coupler Co.
Westinghouse Trac. B. Co.
- Cranes. (See also Holsts.)**
Allis-Chalmers Mfg. Co.
Beaumont Co., R. H.
Niles-Bement-Pond Co.
Van Dorn & Dutton Co.
- Creosoting. (See Wood Preservatives.)**
- Cross Arms. (See Brackets.)**
- Crossing Foundations.**
International Steel Tie Co.
- Crossing Signals. (See Signals, Crossing.)**
- Crossings, Track. (See Track, Special Work.)**
- Culverts.**
Canton Culvert & Silo Co.
- Curtains and Curtain Fixtures.**
Brill Co., The J. G.
Edwards Co., Inc., The O. M.
Electric Service Supplies Co.
Hartshorn Company, Stewart.
Pantasote Co., The.
Railway Supply & Curtain Co.
St. Louis Car Co.
- Cutting Apparatus, Oxy-Acetylene.**
Oxweld Acetylene Co.
Prest-O-Lite Co., Inc., The.
- Derailing Devices. (See also Track Work.)**
Cleveland Frog & Crossing Co.
- Despatching Systems.**
Simmen Automatic Ry. Sig. Co.
Western Electric Co.
- Destination Signs.**
Columbia M. W. & M. I. Co.
Creaghead Engineering Co.
Electric Service Supplies Co.
Western Electric Co.
- Detective Service.**
Wisch Service, P. Edward.
- Doors and Door Fixtures.**
Brill Co., The J. G.
Edwards Co., Inc., The O. M.
General Electric Co.
Hale & Kilburn Co.
- Doors, Steel Rolling.**
Kinnear Mfg. Co.
- Doors, Trap.**
Edwards Co., Inc., The O. M.
- Draft Rigging. (See Couplers.)**
- Drills, Track.**
American Steel & Wire Co.
Electric Service Supplies Co.
Long Co., E. G.
Niles-Bement-Pond Co.
Ohio Brass Co.
- Dryers, Sand.**
Electric Service Supplies Co.
Zelnicker Sup. Co., W. A.
- Engineers, Consulting, Contracting and Operating.**
Archbold-Brady Co.
Arnold Co., The.
Brownell, H. L.
Byllesby & Co., Inc., H. M.
Drum & Co., A. L.
Ford, Bacon & Davis.
Gulick-Henderson Co.
Hunt & Co., Robert W.
Jackson, D. C. & Wm. B.
Little, Arthur D.
Neiler, Rich & Co.
Richey, Albert S.
Roosevelt & Thompson.
Sanderson & Porter.
Sargent & Lundy.
Scofield Engineering Co.
Stephenson Sons & Co.
Stone & Webster Eng. Corp.
Westinghouse Church Kerr & Co.
White Companies, J. G.
Woodmansee & Davidson, Inc.
- Engines, Gas and Oil.**
Allis-Chalmers Mfg. Co.
Westinghouse Elec. & M. Co.
- Engines, Steam.**
Allis-Chalmers Mfg. Co.
Westinghouse Elec. & M. Co.
- Fare Boxes.**
American General Eng'g Co.
Brill Co., The J. G.
Cleveland Fare Box Co.
International Register Co., The
Johnson Fare Box Co.
Ohmer Fare Register Co.
- Fences and Fence Posts.**
American Steel & Wire Co.
- Fencing Wire.**
American Steel & Wire Co.
- Fenders and Wheel Guards.**
Brill Co., The J. G.
Cincinnati Car Co.
Cleveland Fare Box Co.
Consolidated Car Fender Co.
Eclipse Railway Supply Co.
Electric Service Supplies Co.
Lord Mfg. Co.
Star Brass Works.
Western Electric Co.
- Fibre.**
Diamond State Fibre Co.
U. S. Metal & Mfg. Co.
Westinghouse Elec. & M. Co.
- Fibre, Tubing.**
Diamond State Fibre Co.
Westinghouse Elec. & M. Co.
- Field Coils. (See Coils.)**
- Filters, Water.**
Scaife & Sons Co., Wm. B.
- Fire Extinguishing Apparatus.**
Imperial Rubber Co.
- Flooring Composition.**
American Mason Safety Tread Co.
Western Electric Co.
- Forgings.**
Standard Steel Works Co.
- Frogs, Track. (See Track Work.)**
- Furnaces. (See Stokers.)**
- Furniture, Metal Office.**
Edwards Co., Inc., The O. M.
- Fuses and Fuse Boxes.**
American General Eng'g Co.
Chicago Fuse & Mfg. Co.
Columbia M. W. & M. I. Co.
D & W Fuse Co.
General Electric Co.
Western Electric Co.
Westinghouse Elec. & M. Co.
- Fuses, Refillable.**
Columbia M. W. & M. I. Co.
General Electric Co.
- Gaskets.**
Diamond State Fibre Co.
Imperial Rubber Co.
Power Specialty Co.
- Gas Producers.**
Westinghouse Elec. & Mfg. Co.
- Gates, Car.**
Brill Co., The J. G.
Cincinnati Car Co.
Jewett Car Co.
- Gages, Oil and Water.**
Ohio Brass Co.
- Gear Blanks.**
Carnegie Steel Co.
Diamond State Fibre Co.
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Hand tamping has always been slow, costly and far from satisfactory.

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Are pneumatically operated machines that do the same work better, more quickly and more economically. This is true regardless of the ballast—the “Imperial” handles all kinds equally well.

The average experience of users has been that two men with these machines will do the work of eight men tamping by hand.

DOESN'T THAT ANSWER THE QUESTION OF HOW YOU ARE GOING TO GET THIS SEASON'S WORK DONE ON TIME.

Bulletin 9023 Tells What Imperial Tampers Will Do and Describes the Outfits in Detail. Write for a Copy.



The Public Service Railway Co. of New Jersey is using a two-tool Imperial Tamping Outfit for extension work on the Central Ave. line, East Orange, N. J. The portable compressor which operates the tampers is electrically driven from the trolley line.
N. B. The Ingersoll-Rand Company also builds gasoline driven compressors for conditions where electric current is unavailable.



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If cement filler had been used cracks would have been more than possible. Cement links brick to brick in a solid monolith. If the foundation sinks or softens ever so slightly the bricks do not settle with it but bridge the depression and some day a heavy wagon breaks the arch and a long,

unsightly and troublesome crack is the result.

The immense internal strain and stress in a monolithic cement-filled pavement cause many cracks. In a pitch-filled pavement, there is no strain for "every joint is an expansion joint."

The pitch in the joints of this pavement will last as long as the pavement, never needing renewal or repair, and during all the years will be unchanged in chemical and physical properties.

Pitch filler being a non-conductor of sound deadens the noise of a brick pavement and greatly reduces the nuisance of heavy traffic.

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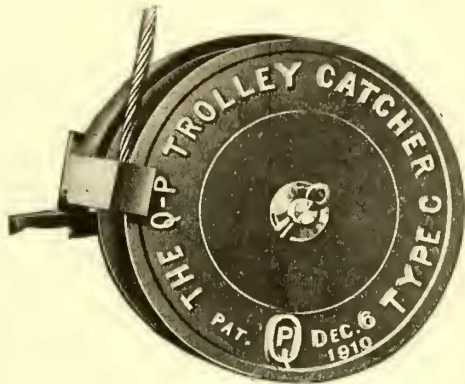
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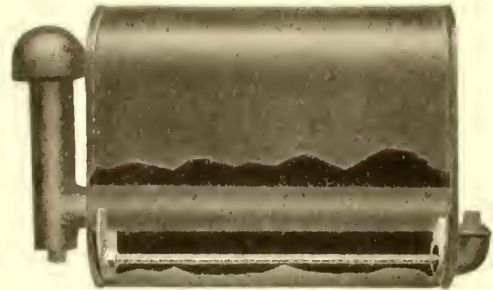
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Nuttall Co., R. D.
Star Brass Works.
- Whistles, Air.**
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Ohio Brass Co.
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- Wire Rope.**
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International Creos. & Con. Co.
Lindsay Bros. Co.
Reeves Co., The.

Lord Devices Get There!



General View Q-P Catcher



Lord Screenless Air Cleaner

Look along the line of Lord devices and note their originality, simplicity, effectiveness!

Take the Q-P Trolley Catcher. It has so few parts that you wouldn't believe it can do all a trolley catcher should, until you see it in action.

Take the Lord Screenless Cleaner for permitting nothing but pure air to get to the compressors. It's so good that the big air-brake makers recommend them as part of the outfit. Let this simple device keep your compressors out of trouble.

Then take the Lord Hand Brakes.

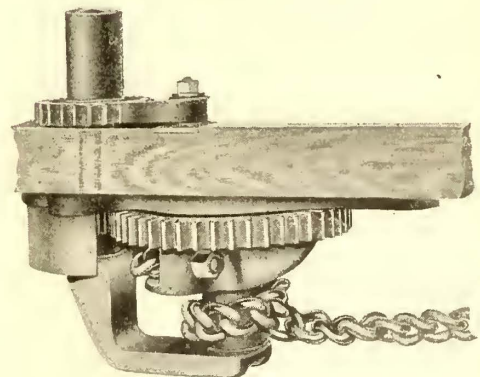
The Horne Double-Acting Brake weighing only 67 lb. yet capable of exerting a pressure of 3000 lb. on the hand-brake rod.

The Giant Geared Brake. You add 42 lb. of equipment below the squared end of the brake staff and get hand-brake pressures up to 2800 lb.

And the prices are peace prices!



Horne Double Acting Brake



Giant Geared Brake

LORD MANUFACTURING COMPANY

105 West 40th Street, New York

ALPHABETICAL INDEX TO ADVERTISEMENTS

NOTICE TO ADVERTISERS:

Printing begins on Tuesday of each week. Changes of Copy received up to 10 A. M. Monday will appear in the issue of the following week, but no proofs can be submitted for OK before publication.

New Advertisements (not changes of copy) received up to Wednesday noon can appear in the issue of that week, but no proofs can be shown.

If proofs before printing are required, changes of copy and copy for new advertisements must be in our hands 10 days in advance of the date of publication.

(An asterisk * indicates advertisements appearing in the International Edition only.)

to Wednesday noon can appear in the issue of that week, but no proofs can be shown.

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Titanium-Treatment Improves All Steels

Do you know that the Bay State Street Railway has improved upon its Mayari rails—made from the famous Cuban nickel-chrome ore—by the use of Titanium-treatment?

These Titanium-treated Mayari rails, as ordered for service at Fall River and Methuen, Mass., comprise 300 tons of 9-in. girder rail and 50 tons of 9-in. guard rail.

They received the usual cleansing with 0.1% titanium. Titanium-treatment makes good rails better.

Write for our new book now.



Titanium-Treated Rails in use at Fall River, Mass.

TITANIUM ALLOY MANUFACTURING COMPANY

Operating Under Rossi Patents

Processes and Products Patented

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



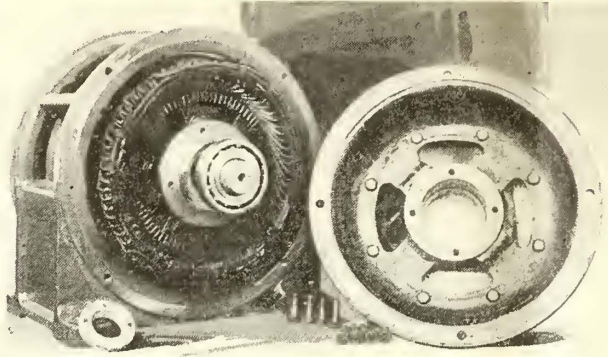
Pittsburgh Office: Oliver Building
Chicago Office: Peoples Gas Building

New York Office: 15 Wall Street

AGENTS:

Pacific Coast: ECCLES & SMITH CO., Los Angeles, San Francisco, Portland

Great Britain and Europe: T. ROWLANDS & CO., Sheffield, England

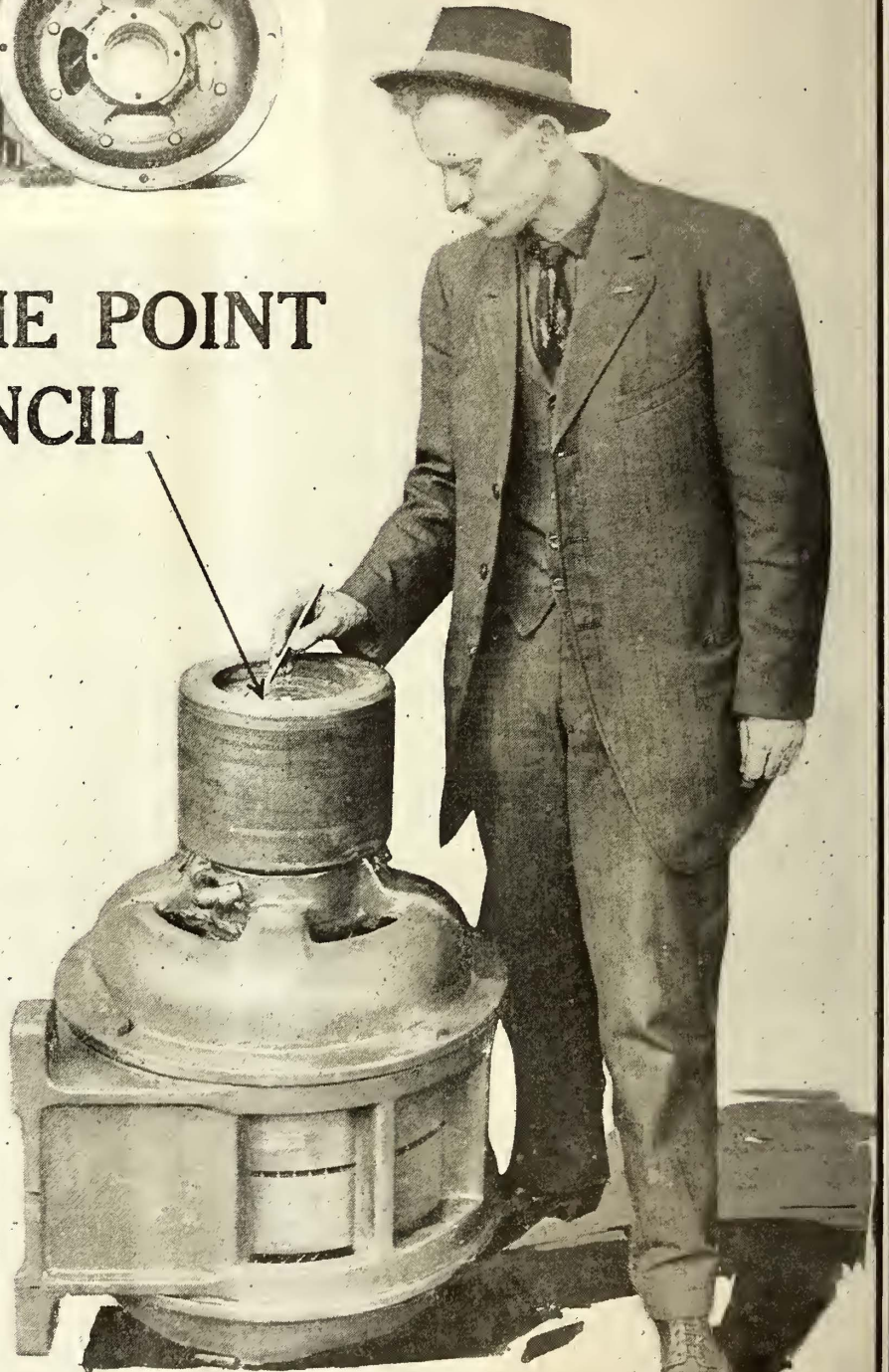


WITH THE POINT OF A PENCIL

1½ inch from
center of shaft
the rotor of
this 25 H. P.
motor may
easily be rotat-
ed because it
is mounted on

**GURNEY
BALL
BEARINGS**

*Specify them for
better efficiency
of your motors*



GURNEY BALL BEARING CO.

JAMESTOWN, N. Y.



**BRILL**

engineers are devoting more and more of their time to the designing and perfecting of single-truck cars. This is a direct result of the increasing popularity of the single-truck proposition as a financial relief for so very many operations overburdened either by heavy, power-consuming equipment or by unfair competition. The cases in which double-truck cars have been done away with in favor of the light-weight equipment are almost innumerable. Although it would be foolish to claim for the single-truck idea that it is a sort of financial cure-all, it is very safe to say that there are a great many lines throughout this and other countries which would profit by the change. The ever-increasing percentage of single-truck car orders is conclusive proof of the fact that the truth of this is being realized.

THE J. G. BRILL COMPANY, PHILADELPHIA, PA.
AMERICAN CAR COMPANY, ST. LOUIS, MO.
G. C. KUHLMAN CAR COMPANY, CLEVELAND, OHIO
WASON MFG. COMPANY, SPRINGFIELD, MASS.

G-E Motor Generator Sets

The success of the commutating pole generator on G-E motor generators used in heavy railway service is well known.

For extremely heavy service the G-E Generators are now equipped with compensating pole-face windings.

The Butte, Anaconda & Pacific, the Chicago, Milwaukee & St. Paul and the Eastern Michigan Power Company motor generators are notable examples of this type.

Other G-E motor generator sets recently built for railway service are as follows:

Recent Sales of G-E Motor Generator Sets

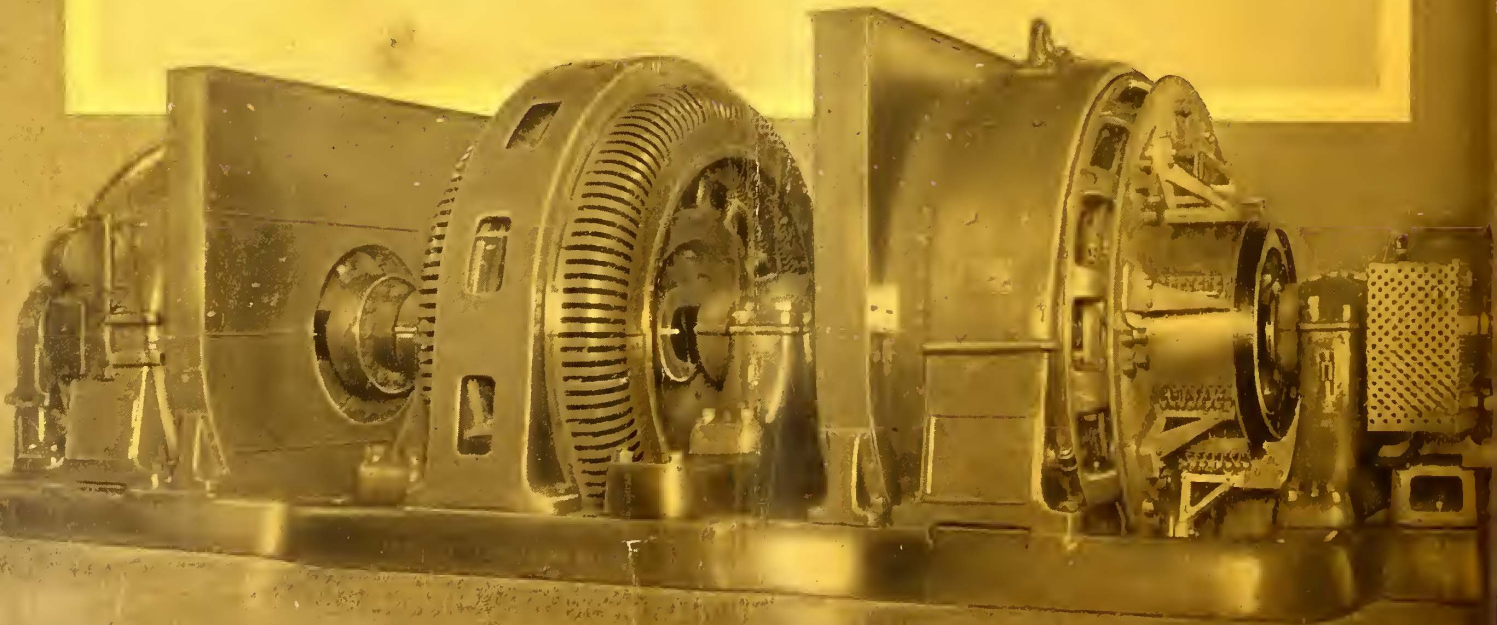
Chicago, Milwaukee & St. Paul Railway	- - - - -	23-	2000 KW
Nashville Railway & Light Company	- - - - -	9-	1500 KW
Detroit United Railways	- - - - -	1-	2000 KW
Pacific Electric Railway Company	- - - - -	1-	1500 KW
Bethlehem Chile Iron Mines Company	- - - - -	8-	1000 KW
East Liverpool Traction & Light Company	- - - - -	2-	1000 KW
Milwaukee Electric Railway & Light Company	- - - - -	1-	1000 KW
Sheboygan Railway & Light Company	- - - - -	1-	750 KW
Kanawa Traction & Electric Company	- - - - -	1-	750 KW
Southern Pacific Company	- - - - -	1-	500 KW
Nashville Railway & Light Company	- - - - -	3-	500 KW
Commonwealth Power Company	- - - - -	1-	500 KW
Wisconsin-Minnesota Light & Power Company	- - - - -	1-	500 KW
Salt Lake & Ogden Railway	- - - - -	1-	500 KW
Holyoke Street Railway Company	- - - - -	2-	400 KW
		1-	300 KW

General Electric Company

General Offices:
Schenectady, N. Y.



Sales Offices
in all large cities



G-E 2000 KW, 3000 Volt Motor Generator Set. Chicago, Milwaukee & St. Paul Railway