

Annual Maintenance Number

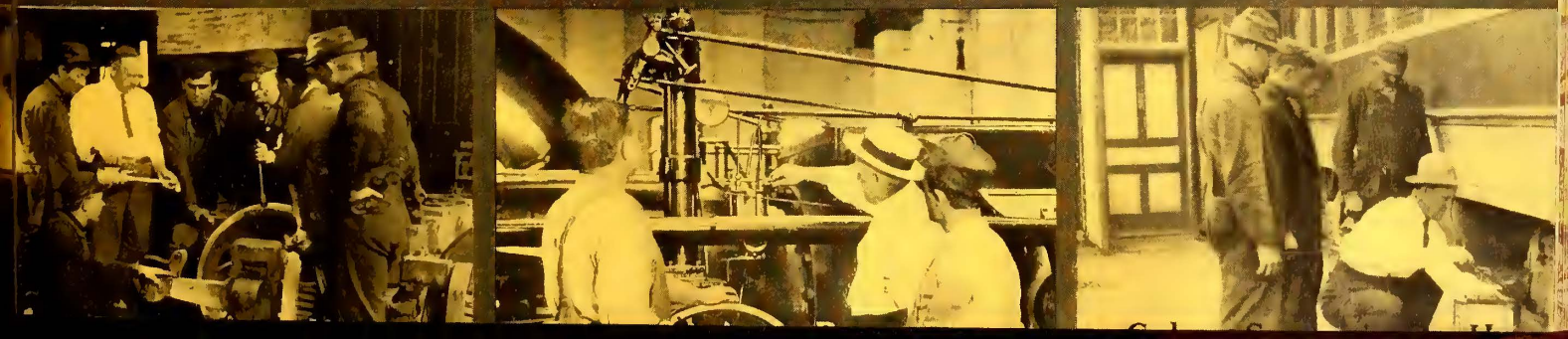
ELECTRIC RAILWAY JOURNAL

Volume 45
Number 12
March 20, 1915

McGraw
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Co., Inc.
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MAR 22 1915
U. S. PATENT OFFICE



The theory of lubrication—its application to practice and the use of Galena Oils—
produce savings guaranteed under contract by the Galena-Signal Oil Company of Franklin, Pa.





Profit or Deficit Frequently Depend upon Maintenance Cost

“**J**OE,” said the General Manager to the Superintendent, “we are at last on Easy Street. During 1914, with a decrease in passenger receipts, we have earned a very reasonable return on the investment of the property. We made most of it in decreased cost of maintenance. Westinghouse HL Control and commutating-pole motors have surely put this road on its feet.”

“Yes, Boss,” answered Joe, “it looks that way. I have a recommendation here now for you to retire the balance of our old motors and substitute Westinghouse No. 323.”

“Well, Joe,” said the General Manager, “with the showing you have made, earning not only the interest but also reducing costs, as well as giving far better service, we will not have much trouble getting the board to authorize it.”

Westinghouse Electric & Manufacturing Co.

Sales Offices in All
Large American Cities



East Pittsburgh,
Pennsylvania

Electric Railway Journal

New York, March 20, 1915

Volume XLV No. 12

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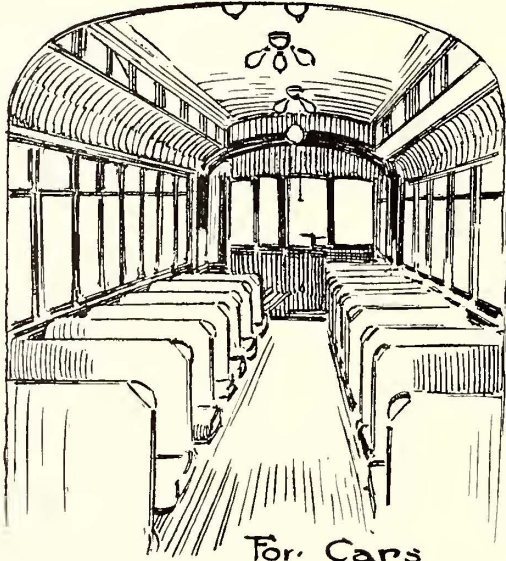
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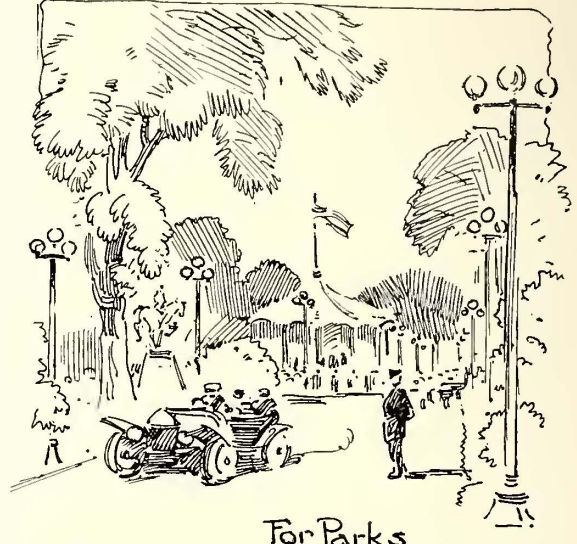
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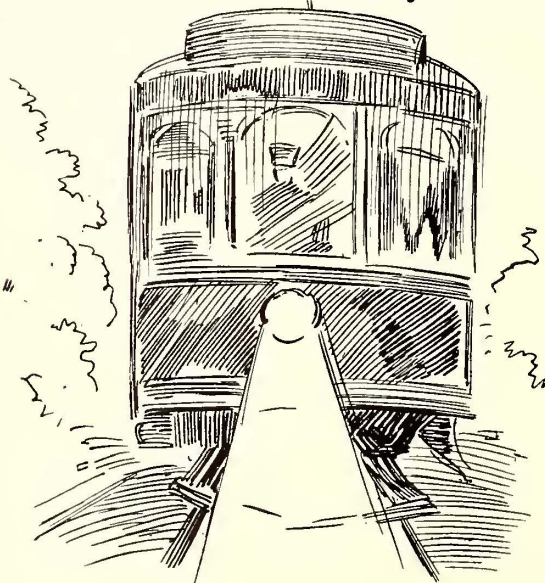
For Cars



For Parks and Streets



For Headlights



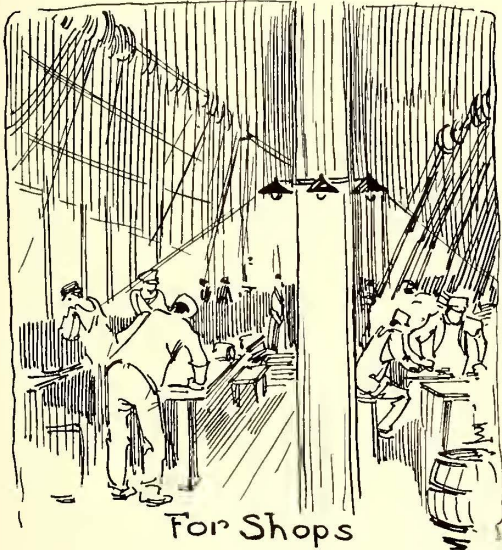
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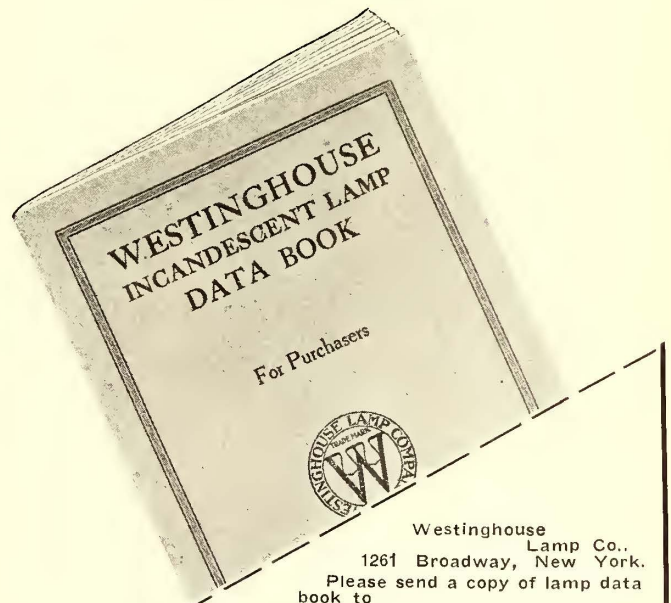
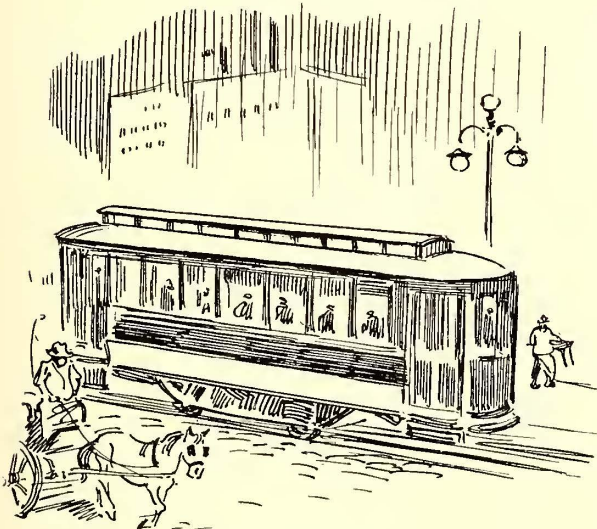
For Shops



For Yards



For Battery Cars



- | | | | |
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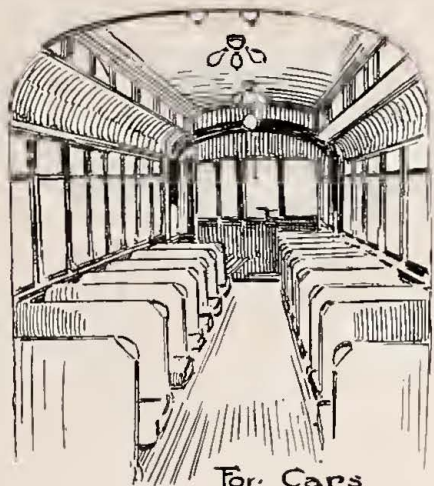
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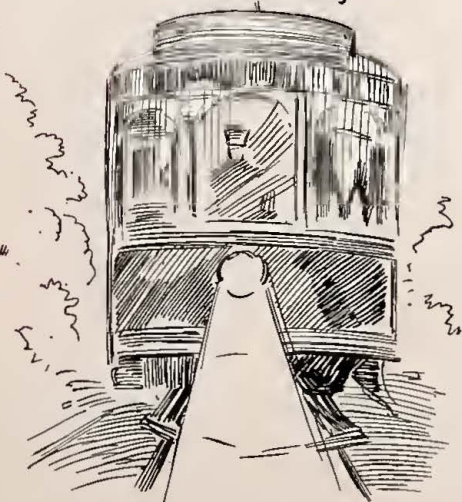
For Cars



For Parks and Streets



For Headlights



For Offices



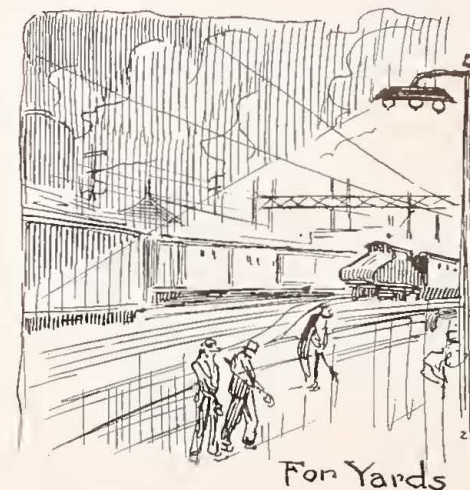
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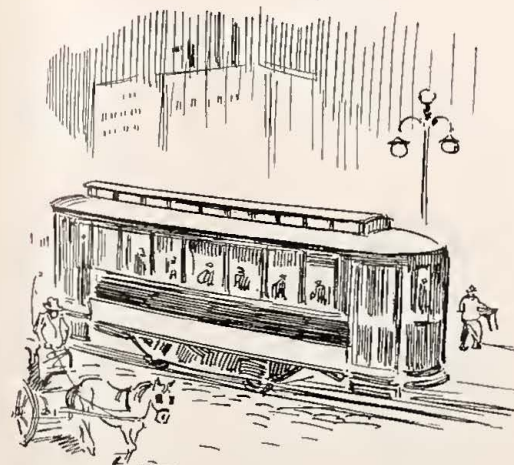
For Shops



For Yards



For Battery Cars



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INERTIA

(What It Means in Railroad Engineering)

INERTIA IS THE TENDENCY OF A BODY AT REST TO REMAIN AT REST; OR OF A BODY IN MOTION TO CONTINUE IN MOTION.

THE INERTIA OF ANY MOVING TRAIN CAN BE INDICATED IN TERMS OF ENERGY, WHICH IS EQUAL TO ONE-HALF THE MASS MULTIPLIED BY THE SQUARE OF THE VELOCITY, AND USUALLY EXPRESSED IN FOOT POUNDS.

IF A MODERN SIX CAR PASSENGER TRAIN WEIGHS 1,500,000 POUNDS AND ATTAINS A SPEED OF 60 MILES PER HOUR, IT HAS ACCUMULATED OVER ONE HUNDRED AND EIGHTY MILLION FOOT POUNDS OF ENERGY TENDING TO KEEP THAT TRAIN IN MOTION.

INERTIA IS WHAT THE AIR BRAKE IS UP AGAINST. THE CONTROL OF INERTIA OR THE ENERGY OF MOVING TRAINS WAS A MAN'S JOB IN 1870, WHEN AIR BRAKES WERE FIRST APPLIED. TODAY—45 YEARS LATER—THIS PROBLEM—WITH TRANSPORTATION ITSELF—HAS GROWN TO GIANT PROPORTIONS.

WHAT IS THE ANSWER?

MODERN BRAKES CONTROL MODERN TRAINS MORE PERFECTLY AND WITH GREATER SAFETY AND ECONOMY THAN EVER BEFORE IN THE HISTORY OF THE ART.

IF NECESSITY IS THE MOTHER OF INVENTION, THEN INERTIA IS THE FATHER OF THE AIR BRAKE.

Suggested by the

Westinghouse Traction Brake Company

Works: Wilmerding, Pennsylvania

PITTSBURGH: Westinghouse Building

CHICAGO: Railway Exchange Building

NEW YORK: City Investing Building

ST. LOUIS: Security Building



5

In order to render good service, electric railways must be allowed to earn a fair return on a fair capitalization.

*—From Code of Principles
Adopted by A. E. R. A.*

The returns on an investment can frequently be considerably increased by very slightly increasing the investment.

For example, the additional investment required to make an ordinary car into a

Prepayment Car

amounts to approximately 2%. Yet the advantages gained by this slight increment result in increased receipts which frequently return this investment ten times over within every year of the car's life—actually repay the **entire** investment in the car four times during the life of the car.

Progressive roads everywhere have shown that they appreciate the fact that our pioneer work and our continuous study of car engineering represented by the Prepayment patents enable us to render a distinct service—and that the investment required to apply our ideas is insignificant as compared with the returns which such applications insure.

PREPAYMENT CAR SALES COMPANY



The Electric Railway Journal at the Panama-Pacific Exposition

FOR the convenience of its friends, the McGraw Publishing Company, Inc., publishers of the Electric Railway Journal, Electrical World, Engineering Record and Metallurgical & Chemical Engineering have equipped a booth in the Palace of Machinery.

A cordial invitation is extended to all who are interested in the electric railway field to avail themselves fully of this space while visiting the Exposition.

It will be a pleasure to receive and care for visitors' mail addressed in care of the McGraw Publishing Company booth.

Competent stenographers are in attendance to handle correspondence.

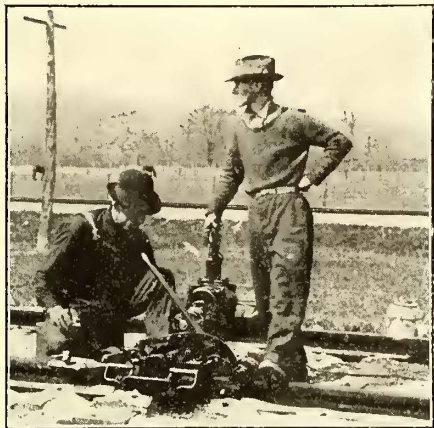
Representatives in charge of the booth will be glad to give information regarding engineering work in the West.

The publishers' San Francisco office, Rialto Building, in fact, is headquarters for technical information about the West, for editorial and business representatives there travel up and down the coast regularly so as to keep readers of the McGraw Publications in intimate touch with conditions.

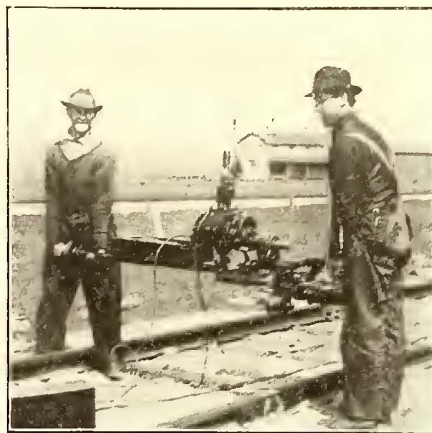
Use the McGraw Booth as your office while you are at the fair.

[PUBLISHER'S PAGE]





The Machine in Operation. Pat. applied for.



No Trouble to Remove from Track.

The Low Cost of Bonding With O-B Type J Bonds

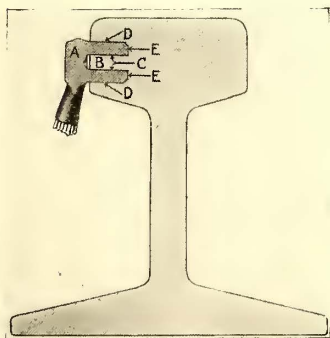
is due largely to the electrically operated O-B Milling machine used for milling holes in the ball of the rail.

Two men operate the machine and remove it from the track easily when necessary. A third man installs the bonds.

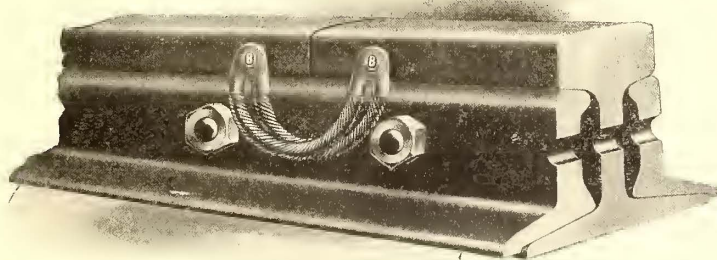
Records of installations on different roads show that three men can be expected to bond more than 100 joints per day, even under severe conditions. The total cost of installing is remarkably low.

Let us give more detailed figures.

THE OHIO BRASS COMPANY Mansfield, Ohio



Section of Terminal Installed in Rail.



O-B Type J Bond Installed--Patented.

A Big Help in Selling to Electric Railways

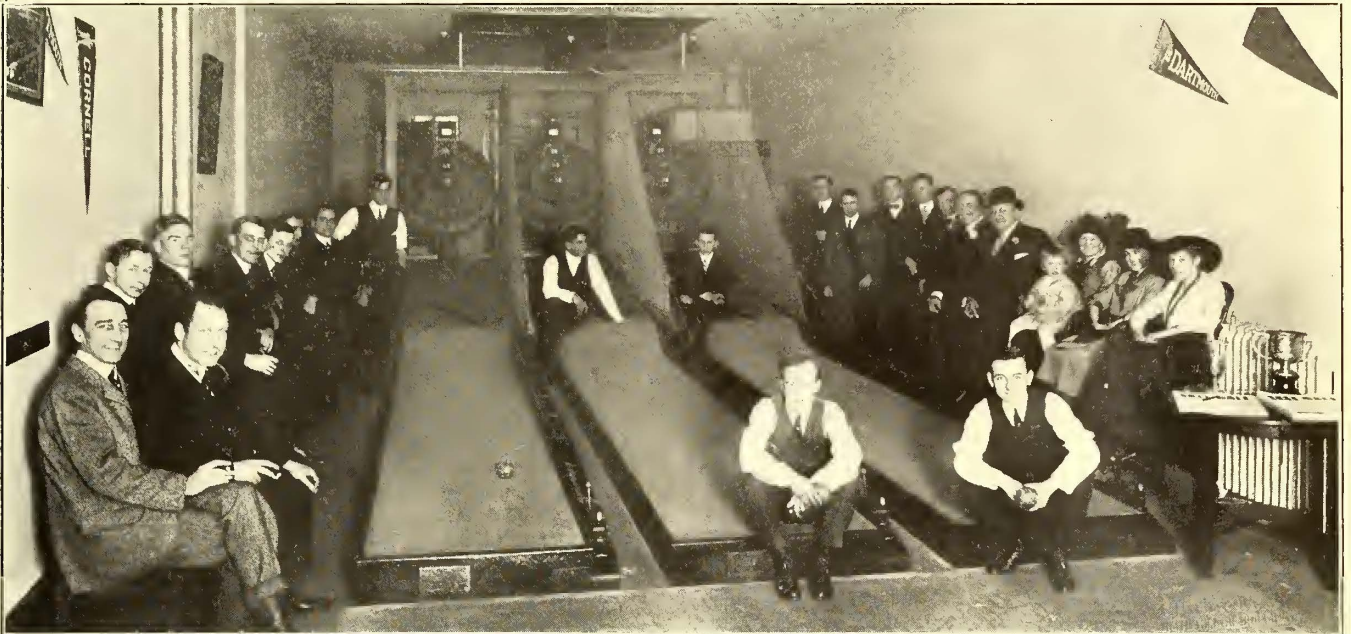
- Who's the man to see on that road?
The McGraw Electrical Directory tells.
- What's that man's title?
The McGraw Electrical Directory tells.
- Who's the Superintendent?
The McGraw Electrical Directory tells.
- Who's the General Manager?
The McGraw Electrical Directory tells.
- What kind of current does it use?
The McGraw Electrical Directory tells.
- What's its generating equipment?
The McGraw Electrical Directory tells.
- What make and type of boilers?
The McGraw Electrical Directory tells.
- How many miles of track has it?
The McGraw Electrical Directory tells.
- How many cars, what type, etc.?
The McGraw Electrical Directory tells.
- Where are its shops located?
The McGraw Electrical Directory tells.
- Where are its power stations and sub-stations located?
The McGraw Electrical Directory tells.
- Does it furnish lighting current?
The McGraw Electrical Directory tells.
- Does it operate an amusement park?
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- What roads does it control?
The McGraw Electrical Directory tells.
- What are the names of the roads at Indianapolis?
The McGraw Electrical Directory tells.
- What does this book cost?
Five dollars a year.
- How often is it published?
Twice a year. A new one has just been issued.
- How will it help our sales work?
Write for a copy on approval and see for yourself.
- Who publishes it?
McGraw Publishing Company, Inc.
- What's their address?
239 West 39th Street, New York.
- What shall we do about it?
Write for your copy on approval
TO-DAY.

The image shows an open McGraw Electrical Directory. The left page is titled 'PENNSYLVANIA' and the right page is titled 'PENNSYLVANIA'. In the foreground, there is a large advertisement for 'CANDLER BUILDING' and 'Collier's' magazine. The advertisement features the text: 'YOU are cordially INVITED to INSPECT our NEW CENTRAL PLANT' and 'CANDLER BUILDING 220 W 45th St. NEW YORK CITY'. It also includes the 'Collier's' logo and the text 'CAR ADVERTISING ALMOST EVERYWHERE'.

SKEE-BALL

For Big Park Profits This Summer

Skee-Ball is the ideal amusement for parks and popular resorts. Its interest is permanent. From the beginning to the end of the season the crowds continue to play. It appeals to both men and women and furnishes enjoyment from the start, which increases as skill is attained by practice.



FINALS OF A TOURNAMENT ON CHIEF BENDER'S ALLEYS

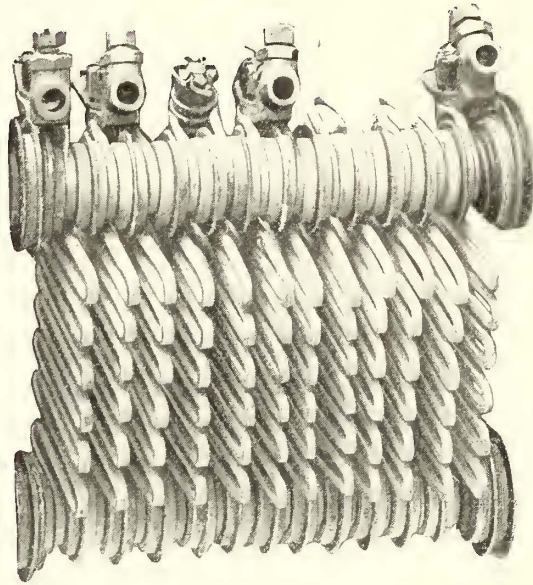
The great Indian pitcher is seen sitting on the middle of the center alley.
The Chief is a Skee-Ball expert as well as an enthusiast.

SKEE-BALL as a money-maker is in a class by itself. Throngs are invariably attracted and seem unable to leave after they start to play. The Automatic Slot Machine and the Automatic Scoring Device reduce the cost of operation to a minimum.

Order Now for Early Delivery. Write for Booklet.

THE J. D. ESTE COMPANY
1534 Sansom Street PHILADELPHIA

SAVES



Maintenance

You have charges against resistance maintenance if you use cast grids. They corrode and have so many joints that they soon open up. E. M. B. resistances eliminate 95% of the joints, are rustproof and when you put them on the car you can forget them.

Labor

The best way to adjust the steps on resistances is the "cut and try method." With E. M. B. resistances the loops in the material are used for terminals—each loop is a tapping point. Note how easy it is to shift from one terminal to another.

Cost

Cast grids break in shipment, they break in handling and in Service. E. M. B. grids are *unbreakable*. The material is drawn—not cast, and being rustproof is practically indestructible. Their eventual cost is therefore lower than that of cast grids.

Write us for data sheet which will enable you to give us just the right material for quoting.

The Ellcon Company

50 Church Street, New York

"UP TO THE MINUTE" ELECTRIC RAILWAY CARS

Call for Ellcon Porcelain Enameled Barriers
and Stanchions and Aero Metal Fittings



Showing Ellcon Aero Metal Fittings on New York Municipal Railway Car.

The Ellcon snow-white enameled, hygienic stanchions and Aero metal fittings which are going into modern cars all over the country are the finest product of the art. Baked glass-hard at a high temperature, they are indestructible from ordinary causes, and are easily and rapidly cleaned. They are ideal for "public relations" considerations and are permanent value-adders to the cars.

The New York Municipal Railway Corporation has specified them for its new subway cars (illustrated). The New York Railways have furnished their 150 center-entrance cars with them, and when the New Orleans Railway and Light Company wanted to meet the question of cleanliness plus durability in stanchions and general fittings for its new cars it ordered Ellcon Porcelain Enameled Stanchions and Aero Metal Fittings. They are also in use on or have been specified on many other car orders.

Ellcon Enameled Fittings and modern car equipment are synonymous.

Write us for all the facts.

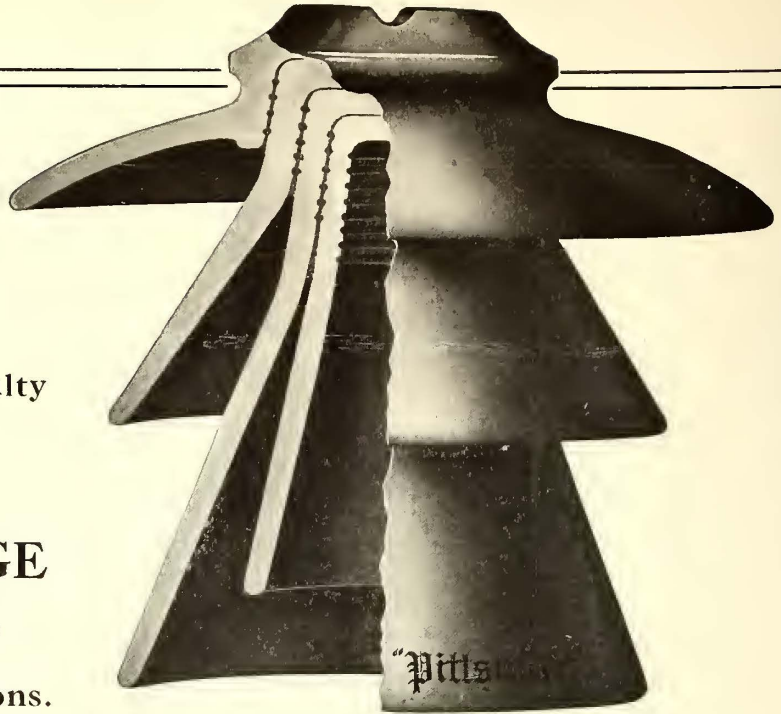
The Ellcon Company
50 Church Street, New York

300,000 VOLTS

is handled without difficulty
by the

PITTSBURG HIGH VOLTAGE INSULATORS

under all weather conditions.



They erect a wall of safety around high voltage transmission. The secret of this efficiency lies in the blending of the art of porcelain-making and electrical knowledge.

The Pittsburg High Voltage Insulators are the result of years of elaborate tests from the pottery to the electrical transmission line. That the Pittsburg High Voltage Insulators satisfy the most exacting requirements is evidenced by its wide use wherever light, power, railroading or any other electrical transmission is applied.

Will you let us be your consultants?

We are interested in your insulating problems.

The Pittsburg High Voltage Insulator Co.

Main Office and Factory, DERRY, PA.

Canadian Representatives, the Canadian General Electric Co.
New York Office, 114 Liberty St.

Los Angeles Office, 757 So. Los Angeles St.
San Francisco Office, 247 Minna St.

JOHNS-MANVILLE SERVICE

TO THE ELECTRICAL INDUSTRY



MAINTENANCE

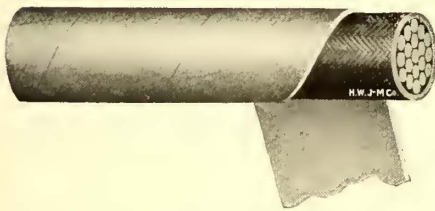
As you read the maintenance articles in this issue, they will perhaps suggest the thought of maintenance materials.

Johns-Manville Products are maintenance materials each of which has proven itself and earned its reputation in service.

The marketing of these maintenance is governed by a policy known as

Johns-Manville Service

—a service that renders every cooperation before and during the purchase of materials and afterwards stands sponsor for the results of their performance.



What J-M Niagrite Means to the Electric Railway Engineer

The covering of those parts of cables that are unprotected by ducts or lead sheathing, such as the terminals of cables in tunnels or man-holes, on cable rocks and back of switchboards is recognized as important. This is particularly true where large cables and, therefore,

heavy currents are handled.

The atmospheric conditions in tunnels and man-holes and the necessity of fireproofing cables against heavy current surges or even short circuits, call for a material that must be generally applicable.

J-M Niagrite is such a material. It is a dense felt compound furnished in the form of a listing wrapped on the cable and then impregnated with J-M Fire-and-Water-Proof Cement. The result is a sheath that is as hard as bone, a fire retardent, and absolutely waterproof.

We are selling more J-M Niagrite every year to Electric Railways. May we add you to the list of users? Ask nearest branch for particulars.

J-M Niagrite is one of the many textiles we carry. Everything is asbestos sheets, tubings and listings for all purposes.

Did You Ever Get a Report Like This?

"The last shipment of slate we received had several slabs broken."

This is why J-M Ebony Asbestos Wood is supplanting slate and marble for electrical work.

You can still have your "oiled finish Monson" appearance or Black Enameled if you prefer it, so there will be no trouble matching up your panels on switchboard additions.

This material is strong mechanically and dielectrically much superior to slate or marble. It can be readily machined with regular tools.

It is obtainable in all shapes and thicknesses so that it is generally useful all over the system.

All your distribution Board Mountings and linings can be made of this material as well as those little special jobs that you work out for yourself.

H. W. JOHNS-MANVILLE COMPANY

Akron	Boston	Columbus	Duluth	Kansas City	Minneapolis	Philadelphia	St. Paul	Toledo
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Birmingham	Cleveland	Detroit	Indianapolis	Milwaukee	Omaha	St. Louis	Syracuse	

THE CANADIAN H. W. JOHNS-MANVILLE CO., LTD., Toronto, Winnipeg, Montreal, Vancouver

The Double Trolley System in Seattle

One of the Very Few Installed in This Country—It Contains Many Interesting Features, Some of Which Are Explained in Detail

BY H. J. KENNEDY, ELECTRICAL AND MECHANICAL ENGINEER.

Particular technical interest attaches to Division "A" street and alley intersections (often diagonal), entrances, existing poles, cross lines, etc., and varied from of the electric railway recently put into operation by the

The feeder system at present installed is considerably less than that designed for ultimate installation when the line is extended and the traffic becomes very much heavier than at the present time. Five feeder-circuit breakers were installed in the substation, with space for some additional ones. Only three have been utilized at the start, one feeding a pair of 1,192,500 circ. mil aluminum cables (each equivalent to 750,000 circ. mil copper), extending northerly and westerly to near the outer end of the line; another tapped on by 638,000 circ. mil aluminum cables (equivalent to 400,000 circ. mil copper) to trolley wire opposite substation, and another pair of 1,192,500 circ. mil aluminum cables extending south. Feeder taps are located from 1000 ft. to 2270 ft. apart, with section breaks between them. With this arrangement of feeders, with ten cars in operation on the division and 600 volts emf at Aloha Street, it is estimated that the maximum drop would be experienced at the outer end of the line, being about 61.5 volts or 10.3 per cent at the furthest feeder tap. Near the southerly end the drop is less. On the initial installation, a saving in first cost of more than \$3,000 was made by using aluminum instead of copper, the price per pound of aluminum cable being 22.3 cents delivered at Seattle, while copper cable was 15.6 cents per pound, the total weight of aluminum required being of course very much less for equal conductance.

\$3,000

Saved
by installing

ALUMINUM CONDUCTORS

That saving, too, takes into account only the saving in first cost of aluminum over the cost of copper. The saving by reduction of number of poles, with pins, insulators, etc., possible through the use of longer spans practicable because of the light weight of aluminum, largely swells the above figure. Reduced maintenance charges is a vastly important item; don't forget that Aluminum is advancing as the ideal metal for feeders and transmission lines. It is advancing because it *pays*. Make it pay you. Write for data.

Aluminum Company
of America
Pittsburgh, Pa.

New York	99 John Street
Boston	131 State Street
Chicago	Old Colony Bldg.
San Francisco	118 New Montgomery Street



SEATTLE MUNICIPAL RAILWAY—EXTERIOR VIEW OF SUBSTATION



For Safety at Sidings—For the Elimination of Troublesome, Time-Wasting “Fishing” for Trolley Wire

The **RYMCO**

High Speed Automatic Trolley Switch

Write for descriptive bulletin

Standard on the Illinois Traction System

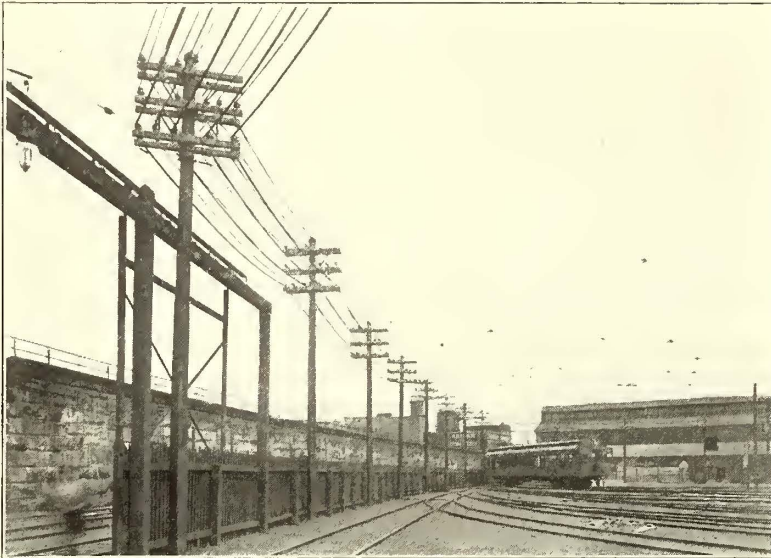
**The RYMCO
High Speed Automatic
Trolley Switch**

The Illinois Traction System has left no stone unturned to achieve the highest possible safety. It not only practices safety, but capitalizes it through publicity. Its use of Rymco products is therefore significant.

**Our
Steel Back
Brake Shoes**

The Railway Materials Company, Chicago, New York

Diamond Tapered Steel Poles the "Permanent" Way



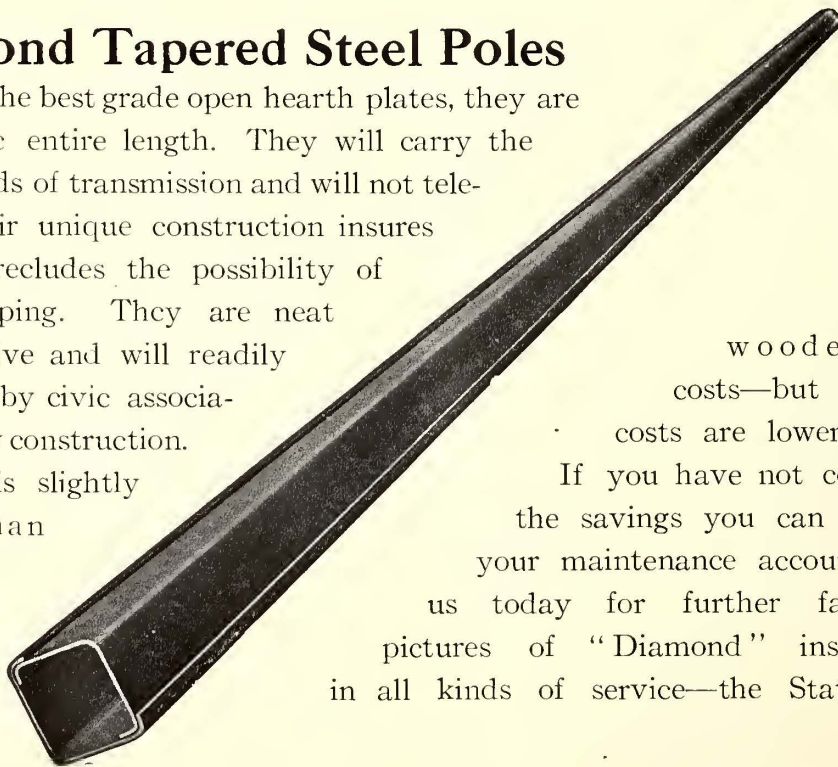
The "Permanent" Way Pole Construction on Electric Railway

It has been estimated, and conservatively so, that electric railways spend annually upwards of \$55,000,000 for maintenance and replacement alone.

Your maintenance and replacement costs form a share of this enormous sum, which annually eats up 10% or more of your gross. What share of this is spent on the maintenance and replacement of your wooden pole lines? Whether it be 1 or 20 per cent it is worth saving and you can save it each year by building your pole line in the "Permanent Way"—*build it of steel.*

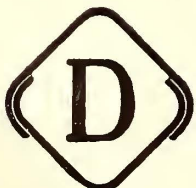
Diamond Tapered Steel Poles

are built of the best grade open hearth plates, they are uniform the entire length. They will carry the heaviest loads of transmission and will not telescope. Their unique construction insures this and precludes the possibility of fittings slipping. They are neat and attractive and will readily be indorsed by civic associations for city construction. First cost is slightly greater than

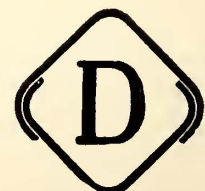


wooden pole costs—but ultimate costs are lower by far.

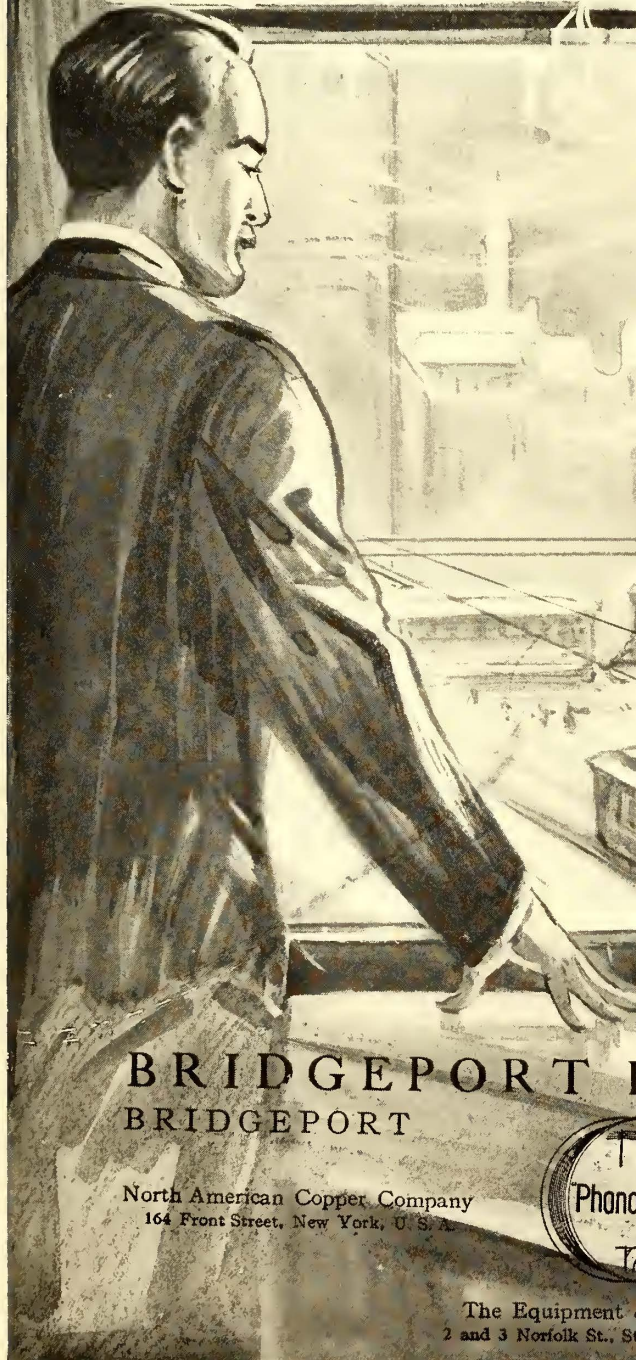
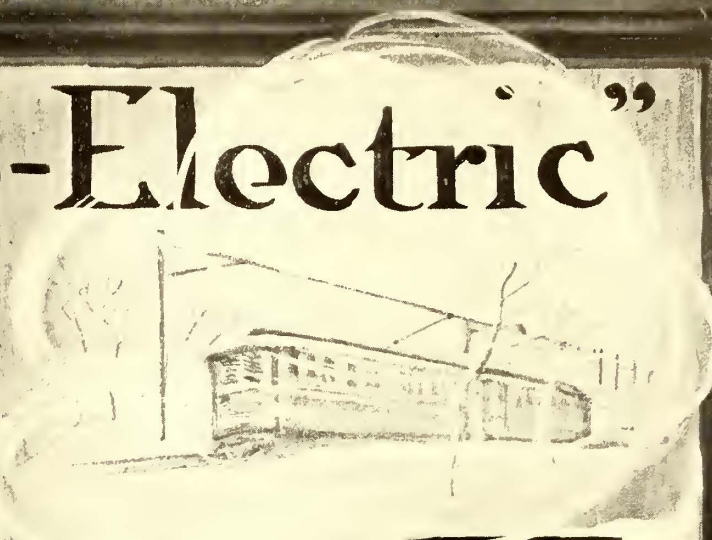
If you have not considered the savings you can make in your maintenance account—write us today for further facts and pictures of "Diamond" installations in all kinds of service—the States over.



Diamond Steel Pole Co.
Philadelphia, Pa.



“Phono-Electric” Trolley Wire



Schedules Maintained All Along the Line

No matter where your lines may be—in the city or country—the question of service is uppermost in the minds of your patrons.

The most important factor in the accomplishment of the best service is in the installation of a trolley wire that is unusually strong and tough. A trolley wire that will give the longest service life and lowest cost of maintenance.

“Phono-Electric”

will give you long service life. It has more than twice the wearing qualities of hard drawn copper.

It has no hardened surface—is uniform throughout its cross-section.

IT'S TOUGH—saves renewals, and renewals cost money.

BRIDGEPORT BRASS COMPANY
BRIDGEPORT CONNECTICUT

North American Copper Company
164 Front Street, New York, U. S. A.



Pierson, Roeding & Company
San Francisco Portland Seattle Los Angeles

The Equipment & Engineering Company
2 and 3 Norfolk St., Strand, W. C., London, England



**Safety
That
Cannot
Fail**

Northern Division, Pennsylvania Railroad
Crossing Protection at Farwell's Crossing, Near Ischua, N. Y.

Ivy L. Lee, Executive Assistant of the Pennsylvania Railroad, said recently:

“We must imbed in the public mind that the railroad men are doing their work as best they can.”

This Policy is emphasized by the Pennsylvania Railroad by its use of

PROTECTIVE HIGHWAY CROSSING SIGNALS

The crossing is one of the important points of relation between the public and the transportation companies, and crossing protection is becoming an important consideration in railway work.

The PROTECTIVE SIGNAL MFG. COMPANY has combined the three elements of Simplicity, Safety and Economy in its devices, and has

1. Cut down cost of installation and maintenance.
2. Eliminated bond wires, insulated joints and track circuits.
3. Not required readjustment of signals, or track circuits, or track already in use.
4. Effected entire safety of crossing.

State your requirements to us, and we will match our signals—on trial—against your needs.

The Protective Signal Mfg. Co., Denver, Colorado

WILLIAM R. GARTON, GENERAL SALES MANAGER, 299 BROADWAY, NEW YORK, N. Y.

W. R. Garton Co., 11-17 So. Desplaines St., Chicago.
John S. Black Co., 908 Hennen Bldg., New Orleans.
Hoffecker & Phenneger, Richmond, Virginia.

The Allen General Supplies, Ltd., 205 Yonge St., Toronto.
Benton C. Moss, 501 East 16th St., Kansas City.
The O. H. Davidson Equipment Co., Denver, Colorado.



Business Still Booming

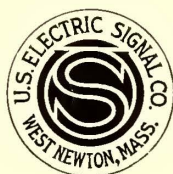
February was a short month—but

—it produced 16% as much business for us as the whole of 1914.

—it produced contracts for 25% of the whole number of United States Electric Signals contracted for in 1914.

—and yet 1914 wasn't a bad year.

There may be a business depression in the luxury line—but not for necessities.



United States
Electric Signal Co.

West Newton Mass.

Foreign Representatives
Quilliam Erectors Clegg Court,
Chapel Street, Salford, England

—a Court of Last Resort

ON an interurban railway equipped with Nachod Automatic Signals and operating by telephone dispatching, it so happened that three motormen on separate occasions ignored, or forgot, all written or verbal instructions and forged ahead toward the single track, only to be stopped by the insistent and vigilant eye of the Nachod Signal looming up Red before them.

Thus Automatics are a check and not a substitute for train orders, telephone dispatching or positive meets.

Couldn't this happen on YOUR road? Wouldn't it pay to obtain this positive protection at the low cost of Nachod Automatic Signals?

The Nachod line comprises signals for single and double track, highway crossing bells, headway recorders, car annunciators, trolley contractors, relays, etc.

NOW is the time to investigate.

NACHOD SIGNAL CO., Inc.
Louisville, Ky.

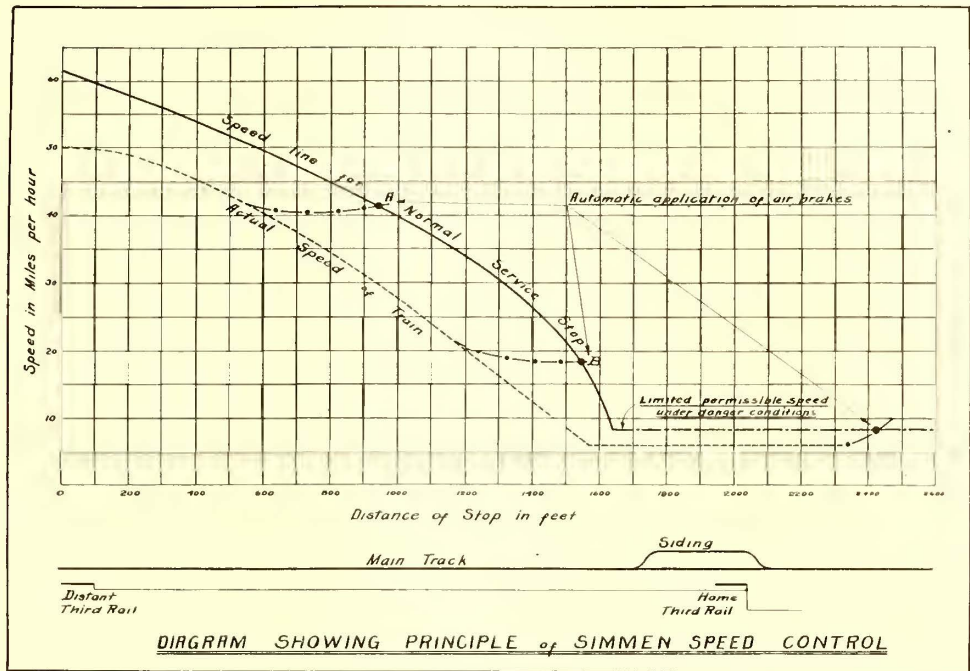
Remember:

NACHOD

Spells

Safety





**Why
the
SIMMEN
SYSTEM
is gaining
recognition**

**Cab Signal
Always Before the
Eyes of the
Motorman**



No student of the signal situation, approaching the subject with an open mind, can possibly avoid the absolute conclusion that conditions today are surely pointing in all fields to the ultimate adoption of the CAB SIGNAL in some form as the standard which will finally obtain, either by itself alone or in connection with other forms of signals.

A recent event pointing in this direction is the adoption of SIMMEN CAB SIGNALS and SIMMEN AUTOMATIC SPEED CONTROL by the New York Municipal Railway Corporation for the new Brooklyn Subways, where the highest type of signaling is required.

The Simmen System has broken absolutely new ground. It has been developed on fundamental principles. It contends, not merely for the same efficiency as the older standards, but a much higher efficiency. That its cost is less than the old standards is incidental. It is not merely different in METHODS, but is different in the production of RESULTS.

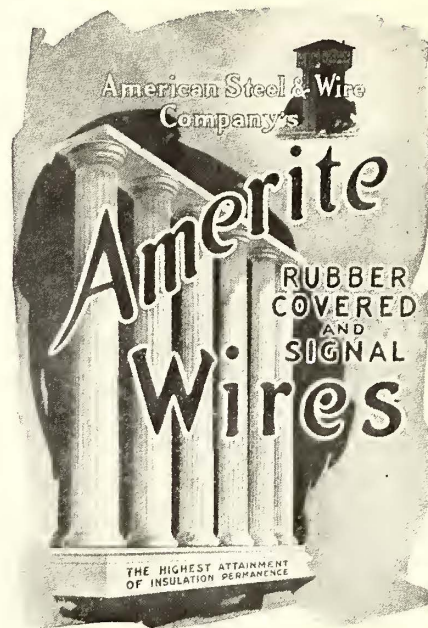
The recognition it is receiving is not based merely on the principle that it produces the SAME results as the older standards, AT A LOWER COST, but that it produces—First: A higher standard of SAFETY and EFFICIENCY than any signaling method so far devised. Second: That in addition to producing safety, it accomplishes results of the highest importance not possible by any other method, and then, Third: That it succeeds in doing these things at costs for installation and maintenance which are far below the costs possible under the older standards.

THE SIMMEN SYSTEM

SIMMEN AUTOMATIC RAILWAY SIGNAL CO.
BUFFALO

THE NORTHEY-SIMMEN SIGNAL CO., Ltd.
TORONTO

Economy Results from Go



WE present these wires as the result of many years of exhaustive research and test under *service* conditions, assuring the greatest efficiency over the longest period of usage.

For Station Wiring, Arc Light and Signal Service, High Voltage Power Transmission Lines

These rubber-covered wires and cables are made to the most exacting specifications; in any size or finish and for all services and voltages. The insulation contains only the highest grade of pure dry Para rubber and other necessary preservative ingredients.

We make copper wire for all purposes in any required shape or size; copper cables of all capacities and degrees of flexibility; hard-drawn or annealed, bare or insulated. We also make galvanized iron and steel wire in all shapes and sizes, bare or insulated, and for all purposes—trolley, telephone and telegraph wires, armor wires, strand and wire rope of all kinds.

American Steel &

Chicago, New York, Worcester,

Export Representative: U. S. Steel Products Company, 30 Church Street, New York.

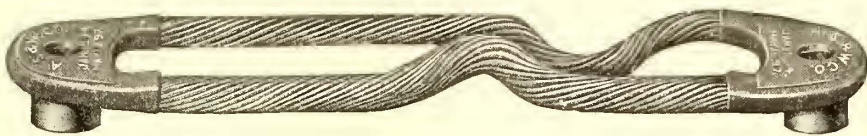
Pacific

Good Materials well Installed

Lasting and Economic Service in Rail Bonds

Crown Rail Bonds United States Rail Bonds
Twin Terminal Rail Bonds Soldered Rail Bonds

WE are extensive manufacturers of all kinds of rail bonds. Nothing but pure drawn copper enters into their construction. Our bonds have been developed to the highest possible state of perfection, the workmanship is of the best, and their design is correct for long life and high efficiency. We also make a complete line of tools for installing rail bonds. Catalogue fully illustrating rail bonds sent on application. Our engineers are at your service.

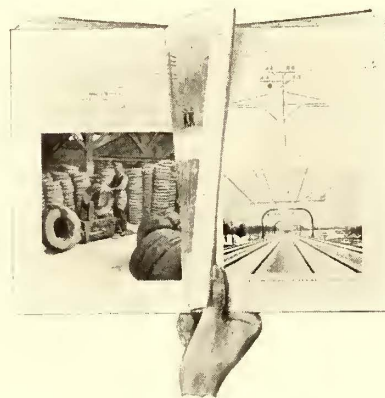


There's a Fund of Valuable Data in this Catalog

234 pages of information, illustrations and engineering data covering a wide range of subjects of decidedly practical as well as technical value to engineers and operating men.

If you haven't one of these catalogues we shall be glad to hear from you. State whether particularly interested in wires and cables or rail bonds.

If you have this catalog get it out and look it over. You will find it especially helpful right now.

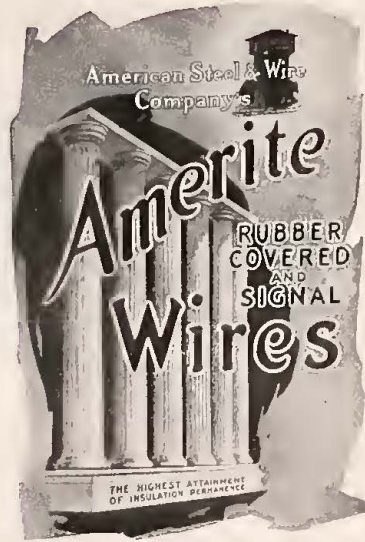


Wire Company

Cleveland, Pittsburgh, Denver

Coast Representative: U. S. Steel Products Company, San Francisco, Los Angeles, Portland, Seattle.

Economy Results from Good



WE present these wires as the result of many years of exhaustive research and test under *service* conditions, assuring the greatest efficiency over the longest period of usage.

For Station Wiring, Arc Light and Signal Service, High Voltage Power Transmission Lines

These rubber-covered wires and cables are made to the most exacting specifications; in any size or finish and for all services and voltages. The insulation contains only the highest grade of pure dry Para rubber and other necessary preservative ingredients.

We make copper wire for all purposes in any required shape or size; copper cables of all capacities and degrees of flexibility; hard-drawn or annealed, bare or insulated. We also make galvanized iron and steel wire in all shapes and sizes, bare or insulated, and for all purposes—trolley, telephone and telegraph wires, armor wires, strand and wire rope of all kinds.

American Steel &

Chicago, New York, Worcester,

Pacific

Export Representative: U. S. Steel Products Company, 30 Church Street, New York.

Materials well Installed

Lasting and Economic Service in Rail Bonds

**Crown Rail Bonds United States Rail Bonds
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WE are extensive manufacturers of all kinds of rail bonds. Nothing but pure drawn copper enters into their construction. Our bonds have been developed to the highest possible state of perfection, the workmanship is of the best, and their design is correct for long life and high efficiency. We also make a complete line of tools for installing rail bonds. Catalogue fully illustrating rail bonds sent on application. Our engineers are at your service.



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Wire Company

Cleveland, Pittsburgh, Denver

Coast Representative: U. S. Steel Products Company, San Francisco, Los Angeles, Portland, Seattle.



64 regular electric cars and 18 regular steam trains have passed over this crossing daily for 25 months without showing any wear on the substructure. The crossing is still in excellent condition, while heretofore it was necessary to replace the crossing every 24 months.

Steel Foundations for Grade Crossings

are no longer an experiment. They are a demonstrated, economical success. After being subjected to the hardest kind of traffic for more than two years, the steel foundations of the crossing shown in the illustration herewith are found intact in every respect. Not even a bolt was loosened during the two years' service; not a particle of wear was noticeable on the steel longitudinals which carry the rails at the crossing; not a clip was sheared; not an inch of "creeping" was noticeable, and what is more important, the steel

crossing itself had withstood the service during this period of twenty-five months with but little wear and is now pronounced fit for safe operation for four years more. This is notable in view of the fact that up to the time the International Steel Foundation was installed at this crossing the life of the crossing seldom exceeded two years. And this illustration is only one of many installations in all parts of the United States that are making good.

International Steel Crossing Foundations

show tremendous savings in the annual cost of installation and maintenance of tracks. They will give your crossings from two to three times the life that wood foundations give and still be in first class condition for carrying new crossing installations. Through increasing, by years, the life of the crossing they automatically reduce the crossing cost and at the same time reduce the maintenance cost.

The design of this crossing foundation is a development of the International twin steel tie for paved street

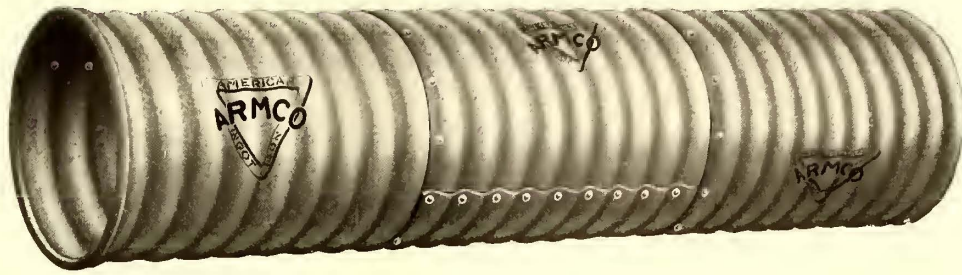
construction which we have been marketing successfully for the past seven years.

Many of these ties, and many of these steel crossing foundations, are now in use at many of the most important intersection points of leading steam and electric railways in all parts of the country. Both are conceded, by engineers who know, to be the last word in safe, sane and substantial construction.

The foundations are made for any desired angle.

Write for list of users and further details.

International Steel Tie Co., Cleveland, Ohio



Frost and Flood Heave and Hoist Rot and Rust



play the dickens with many railway drains and bridges. But not with

ARMCO AMERICAN INGOT IRON CULVERTS

Their corrugated form and overlapping joints give them ample strength to carry heavy fills and heavy traffic and a certain toughness that enables them to withstand the strains of shifting foundations.

The unequalled purity and evenness of their material results in an unequalled resistance to the action of the elements.

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

Arkansas, Little Rock
Dixie Culvert & Metal Co.

California, Los Angeles
California Corrugated Culvert Co.

California, West Berkeley
California Corrugated Culvert Co.

Colorado, Denver
R. Hardesty Mfg. Co.

Delaware, Clayton
Delaware Metal Culvert Co.

Florida, Jacksonville
Dixie Culvert & Metal Co.

Georgia, Atlanta
Dixie Culvert & Metal Co.

Illinois, Bloomington
Illinois Corrugated Metal Co.

Indiana, Crawfordsville
W. Q. O'Neill Co.

Iowa, Des Moines
Iowa Pure Iron Culvert Co.

Iowa, Independence
Independence Culvert Co.

Kansas, Topeka
The Road Supply & Metal Co.

Kentucky, Louisville
Kentucky Culvert Co.

Louisiana, New Orleans
Dixie Culvert & Metal Co.

Maryland, Havre de Grace
Spencer, J. N.

Massachusetts, Palmer
New England Metal Culvert Co.

Michigan, Bark River
Bark River Bridge & Culvert Co.

Michigan, Lansing
Michigan Bridge & Pipe Co.

Minnesota, Minneapolis
Lyle Corrugated Culvert Co.

Minnesota, Lyle
Lyle Corrugated Culvert Co.

Missouri, Moberly
Corrugated Culvert Co.

Montana, Missoula
Montana Culvert Co.

Nebraska, Lincoln
Lee-Arnett Co.

Nebraska, Wahoo
Nebraska Culvert & Mfg. Co.

Nevada, Reno
Nevada Metal Mfg. Co.

New Hampshire, Nashua
North-East Metal Culvert Co.

New Jersey, Flemington
Pennsylvania Metal Culvert Co.

New York, Auburn
Pennsylvania Metal Culvert Co.

North Carolina, Greensboro
Dixie Culvert & Metal Co.

North Dakota, Wahpeton
Northwestern Sheet & Iron Works

Ohio, Middletown
American Rolling Mill Co.
The Ohio Corrugated Culvert Co.

Oklahoma, Shawnee
Dixie Culvert & Metal Co.

Oregon, Portland
Coast Culvert & Flume Co.

Pennsylvania, Warren
Pennsylvania Metal Culvert Co.

South Dakota, Sioux Falls
Sioux Falls Metal Culvert Co.

Tennessee, Nashville
Tennessee Metal Culvert Co.

Texas, Dallas
Atlas Metal Works

Texas, El Paso
Western Metal Mfg. Co.

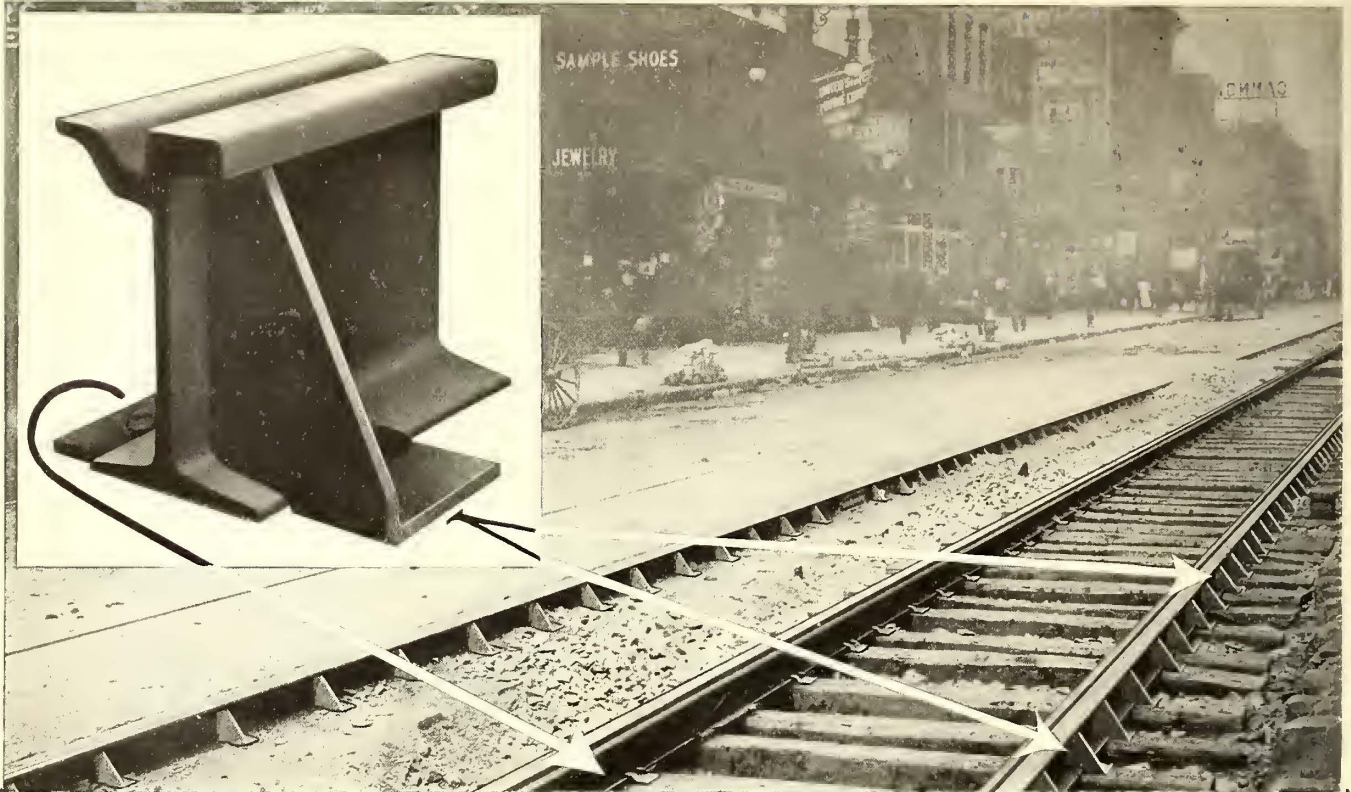
Texas, Houston
Lone Star Culvert Co.

Utah, Woods Cross
Utah Corrugated Culvert & Flume Co.

Virginia, Roanoke
Virginia Metal Culvert Co.

Washington, Spokane
Spokane Cor. Culvert & Tank Co.

Wisconsin, Eau Claire
Bark River Bridge & Culvert Co.



Tie Plate

Rail Brace

Combination Rail Brace and Tie Plate

Save Ties
Eliminate
Rail
Drilling
Cost Less
Than Tie Rods
Cheaper to
Install
Than Tie Rods

Save your ties. Reduce the cost of track construction. Cut the cost of track maintenance. Provide for easy paving between rails, instead of hindering it with tie rods. Do away with the rods. Install COMBINATION RAIL BRACE TIE PLATES. They need no rail drilling. Tie rods do. Brace tie plates cost less than tie rods—give better service. Forged from open hearth steel for any rail section. Write for prices and list of users.

Can Be Used
Repeatedly
Do Not
Interfere
with Paving
Made for
Either Girder
or "T" Rails
Write for
Samples

STEEL CAR FORGE COMPANY

Pittsburgh

New York

Chicago

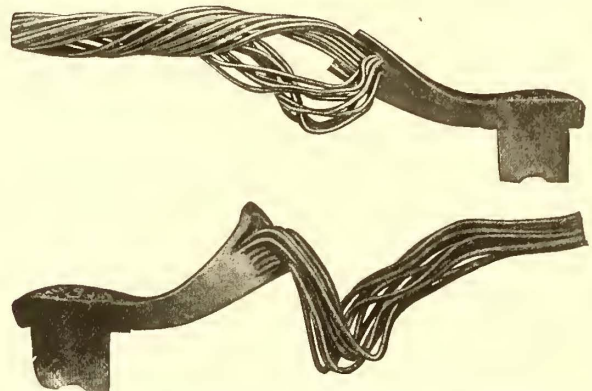
Works: Ellwood City, Pa., and Hammond, Ind.

You Ask Why "Protected" Rail Bonds Will Cut Your Maintenance Costs? Here Are the Answers—

The "Shot-Over" Sleeves

A Standard P-4 Cable Bond, terminal sawed lengthwise and strands pulled apart to show the "Shot-Over" sleeve. Note that strands are absolutely free and in their original shape. They are not cramped or welded together. They have not been flattened. They have not been heated enough to soften or to oxidize. They are not in the least distorted. They are not reduced in area.

The copper strands are in their original shape and original condition for a limited distance inside this protecting sleeve.



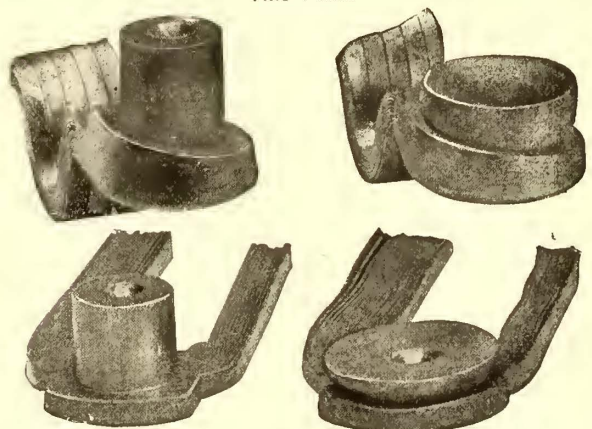
"Protected" Rail Bonds Won't Crystallize and Break at This Point

Soft, Dense Terminal Copper

A Type L 300,000 C. M. Bond, whose terminal diameter was normally $\frac{7}{8}$ inch, length 1 inch. Placed in a hydraulic compressor and by this means compressed to an average length of $\frac{3}{8}$ inch, the mean diameter increasing to $1\frac{1}{4}$ inches — and without a crack or imperfection developing.

A Type F-6 Bond, terminal normally $\frac{3}{4} \times 11/16$ inch, was likewise compressed and then hammered to a length of $\frac{1}{4}$ inch and a mean diameter of $1\frac{1}{4}$ inches, without a crack or imperfection developing.

Surely these are supreme tests of a rail bond terminal, tests far more severe than would ever be met in service.

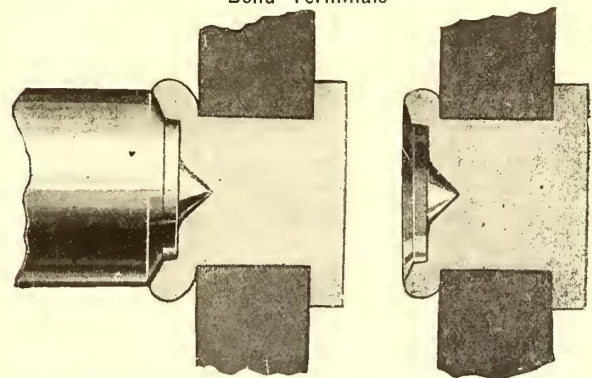


Showing the Wonderful Malleability of "Protected" Rail Bond Terminals

A Contact That Lasts

With their body portions made from pure lake copper, protected at their junction with the terminals by the famous "Shot-Over" sleeves; with terminals of soft, dense copper, copper so soft that it may be compressed into the very pores of the steel of the rail, is it at all surprising that "Protected" Rail Bonds give the service that they have been giving for years? *Is it surprising that over eight millions have made records for efficiency and service excelled by no other type of bond?*

This is the bond we offer you for your work. Why not use it?



Resulting in a Finished Joint That IS Good and That STAYS Good

ELECTRIC SERVICE SUPPLIES Co.

Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA
17th and Cambria Sts.

NEW YORK
Hudson Terminal

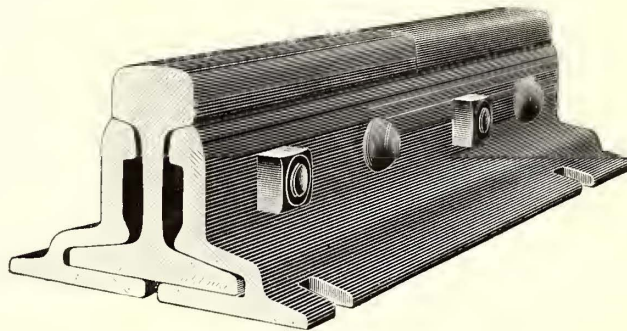
CHICAGO
417 So. Dearborn St.

The Rail Joint Company

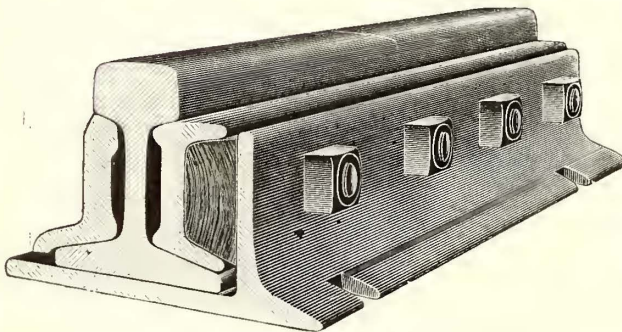
185 Madison Avenue

New York

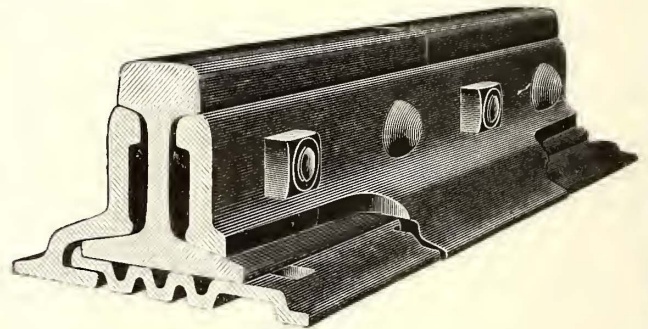
Makers of Base-Supported and One Hundred Per Cent. Rail Joints for Standard, Girder and Special Rail Sections. Also Joints for Frogs and Switches: Insulated Rail Joints, and Step or Compromise Rail Joints. Patented in United States and Canada.



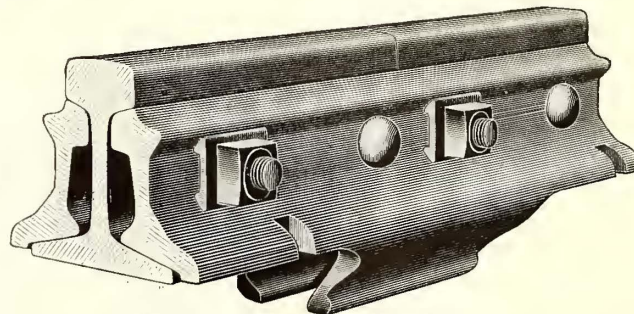
CONTINUOUS RAIL JOINT



WEBER RAIL JOINT



WOLHAUPTER RAIL JOINT



ONE HUNDRED PER CENT. RAIL JOINT

THE RAIL JOINT COMPANY'S product is not in an experimental stage; it is an acknowledged standard. Not only the best for the price but the best for the purpose.

See our Exhibit at the Panama-Pacific International Exposition, Palace of Transportation, Block 1, East End.

**Best Quality Hot-Worked HIGH CARBON STEEL used exclusively.
Oil-Quenched when desired.**

Catalog and full information furnished at all Agencies

BOSTON, MASS., India Bldg.

CHICAGO, ILL., Railway Exchange Bldg.

DENVER, COLO., Equitable Bldg.

MONTREAL, CAN., Board of Trade Bldg.

PHILADELPHIA, PA., Pennsylvania Bldg.

PITTSBURGH, PA., Oliver Bldg.

PORTLAND, OREGON, Wilcox Bldg.

ST. LOUIS, MO., Commonwealth Trust Bldg.

TROY, N. Y., Burden Ave.

LONDON, E. C., ENG., 36 New Broad St.



You Know

- You know that mechanical rail joints develop into such conditions as shown above.
 - You know that every such joint means tearing up of pavement at great expense to make repairs.
 - You know that such conditions decrease the life of your rails and the life of your rolling stock.
 - You know that your electrical engineer is always complaining about the loss of current due to such conditions.
 - You know that such conditions may result in damage by electrolysis and consequent law suits.
 - You know that you have been up against such conditions during all the years you have used mechanical joints.
 - You know that at this season of the year you are contemplating ways and means to overcome such conditions.
- Then, why not take advantage of what

We Know

- We know that to overcome your trouble you must eliminate the joints from the track. That is what our Thermit Rail Welding Process accomplishes. We weld the whole rail section and give you a continuous rail with all joints eliminated.
- We know that our pamphlet No. 3932 will be of service to you. Write for a copy.



Finished Thermit Fully Welded Insert Rail-Joint



Thermit Fully Welded Insert Compromise Joint



GOLDSCHMIDT THERMIT CO.

WILLIAM C. GUNTZ, General Manager

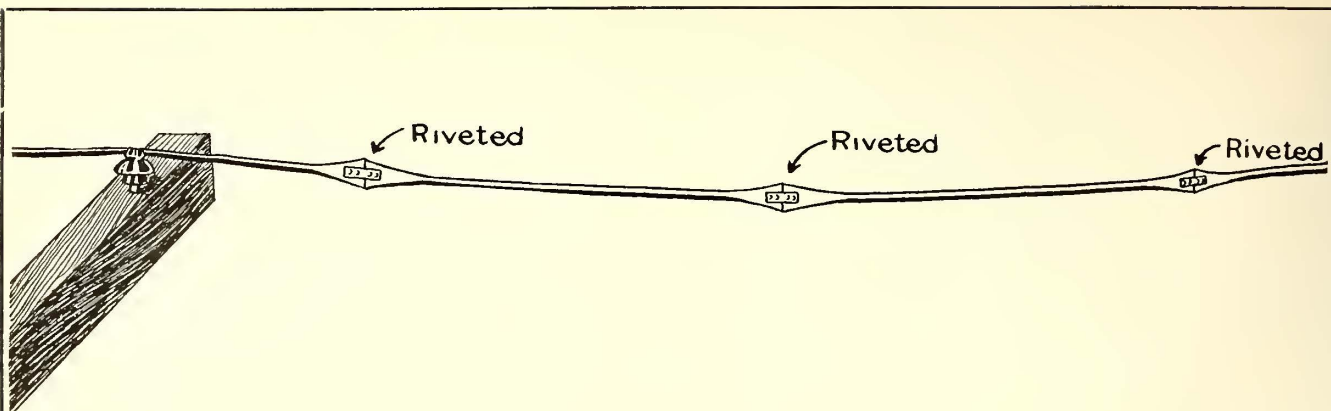
90 WEST STREET, NEW YORK

329-333 Folsom St., San Francisco

103 Richmond St., W., Toronto, Ont.

7300 So. Chicago Ave., Chicago





“Nothing Doing”

you say, when we try to get you to use this kind of a joint for your overhead transmission lines.

But

your return circuit carries the same amount of current that the overhead lines do.

Then

why use riveted joints in the return circuit?

Electric Weld Rail Bonds

do not corrode at the terminals.

The Electric Railway Improvement Co.

Cleveland, Ohio

Stroh Process Steel

For Street Railway Special Work



FROGS — CROSSINGS — INSERTS

Harder than Manganese Steel

Will Not Spall Nor Flow

Long Lived—Economical

The Stroh Process is not a case hardening or a heat treatment. It is a method for casting Stroh Alloy Steel (the greatest known wear resistant) together with ordinary soft steel in one solid piece. The resultant casting has a wear-proof alloy steel stratum upon the wearing surfaces, while the body is composed of any desired steel and is in no way affected. This alloy can neither come loose, nor spall, nor spread nor flow. Its depth or thickness, its location and its hardness are completely controlled and are varied according to the size of the piece and the nature of service expected.

Our descriptive bulletin will interest you. Send the coupon.
Our prices will also be of interest. Send us your inquiries.

KENNEDY-STROH CORPORATION

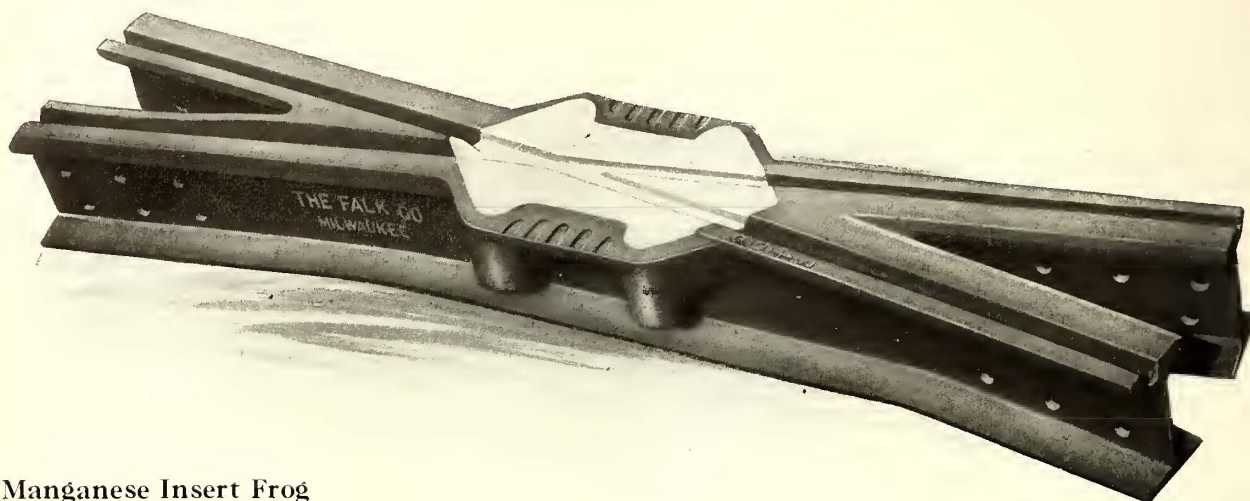
Sole Proprietors of the Stroh Process

Pittsburgh, Pa.

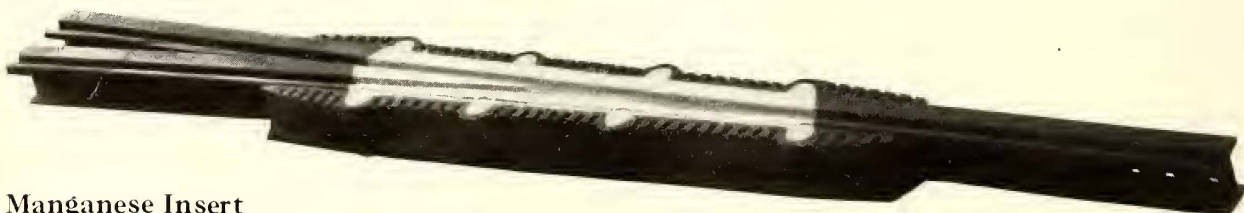
Enclose this Coupon with Letterhead or Business Card
Forward me at once a copy of the Stroh Process Bulletin.
Name.....
Street.....
City.....
State.....
E.R.J. 3-20-15

Falk Special Track Work

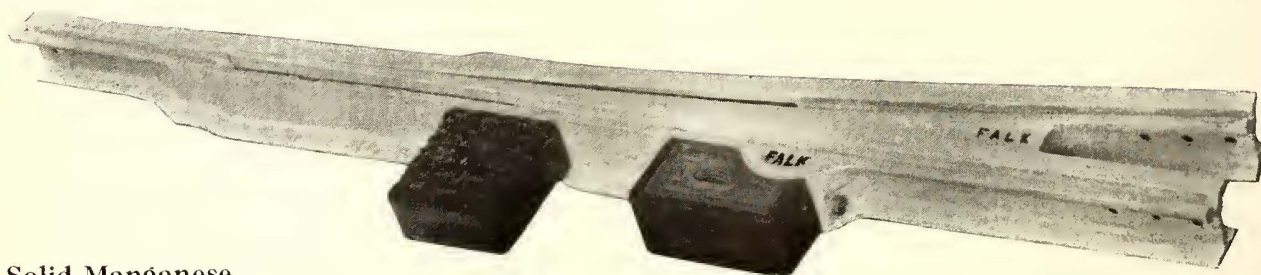
DOES REDUCE YOUR MAINTENANCE CHARGES



Manganese Insert Frog
with Cast Steel Body



Manganese Insert
Cast Iron Bound Mate



Solid Manganese
Steel Switch

These Three for Maximum Service

The Falk Company

Milwaukee

NEW YORK CITY—Wendell & MacDuffie Co.

LOS ANGELES—Alphonso A. Wigmore

NEW ORLEANS—A. M. Lockett & Co.

These Men are Grinding an Average of 300-ft. per day

Cost per Foot, .0206 Cents

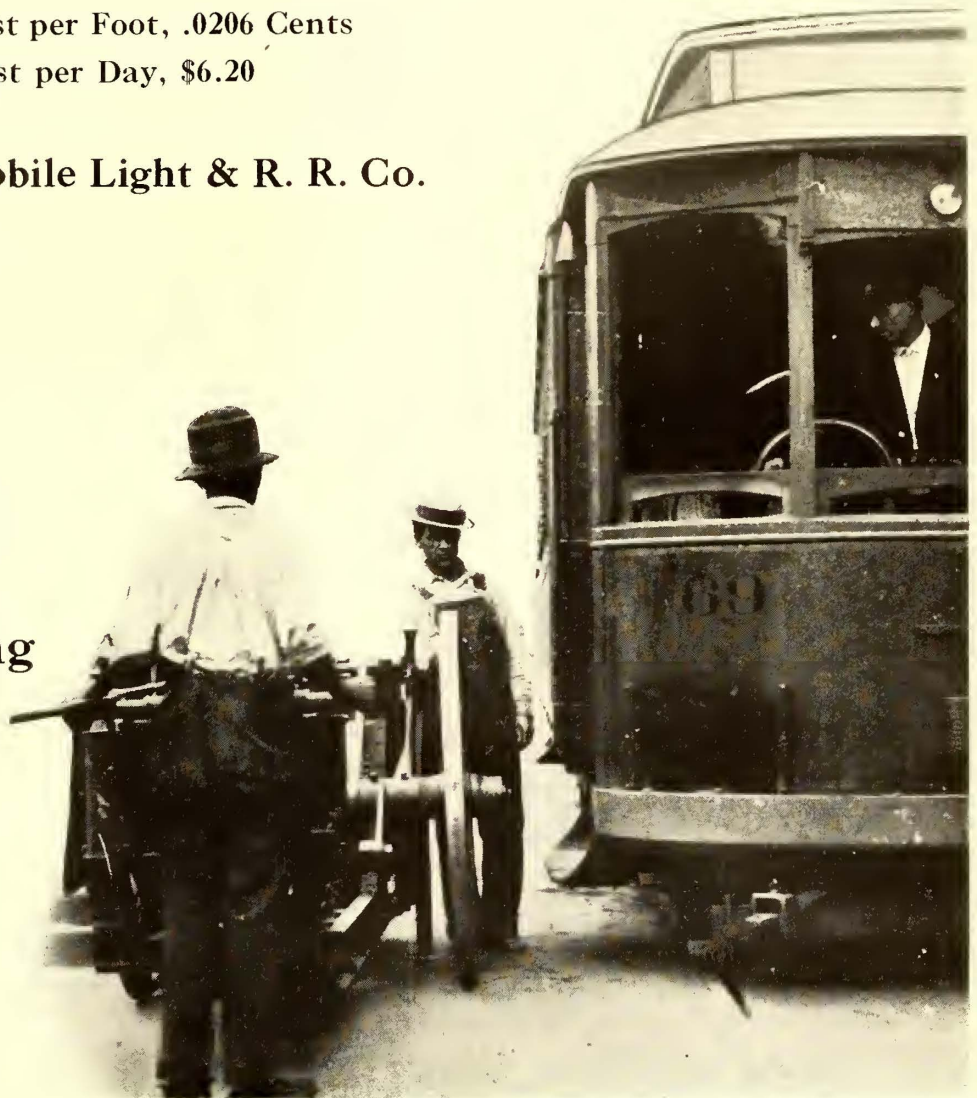
Cost per Day, \$6.20

Ask the Mobile Light & R. R. Co.

Reason:



The Reciprocating Track Grinder

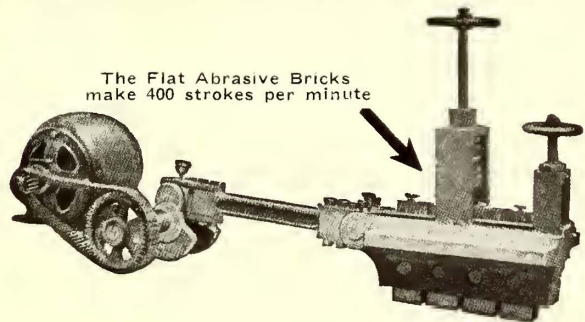


Having These Essentials

1. A flat grinding surface.
2. Reciprocating Motion.
3. Forty square inches grinding surface.
4. Four Hundred Strokes per Minute.
5. High Wheel derail.
6. No fine adjustments for pressure.
7. It will grind rapidly, economically and accurately.
8. It will grind hammered joints and make them serviceable for years to come without need for shimming up or use of step joints.
9. It will grind new joints to such perfection that hammering or cupping will be of remote occurrence.
10. It may be operated by common labor and, in such hands, is not likely to damage the track.
11. It will be self contained, requiring no motor car to complete the outfit.

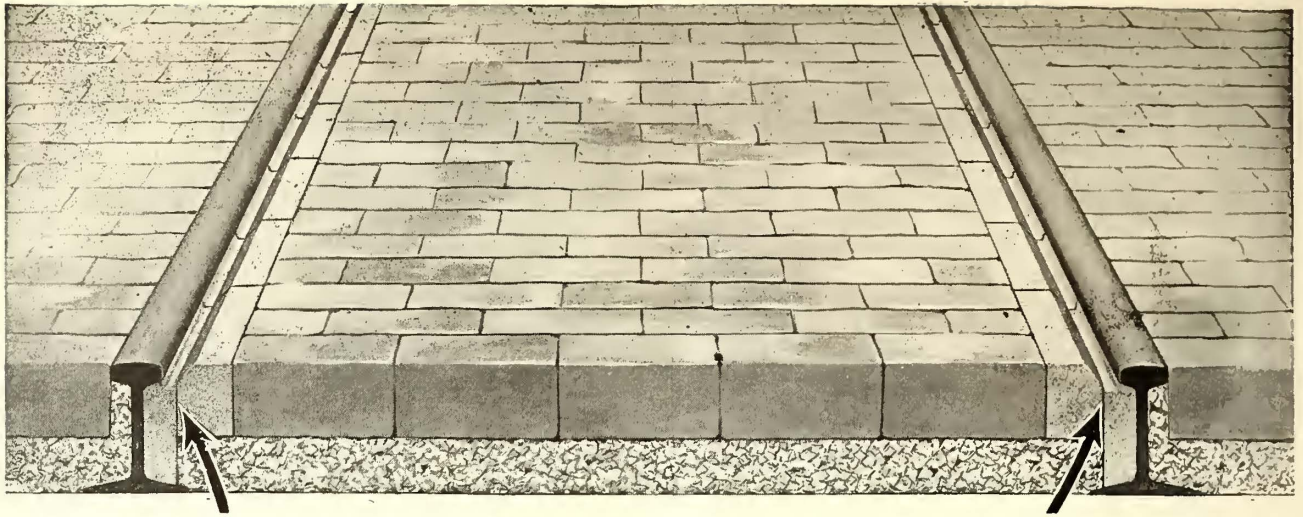
Write for data and price.

The Flat Abrasive Bricks make 400 strokes per minute



Railway Track-work Co.

Heed Bldg., Philadelphia



Economize

—on Rail

—on Maintenance

You know the substantial saving in first cost which T-rail track permits. Electric Railway officials in over a hundred cities can tell you what the saving on paving maintenance amounts to when protected with

NELSONVILLE FILLER AND STRETCHER BRICK

This common-sense and effective track construction has won the cordial approval of city officials wherever it has been installed. It results in more sightly track—a better joint between the paving slab and rails—and a perfected paving which does not break down under the vibration of traffic.

The filler brick block firmly fits against the rail, and fills the gap between ball and flange. The stretcher brick is bonded to the

paving block between the rails. The joint between the stretcher and filler bricks remains ungrouted—no vibrations pass from the rail to paving—filler slides freely against side of the stretcher.

Twenty-five years' experience and the best paving block clay go into the making of Nelsonville Brick.

Write for a copy of "Rail Brick of the Right Sort."

The Nelsonville Brick Company

Nelsonville, Ohio



“By Jove! Why didn't I install Pulmotors

like the Pittsburgh Railways did before This Accident Happened! George Woodman my best Transformer

foreman has been electrocuted.—

The Doctor said a Pulmotor would have saved him as he was alone and couldn't keep up respiration by hand long enough to do any good.”

Progressive electric railways—large and small—from coast to coast—have adopted the Pulmotor. A partial list follows:

- Birmingham Ry. Lt. & Pwr. Co.
- Fort Smith Lt. & Trac. Co.
- British Columbia Elec. Ry. Co.
- Los Angeles Ry. Corporation.
- Pacific Elec. Ry. Co.
- Arkansas Valley Ry. Lt. & Pr. Co.
- Athens Ry. & Elec. Co.
- DeKalb, Sycamore Int. Ry. Co.
- Terre Haute, Ind. & E. Trac. Co.
- Iowa Ry. & Light Company.
- New Orleans Ry. & Light Co.
- Bangor Ry. & Elec. Co.
- Bristol & Plainville Tramway Co.
- Benton Harbor-St. Joe Ry.
- Muskegon Trac. & Lt. Co.
- Hattiesburg Trac. Co.
- The S. W. Missouri Ry. Co.
- United Railways Company (St. Louis)
- Butte Elec. & Pr. Co.
- Public Service Ry. Co.
- Hudson & Manhattan R. R. Co.
- Rochester Ry. & Lt. Co.
- Northern Ohio Trac. & Lt. Co.
- Toledo Ry. & Lt. Co.
- Bartlesville Int. Ry. Co.
- Portland Ry., Lt. & Pr. Co.
- Pittsburgh Ry. Company.
- Charleston Consol. Ry. & Lt. Co.
- Nashville Ry. & Light Co.
- Northern Texas Trac. Co.
- Chicago, Milwaukee & St. P. R.R. Co.
- Washington Ry. & Elec. Co.
- Milwaukee Elec. Ry. & Lt. Co.
- Wisconsin Elec. Ry. Co.

When will your company join the ranks? Don't wait until it is too late.



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 1-Carnegie Sub-Station. 2-Bellevue Sub-Station. 3-Esplan Sub-Station. 4-Brunots Island Power Station. 5-North Side Sub-Station. 6-Washington Junction Sub-Station. 7-Allegheny Heating Co. 8-Tunnel Sub-Station. 9-Philadelphia Building. 10-13th St. Power Station. 11-Equitable Gas Co. 12-Oakland Sub-Station. 13-Glenwood Power Station. 14-East Liberty Sub-Station. 15-Equitable Gas Co. 16-Homewood Shops. 17-Wilkinsburg Sub-Station. 18-Rankin Power Station. 19-McKeesport Sub-Station 20-Verona Sub-Station.
 Outside of County—Riverview Sub-Station (Monongahela, Pa.) Tylersdale Sub-Station (Washington, Pa.)

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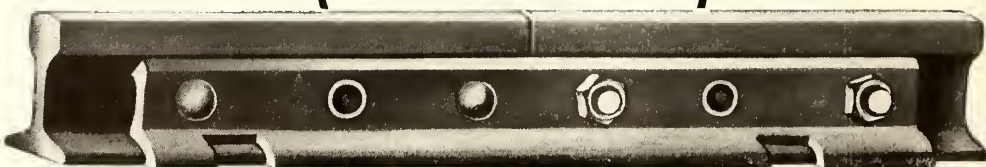
If it's a J. A. J. You Can Forget Electrical Resistance in Your Bond

As a result of the perfect bonding you get entire electrical contact with the J. A. J., without the conversion of current into heat at the bond, as with cables or strips of copper.

Quick method of application—since the J. A. J. is designed for insertion in the same holes as the bolts, and the installing copper coats fish-plate and rail.

The J. A. J. makes one rail out of the thousands that constitute the line.

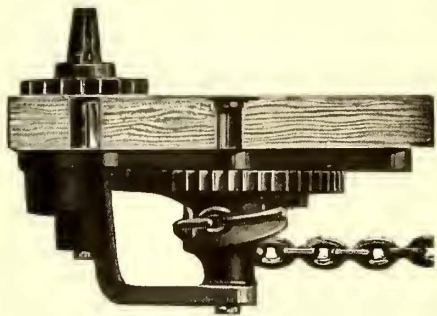
We have a proposition in which we believe you will be interested. Write us.



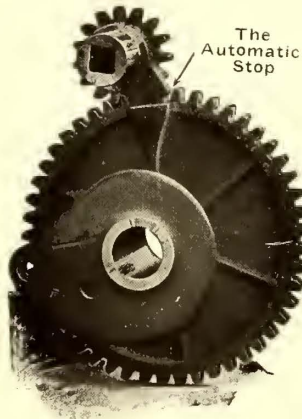
The Jamison Rail Bond and Electrical Supply Co.

202-203 Keystone Bldg., Pittsburgh, Pa.

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The Peacock Improved Brake



You can't put any old hand brake on the cars and expect the maintenance cost to be low.

It is excessive maintenance cost that makes cheap brakes expensive.

It is the absence of maintenance cost that makes the Peacock Improved Brake lower in cost than cheap brakes.

Hand brake costs amount to far more than is generally imagined. A Superintendent of Equipment on one of our large roads recently pointed out to the board that the hand brakes they were operating cost far too much to maintain.

He showed in figures how he could scrap the old brakes and pay for Peacock brakes inside of one year.

And he was **conservative**.

Reduce your maintenance by ordering Peacocks **NOW** for every car without them.

NATIONAL BRAKE CO.

888-890 Ellicott Square, Buffalo, N. Y.

Poor Richard says:

"A dollar saved is a dollar earned."

We insist that we have something that will save the dollars. This is the

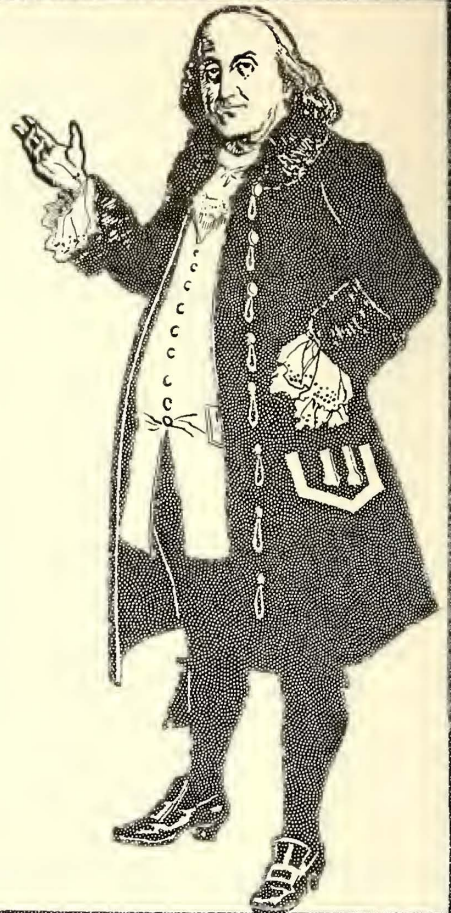
CHAPMAN AUTOMATIC SIGNAL



We have been emphasizing the advantage of this for three years.

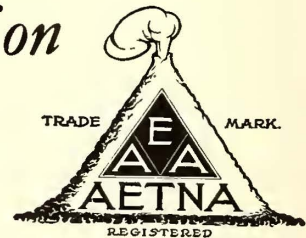
If you haven't considered it, you should do so now. It is an absolutely-to-be-depended-upon signal. There is no user who would part with his or change for another make. It is earning and saving the dollar for your neighbor. Why not put it to work for yourself?

**Charles N. Wood Co.,
Boston, Mass.**



Over Twenty Years Standard for Electric Railway Line Insulation

For more than two decades Aetna Insulating Material has held foremost place in the electric railway insulation field. Quality, service, economy, are the strong planks in the Aetna platform that have maintained its prestige in the past and shall uphold it in the future.



Aetna Insulating Material

is incorporated into the structure of many well known Anderson Line Insulating Specialties and to the value of Aetna they largely owe their great efficiency and long life in service.

Wherever electric railways span the earth Anderson Line and Insulating Material is found **proving** that the name Anderson stands for **quality and service.**

ALBERT & J. M. ANDERSON MFG. CO.

Established 1877

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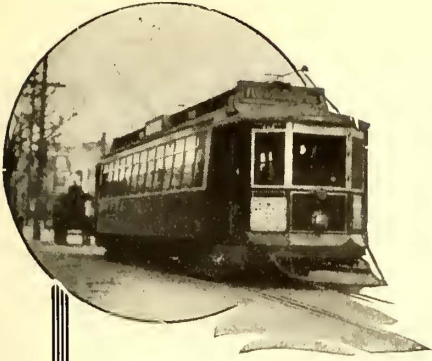


New York, 135 Broadway.
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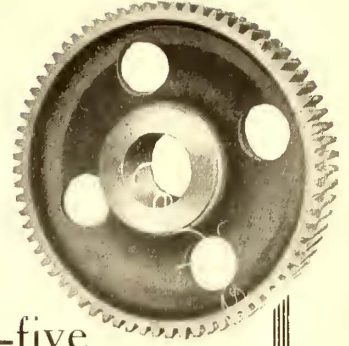
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Boston Elevated Orders Grade M



Six hundred and seventy-five Grade M Gears and the same number of Grade M pinions have just been ordered for immediate service by the Boston Elevated Railway Company for use on its surface lines.

The new trailer service to be inaugurated by this road will require gearing of exceptional strength and wearing qualities.

Although Grade M gearing has been on the market but three years, ninety roads in this country alone are using these gears and pinions with absolute satisfaction. Grade M gearing has proved its title as the "more miles per dollar" gearing.

Ask the roads using it.

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G-E Outdoor Aluminum Arresters

Have Strong Mechanical Construction

Strong, compact and well braced pipe work gives stable support to horn gap mechanism and wiring.

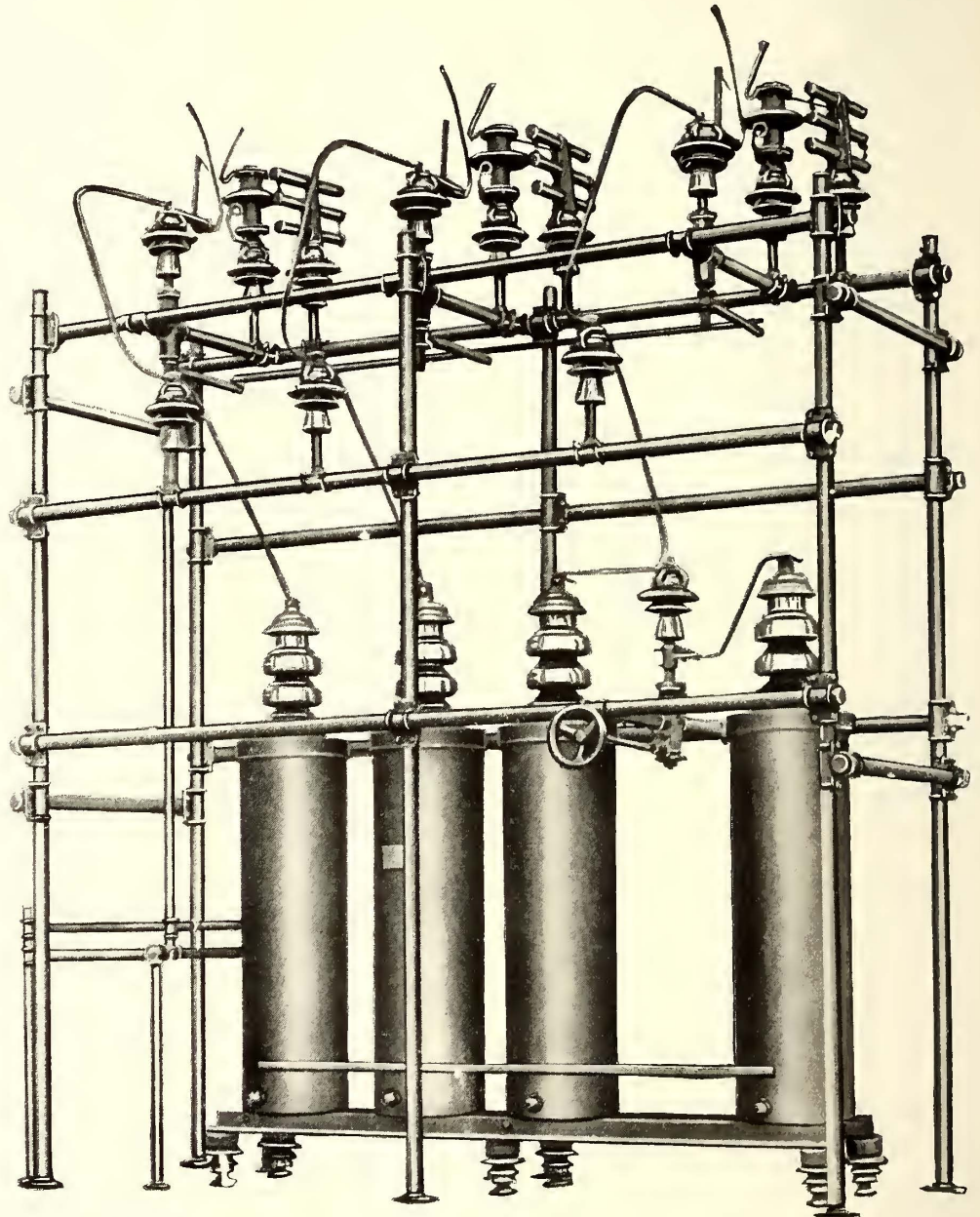
Construction readily permits placing wire screen around framework.

Lever operated horn gap.

Transfer switch located between tanks, and hand wheel operated.

Tanks and pipes galvanized, all pipe and insulator fittings, transfer switch gears and handwheel, sherardized.

These and other refinements promote safety and ease of operation and reduce installation and maintenance charges.



35,000-volt G-E Aluminum Arrester

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Traffic Direction Block System of automatic signaling for Electric Railways



Style "B" Semaphore Signals at Passing Siding, Ohio Electric Railway.

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.

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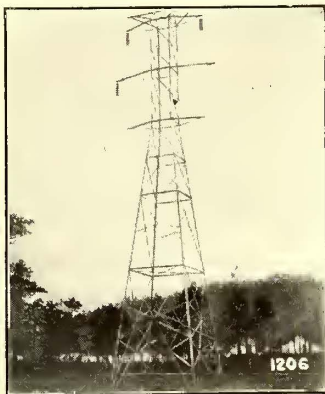
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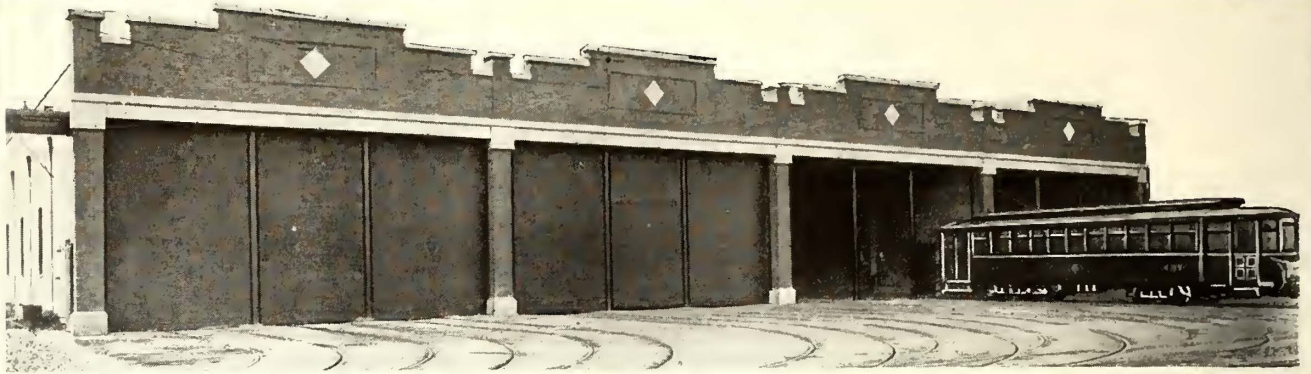
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KINNEAR ROLLING STEEL DOORS

Installed in the new Tri-City Car House

Illustrated above is the recently completed car house of the Tri-City Railway and Light Company situated at Rock Island, Illinois. This new car house, up-to-date in every particular, was built to replace a structure burned last year.

An important factor in the fireproofing of this new building is the Kinnear Rolling Steel Doors inclosing the entrance ends of all bays.

Modern car house construction demands Kinnear Doors because they are fireproof, easily operated, and involve practically no maintenance expense. Write for booklet "Car Barn Doors."

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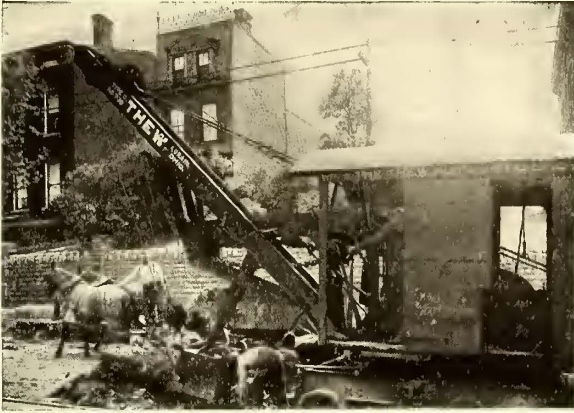
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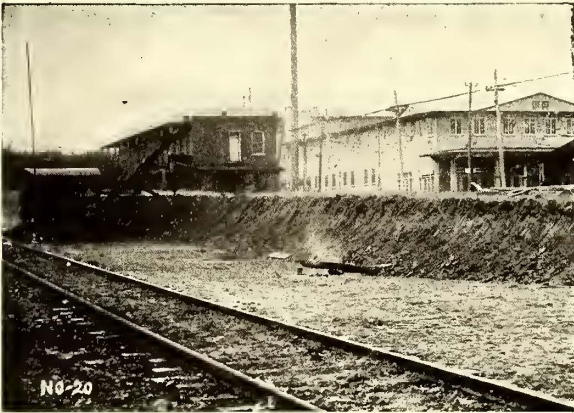
Over one million E. H. P.
to date.



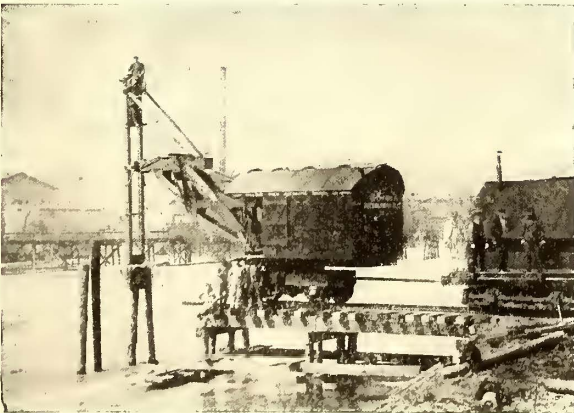
Showing application of the Thew Prying Motion in "breaking the bond" and handling 13 in. concrete, Cincinnati.



Thew Shovel making a shallow cut for track foundation, Indianapolis. Note pieces of concrete, rocks, etc.



Thew Electric Shovel grading for side track, St. Louis. Note level floor obtained with small amount of hand work by two laborers.



Thew Electric Shovel owned by The Rockford & Int. Ry. Co., Rockford, Ill., equipped for driving piles. Change can be made in 1/2 day.

WORK for the **THEW** Electric Railway Shovel means

deep or shallow cuts, track trenching, grading interurban road beds, tearing up concrete and track ballast, removing old rails and ties, rehandling materials to cars, and even driving piles (as the lower illustration shows). The success of this full-circle-swing type shovel with electric railways has been due not only to its generally good construction, but to such features as the horizontal crowding motion of the dipper, and its powerful prying action.

Upon request, we will send you our special electric railway pamphlet containing photographs and cost-figures dealing with Thew shovel operation. Write today.

**The THEW
Automatic Shovel Co.
Lorain, Ohio**

From Coast to Coast—



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Sky Line New York City

Indianapolis Portable Welder and Gr

From the Atlantic to the Pacific on electric railways big and little, where track replacements and car equipment renewals range from dollars to many thousands, the INDIANAPOLIS PORTABLE ELECTRIC WELDER is effecting the most surprising savings.

“Maximum Economy” in the operation of Electric Railways is impossible without the Indianapolis Welder and Grinder.

Reclaim worn special work and cupped joints—good as new, quickly—at minimum cost.

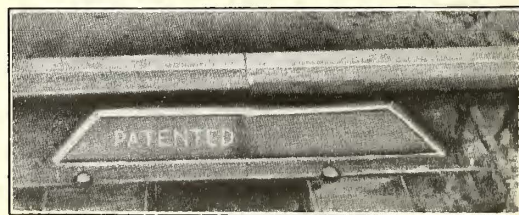
New Track laid with Indianapolis Welded joints—will never cup or require joint or bonding maintenance.

Old Track—made good for years—for less than the cost of ordinary temporary repairs.

Look carefully at the map—the users are in the majority.



Cupped Rail



Cup Filled in and Reground

INDIANAPOLIS SWITCH &

New York

Chicago

Kansas City

Spokane

the Indianapolis Welder



Exposition Sky Line San Francisco

Under Salvages Track and Equipment

Such universal adoption in two years is proof of the extraordinary value and merit of the Indianapolis Method.

NOTICE TO THE MINORITY

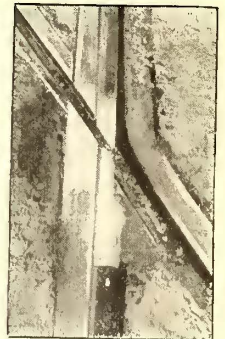
(Those not yet using The Indianapolis Economy Twins.)

Any road operating four cars or over can't afford to be without them.

No piece of equipment on your line can yield such dividends. No appropriation necessary; they are paid for from the savings of the Maintenance fund.

You do have use for the Method.

Don't want to hurry you, but now is the best time for several reasons.



FROG CO., Springfield, Ohio

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Seattle

Los Angeles

San Francisco

From Coast to Coast—the Indianapolis Welder



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Indianapolis Portable Welder and Grinder Salvages Track and Equipment

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New York Chicago Kansas City Spokane

FROG CO., Springfield, Ohio

Portland, Ore. Seattle Los Angeles San Francisco

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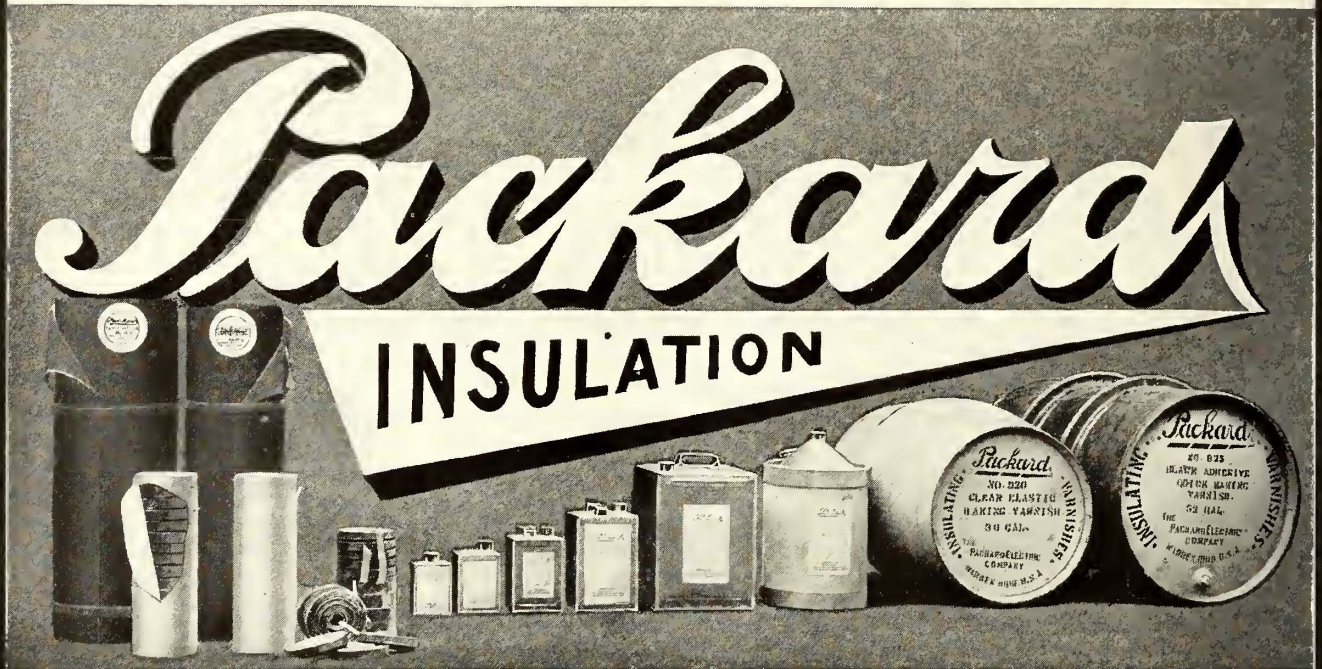
No piece of equipment on your line can yield such dividends. No appropriation necessary; they are paid for from the savings of the Maintenance fund.

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Don't want to hurry you, but now is the best time for several reasons.



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Our process of "aging" keeps this tape "live" for months when carried in stock.

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A general utility product made from higher grade materials than are usually put into ordinary tape.

The fine, hard thread, closely woven, makes a web firm and strong but not bulky.

The film, tacky but not smeary, sticks and stays stuck. Furnished in two grades.

Rubber Tapes

Made to meet Underwriters and other specifications requiring direct rubber coating on the wires.

These tapes have smooth surface, are entirely free from pin holes and are very adhesive.

When wound on a splice they make a perfectly water-tight joint. Furnished in two grades.

Varnished Cloth

We sell miles of this cloth in 35-inch width, to be used in wrapping field and armature coils.

Makers of electrical apparatus use the Packard product on parts subjected to vibration, heat, oil, grease and excessive voltage in case of overload.

Furnished in eight grades.

Insulating Varnishes

Used to protect armature windings, field coils, oil-cooled transformer coils and all internal parts of electrical apparatus.

There are so many classes of work, each requiring a special varnish, that we now furnish 17 distinct products.

Send for 24-page booklet describing them.

Impregnating Compounds

An insulator for impregnating armature and field coils, also as a filling compound for ignition and lighting transformers, storage batteries, pot-heads, junction boxes, underground cable connections and tubes.

The Packard Electric Co.

525 Dana Avenue

Warren, Ohio

Better Rail Bonding Plus Greater Savings

We are prepared to prove to you—
By records of actual work or—
By demonstration on your track—

That the use of Prest-O-Lite for the Oxy-Acetylene welding of bonds makes it possible for one man and two helpers to apply eighty bonds per day.

That these bonds will "stand up" better than bonds applied by any other process. Once applied, the oxy-acetylene bond is practically a part of the rail, and its electrical efficiency does not decrease through years of use. This positive permanence, ease and speed of installation, at very low expense, means a heavy decrease in your cost of bonding.

Bonds of suitable design for application by this process are supplied by leading bond manufacturers. Welded bonds will not corrode at the terminals. They *cost less* and *last longer* than any other type of bond.

In addition to absolute proof on these points, consider the fact that this outfit leaves the tracks free for traffic—requires no current or train crew—can be operated night and day—full 24-hour efficiency.

The same outfit, with cutting torch, is indispensable in the shop or for emergency track repairs.

We furnish a thoroughly high-grade welding apparatus for \$60.00, not including acetylene cylinders, which are extra, and are furnished under a liberal service plan. Truck and special equipment for cutting operations at extra cost.

PREST-O-LITE Dissolved Acetylene (Ready-made carbide gas)

Prest-O-Lite Acetylene Service furnishes the highest grade of Dissolved Acetylene in portable cylinders, used as conveniently as you use cylinders of oxygen. Saves the large initial outlay and heavy depreciation, trouble and inconvenience of making crude Acetylene in carbide generators. Besides, Prest-O-Lite Dissolved Acetylene is perfectly dried, cleaned and purified—makes better welds and is cheaper to use.

THE PREST-O-LITE CO., Inc.

The World's Largest Makers of Dissolved Acetylene

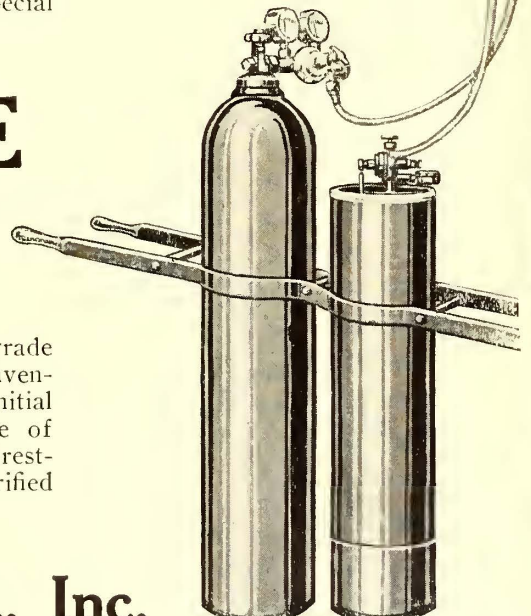
805 Speedway

Indianapolis, Ind.

53 direct factory branches and charging plants in principal industrial centers.

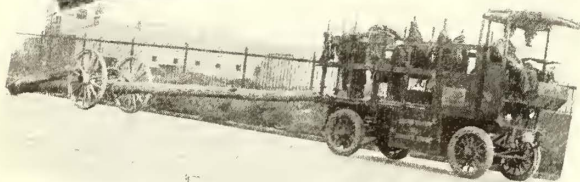


Out of
the way of
Traffic—
No
"Tie-Ups"



One large traction company employs this method of carrying welding cylinders (Oxygen and Prest-O-Lite). Four bonds may be applied from one location. A light hand car can also be employed. When bonding a long stretch of track, full cylinders may be distributed in advance.

G.V. Electric



Over 100 leading public utility companies use G. V. Electrics in the United States, Canada, Brazil and the Philippines. The New York Railways Company, for example, uses over 30. There are nearly 5000 G. V. Electrics in daily service. Twenty-five firms alone use 1107.



General Vehicle

General Office and Factory, [NEW YORK CHICAGO



Trucks for Traction Companies

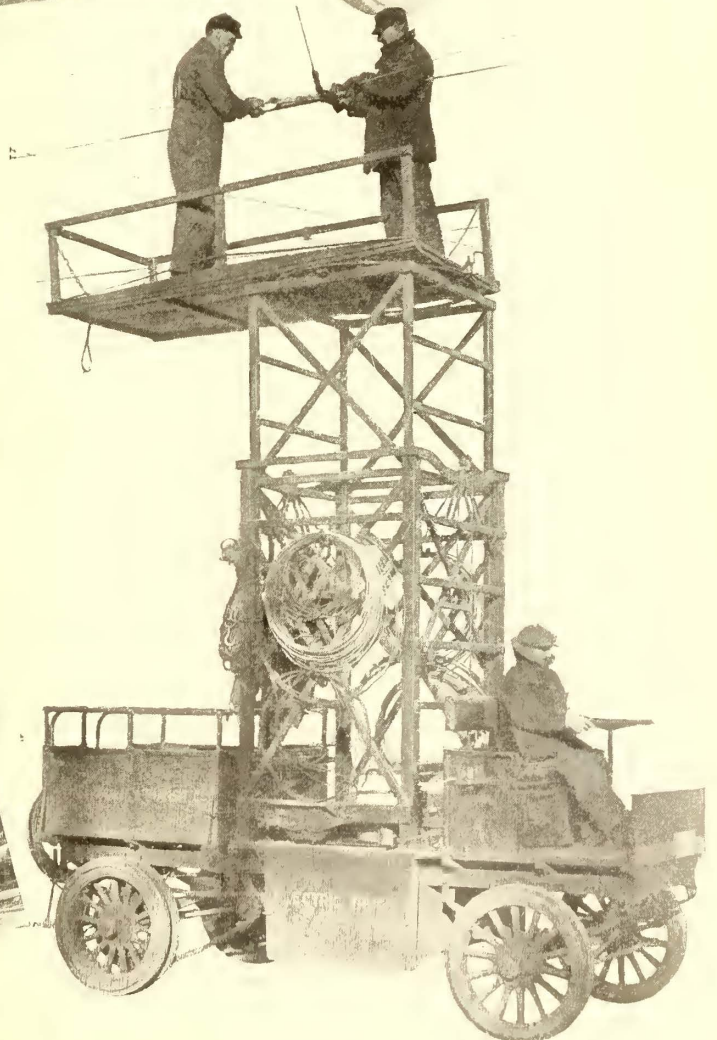


In addition to our standard models, public utility companies use G. V. winch equipped trucks, hoist equipped trucks, emergency wagons, tower wagons, etc. We also build industrial trucks, crane trucks, tractors, etc., etc. Catalog J-82 on request.

Company, Inc.

Long Island City, N. Y.

BOSTON PHILADELPHIA



G.V. Electric



Over 100 leading public utility companies use G. V. Electrics in the United States, Canada, Brazil and the Philippines. The New York Railways Company, for example, uses over 30. There are nearly 5000 G. V. Electrics in daily service. Twenty-five firms alone use 1107.



General Vehicle

General Office and Factory,
NEW YORK CHICAGO



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Company, Inc.

Long Island City, N. Y.
BOSTON PHILADELPHIA



W E E D S

NOT TO WEED —IS INEFFICIENT
 TO WEED BY HAND —IS EXTRAVAGANT
 TO WEED WITH **TRACKOLINE** IS
 EFFICIENT AND ECONOMICAL

¶ The day of hand weeding is past, thrown into the discard by the advent of TRACKOLINE, a time-tested, proven method of eliminating weed growth by chemical means.

¶ TRACKOLINE is a scientifically compounded chemical preparation which is a positive destroyer of every type of vegetation. It kills the entire plant, tops, roots and seeds, quickly, positively and permanently.

¶ It effectually sterilizes the roadbed so that a new crop cannot grow again for an entire season. A year's rains are required to dissolve TRACKOLINE from the soil sufficiently to permit weed growth, even from seed.

¶ On hundreds of roads, in all sections of this country, and in the tropics, TRACKOLINE has demonstrated its absolute efficiency.

¶ It kills every type of weed growth—Johnson-grass, rag-weed, bind-weed—any form of vegetation, from clover to cactus, will be destroyed by TRACKOLINE.

¶ It is unconditionally guaranteed to be harmless to livestock. It is absolutely non-injurious to ties, rails or track superstructure.

¶ The cost of weeding with TRACKOLINE is less than that of any other method, yet it gives you what no other method can give you—absolutely clean tracks from one year's end to the other.

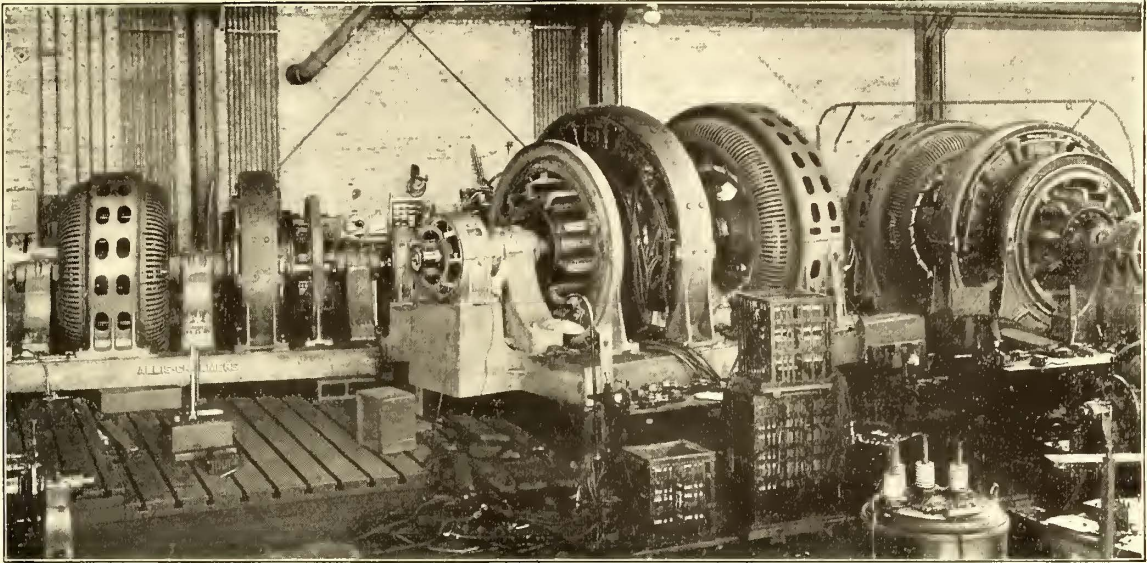
¶ Full particulars on request.

TRACKOLINE
 KILLS EVERY WEED TOP ROOT & SEED

COMMERCIAL CHEMICAL COMPANY

1733 Grand Central Terminal

New York City

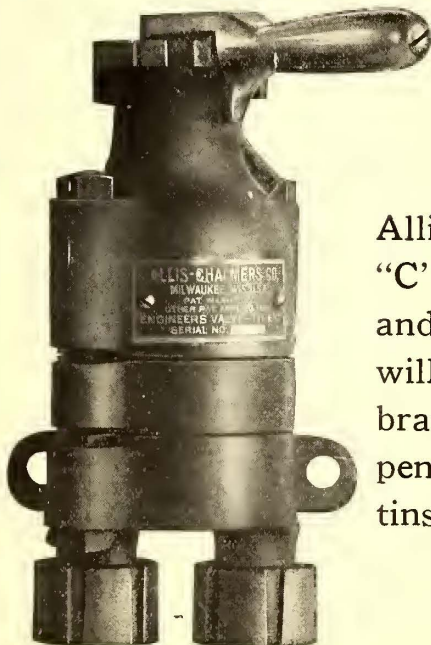


Shop Test of Two 1500 K.W. and One 1000 K.W. Railway Motor-Generator Sets

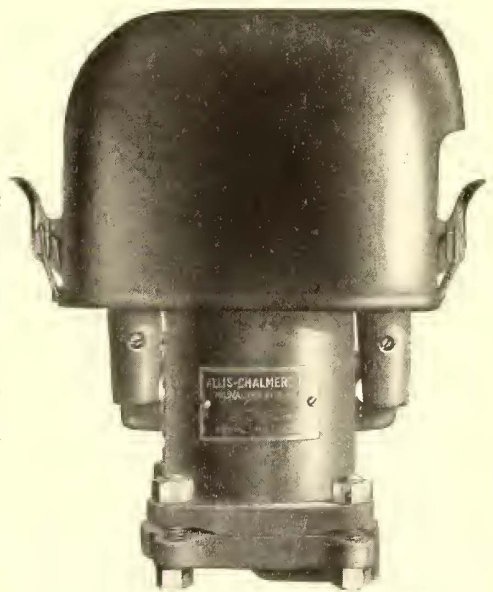
The Test of Allis-Chalmers Railway Motor-Generators

given each set before shipment, is rigorous and very thorough, but their reputation for correct design and careful construction is due to their service record:

Reliable Operation and Low Maintenance Costs



Allis-Chalmers Type "C" Engineers' Valves and OB-4 Governors will reduce your air-brake maintenance expense. Write for bulletins.



Allis-Chalmers Manufacturing Company

Milwaukee, Wisconsin

For all Canadian Business refer to Canadian Allis-Chalmers, Ltd., Toronto, Ont., Canada

Offices in All
Principal Cities

Foreign
Representatives

{ H. I. Keen.....732 Salisbury House, London Wall, E. C., England
Mark R. Lamb.....Huertas 1157, Casilla 2653, Santiago, Chile
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American Trading Co.,
Representatives in China, Japan, South America and Philippine Islands

ELECTRIC CAR MAINTENANCE

A BOOK OF PRACTICAL METHODS

In this book you get the methods of the cleverest men in the country.

It is not a "one man book." No one man could write such a book.

Every issue of the Electric Railway Journal contains new ideas on quick, economical methods in the car shop. The best shops of the Country are searched for something new—a quicker, cheaper, better way to handle the work of car maintenance.

Walter Jackson, in charge of this work for the Electric Railway Journal, has brought these together in a book—a very useful, practical book.

READ THIS LIST OF SUBJECTS:

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| I—Mechanical Appliances for Train Operation. | VIII—Bearing Practice. |
| II—Non-Electrical parts of the Carbody. | IX—Current-Collecting Devices. |
| III—Brake Equipments and Brake Rigging. | X—Motors and Gearing. |
| IV—Trucks, Wheels and Axles. | XI—Control, Circuit-Breakers, Controllers, Resistances and General Tests. |
| V—Cleansing by Dipping or Sand-blasting, Car Washing, Painting and Glazing. | XII—Heaters, Lighting, Signs and Signals. |
| VI—Sanders and Sanding Devices, Scrapers, Brooms. | XIII—Welding Methods, Shop Tools, Storage, Etc. |
| VII—Lubrication. | XIV—Instruction Prints and Tables for Shopmen. |

DON'T THINK OF THIS AS A SCRAP BOOK

The thousand and one ideas have been classified and filled out till every subject is complete.

The problems of car maintenance are covered thoroughly and every item is indexed so that you can find what you want instantly.

It isn't theoretical either. It is everyday practice—just what any man could learn if he could afford to visit and study the methods of the best shops in the country.

There is one feature that is worth the price of the book in itself—150 wiring diagrams, covering all car circuits. They are as simple as A, B, C.

REMEMBER—You have the privilege of Free Examination of this book. Read our offer on the opposite page.

**275 pages, 6 x 9, over 300 Illustrations.
\$3.00 (English price 12/6) net postpaid.**

USE THE COUPON ON THE OPPOSITE PAGE. DO IT TODAY.

Now Ready

ELECTRIC RAILWAY HANDBOOK

By **Albert S. Richey**, Electric Railway Engineer, Professor of Electric Railway Engineering, Worcester Polytechnic Institute.

830 pages, over 600 illustrations, leather, pocket size, full gilt, \$4.00 (English price 17s), net postpaid.

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We want to prove this by sending you a copy for free examination.

You do not agree to buy the book or pay one cent until you are satisfied that it will help you.

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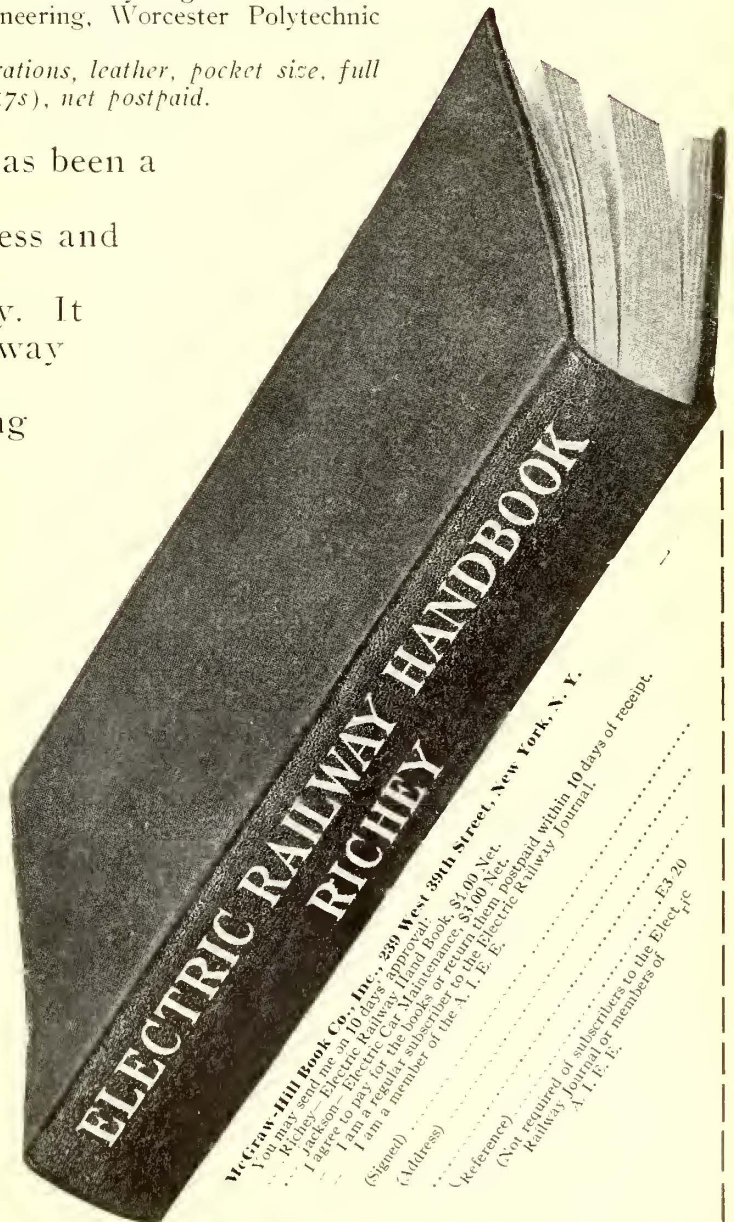
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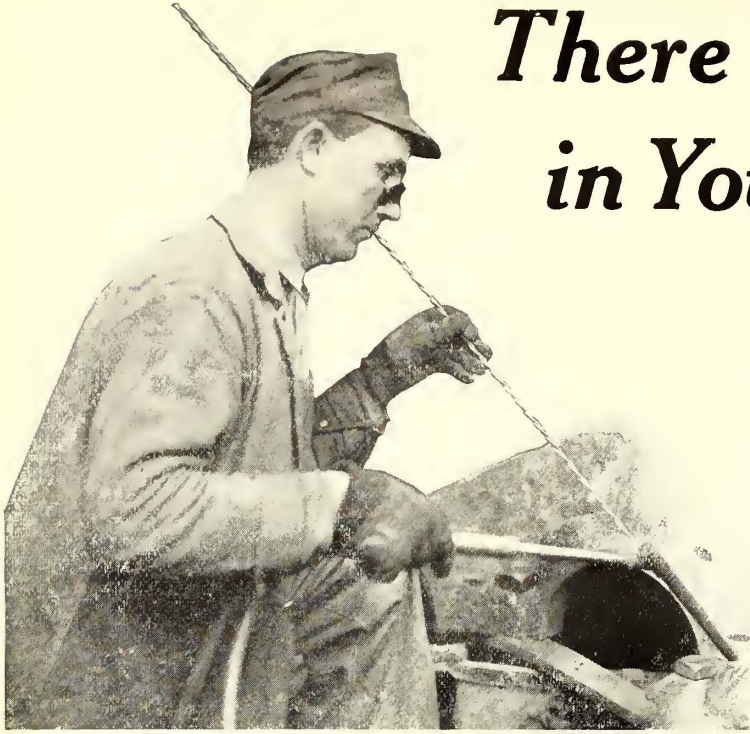
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There are Dividends in Your Scrap Pile!



At Indianapolis Traction & Terminal Shops. Oxwelding on Broken Gear Suspension Lug

Every road has in its scrap pile discarded parts which may be put into 100% condition quickly and at low cost.

Reclaiming discarded equipment from the scrap pile means not only conserving the original investment, but avoiding an unnecessary replacement cost.

In other words, there is no question that the biggest part of your scrap pile can be made practically as good as new by use of

The OXWELD Process of Welding and Cutting Metals

By this process worn and broken parts can be repaired quickly and cheaply—ready to do full service, thus saving the cost of new equipment.

Note the illustrations. These cases are typical of hundreds of savings, large and small, which can be made in any shop, by reclaiming the scrap pile.

Some Savings on the Indianapolis Traction and Terminal Co.

TRUCK SIDE FRAME—Nature of repairs, refilling worn pedestal faces. Cost of repairs, \$8.00. Cost of replacement, \$38.00. Scrap value, \$1.50.

TRUCK END FRAME—Nature of repairs, refilling end connecting holes, \$4.50; cost of replacement, \$7.00. Scrap value, \$0.60.

MOTOR FRAME (TOP HALF)—Nature of repairs, welding gear case suspension lug. Cost of repairs, \$8.91. Cost of replacement, \$105.17. Scrap value, \$2.76.

MOTOR FRAME (TOP HALF)—Nature of repairs, welding axle bearing housing. Cost of repairs, \$12.00. Cost of replacement, \$77.76. Scrap value, \$2.66.

Isn't apparatus which will effect such savings worth investigating? Write for further particulars.

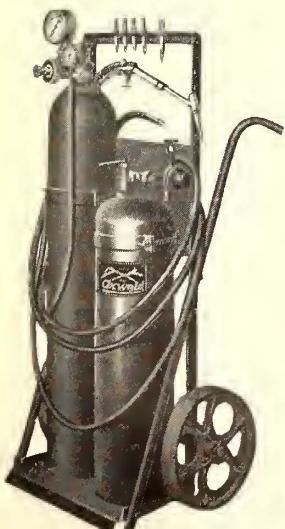
Oxweld Acetylene Co.

Newark, N. J. Chicago

Largest Makers of Welding and Cutting
Equipment in the United States



At Aurora, Elgin & Chicago Shops. Oxwelding Worn Motor Axle Seat



OXWELDING Unit

There is profitable work for a Davis-Bournonville Welding and Cutting outfit in the shops of every Electric Railway, Lighting and Power plant.



It will quickly pay for itself many times over on large and small repairs, new construction, general plant and equipment maintenance—

It will pay for itself in the parts saved from the scrap heap by welding—from the reduced lost time on repairs or waiting for new parts on a break-down—

It will pay for itself in steel cutting on new construction, reconstruction, wrecking—

It is the most indispensable apparatus in many repair shops—

It is the most efficient welding and cutting apparatus for general or special work, because—

It has practical development, long experience, record for efficiency, and **competent instruction** back of it.

Write for "Autogenous Welding," describing and illustrating some of the practical work accomplished by users of Davis-Bournonville Oxy-Acetylene Welding and Cutting outfits.

All of the pressure gas mains, services and meter installations in the Panama-Pacific International Exposition, over 100,000 feet of 4-in. to 16-in. pipe, was welded with Davis-Bournonville apparatus, on the ground. Exposition number of "Autogenous Welding" illustrates it. Write Dept. R for copy and visit our working exhibit at the Exposition, in Spaces 35, 36, 37, of the Collective Gas Exhibit, in the Palace of Manufactures.

DAVIS - BOURNONVILLE COMPANY

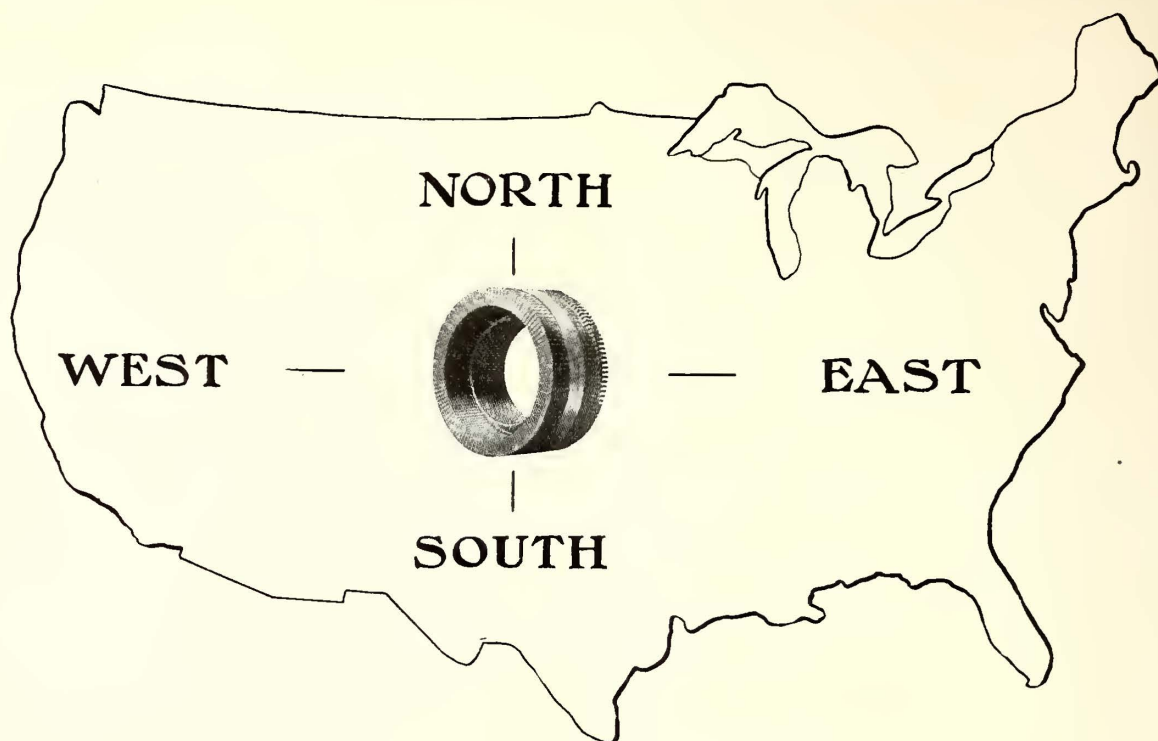
NEW YORK

General Offices and Demonstration Plant
JERSEY CITY (Marion Station), N. J.

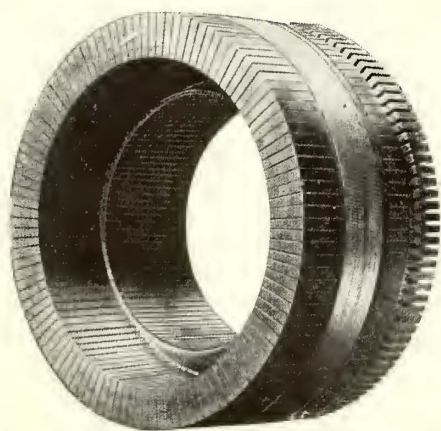
CHICAGO

Sales Offices: New York, Chicago, Cleveland,
Detroit, Philadelphia, Pittsburgh.

General Dealers in New England and Western
States.



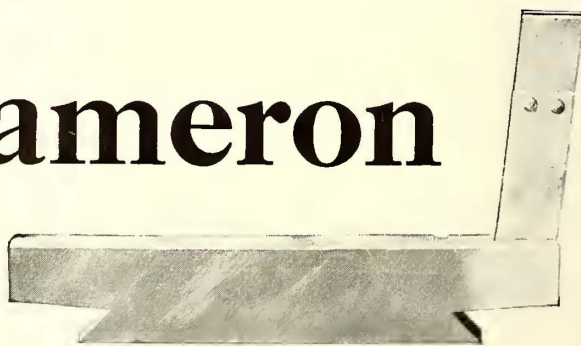
National Maintenance Reducers



COMMUTATORS

Made permanently tight by hydraulic pressure. This precludes arcing at the brushes.

Cameron



PARTS

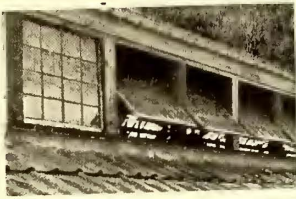
Bars made of hard-drawn copper in order to give better conductivity and uniformity than the drop forged type. *Mica*, nothing but "Canadian Amber" to insure softness and even wear.

COILS

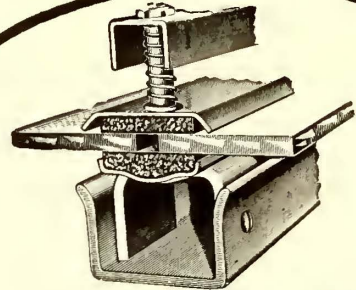
Armature coils are a part of Cameron service—that means A1 material and GRADE A work—and you can't *afford* to use anything less than that.

Cameron Electrical Mfg. Co., Inc.

Ansonia, Connecticut, U. S. A.



**"STRAIGHT-PUSH"
Sash Operators**
PATENTED

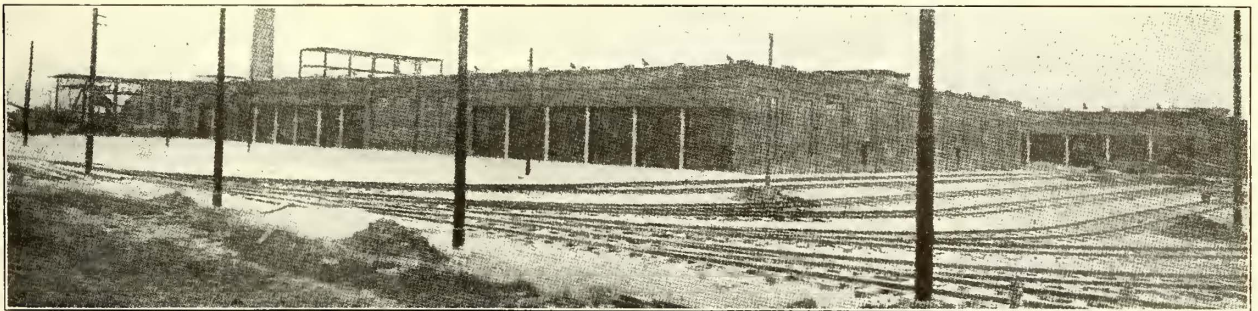


**"ANTI-PLUVIUS"
(Trade Mark)
Puttyless Skylights**

on the Roofs



of the New Cleveland Railway Shops



30,000 sq. ft.
"Anti-Pluvius"

4,000 ft.
"Straight-Push"

Consult us when in the market for skylight or sash operators. We specialize, and our information, gathered in years of manufacturing and erecting these products, may be of assistance in assuring proper conditions from the start.

In addition to the above installation we have also served such representative roads as the

- Public Service Ry. Co.
- Capital Traction Co.
- Boston Elevated Ry. Co.
- Detroit United Ry.
- Chicago City Ry.
- Dayton City Ry.

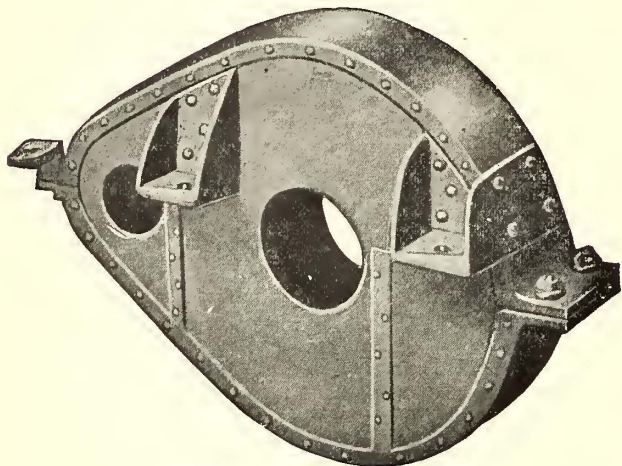
- Connecticut Co.
- Rhode Island Co.
- New York City Rys.
- Los Angeles Gas & Electric Co.
- Portland Ry., Light & Power Co.
- Mt. Hood Electric Ry.

The G. Drouvé Co., Bridgeport, Conn.

180 North Dearborn St., Chicago

C O L U M B I A

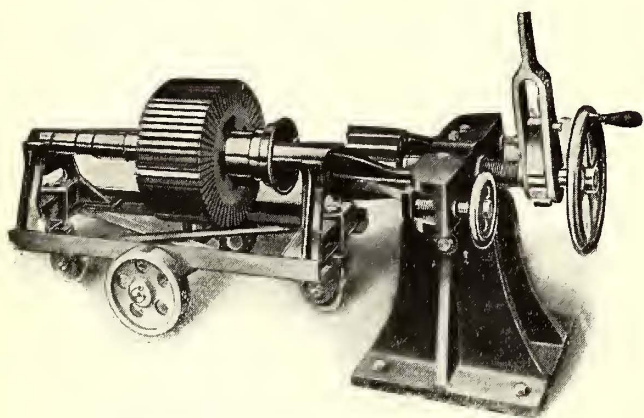
Car and Repair Shop EQUIPMENT



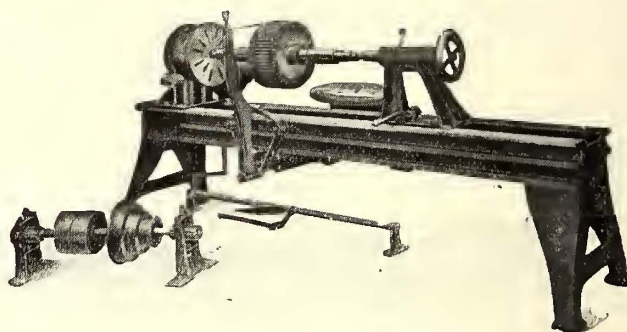
Columbia All-Steel Gear Case

We manufacture in our plant the following Electric Railway Equipment

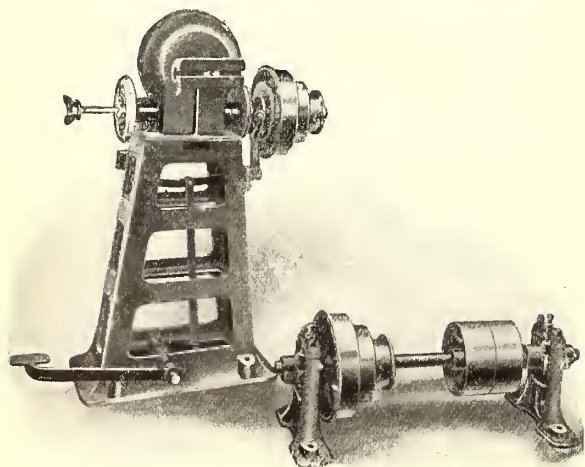
Controller Handles, Malleable Iron and all Steel Gear Cases, Coil Tapeing Machines, Pinion Pullers, Car Trimmings, Door Locks, Brake Appliances, Armature Stands, Field and Armature Coil Tension Stands, Coil Winding Machines, Signal or Target Switches, Rolls for Flattening Leads of Armature Coils, Brakes for Pony Trucks, Steel Trolley Poles, Trolley Wheels, Day and Night Car Signs, Armature and Axle Bearings, Field and Armature Coils, Commutators, Babbitting Moulds, Axle Straighteners.



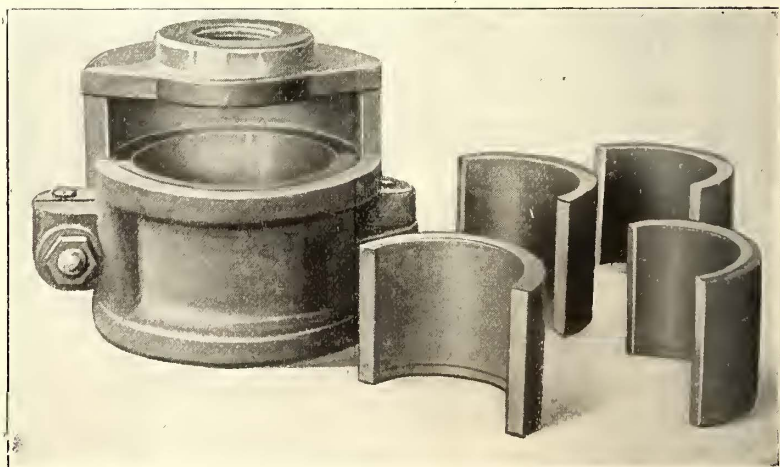
Columbia Pinion Puller and Armature Buggy



Columbia Armature Banding Machine



Columbia Field Coil Winding Machine

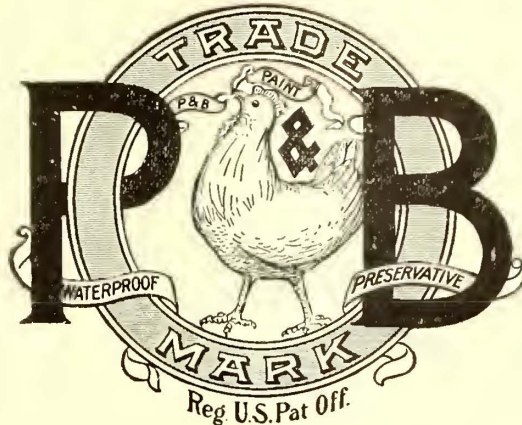


Columbia Boring Chuck for Motor Bearings

Columbia Machine Works & Malleable Iron Co.
Atlantic Ave. and Chestnut St., Brooklyn, N. Y.

Weatherproof
Tape

Insulating
Compound



Baking Varnishes

Air-Drying
Varnishes

Solid Compounds

*For the prevention and cure
of Insulation Troubles use*

P & B Insulation

The right insulation in the right place is what you are after. We are prepared to *determine* the right insulation for your service as well as *supply* it. P. & B. Insulation has been standard with many large roads for thirty-one years.

We manufacture insulating varnishes, compounds and tapes for specific purposes. The following is a partial list:

CLEAR AND BLACK BAKING VARNISHES for armature and field coils, transformers and magnet coils, where high insulation is required.

BLACK AIR-DRYING VARNISH for quick repairs to dynamos, motors and taped connections, for feed wires, overhead and underground work, and for car motor leads.

BLACK FINISHING VARNISH, a quick-drying, absolutely oil-proof spirit varnish.

ELECTRICAL COMPOUNDS for switchboards, junction boxes, underground cables, etc.

P & B INSULATING TAPE, the most durable weather-proof tape made.

Write for Booklets

The Standard Paint Company

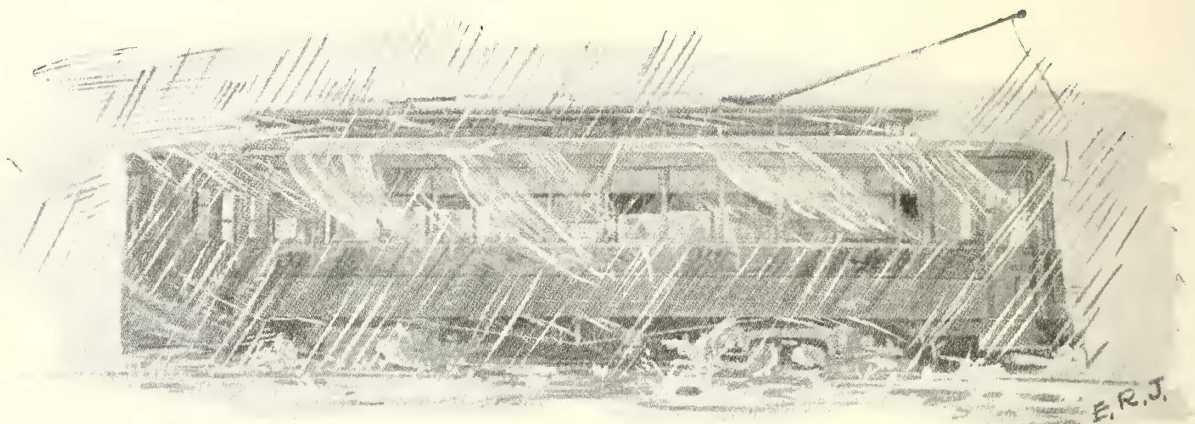
Woolworth Building, New York

Boston

Chicago



You May Not be Able to Keep Your Armatures
Out of the Wet, but You Can Keep the
Wet Out of Your Armatures



Water Will Not Penetrate

ARMALAC

The Ideal Armature Insulation

Someone has said, "Trust in God, but keep your powder dry." Wise electric railway men say, "Trust your insulation, but keep your armatures dry."

Keeping the armatures out of the wet is not always practicable, but it's an easy proposition to keep the wet out of your armatures. Simply treat them with ARMALAC. An armature **Armalacked** is rendered **permanently impervious to moisture**. Water will not penetrate Armalac nor will any chemical action produce water from it. It is easy to apply and affords an ideal means of rejuvenating old armatures and making quick repairs inexpensively. Write for our interesting booklet: "How to Insulate an Armature."

Walpole Tire & Rubber Co.

Massachusetts Chemical Co.'s Products

Walpole, Mass.

Pioneers in Insulation Engineering



We Can Save Money For You Too

Electric Railway Companies all over the United States and Canada send us the r old field coils to be rebuilt and impregnated, because it means a substantial saving in cost over new coils, and because we do the job right and they know it.

The coils we return are absolutely perfect and "money back if they don't stand up" is the guarantee we give with each coil.

We have the plant, the men, the knoweldge and the experience to do the work right.

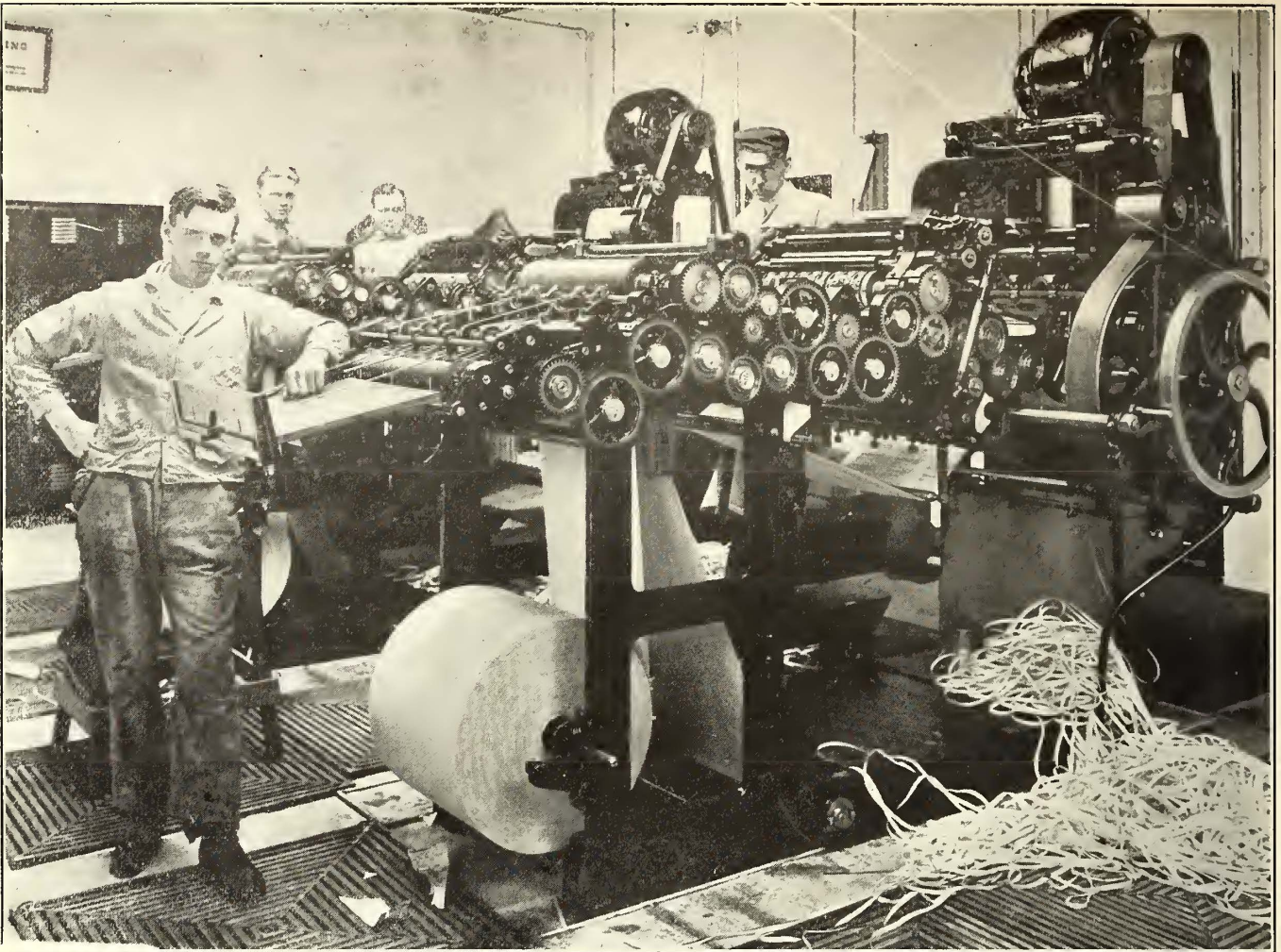
We solicit your work on the merit of our past performance.

Send us a few of your old coils, and be assured that while we are convincing you, you are saving money.

Electric Operations Co., Inc.

Bush Terminal, Brooklyn, N. Y.





Transfer Printing

262,500 transfers per hour
or 2,100,000 per 8-hr. day

is an ordinary performance for a

Series V—Model 2 Meisel Rotary Transfer Ticket Press

In use by Third Avenue Ry. Co., N. Y., Los Angeles Ry. Corp., Los Angeles; Twin City Rapid Transit Co., Minneapolis; Spokane & Island Empire R. R. Co., Spokane.

Send This Coupon For Further Facts

MEISEL PRESS MFG. CO.
DORCHESTER, MASS.

Meisel Press Mfg. Co., Dorchester, Mass.
Please send me complete particulars
of your Rotary Transfer Presses.
Name.....
Company.....
Address.....
E.R.J.-3-20-15

THIRD AVENUE RY. CO. N. Y. APR 14 1915
LOS ANGELES RY. CO. LOS ANGELES APR 14 1915
TWIN CITY RAPID TRANSIT CO. MINNEAPOLIS APR 14 1915
SPOKANE & ISLAND EMPIRE R. R. CO. SPOKANE APR 14 1915

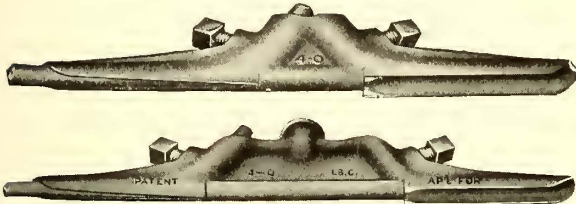
THIRD AVENUE RY. CO. N. Y. APR 14 1915
LOS ANGELES RY. CO. LOS ANGELES APR 14 1915
TWIN CITY RAPID TRANSIT CO. MINNEAPOLIS APR 14 1915
SPOKANE & ISLAND EMPIRE R. R. CO. SPOKANE APR 14 1915

Drew Products

have contributed extensively to operating and maintenance economies. They have each been designed to solve special problems. Below are illustrated a few of the Drew Specialties which have made Drew Service noteworthy.

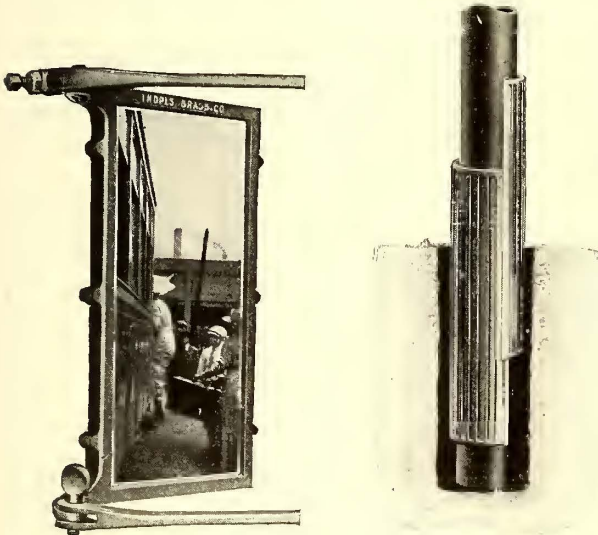
Others are:

- | | |
|---------------------|------------------|
| Trolley Ears | Suspensions |
| Frogs | Hangers |
| Brackets | Insulators |
| Lightning Arresters | Pins, etc., etc. |



Sampson Splicers

have done away with arcing and have eliminated hammering of the trolley wheel under the splicer, thus insuring longer life to the splicer, trolley wheel and wire.



Drew Motor-man's Mirror

reduces car step accidents by giving the motorman a view of the rear step or running board. It is a true Claim Reducer.

Drew Pole Sleeve

makes new poles of those that have weakened at ground line. Its use on new poles insures almost eternal life. A true Maintenance Saver.



Pipe Insulators

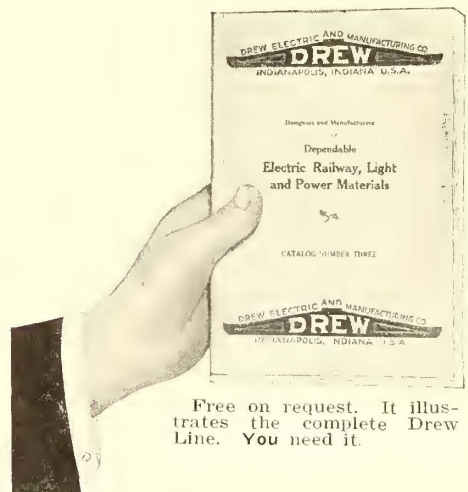
prevent electrolysis by keeping gas and water pipes and mains distinct units.

**A Drew Offer
\$25
for a
Suggestion**

This amount will be paid to anyone who will suggest the best trade mark or trade design for use in our advertising and printed matter and on our electric railway and other products.

All answers will be judged by the officers of this company and must be at this office not later than April 15, 1915. In case of a tie, \$25.00 will be awarded to each of those whose suggestions are found to be equally meritorious.

To get further particulars regarding the contest or the complete line of Drew products, send for catalog No. 3 J.



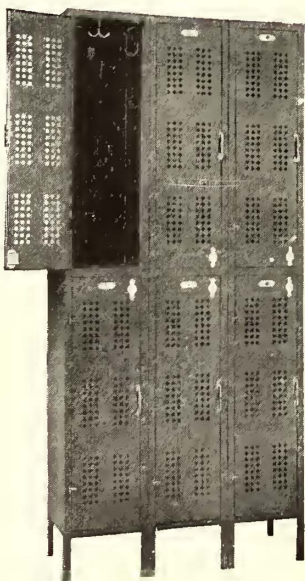
Free on request. It illustrates the complete Drew Line. You need it.

Drew Electric & Manufacturing Co.

814 Traction Bldg., Indianapolis, Ind.



DURAND STEEL RACKS



Type S. D. 12"x12"x36"

This steel rack contains no waste space, —does away with "lost material," delays in finding stock and delays in handling.

It's the perfect equipment for the modern railway shop.

DURAND STEEL LOCKERS

are manufactured in a variety of styles and sizes, for every equipment. Manufactured entirely of steel they are absolutely fire-proof, practically indestructible, clean, sanitary and convenient.

Yale locks insure the safety of the contents.

Write today for new rack and locker catalogues.

DURAND STEEL LOCKER COMPANY

Chicago
76 W. Monroe St.

New York
134 Nassau St.

From England—

All Communications to be Addressed to BROADWAY, BEXLEYHEATH.

URBAN DISTRICT COUNCIL OF BEXLEY.

ELECTRICITY AND TRAMWAY OFFICES,
BROADWAY,
BEXLEYHEATH, KENT.

TELEGRAMS: STOKES, TRAMWAY, BEXLEYHEATH.
TELEPHONE: 70 BEXLEYHEATH.
(MERCER'S HOUSE 1771)
H. P. STOKES, A.M.I.E.E., A.M.I.M.E.E.,
ELECTRICAL ENGINEER
AND TRAMWAY MANAGER.

February 1st, 1915.

Messrs. The Pyrene Co. Ltd.,
19/21 Great Queen St.,
W.C.

Dear Sirs,

With reference to yours of the 27th. ult.,
I have to inform you that we have used your Pyrene Fire
Extinguishers on three electrical fires with very great
success.

One was a fire among the rubber cables of
our old H. T. Switchboard, which would have led to disastrous
results had it not been for the promptness with which your
Fire Extinguisher was used.

The second instance, was on the occasion of
a burn-out on a Traction Generator, and in this instance,
the damage done to the machine was comparatively small on
account of the efficiency of the Extinguisher.

The third instance, was the case of a burn-
out on a single-phase alternator armature coil, which was
put out within a few moments without finding it necessary to
stop the machine, which is one coupled in tandem to the
traction generator.

We have also used the Fire Extinguisher on
other small outbreaks in the workshop and boiler-house, and
I am perfectly satisfied with the success of same

I would specially emphasize that in no instance
has any injury been caused to the electrical apparatus on
which the fires have occurred.

Yours faithfully,



← Didn't even find it necessary to stop the machine.

Write for special Electrical Booklet

PYRENE MANUFACTURING CO., 1358 Broadway, N. Y.

Offices in all large cities

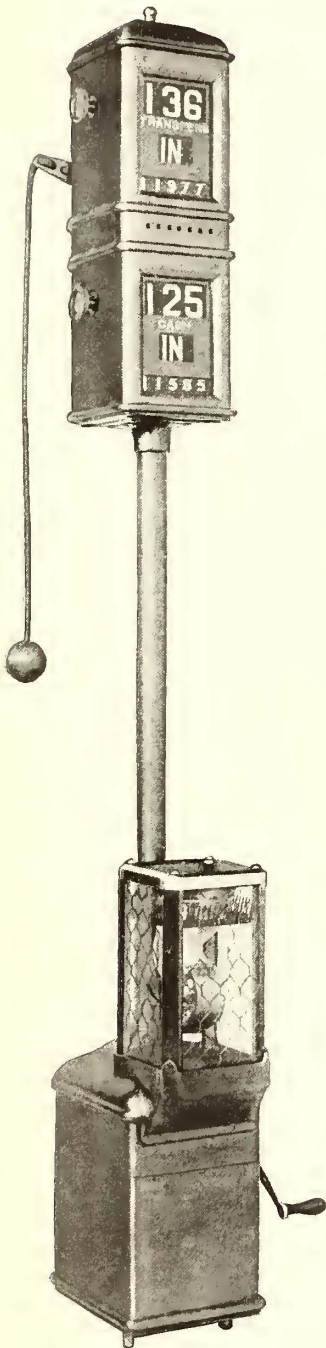
DISTRIBUTORS TO ELECTRICAL TRADE: WESTERN ELECTRIC CO.

PACIFIC COAST DISTRIBUTORS: GORHAM FIRE APPARATUS CO., San Francisco, Los Angeles, Seattle

Distributors for Canada: May-Oatway Fire Alarms, Ltd., Winnipeg.

Distributors for Great Britain and the Continent: The Pyrene Co., Ltd., 19-21 Great Queen St., London, W. C.

International Coin Registers are Built to Suit Your Needs



Type C 21—Combined Coin and Transfer Register

Each city has its special conditions governing type of car and method of fare collection. One type of fare box cannot possibly serve equally well under a great variety of circumstances.

The International scheme of assembled units adapts itself to any requirements.

Two late types are shown here. Nothing experimental. Merely a new arrangement of mechanisms well seasoned by long service.

Coin and Transfer Register, Type C 21

This is a standard International Coin Register with a second complete fare register added for registering Transfers or Tickets. The Transfer register is operated by pulling the cord. The coin register is operated automatically, by the money counter, when the crank is turned.

Coin, Metal Ticket and Transfer Register, Type C 24

This machine receives metal tickets and coins in the same hopper, counts the tickets on the center unit of the fare register, and the coins on the left hand unit, while the transfers are rung up by pulling the cord on the right hand side.

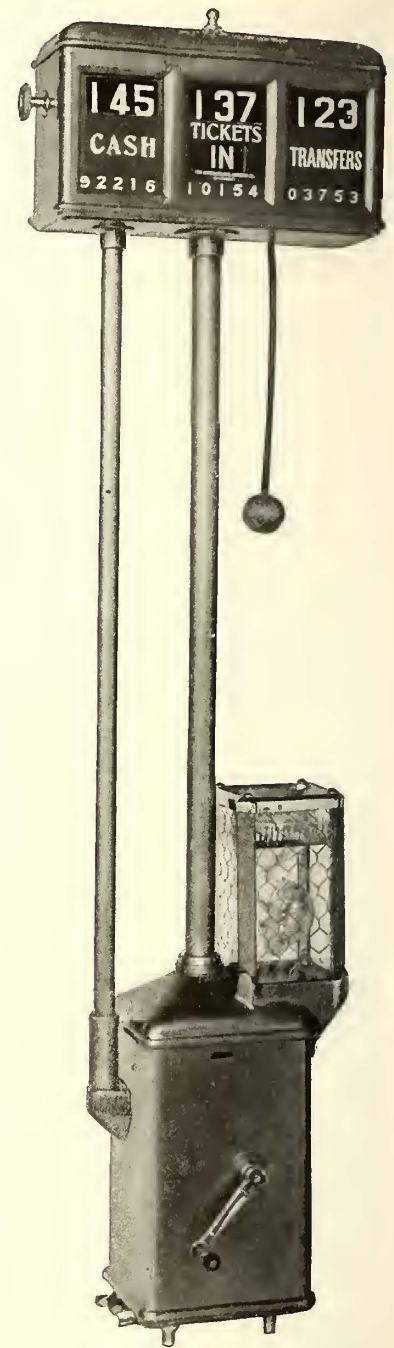
Metal Tickets have many advantages over paper tickets. They are harder to counterfeit, as very expensive and powerful coining presses are required, such as are found in very few private shops, while anybody has access to a printing press.

Cost of paper and printing eliminated. If made attractive in design, they will be carried away as souvenirs and the cost being a small fraction of the face value, the profit from this source should easily cover wear and tear.

All substitution of tickets for money in returns are prevented with the use of the machine, as the tickets are automatically counted separately. All mistakes in ringing up fares are eliminated.

MANY OTHER TYPES are ready for inspection and trial. Should none of these meet your conditions, we can quickly solve your problem and submit a sample. The C24 was designed and built in one week.

Tell us what you want and we will build it.



Type C 24—Combined Coin, Metal Ticket and Transfer Register

The International Register Company

15 South Throop Street, Chicago, Ill.

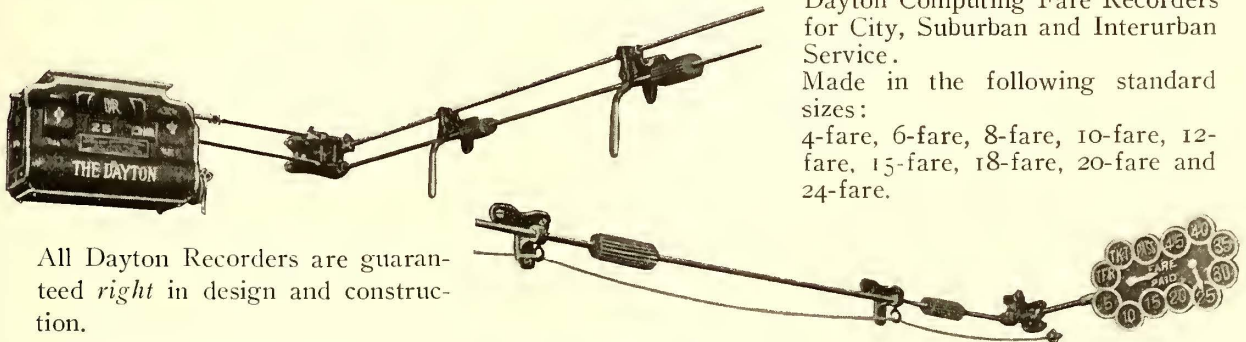
The Three Big Dayton Leaders

NO. 1

Dayton Computing Fare Recorders for City, Suburban and Interurban Service.

Made in the following standard sizes:

4-fare, 6-fare, 8-fare, 10-fare, 12-fare, 15-fare, 18-fare, 20-fare and 24-fare.



All Dayton Recorders are guaranteed *right* in design and construction.

The double-dial fare indicators are a valuable feature, as they constantly attract attention when fares are being registered, making both public and private inspection easy and effective.

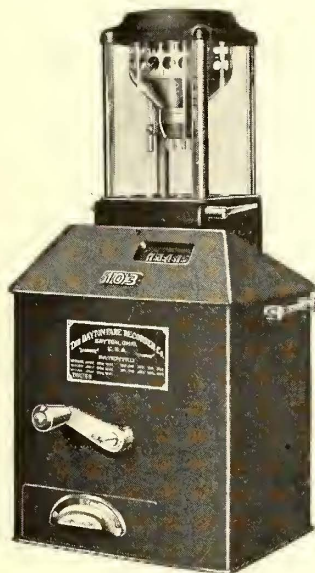
By the Dayton System every fare is indicated as paid, is registered and recorded as indicated and is as effectually checked and verified by the double system of recording as money paid in bank.

NO. 2

The Dayton standard DB registering Fare Box is a masterpiece of mechanical construction—*right* in design—*superior* in material and construction—*supreme* in service.

Every Dayton Fare Box is guaranteed to be practically infallible and indestructible under normal conditions of use and will give years and years of service at the very minimum of maintenance cost.

Ask us to send you a sample box for your examination and trial.



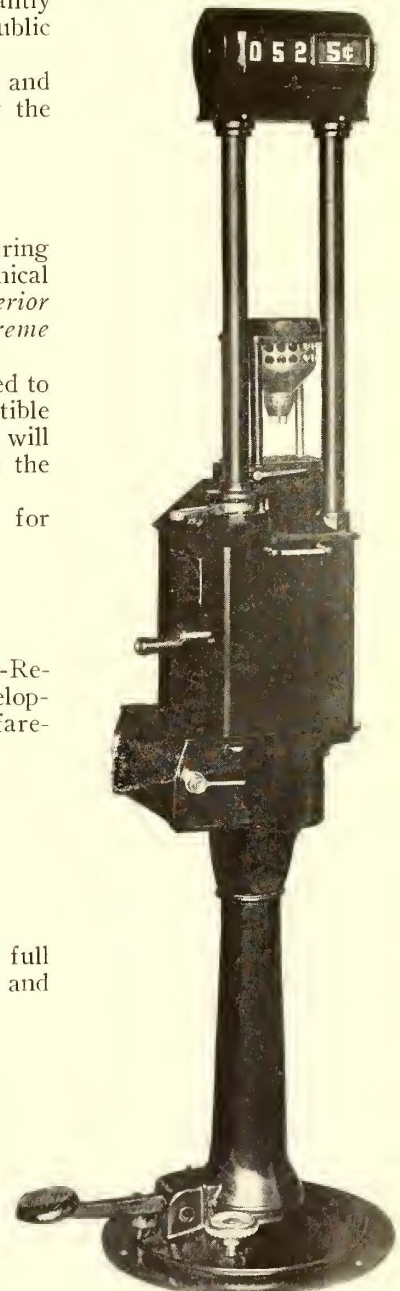
NO. 3

The Dayton Combination Fare Box-Recorder is the full and logical development of the fare box method of fare-getting and fare handling.

ADVANTAGES:

- All cash fares registered through the fare box.
- All fares indicated and registered.
- Indisputable records obtained of the fare collections.
- No figure drudgery.
- No arguments in settlement.
- No money-losing errors in trip sheet footings and extensions—but full collections, full settlements, and a *square deal* for both company and employees.

Write today for information regarding the type of fare register equipment in which you are interested.

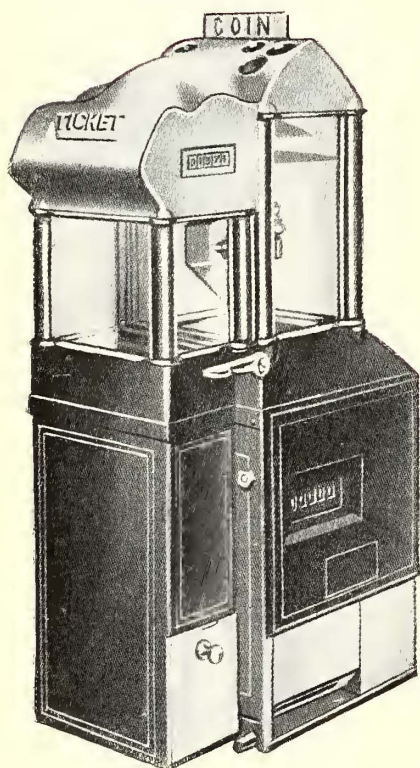


The Dayton Fare Recorder Company

Dayton, Ohio

What Greater Fare Box could than the

The JOHNSON Re



For Coins and Tickets

Roads Like These Use the Johnson Fare Box

Stone & Webster Properties
Public Service Corporation of N. J.
Third Avenue Railway Co., New
York
Union Railway Co., New York
New York Railways Co., New York
United Railways & Electric Co.,
Baltimore
Grand Rapids Railway Co., Grand
Rapids
Omaha & Council Bluffs St. Ry.
Co.
Elmira Water, Light & R.R. Co.,
Elmira, N. Y.
United Railroads of San Francisco,
Calif.
San Francisco-Oakland Terminal
Rys., Oakland, Cal.
Mobile Light & Railroad Co., Mo-
bile, Alabama.
Municipal Railways of San Fran-
cisco, Calif.
Cedar Rapids & Marion City Ry.
Co., Cedar Rapids, Ia.
Union Electric Co., Dubuque, Iowa.
Public Utilities Co., Evansville, Ind.

has proven its ability absolutely beyond the slightest possibility of challenge or doubt to meet *any* and *every* fare-collection requirement.

Get All the Fares

On big roads—on small roads—where the traffic is heavy—where the traffic is light—during ordinary service conditions—during rush-hours, IT HAS DEMONSTRATED ITS PRACTICAL UTILITY AS A MEANS OF FARE COLLECTION WHICH GETS ALL THE FARES.

6000 in Service

Not fifty or a hundred or five hundred or a thousand, but *more than 6,000* of these boxes in use throughout the country afford you ample evidence of the fact that the Johnson Registering Fare Box has "arrived."

Used by 60 Important Roads

Its adoption and use by *sixty important railways* throughout the United States and only the highest praise for the machine's accuracy, its durability and the manner in which it increases fare receipts, would certainly indicate that the Johnson Fare Box has long since gone beyond the experimental stage.

The Blunt Facts Demanded

TODAY, IT IS NOT A QUESTION OF THEORIES OR CLAIMS—BUT RATHER OF "Where is your machine installed? What is it doing? What is its record? How does it stand up in service? What is its maintenance cost? What will it mean to our road in dollars and cents if we put it on our cars?"

The Answer

And what kind of an answer do you think the Johnson Registering Fare Box justifies and earns to those questions when roads like the Public Service Corporation of New Jersey order and reorder 1400 of these boxes—like the Third Avenue Railway of New York, 1000—like the Stone & Webster Properties, 1000—like the Omaha & Council Bluffs Street Railway—United Railroads of San Francisco—San Francisco-Oakland Terminal Railways, and many others of equal prominence which equip their cars with the Johnson Box?

*Write us Stating Number of Cars You
will Suggest How to Meet Them*

JOHNSON FARE

Robey St. & Jackson

30 Church St.

Indorsement of a Would you require these Facts: Registering Fare Box

NOW WHY?

2 to 15% Increase in Earnings

Primarily, because the Johnson Registering Fare Box increases the revenue of an electric railway 2 to 15% and tremendously speeds up the collection of fares, making a most remarkable improvement in schedules during rush hours.

Millions Lost Annually

Millions of dollars are lost annually in missed fares. The Johnson Registering Fare Box will save *YOUR* Road its proportion of that loss. It revolutionizes business methods as far as fare collections are concerned. It does away with the old-fashioned "wooden till" method and applies in its stead the "cash register" principle to street railway operation.

No Chance of Error

It positively eliminates all errors in fare—collection—no matter how or where incurred and assures full and complete fare collection.

Solves Ticket Problem

The Johnson Registering Fare Box not only provides fully for cash fares but it also *solves the ticket problem*, and even goes a step further by seizing the tickets from the passenger's hand, *cancelling the ticket and registering it*.

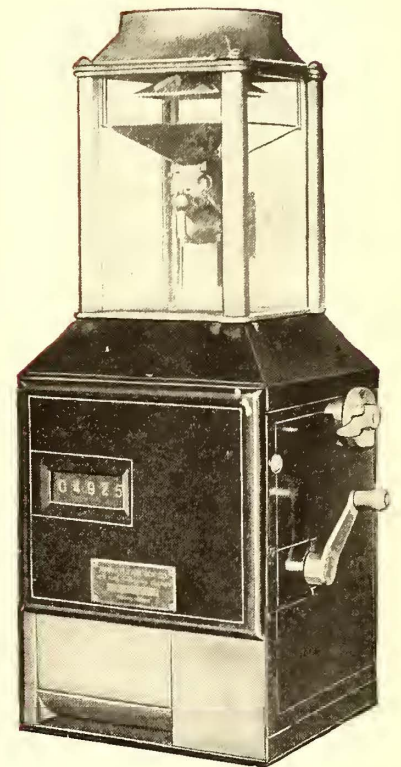
Satisfies U. S. Government

The coin-counting mechanism is the same as in the Johnson Coin Counter which is employed by the *United States Government* and in use in all *prominent banks*—so there can be no room for doubt as to the *accuracy* of this machine.

Maintenance Is Negligible

As to its *maintenance*, that is *practically nil* and we can very quickly satisfy you on that point as well as on every other claim we have made, by the most *convincing indorsements* by some of the biggest, most important and most exacting electric railways on this Continent.

If you are *willing* to be convinced we can *certainly* convince you.



For Coins Only

The Johnson Fare Box INCREASED THE EARNINGS of The Third Ave. Ry. \$194,000 in One Year.

IT ADDS 2 to 15% to Fare Receipts!

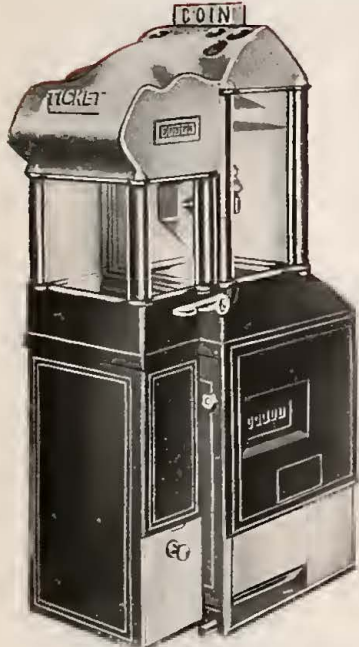
Operate and Your Conditions and we and Advise as to the Cost

BOX COMPANY

Boulevard, CHICAGO
 NEW YORK

What Greater Indorsement of a Fare Box could you require than these Facts:

The JOHNSON Registering Fare Box



For Coins and Tickets

has proven its ability absolutely beyond the slightest possibility of challenge or doubt to meet *any* and *every* fare-collection requirement.

Get All the Fares

On big roads—on small roads—where the traffic is heavy—where the traffic is light—during ordinary service conditions—during rush-hours. IT HAS DEMONSTRATED ITS PRACTICAL UTILITY AS A MEANS OF FARE COLLECTION WHICH GETS ALL THE FARES.

6000 in Service

Not fifty or a hundred or five hundred or a thousand, but *more than 6,000* of these boxes in use throughout the country afford you ample evidence of the fact that the Johnson Registering Fare Box has "arrived."

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The Answer

And what kind of an answer do you think the Johnson Registering Fare Box justifies and earns to those questions when roads like the Public Service Corporation of New Jersey order and reorder 1,400 of these boxes—like the Third Avenue Railway of New York, 1,000—like the Stone & Webster Properties, 1,000—like the Omaha & Council Bluffs Street Railway—United Railroads of San Francisco—San Francisco-Oakland Terminal Railways, and many others of equal prominence which equip their cars with the Johnson Box?

Write us Stating Number of Cars You will Suggest How to Meet Them

JOHNSON FARE

Robey St. & Jackson
30 Church St.

Roads Like These Use the Johnson Fare Box

- Stone & Webster Properties
- Public Service Corporation of N. J.
- Third Avenue Railway Co., New York
- Union Railway Co., New York
- New York Railways Co., New York
- United Railways & Electric Co., Baltimore
- Grand Rapids Railway Co., Grand Rapids
- Omaha & Council Bluffs St. Ry. Co.
- Elmira Water, Light & R.R. Co., Elmira, N. Y.
- United Railroads of San Francisco, Calif.
- San Francisco-Oakland Terminal Rys., Oakland, Cal.
- Mobile Light & Railroad Co., Mobile, Alabama
- Municipal Railways of San Francisco, Calif.
- Cedar Rapids & Marion City Ry. Co., Cedar Rapids, Ia.
- Union Electric Co., Dubuque, Iowa
- Public Utilities Co., Evansville, Ind.

Indorsement of a Fare Box

NOW WHY?

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Maintenance Is Negligible

As to its *maintenance*, that is *practically nil* and we can very quickly satisfy you on that point as well as on every other claim we have made, by the most *convincing indorsements* by some of the biggest, most important and most exacting electric railways on this Continent.

If you are *willing* to be convinced we can *certainly* convince you.

Operate and Your Conditions and we will Advise as to the Cost

BOX COMPANY

Boulevard, CHICAGO
NEW YORK

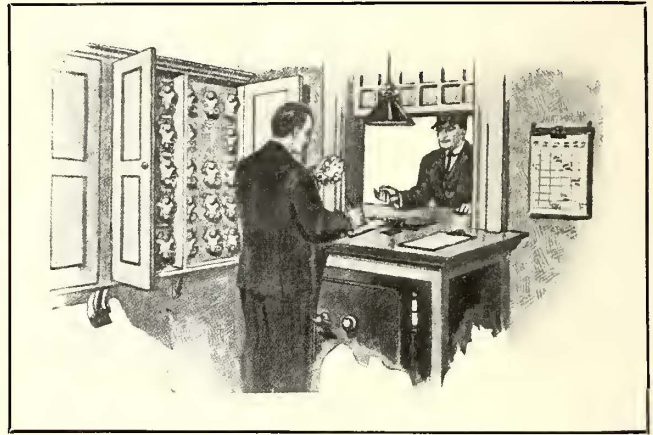


For Coins Only

The Johnson Fare Box INCREASED THE EARNINGS of The Third Ave. Ry. \$194,000 in One Year.

IT ADDS 2 to 15% to Fare Receipts!

Car Equipment vs. Man Equipment In Fare Collection



When buying fare registers or fare boxes the idea instinctively comes to the railway man that he is buying something to *go along with the car—car equipment.*

Unfortunately for him, that is just what he is buying—and being purely car equipment the efficiency varies as car *types* vary.

The old clock register and fare box have many vital defects due to their dependence upon variable factors. They are lame because *the car itself does not provide for certain things*, and these registers or boxes are *dependent upon car arrangement*. The fare box is a go-along-with-the-car proposition. For increased receipts through its use you look largely to the type of car rather than to any increased get-together efficiency in the relationships of passenger, conductor or company.

The ROOKE SYSTEM principle and register is the mechanically expressed result of the idea that if you are ever to get maximum receipts, protect your conductors and secure the proper co-operation of your passengers when paying their fares—if you are ever to get these things, the register used must be *a part of the conductor, a part of the passenger, and a part of the company. These three factors must get together the instant of payment. Their interests, attention and physical moves, the instant of fare payment, must be absolutely conjoined.*

The ROOKE register is not car equipment. *It is fare collecting service.* The register goes along with the conductor, becomes a handy feature of personal convenience, is both a *spur to secure his best efforts and a check positively deterring him from error.*

It is greatly to your advantage that the ROOKE register operates this way. When the conductor takes his car he signs for and takes his register, and

there is no possible dispute regarding readings or complications with other conductors. When he leaves the car the register goes along with him just the same as a valuable watch in his pocket. His record is never locked up in the car, mixed with other conductor's records, or subjected to auditing delays. In making his turn - in the register goes along with his report and can flexibly convenience the auditor. When it is necessary to go into the car to collect fares (and such things are necessary even on prepayment cars) the fare collecting system goes right along with him. *The passenger always pays the same way. The register always goes to the passenger. The transaction is always on the basis of passenger (1st), to company (2d), to conductor (3d).* This applies to all types of cars. It brings to you one standard, uniform system for all your cars—prepayment and otherwise.

On the prepayment platform the ROOKE register, in the conductor's hand, is within the reach of every passenger on the rear platform. The passenger cannot hang back or take advantage. The conductor is not cooling his eye on some box, hampered in his movements and forced to go slow through the slow movement of passengers who may be attempting to "put something over" on the mute fare box. The conductor conveniences passengers, speeds up loading time. He *goes after fares.* His collecting instinct is utilized and developed—*not killed, as with the box.* Each transaction on the car means that the passenger and the conductor are forced to give the instant of attention necessary so that all parties *see* the register, *feel* the action of the register, *hear* the bell of the register, and instinctively *know* that the fare is registered properly.

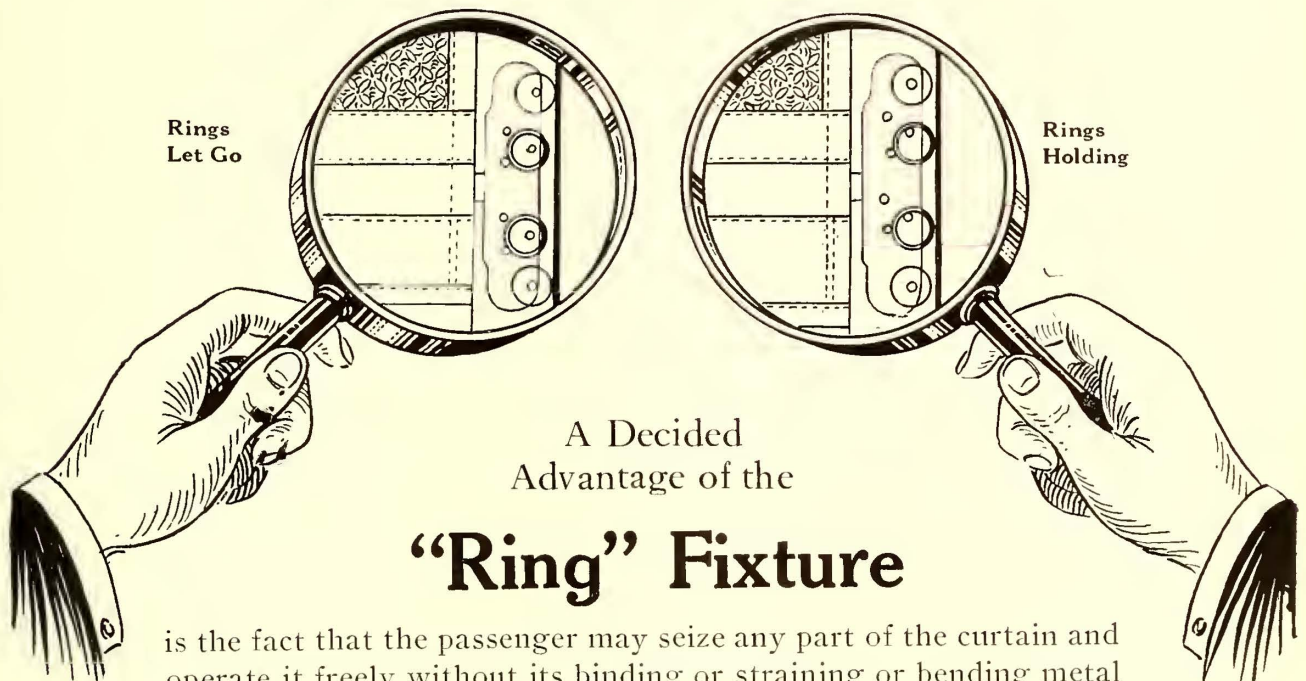
The ROOKE SYSTEM is the only real, get-together system possible for you.

ROOKE AUTOMATIC REGISTER COMPANY

PROVIDENCE, RHODE ISLAND

Educating Passengers to Operate the Pinch Handles of a Car Curtain Costs a Lot of Money!

No "Education" is necessary when *This*
Car Curtain is used



A Decided
Advantage of the

"Ring" Fixture

is the fact that the passenger may seize any part of the curtain and operate it freely without its binding or straining or bending metal or fabric.

And yet the curtain holds fast in any set position.

It is all due to the automatic "Hold" and "Let go" action of the rings (see illustration).

Another very important feature:

The Ring Fixture has a locking adjustment.

This is in the form of a pin and socket on the knurled end of the spring chamber, holding the tips in proper adjustment.

***83% of All the Cars Purchased by Electric Railways in 1914
were Equipped with the Ring Fixture!***

Write for Bulletin "C-3"

**The Curtain Supply Co., 322 West Ohio St., Chicago
48 Church Street, New York**

NEW DISCOVERIES

Everybody Threatened by the GERMS That PLAGUED JOB

We Can "Catch" Boils E



By L. K. HIRSHBERG.
A.B., M.A., M.D. (Johns Hopkins).

A FEW OF THE W

From Left to Right—Straps in Street Cars, Linen C
in the Barber Shops, a Friend

BOILS receive their name because it used to be be-
lieved that they were due to the blood's becoming
too hot and boiling over in different parts of
body. Until very recently most persons wh
ould go to a druggist or to a doc

at the ... of other

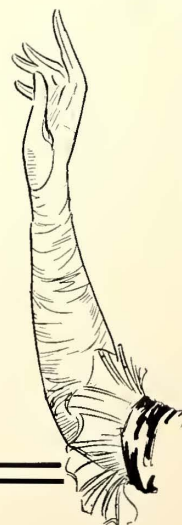
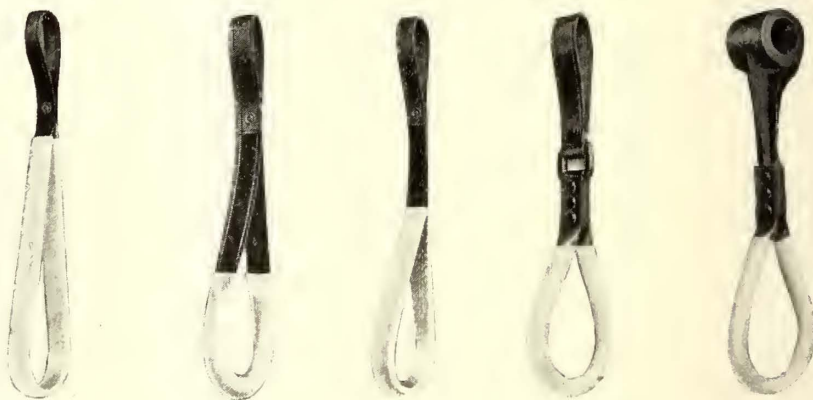
Adopt these snow-white,
non-absorbent
RICO Sanitary Strap Covers.

The public is awakening
to the dangers of unco-
vered leather-straps. They
will appreciate
RICO covers.

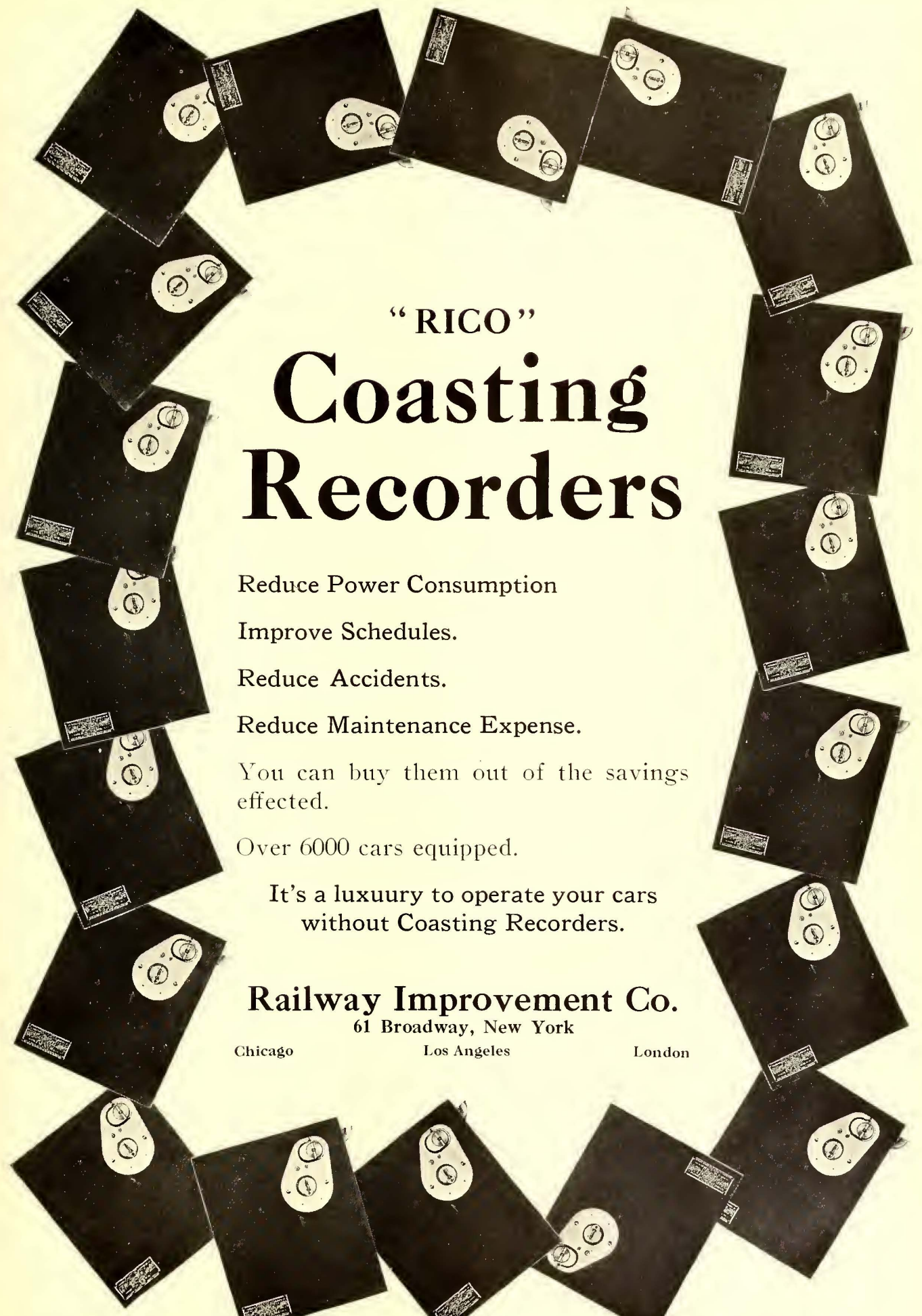
Roads to the number of
300 have adopted them.
You can utilize your old
straps.

Write for our booklet,
"The Car Beautiful."

**Railway
Improvement Co.**
61 Broadway, New York



**RICO
Sanitary
Strap Covers**



“RICO”
**Coasting
Recorders**

Reduce Power Consumption

Improve Schedules.

Reduce Accidents.

Reduce Maintenance Expense.

You can buy them out of the savings effected.

Over 6000 cars equipped.

It's a luxury to operate your cars
without Coasting Recorders.

Railway Improvement Co.

61 Broadway, New York

Chicago

Los Angeles

London



AGASOTE
HEADLINING

PANTASOTE CURTAINS

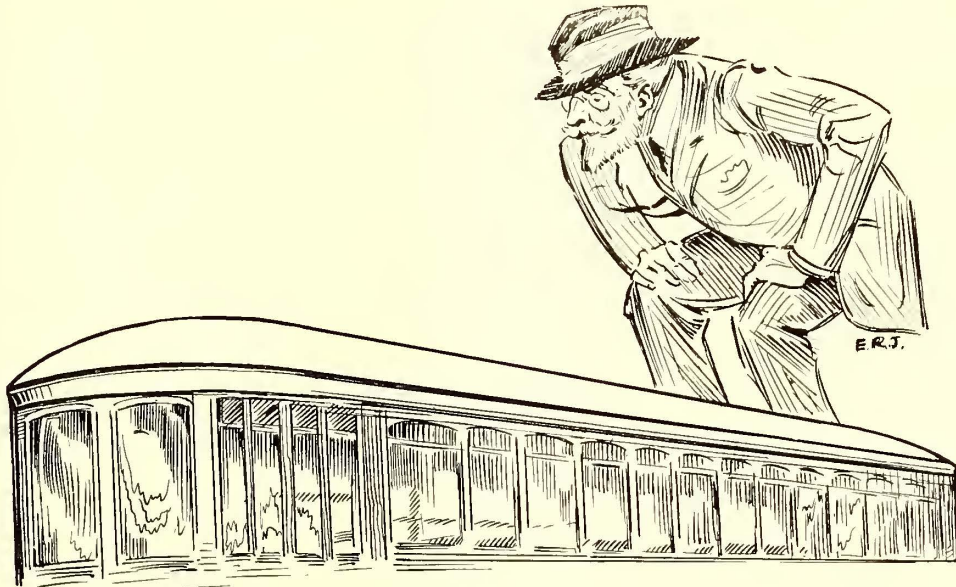
PANTASOTE CURTAINS

Extract from article describing New Orleans Cars.
Electric Railway Journal, Feb. 6, 1915.
"Altogether, the design constitutes an excellent
example of the most modern developments in sur-
face car construction."

Interior view of new cars for New Orleans
Ry. and Light Co. Agasote Headlining
and Pantasote Curtains.

The Pantasote Company
New York
Chicago San Francisco Montreal

Take Thought About the Top of Your Car When Considering 1915 Economies



And Join the Army of BAYONNE CAR ROOFING USERS

The BAYONNE specially prepared canvas has been proved beyond all doubt to be the best weather resisting roof material which has entered into car construction.

Unlike ordinary fabric roofing, BAYONNE CAR ROOFING WEARS. Its ingredients embody the best chemical and mechanical thought in dealing with destructive weather conditions. The many electric and steam roads which are its users since it first came on the market eight years ago have never added new cars without specifying BAYONNE CAR ROOFING. It increases the life of the car. And we have added a new word to car use—"Car-Roof-Mileage."

We would earnestly advise you to pare down roof maintenance cost with

**BAYONNE
CAR
ROOFING**

26" to 120" wide

We would like to send you our literature on
"car head-gear."

JOHN BOYLE & CO., INC.

112-114 Duane Street New York City 70-72 Reade Street

Branch House, 202-204 Market St., St. Louis, Mo.

Wide Cotton Duck

Largest Stock and assortment in United States
Also headquarters for Chccscloth and Bunting

Suppose you had a man on every one of your cars doing THIS

twenty-four hours a day.

Suppose each man's duty was to save heating current now going to waste.

Suppose each had to constantly watch the thermometer.

Whenever the temperature rose above the arbitrary "point," he must cut off the heating current.



You know that this would occur many times a day and the aggregate saving in a year on all your cars would be ENORMOUS.

And you know also that such a task would be well-nigh impossible of accomplishment by any ordinary man and utterly out of the question from a practical standpoint.

But do you realize that there is an actual and remarkably effective method of accomplishing these savings, in

The UTILITY Electric Thermometer Control

And it is a method that is free from the "man factor"—a method that, once installed, works AUTOMATICALLY, hour after hour, day and night, week in and week out, year after year, without ever shirking, without complaint, without pay and WITHOUT FAILING to fulfill its function—the *saving of your current*.

Here's what it means to you: The desired temperature in your cars automatically maintained at all times with a minimum consumption of current.

Utilization of the heat radiated from the passengers' bodies in a well-filled car, with a corresponding saving of heating current.

A greatly reduced heating load at the very time when the power load is greatest.

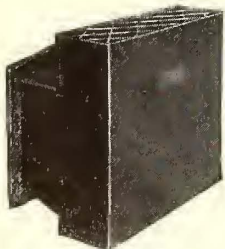
Let us explain the advantages of this method more in detail and show you its superiority over any other device on the market.

Remember, we sell it with an iron-clad guarantee. *Investigate it.* Ask for catalog 400.

Successful Car Ventilation Is Not Simply a Question of Buying Ventilators and Installing Them

UTILITY Car Ventilators

Are Made in Different Types to Meet Widely Varying Conditions



Honeycomb Type for Side Deck

It is an engineering problem which must be met scientifically with the type of ventilator and the number of ventilators best adapted to the work to be performed.

Through constant study of the field, our engineers can tell you the type best suited to meet your particular ventilating conditions.

Put your problem up to us.

Utility Ventilators are economical in first cost, simple and rugged in construction, light in weight, easily and cheaply applied, durable, water-proof, weather proof, dust, dirt and cinder-proof. They exhaust the air efficiently whether the car is running or standing still.

Charts and full technical data sent to any road interested, on request.



Round "Jet" Type (Patented)

Railway Utility Company

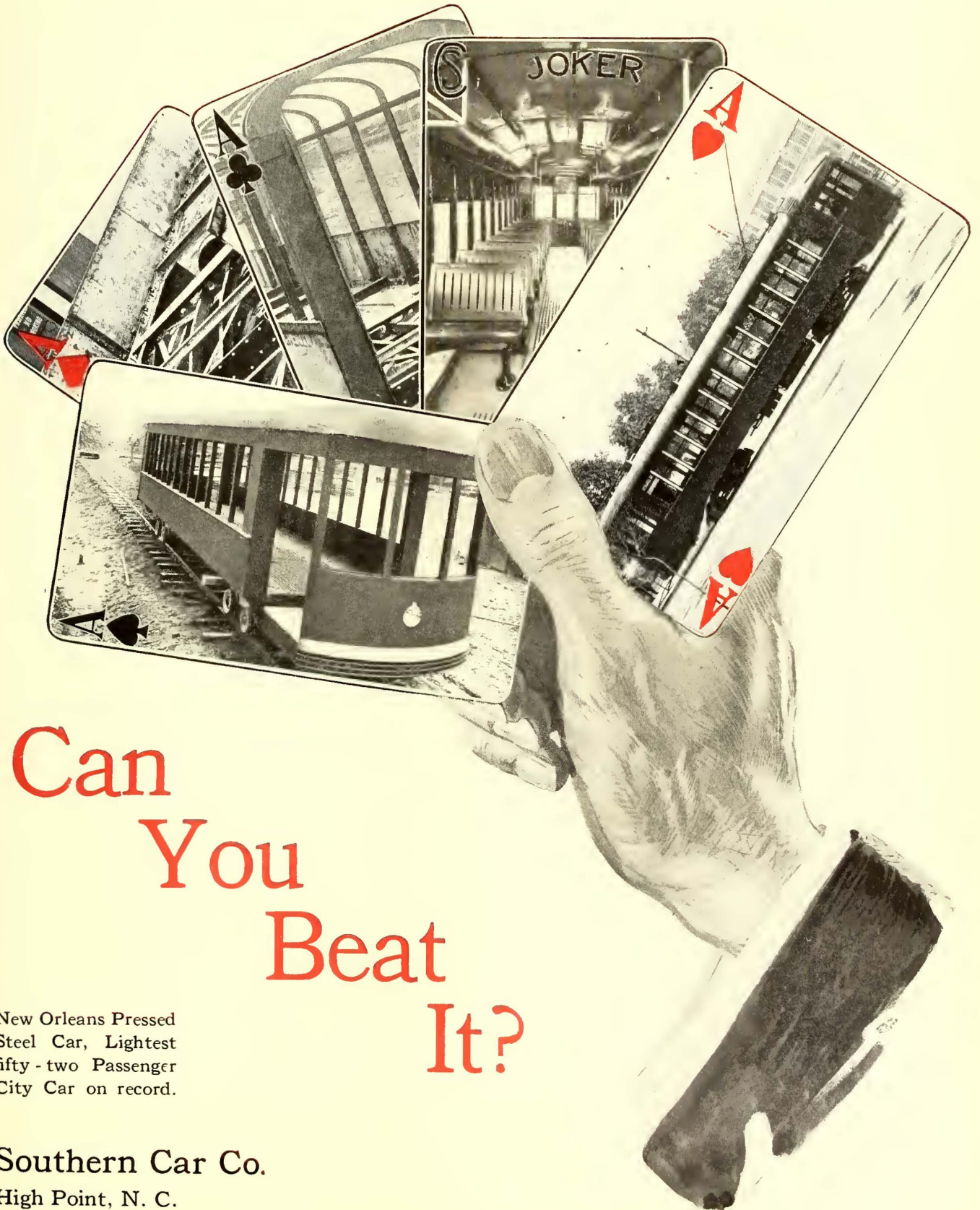
General Offices

721 West Fulton St., Chicago

Eastern Office

1328 Broadway, New York

The Bluff Called!



Can
You
Beat
It?

New Orleans Pressed
Steel Car, Lightest
fifty - two Passenger
City Car on record.

Southern Car Co.
High Point, N. C.

Watch Your Step!

No matter what the weather
guarantee your passengers

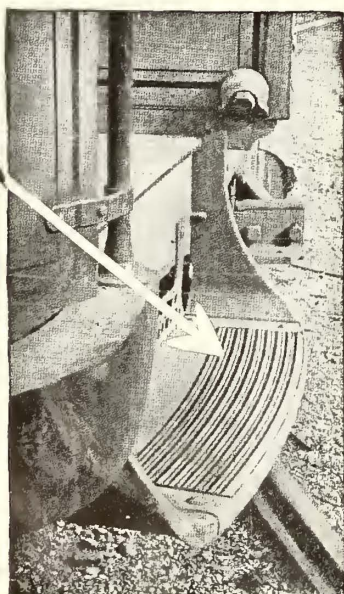
SAFE FOOTING

The Stanwood Car Step

with its high carbon steel treads which are arranged to be self-cleaning, makes entrance to the car and departure from it safe. Its reputation is world-wide. Made in single, double, triple and folding types. It can be furnished with various types of hangers to fit any make of car—new or old.



The most costly thing in equipment is not first cost—but after-maintenance. Cost of accidents to passengers should be listed under this head.



Mason Safety Tread on Curved Step of Trolley Car.

The Mason Safety Tread

is necessary wherever walking in a vehicle is dangerous because of motion or weather conditions. Every condition under foot is provided for by the Mason Safety Tread—aisles, station-platforms, vestibules, running boards, steps, etc. The tread can be put on any material. It is ideal in resisting wear, and is made with either lead or carborundum filled grooves.

Complete Information on Request

American Mason Safety Tread Co.

Main Offices, Lowell, Mass.

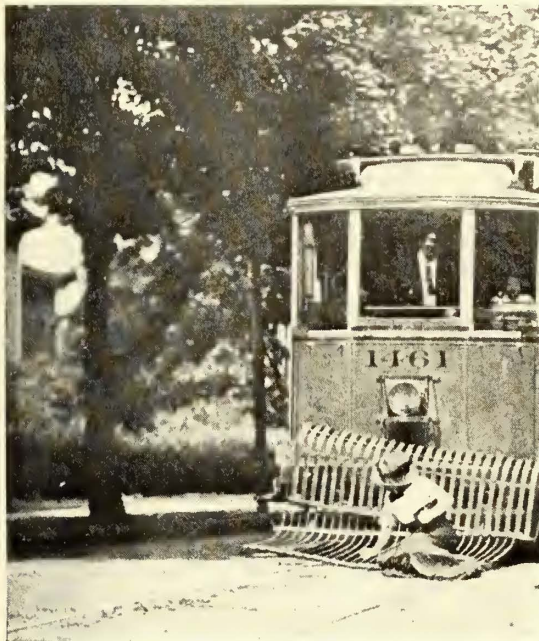
Branch Offices: Boston, New York, Chicago, Philadelphia, Kansas City, Cleveland, St. Louis

There can be No Half-Way Measures in Life-Saving

Hence the Wide Adoption of

Providence Fenders

and



From the Public Service Safety Campaign

H-B

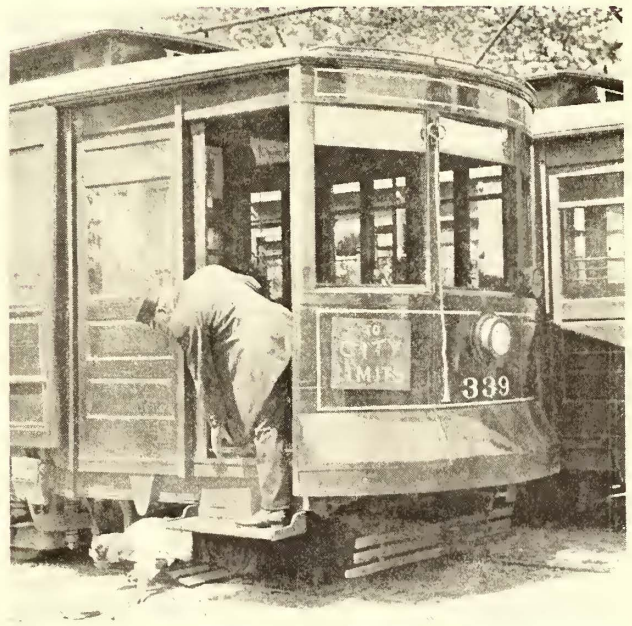
Life-Guards

The Consolidated Car Fender Co.

Providence, R. I.

Wendell & MacDuffie Co.

61 Broadway
General Sales Agents



From the Chicago Safety Campaign



Golden Glow replaced 4 ampere arc and incandescent headlights at Omaha after thorough competitive test.

OMAHA & COUNCIL BLUFFS
STREET RAILWAY CO.

OMAHA, February 2, 1915.

BROWN & HALL, St. Louis, Mo.

Gentlemen:

I feel that some explanation is due regarding this photograph.

You will note that this picture shows the Golden Glow headlight and also the ordinary dash type incandescent headlight below. You will recall that we formerly used arc headlights in the outlying districts and the incandescent light when in town.

We replaced the arc light with the Golden Glow and use it exclusively on these cars, the semaphore lens lamp not being used at any time.

The latter was set in the dash and as we have not needed them elsewhere and the cars have not been overhauled, the lower light has been left in the car dash up to this time.

Yours very truly,

(Signed) F. S. WELTY,
Purchasing Agent.

Golden Glow Headlights Are Winning in Every Test

Because

They Give More Light than an arc or any other incandescent headlight. This is easily proven. You can actually see further down the track, pick out switch points, distinguish passengers in easy stopping distance.

They Provide a Different Quality of Light—a soft golden beam which will not dazzle or blind those approaching. It will penetrate fog and rain far better than a white light. On city streets where lights are numerous the beams from the "Golden Glow" blend with the general illumination. In dark sections "Golden Glow" gives a result which cannot be secured with any other headlight.

They Decrease Expense of front-end illumination. The average arc light costs \$75 to \$80 per year for current and maintenance. It consumes from 2½ to 5 amperes, 1.4 to 3 K.W., a very considerable amount. "Golden Glow" uses between 23 and 150 watts, depending upon the type and service. There is no maintenance to the "Golden Glow" mirrored glass reflector, nothing to wear out, and replacements are limited to the renewal of incandescent bulbs.

They Increase Efficiency. Your motorman always has an operating light, a light which is always on the right of way, never flickers nor kicks out. There has never been an accident to a car so equipped because of lack of light.

Let us Make a Trial for You

Scores of operating officials all over the country have accepted our offer to make an actual service demonstration of "Golden Glow" headlights. We leave the lamps on the car

for a month or two, subject to their most severe conditions.

We will be glad to do this for you. Either write the factory direct or our nearest office.

E. R. Mason Co., 2038 Grand Central Term., New York.
The Walker-Smith Co., Knickerbocker Bldg., Baltimore.
The C. E. A. Cary Co., 2 Toronto Street, Toronto, Canada.
J. B. Sebring Co., Baum and Euclid Streets, Pittsburgh.
L. L. Parkinson, 634 Cass Avenue, Detroit.
C. F. Saenger & Co., Electric Building, Cleveland.
R. R. Holden, 320 New York Life Building, Chicago.
Grayson Railway Supply Co., LaSalle Building, St. Louis.
Brown & Hall Supply Co., 620 Central National Bank Building, St. Louis.

Railroad Signal Supply Co., Hackney Building, St. Paul.
Alfred Connor, Majestic Building, Denver.
F. C. Morton, Walker Bank Building, Salt Lake City.
G. L. Priest, 229 Sherlock Building, Portland, Oregon.
F. F. Bodler, 901 Monadnock Building, San Francisco.
S. I. Wailes, Trust and Savings Building, Los Angeles.
Giovanni Chechetti, Milan, Italy.
Ammann & Co., Zurich, Switzerland.
Forest City Electric Services Supply Co., Salford, England.

The **ESTERLINE** Co.

219 East South Street,

Indianapolis, Indiana

SERVICE

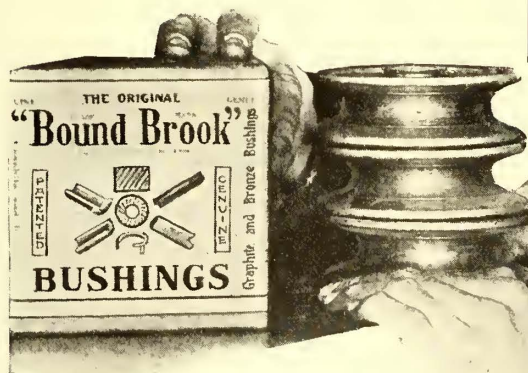
The service you get *out* of your bushings depends entirely upon what the manufacturers put *into* them.

Recently a "Bound Brook" Bushing was removed from a four-inch trolley wheel after having run

27,633 Miles

The wheel was worn out, *but the bushing showed little evidence of wear.*

With such evidence as this, and knowing the fact that

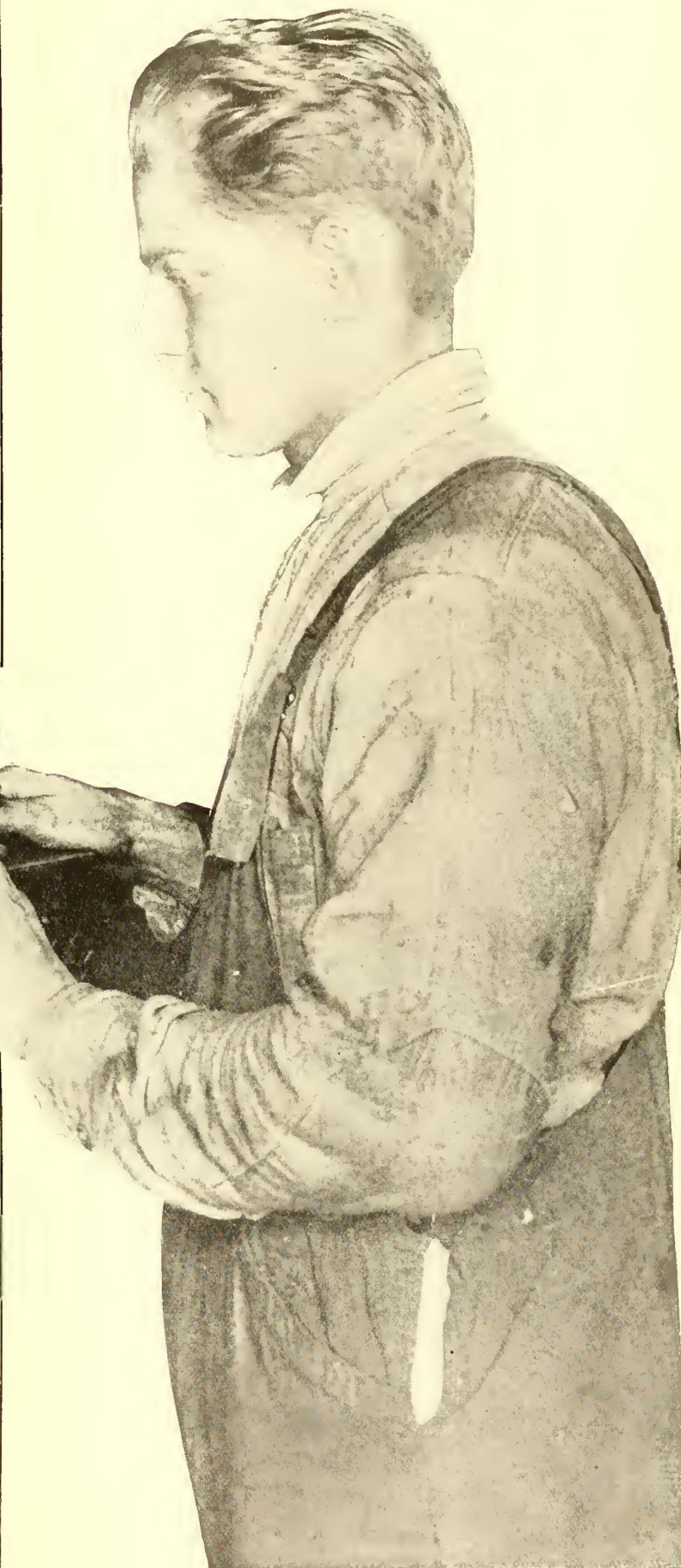


Over a Million

"Bound Brook" Bushings were sold last year, you should buy *only* the Genuine Bound Brook Bushing, packed fifty to the box, with the green label.

All genuine graphited "Oil-less Bearings" have always been made at Bound Brook, N. J., in the U. S. A. by the

**Graphite Lubricating
Company**





33 $\frac{1}{3}$ % Reduction

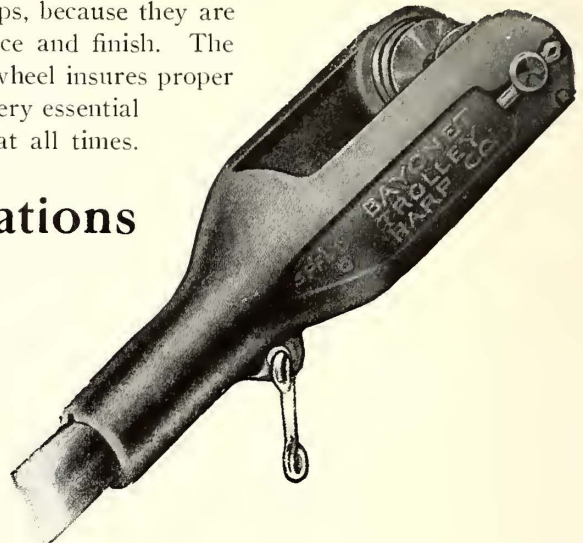
in trolley maintenance expense is the usual record of railway companies after standardizing on BAYONET TIME-SAVING TROLLEY EQUIPMENT. The saving in trolley wheels alone usually pays for the harps and their maintenance.

Bayonet Special Trolley Wheels

increase this saving if used in Bayonet Detachable Harps, because they are made of superior quality of metal with accurate balance and finish. The quick and easy method of changing the harp head and wheel insures proper inspection, lubrication and adjustments, all of which is very essential in keeping your trolleys in perfect running condition at all times.

75 Styles, Sizes or Combinations of Harps

to select from. Detachable Harps—changed in TEN SECONDS—for Interurban, City and Industrial Cars, surpass all others for economy and efficiency. Non-detachable Harps, ranking next to our Detachable Harp for efficiency, for those who want THE BEST FOR THE LEAST MONEY. No harp is so well made. Smooth, symmetrical, light.

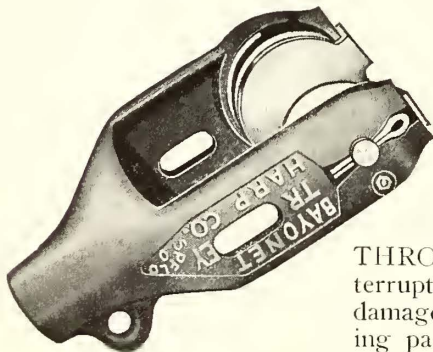


We will eliminate your trolley wheel bearing troubles and expense, if you will use either our No. 57 or 67 Harp and our No. 18 or 19 Wheel, which are provided with our famous self-lubricating bearings that never wear out. A 4000-mile test on high-speed showed no wear in the bearing of a No. 19 wheel. The groove will run several thousand miles more. Let us tell you why.

Bayonet High Speed Trolley Bases

are built to stand the severest service. Made largely of steel, renewable bushings in all bearings, highest grade springs, anti-friction tension, POLES CHANGED IN ONE MINUTE and wheels perfectly aligned with wire. It is THE WEAR-EVER BASE WITH THE TIME-SAVING FEATURES

THROWN IN. No delays to cars. No interruption to train schedules on account of damaged trolleys. Its interchangeable wearing parts make it the cheapest to maintain.



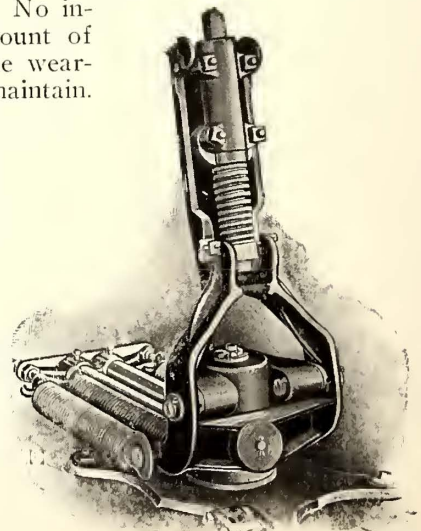
Bayonet Equipment Sells on Its Merits

SOLD ON 90 DAYS' APPROVAL. IF NOT SATISFIED THAT IT IS THE BEST YOU EVER USED, SEND IT BACK AT OUR EXPENSE.

Will you take advantage of this golden opportunity to learn why it is economy to use Bayonet Time-Saving Trolley Equipment on your cars? Write us for further particulars.

Bayonet Trolley Harp Co., Springfield, Ohio

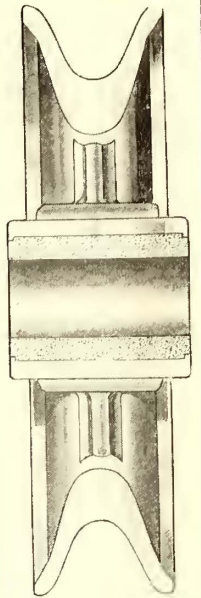
Wm. R. Garton, Sales Engineer, 299 Broadway, New York City, N. Y.
John S. Black Co., Sales Agents, 908 Hennen Bldg., New Orleans, La.
Satterlee Elec. Co., Hall Bldg., 9th and Walnut Sts., Kansas City, Mo.





This Wheel

needs No Lubricating



Think what this means.
Once installed, it requires no attention—saves lubricant and labor—does away with the destructive effects of dripping oil and the constant wear and tear on roofing caused by shopmen. The

V-K

OILLESS TROLLEY WHEEL

is effectively and continuously self-lubricating without any of the drawbacks that limit the practical value of other self-lubricating types.

Because the "V-K" has no oil or grease chamber around the bearing acting as an insulator to destroy or diminish perfect conductivity. It is made with a patented graphite and gauze bushing thoroughly impregnated with graphite lubricant—non-insulating—heat-proof—long-lived—easily interchangeable.

The "V-K" wheel is made of specially tough metal—not hard—is properly balanced—mechanically perfect in finish—gives greater mileage with least detriment to overhead wiring.

For best results, use the "V-K" OILLESS TROLLEY WHEEL with the

"V-K" NON-ARCING HARP

The harp with the patented gripping device for locking the axle-pin in its socket. Gives the best form of contact yet obtained in any type of harp—ensures freedom from interruption of current—prolongs life of wheel and harp together.

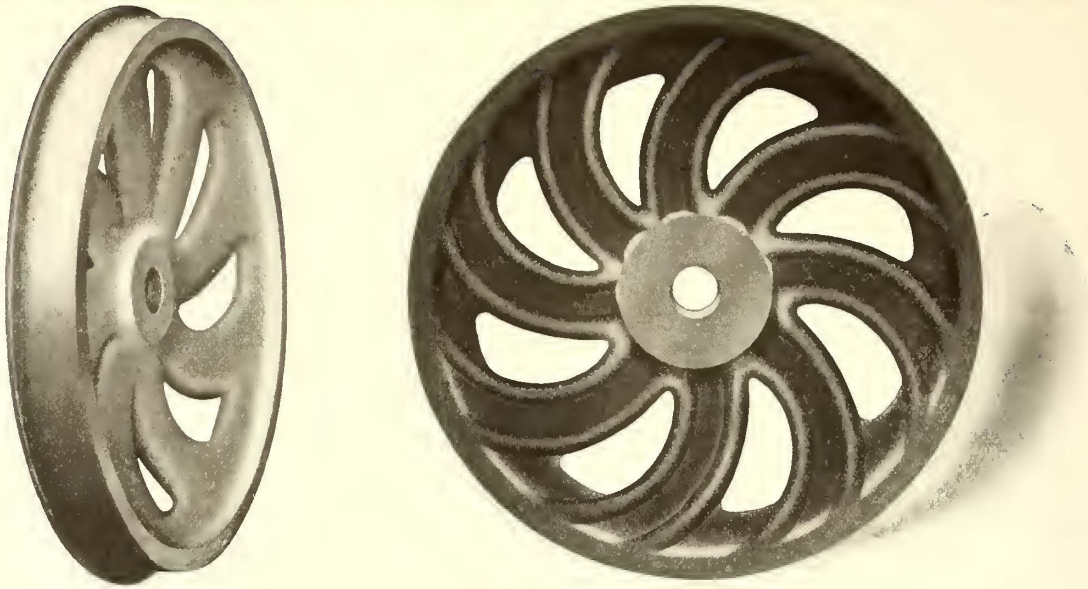
Any fair trial of the "V-K" equipment will convince you of the wisdom of adopting them as standard. Look into this further—write us for particulars.

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

MORE-JONES BRASS & METAL CO.
ST. LOUIS, MO.

Manufacturers of

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



The Wonderful Single Service Chilled Iron Car Wheel

In One Hundred Cities of the United States and Canada 90 per cent. of the Street Car Companies operating 100 cars or over use Chilled Iron Car Wheels.

Occasionally a Street Car Company will experiment with other types, but in most cases return to the Chilled Iron Wheel. This does not just happen—it is a lesson forced by experience.

Chilled Iron Wheels, unlike other types, act in harmony with the parts with which they come in contact such as brake shoe and rail.

Comparative tests in some cases show the consumption of brake shoes 25% to 50% greater with other types than with Chilled Iron Wheels. When this loss is considered and when we reckon on an additional loss in rail wear and power consumption of at least 10%, the reason why Chilled Iron Street Car Wheels are used in such a diversified territory is apparent.

The Wonderful Single Service Chilled Iron Car Wheel

ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS

1214 McCormick Building, Chicago

Representing forty-eight wheel foundries throughout the United States and Canada.
Capacity 20,000 Chilled Iron Wheels per day.

More than three dozen electric roads, operating nearly ten thousand cars have, within the past three years, equipped every car on their systems with

BARRETT

Emergency

CAR JACKS

In every important case on record, the railway companies have benefited greatly by the presence of the emergency jack for promptly relieving tie-ups, as well as for rescue work before the arrival of an emergency wagon in cases of serious accidents.

The Barrett Emergency Car jack is a powerful aid in minimizing losses through unavoidable accidents and tie-ups; it effects substantial savings of time and money.

No. 239 "Bay State" 15-ton jack with swivel claw is shown in middle picture lifting a car back on the track.

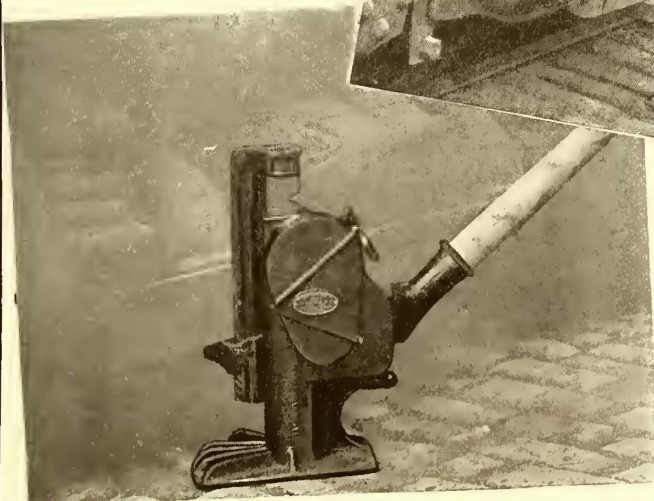
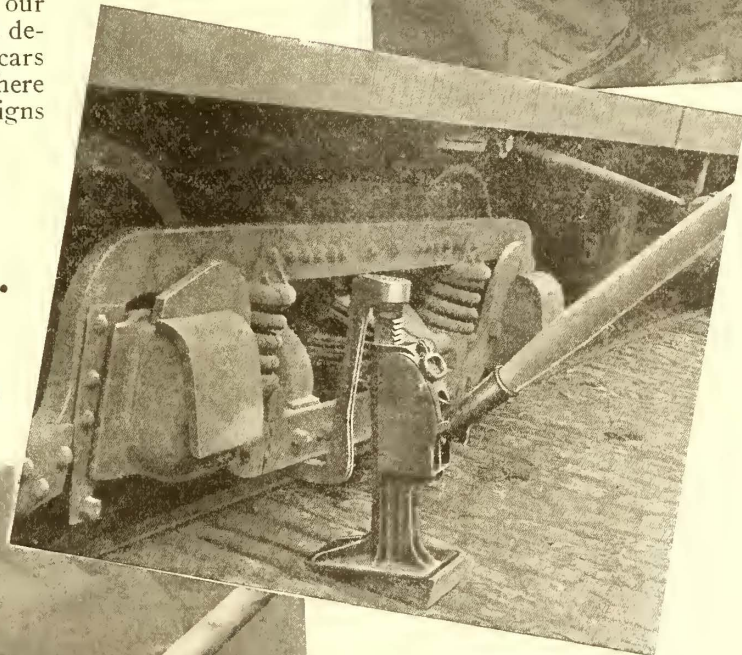
No. 439 "Senter" 20-ton geared jack was recently adopted by the Philadelphia Rapid Transit Co. for all their cars. Note the quickly adjustable swivel claw in lower photo. These are our two most recent models.

We offer the services of our engineering department in designing special jacks for cars of special construction, where none of our standard designs will fill requirements.

The Duff Mfg. Co.

Established 1883

PITTSBURGH, PA.
 50 Church St., New York
 Peoples Gas Bldg., Chicago
 Candler Bldg., Atlanta

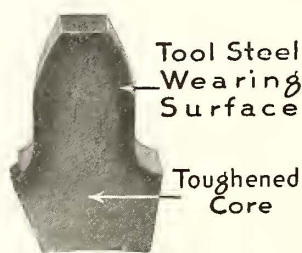


Send for complete Catalog No. 102 of:

- Barrett Track and Car Jacks
- Duff Ball Bearing Screw Jacks
- Armature Motor Lifts or Pit Jacks



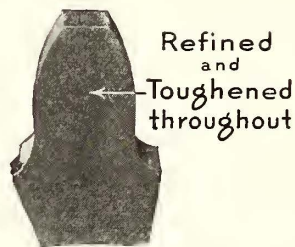
Insure Minimum Operating Cost by using "V D & D" Gears and Pinions



Grade HARDENED

Maximum Wear and Strength are secured by our special process of hardening. The wearing surface is converted into Tool Steel (wear), and the core materially toughened (strength).

Use our grade HARDENED for lowest cost per car mile.



Grade TREATED

Great Strength and Long Service are outstanding features of our Grade TREATED. Our special process of heat treatment refines and toughens the steel throughout, reducing breakage to a minimum.

Use our Grade TREATED for extra Heavy Duty Service.

*Write for our Pamphlet
A feature of lowest operating and maintenance cost*

THE VAN DORN & DUTTON COMPANY

Gear Specialists

CLEVELAND, O., U. S. A.

NEW YORK

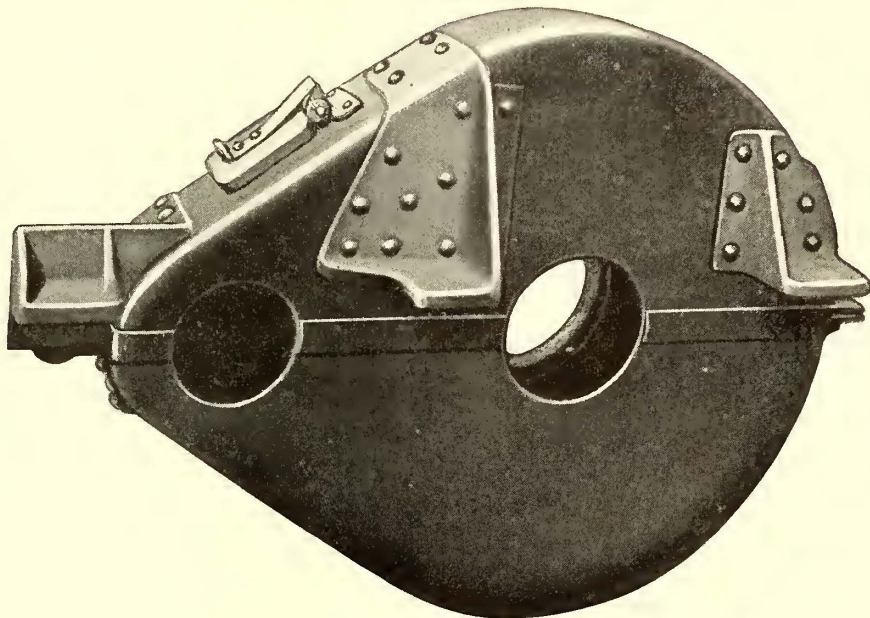
SAN FRANCISCO

C. E. A. Carr, Special Canadian Representative, 2 Toronto St., Toronto, Canada

Many railway men have admitted to us that particularly on low hung motors they are experiencing numerous gear case failures due entirely to bumping them over their special track work, etc.

Have you ever considered the importance this condition plays in running up your maintenance cost, and have you ever investigated whether or not the distance between your pavement and gear cases could be increased?

You can obtain Maximum Clearance with
Chillingworth Shallow Bottom Halves



W. H. 49 or W. H. 56

Are the Brackets you use designed and constructed to resist hard service, and will they compare with those illustrated above?

If you use Riveted Up Cases you already appreciate the value of the fact that there are no seams to open up on Chillingworth Cases.

If you are having Gear Case Troubles and are interested in solving them why don't you order about one dozen Chillingworth Cases and place them in service alongside of any other type of case and keep a comparative record of the results obtained, and award your business to the case that gives the most satisfaction with the least expenditure of money?

Thayer & Company, Inc., Agents
 111 Broadway, New York City

REPRESENTATIVES:

U. S. Metal and Mfg. Co., Southern and New England States
 Allen General Supplies, Canada.
 H. F. Keegan & Company, Chicago.

Grayson Railway Supply Co., St. Louis.
 W. R. Garton Company, Chicago.
 Union Electric Company, Pittsburgh.



Philip Nungesser

We Proved It

In the comparatively short time that Nungesser Carbon and Metal Brushes have been on the market, we have secured as regular customers leading firms in all lines of industry using carbon products as follows—

Street Railways

Steam Railways

Steel Mills

Electric Crane Manufacturers

Electric Signal Manufacturers

Automobile Starter and Lighter Manufacturers

Central Stations

Dynamo and Motor Manufacturers

Circuit Breaker Manufacturers

Railway Car Lighting Manufacturers

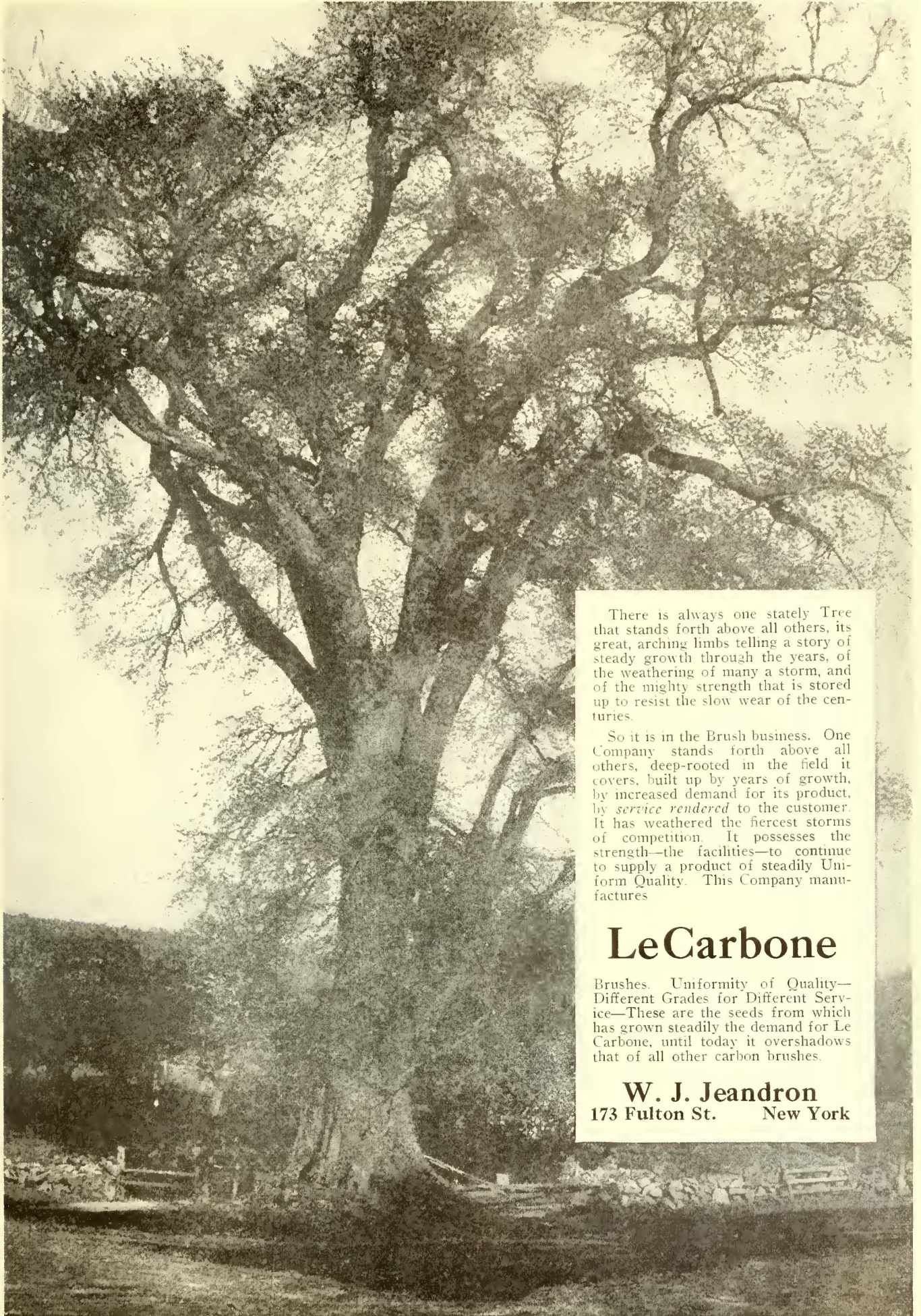
Electric Drill Manufacturers and Others

In each case we were obliged to prove that Nungesser brushes would give the customer "Better service than he had been receiving before."

If Such Service Interests You—Say the Word

The Nungesser Carbon & Battery Co.

Cleveland, Ohio



There is always one stately Tree that stands forth above all others, its great, arching limbs telling a story of steady growth through the years, of the weathering of many a storm, and of the mighty strength that is stored up to resist the slow wear of the centuries.

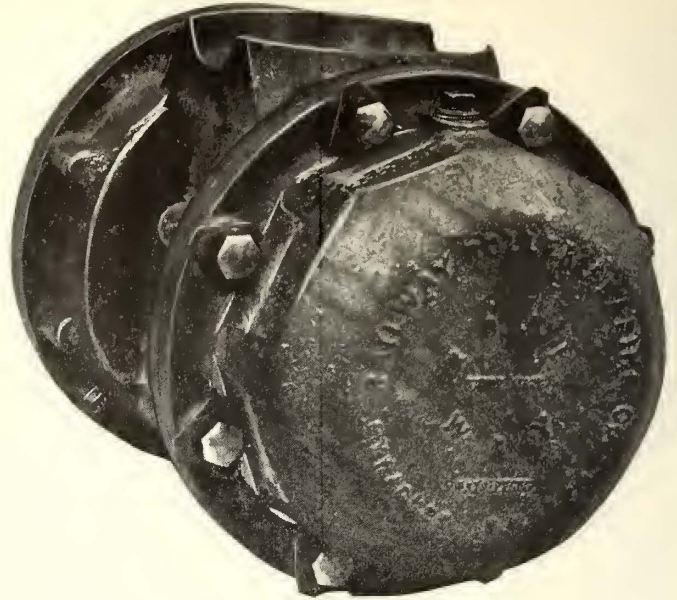
So it is in the Brush business. One Company stands forth above all others, deep-rooted in the field it covers, built up by years of growth, by increased demand for its product, by *service rendered* to the customer. It has weathered the fiercest storms of competition. It possesses the strength—the facilities—to continue to supply a product of steadily Uniform Quality. This Company manufactures

LeCarbone

Brushes. Uniformity of Quality—Different Grades for Different Service—These are the seeds from which has grown steadily the demand for LeCarbone, until today it overshadows that of all other carbon brushes.

W. J. Jeandron
173 Fulton St. New York

Making Good in New York



Rollway Bearings

For the past three years the Third Avenue Railway of New York has been operating thirty storage battery cars equipped with Rollway Bearings. They have been making a splendid record for low maintenance cost.

Rollway Bearings require *less lubricant* because they reduce friction and they are oil-tight and dust-proof.

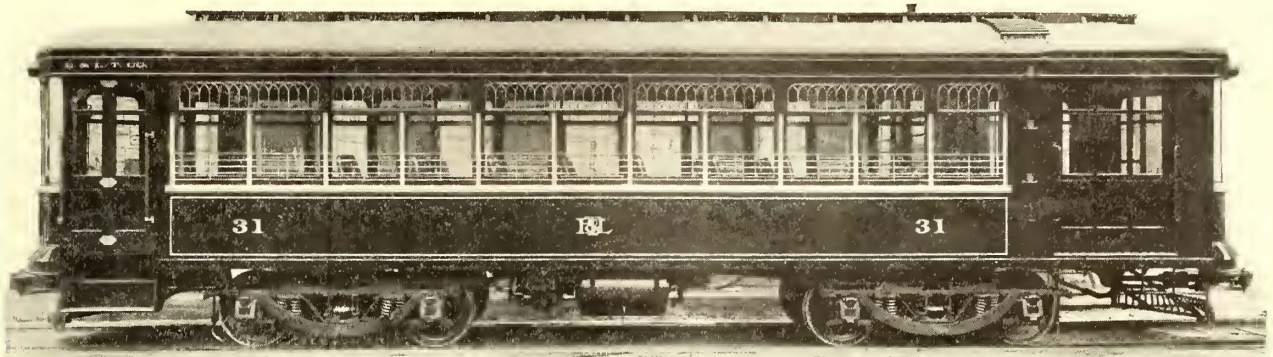
They *reduce maintenance cost*. They have a fixed adjustment, thus requiring no adjustments.

They save fifteen per cent. of the total amount of power required to run the car.

We will gladly give you figures. *Write.*

The Railway Roller Bearing Co.
SYRACUSE, N. Y.





This Ephrata and Lebanon Street Railway Co.'s car is mounted on Baldwin trucks, Class "K."

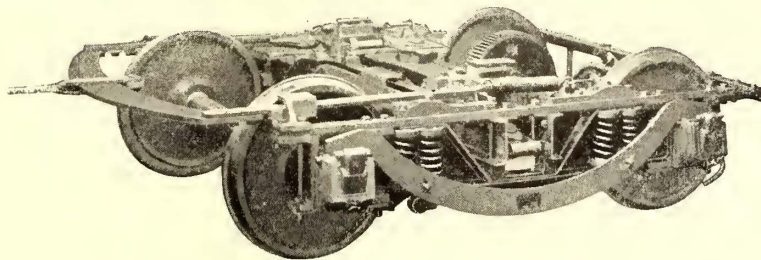
WHY?

SAFETY FIRST. In the design and workmanship of all parts; in the proper consideration of the elastic limit of the material.

SECOND — ECONOMICAL MAINTENANCE. The wearing parts have renewable wearing plates or hardened bushings.

THIRD—SIMPLE CONSTRUCTION. The parts are few in number, easily removable and held together by taper turned bolts in reamed holes. The gussets are substantial, and each truck is a unit.

FOURTH — NOISELESS OPERATION. The truck frame is strong, light and rigid, and the bolted brake with compression springs is chatter-proof.



Baldwin Truck, Class "K"

THE BALDWIN LOCOMOTIVE WORKS

Philadelphia, Pa.

REPRESENTED BY

Charles Riddell, 625 Railway Exchange, Chicago, Ill.
C. H. Peterson, 1610 Wright Building, St. Louis, Mo.
F. W. Weston, 50 Church Street, New York, N. Y.

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

42 Per Cent

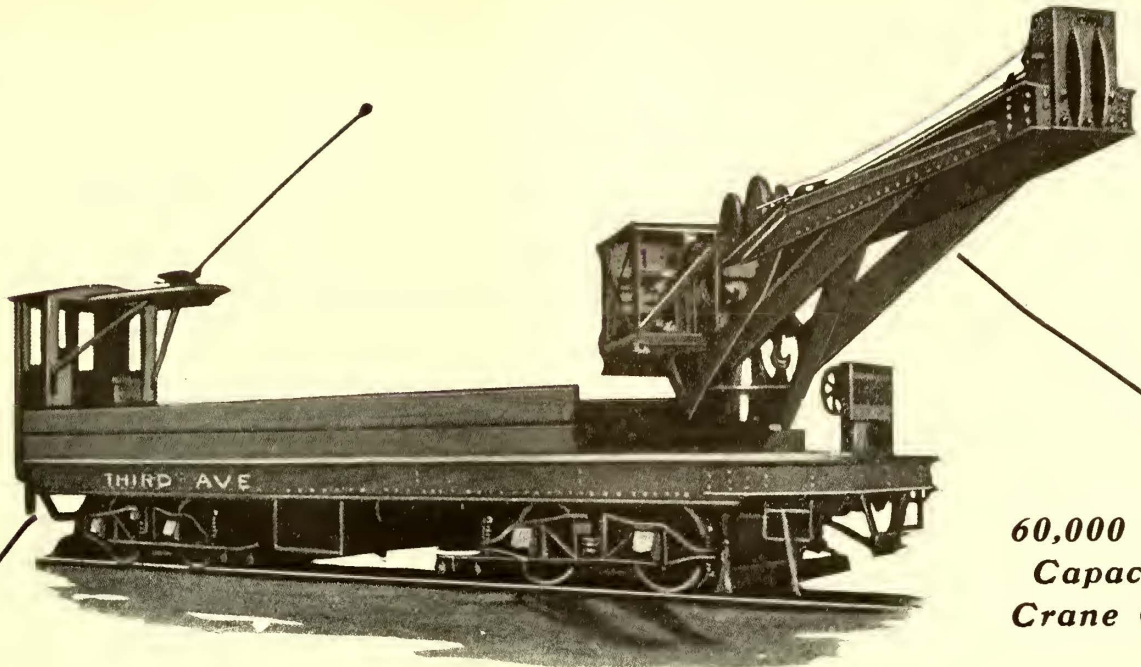
of the all-steel cars ordered during 1914 for electric traction service were "Cincinnati" Cars.

It is a noteworthy fact that the Cincinnati Car Co. was awarded orders for a majority of the cars of this type built—in this—the most important year in the advance of all-steel cars.

The Cincinnati Car Co.

Winton Place

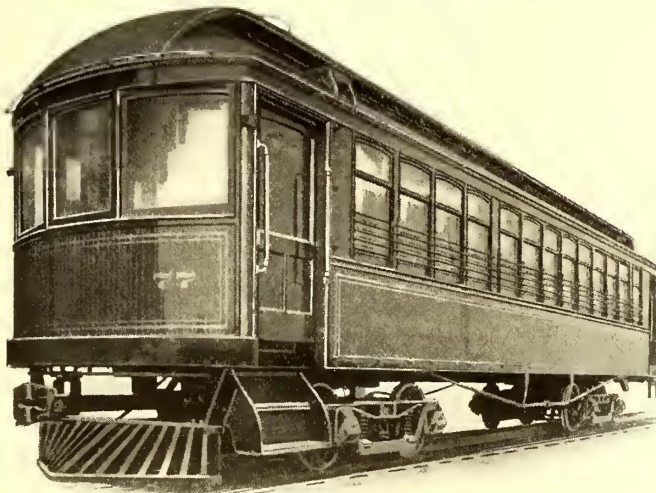
Cincinnati, Ohio



*60,000 Lb.
Capacity
Crane Car*

Built by McGuire-Cummings Mfg. Co.

The McGUIRE-CUMMINGS Car-Building Organization



Can render you an especially valuable service in designing and building standard and special equipment to meet all requirements.

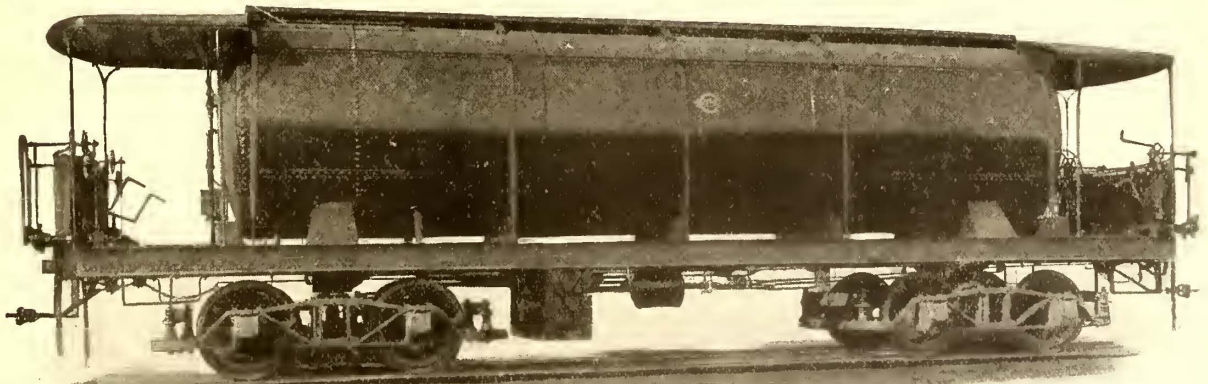
The season of new construction is opening up—we shall be pleased to quote you.

McGuire-Cummings Mfg. Co.

General Offices

Harris Trust Bldg., Chicago

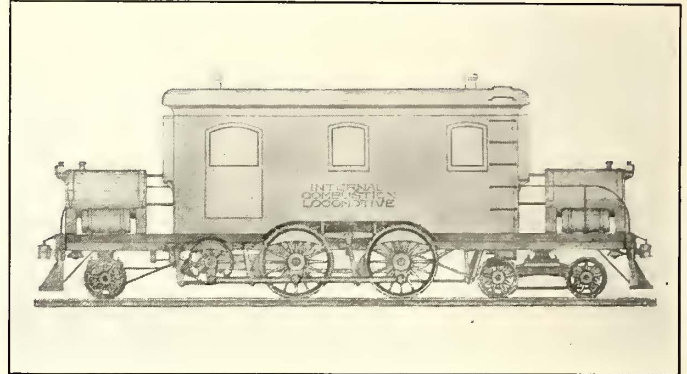
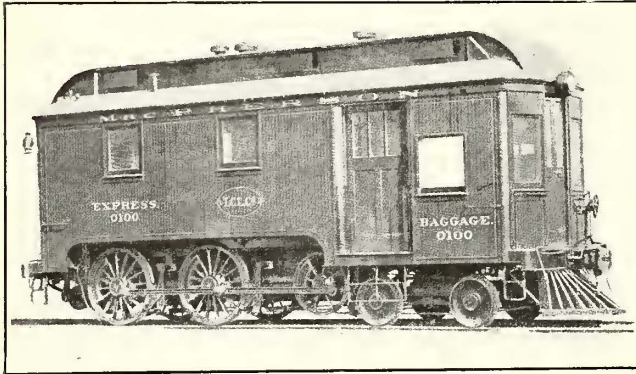
Builders of City and Interurban Cars, Trucks,
Sprinklers, Crane Cars, Work Cars, etc.



6000 Gallon Sprinkler—One of a Number of Designs We Build.

Internal Combustion Locomotives

The Motive Power You Have Long Desired



20 Ton Gasoline Locomotive

46-inch drivers
Five to 45 miles per hour
Develops 450 horsepower
Single end control
Three speeds forward
Three speeds reverse

40 Ton Gasoline Locomotive

54-inch drivers
Five to 60 miles per hour
Develops 800 horsepower
Double end control
Three speeds forward
Three speeds reverse

All Locomotives Equipt with Electric Starters, Lighters and Generators.

IDEAL POWER—The ideal power for surface, subway and elevated lines. Also for local and terminal service. No smoke.

FUEL—Gasoline—Ozoline—Oil or Distillates.

OPERATION—A One-Man Pneumatic Operation.

Biggest and Best Transportation Proposition of this Century.

Write Us—It will Pay You

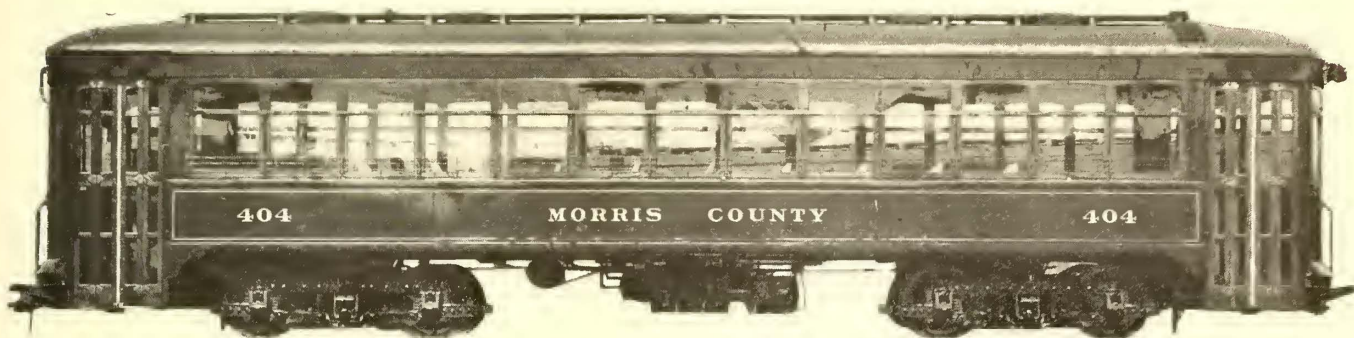
Internal Combustion Locomotive Co.
Equitable Bldg., Wilmington, Del.

J. W. McKay, General Manager

Taylor Trucks—Modern Equipment

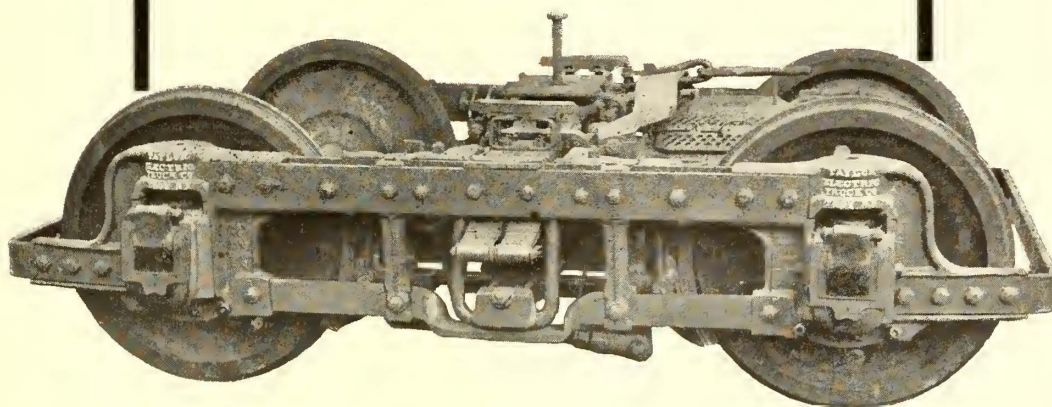
The new cars for the Morris County Traction Co., Morristown, N. J., represent the most advanced type of car construction throughout. It is significant, then, that TAYLOR TRUCKS were chosen for Morris County service.

If the trucks are "TAYLOR-MADE," ease of riding, durability and lowest cost of maintenance are assured.



Specifications

Type: Taylor Improved L. B. double truck.
Wheel Base, about 6' 0".
Brakes and Motors, inside hung.



Send for Portfolio

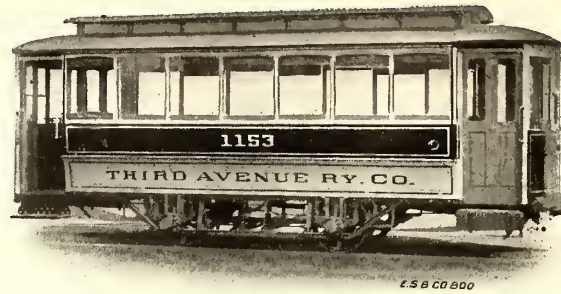
of "TAYLOR-MADE" Trucks with description and specifications.

Taylor Electric Truck Co.

ESTABLISHED 1892

Main Office and Works: TROY, N. Y.

We also manufacture Coil and Elliptic Springs for any type and make of truck, and T. M. C. Steel Tired Wheels.



Storage Battery Car of the Third Avenue Railway Co., New York City

“Exide” Batteries in Traction Service

Storage battery cars are receiving the consideration of railway men on both steam and electric roads.

Steam roads can frequently add to their revenue by giving more frequent service between small stations. This can be done most satisfactorily by storage battery cars operating over the same tracks as steam trains.

On electric lines where traffic is light or where an infrequent schedule is desired, storage battery cars furnish a more profitable service, than any other system.

Storage battery cars have been successfully used in New York City since 1910. There are now 205 battery cars in operation in New York, 174 of which are equipped with the “Hycap-Exide” Battery. These battery cars are making a total of over 3,000,000 miles a year. The service rendered by these batteries is in every way satisfactory.

“Exide” batteries are also used by many of the large railway and power companies in their electric trucks and electric service wagons.

Our engineers are at the disposal of railway men interested in the subject of electric traction with storage batteries, either in connection with storage battery cars or electric trucks.

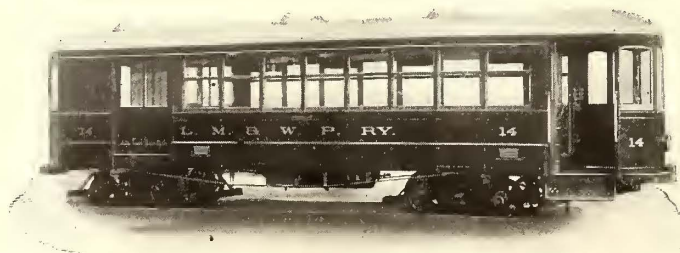
THE ELECTRIC STORAGE BATTERY CO.

Manufacturer of

The “Chloride Accumulator”, The “Tudor Accumulator”

The “Exide”, “Hycap-Exide”, “Thin-Exide” and “Ironclad-Exide” Batteries

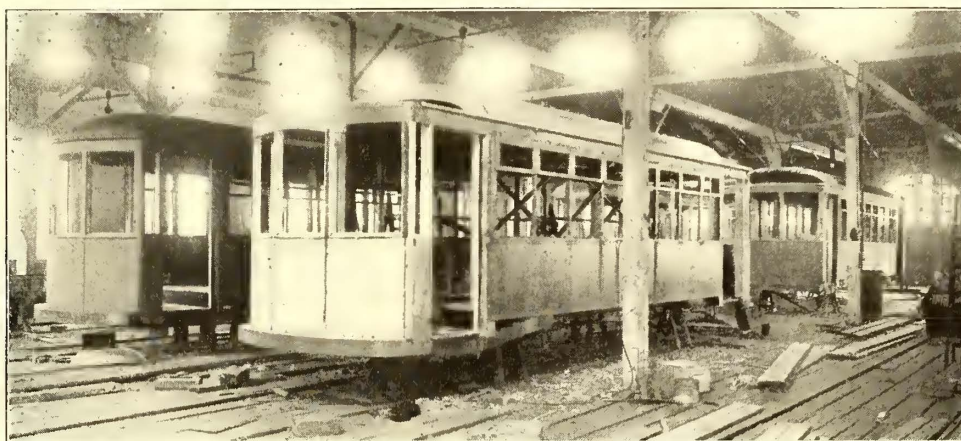
Boston Atlanta Rochester Cleveland PHILADELPHIA, PA. Chicago Denver San Francisco
New York Washington Pittsburgh Detroit 1888-1915 St. Louis Los Angeles Toronto



Storage Battery Car of the Lewisburg, Milton and Watsonstown Pass. Ry. Co., Milton, Pa.

NILES

“Commercial Shape” Steel Construction



as practiced in small single-truck city cars.

The underframe is built up without shearing strains. The sub-sills rest directly on the truck; cross sills on sub-sills and side sills on ends of cross sills; all riveted together with gussets or angles.

The sides are plate cantilever girders from sills to letter panels.

Continuous top plates or continuous post-carlines

are optional with purchaser. We advise continuous top plates and separate carlines.

The letter panels form a continuous steel hoop entirely around top of car preventing sagging or spreading.

We recommend solid side walls of steel, cork and Agasote, wooden floor and double roof with dead-air space.

Parts are riveted and separable, being welded only where necessary to exclude water.



Length, 32 feet 0 inches; Seating Capacity, 32.

NILES “ALL SERVICE” CAR

It can be operated one-man or two-men, near-side or far-side, single-end or double-end, prepayment or collect. In fact, it meets *all* requirements for single-truck cars for small cities and non-paying branches or feeders of large systems.

Let us tell you more about it.

PREDICTION

The single truck car of the future will be run by one man and will convert many non-paying lines into profitable ones.

Depressed separable platforms will be eliminated. The steel underframe will extend continuous from buffer to buffer, with step and door openings cut out at right of motorman.

It will be mounted on a truck with long wheel base, small diameter wheels and motors to allow low steps.

The body will weigh about 10,000 pounds, seat about 30 and carry double that number.

It will be of light steel construction of standard commercial shapes and sheets which can be replaced independently of the car builder.

We are building that car now and can supply duplicates for quick delivery.

NILES CAR & MFG. CO., NILES, OHIO

NAUGLE POLES

PLAIN OR TREATED

OPEN TANK METHOD

Shipped from Chicago yard same day order received

POLES—TIES—POSTS

Service Price Quality

Write for Delivered Prices

NAUGLE POLE & TIE CO.

5 South Wabash Avenue, Chicago, Illinois



No. 72—Voltages—Test—Dry 64000. Wet 31400. Line 10000.

It's the
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which has made

TRADE MARK
HEMINGRAY
REGISTERED.

Insulators



No. 20—Line Voltage 5000.

The Choice of Managers of Power Companies

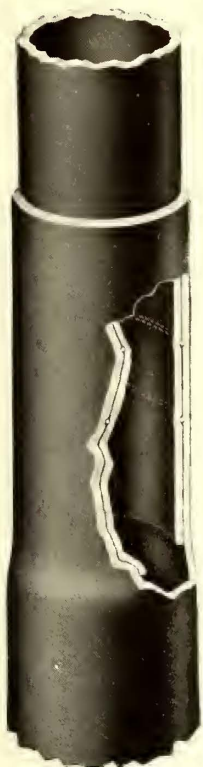
when high voltage transmission could not be jeopardized by creeping moisture on insulators. The Teats on the Petticoats quickly drain the insulator in wet weather, and insure a dry inner area. Begin the fight against power losses through moist insulators by sending for our Catalog No. 28.

Hemingray Glass Company

Established 1848 }
Incorporated 1870 } Covington, Ky.

Factories: Muncie, Indiana

Wire Lock Swedge



**Joints
Build
Strength
into
Tubular
Steel
Poles**

A water-tight joint which will stand an internal pressure test insures that no moisture will ever work in to corrode the pole at this point.

The sectional view clearly shows how the joint grips. Notice that the steel tube is of uniform thickness throughout the joint. In fact the material is thickened in place of being stretched and thinned, as in the ordinary process of swedging by hammers.

This is the joint that *perfects* the steel tubular pole.

The catalog contains valuable and interesting data on overhead construction.

Send for a copy.

**Electric Railway Equipment Co.
Cincinnati, Ohio**

New York

30 Church St.

30 Years Pole Service

Three times the life of wood poles for a fifth the maintenance cost is the pole service offered electric railways by

CARBO

**Flexible
Poles**

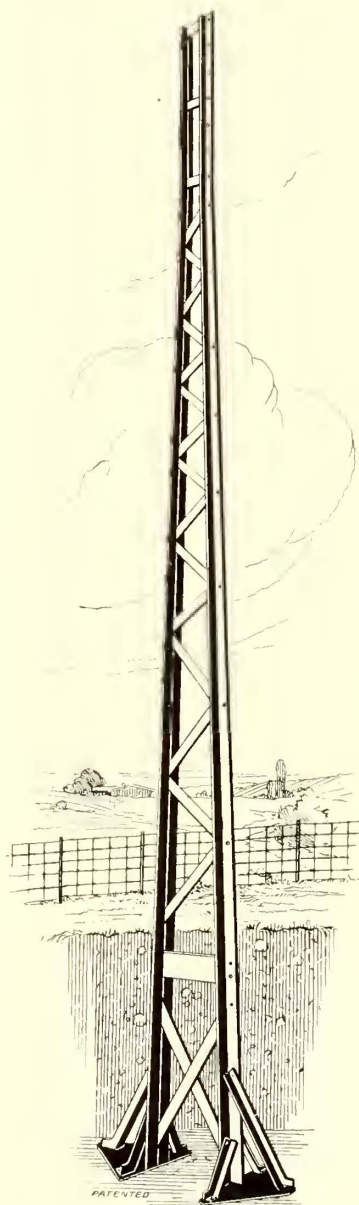
The cut shows a light design for telephone or telegraph lines—there is a heavier type for transmission line work.

The flexible principle insures that your pole lines will weather the most severe storms. Proof against wind, ice and sleet.

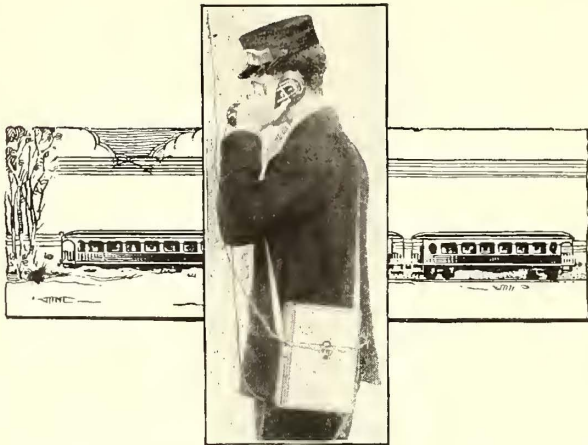
Handled for half the cost of wood poles. Light-weight and nestable.

Our Commercial Engineering Department will furnish designs and estimates, free. Write for Complete Data.

Carbo Flexible Posts for right-of-way fence offers the maintenance man a new study in economy.



**CARBO Steel Post Co.
Chicago, Ill.**



“All along our lines”

said the chief dispatcher, “you will find our road-men—conductors, inspectors and construction foremen—carrying

***Western Electric*
Portable Telephones**

as a part of their regular equipment.

The portables have prevented a great many expensive delays and some possible accidents simply by giving our men a means of getting in touch with the division dispatcher from any point on the road. They’re worth their weight in gold.”

Write for prices of our various types of portables.

Western Electric Company

Manufacturers of the 8,000,000 “Bell” Telephones

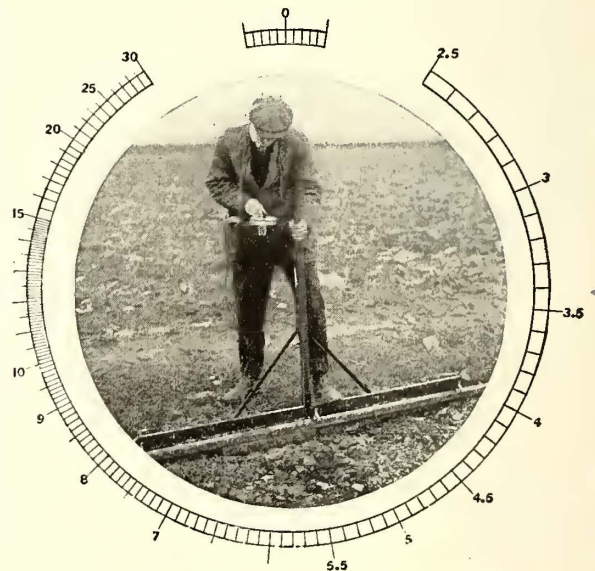
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EQUIPMENT FOR EVERY ELECTRICAL NEED
Member Society for Electrical Development. “Do it Electrically”

**Locates Leaks
at
the
Rail
Bonds**



ROLLER SMITH Bond Tester



Bond Tester in Use, and Scale.

The light, portable outfit which gives accurate results. Saw blade contacts bite into the rail cleanly. The resistance is read directly from the dial—no computations are necessary. One man makes the tests quickly and the results are correct.

“Standard Sensibility” type for all ordinary work. “High Sensibility” type for special work.

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Roller-Smith Company

203 Broadway, New York

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**You're on the Right Track
if it's a RAMAPO
Automatic Safety Switch Stand**
(Patented)

A permanent automatic switch stand which will safely take care of interurban service and passing sidings, which does away with spring in track. Furnished in all heights.

Our T-Rail Special Work
For Your Interurban Line
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is of manganese construction and is a great cost-cutter. In all styles.

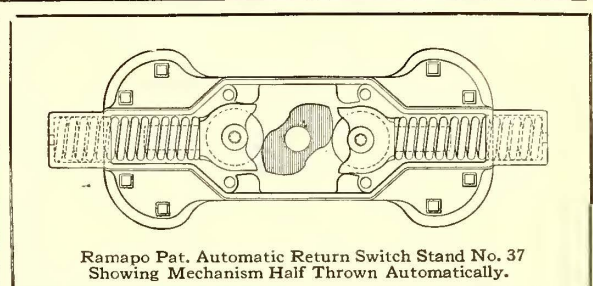
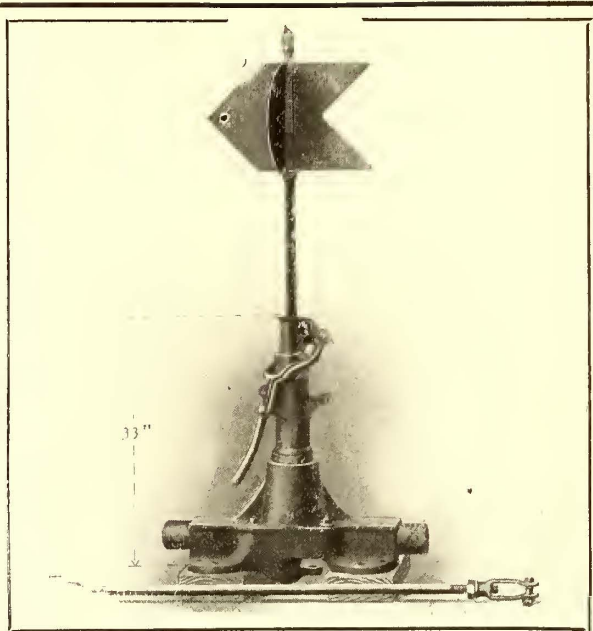
Write for the facts.

Ramapo Iron Works

HILLBURN, N. Y.

Main Office, Hillburn, N. Y.

New York: 30 Church St. Plants: Hillburn & Niagara Falls



Ramapo Pat. Automatic Return Switch Stand No. 37
Showing Mechanism Half Thrown Automatically.

CARNEGIE STEEL COMPANY

General Offices—Pittsburgh, Pa.

CROSS TIES

Steel ties are making steady progress in displacing wood ties. There are several reasons for this:

1st.—The life of one steel tie is about equivalent to that of three wood ties.

2nd.—Owing to the longer life of steel ties there is a saving in labor cost equal to the difference in cost of removing and installing one steel tie and three wood ties.

3rd.—At the end of their serviceability steel ties have a scrap value of approximately one-third of their original cost.

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**The kind of Fibre Conduit
strongly influences
Maintenance**

if YOU are conducting signal, car, or other wires or cables in fibre conduit, as are other railway companies. It is significant that

**ORANGEBURG
FIBRE CONDUIT**

is the choice of such companies as the Penn. R. R., Boston Elevated, N. Y. Central, B. R. T., etc. Its strength, fire resisting and insulating qualities have been tested, and proven efficient in the highest degree. Shipments of standard stock within 3 days. Catalog "R" on request.

**THE FIBRE CONDUIT COMPANY
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New York Boston Chicago San Francisco

**A Broom for Every Track Want
That Will Bring Track Comfort to You at a Saving**

THE PAXSON



A split bamboo broom for light work with snow or dirt at curves, frogs and switches. "Fan" bristles make a strong cleaning edge, and give durability to the broom.

A crossing broom that will stand hard work. Of flat, tempered steel wire bristles.

Built for rapid work. Makes a clean sweep, and serviceable the entire year.

A fine utility broom which is built to handle all debris that may get into frogs, switches and curves. A hard service broom made with flat tempered steel bristles.

We have "corraled" a large portion of the broom business because of the economy and durability of our brooms.

On yearly contracts we have an interesting proposition we would like to make you. The low cost will surprise you.

J. W. PAXSON CO., Manufacturers

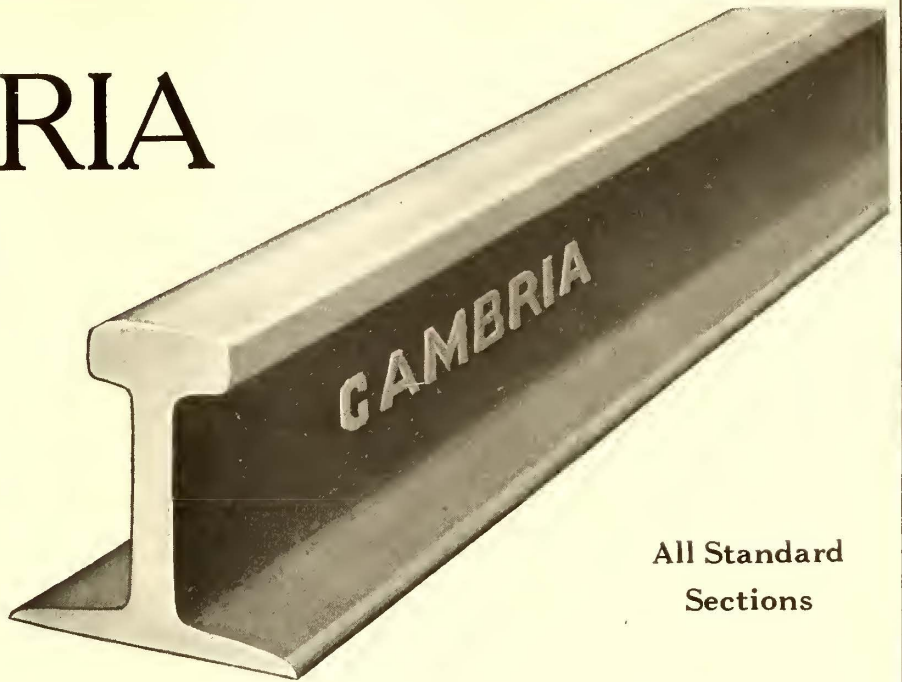
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CAMBRIA RAILS

Open Hearth Bessemer

BOLTS AND NUTS

100%
Splice Bars
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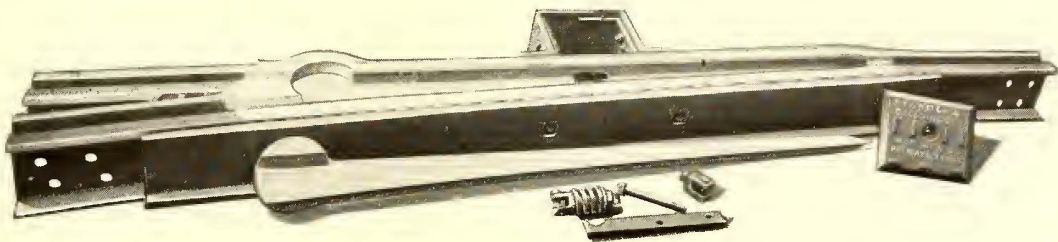
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CAMBRIA STEEL COMPANY

Philadelphia

Sales Offices: Atlanta, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Detroit, New York, Philadelphia,
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Works at Johnstown, Pa.

Improved Manganese Tongue Switch For Heavy Service



Pinless Tongue—

100% bearing efficiency

Enlarged Heel—Heavily reinforced—

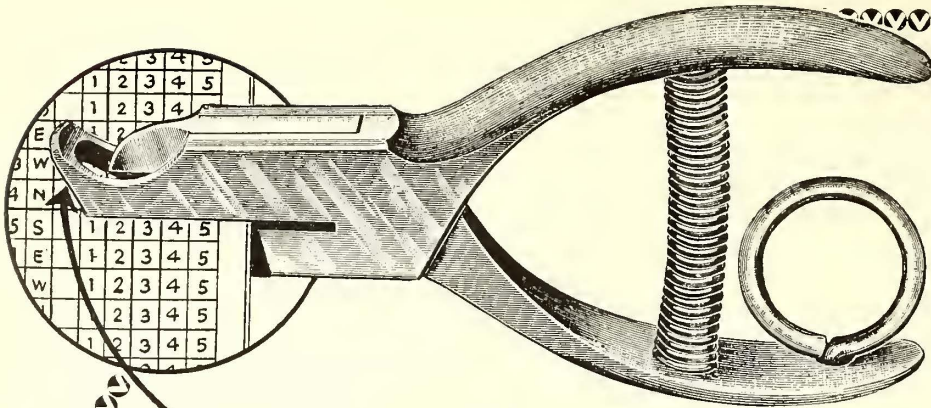
Held positively by beveled end in Solid Manganese pocket

SPECIAL TRACK WORK

Switches, Mates, Frogs, Crossings

NEW YORK SWITCH AND CROSSING CO.

Office and Works, Hoboken, N. J.



B-V Visible Punches

Standard Open Sight Punch Quick and Accurate

The conductor can see *through* the punch, enabling him to punch the correct spot with speed and precision. This is a great advantage, especially on lines where traffic is heavy, promoting better service in behalf of both company and public. The tool steel dies in B-V Punches insure long service and economy. They cost no more than the ordinary kind. Send for prices and catalog.

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

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DOSSERT CONNECTORS

For Electric Railway Power and Sub-Stations

Did you ever have to make a quick change-over on your switchboard, transformer or brush-holder?

Ever any loose ends to connect?

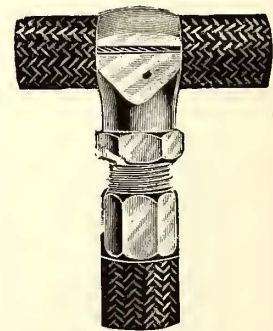
Then you will appreciate what a ready-made joint would have meant to you.

DOSSERT LUGS provide these joints—no solder, no trouble. Just stick in the wire and tighten with a wrench.

Dossert Connectors, besides increasing efficiency and safety, save time and labor on installation costs. Used for connections to switchboards, busbars, switch and control gear, generator, converter and transformer apparatus, sectionalizing cases for signal installations, car wiring and all shop and mine wiring and apparatus.

**Familiarize Yourself
with Dossert Service!**

**Ask for our Tenth
Year Catalogue!**



Dossert Cable Tap

Dossert & Company

H. B. LOGAN, President, 242 West 41st Street, N. Y.



Post's "Zero" and "Motor" Metals

For Car Axles and Journals and Armature Bearings

Consider the economy of Post's Zero Metal for car axles and journals.

Small first cost in bearing metal usually means large expenditures in repairs. Most of the leading roads have already seen the wisdom of using Post's "Zero" Metal on their axle and journal bearings *first* rather than wish they had afterward. If you have not arrived at similar conclusion let us explain why you should.

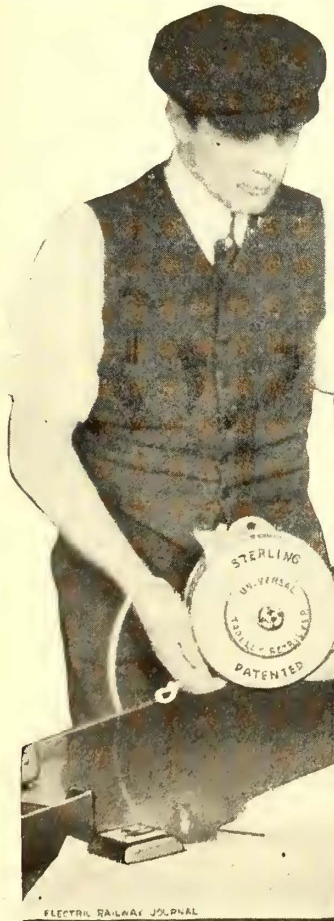
Our claims are backed by service results.

Car Armature Bearings require a very tough and hard metal, coupled with good lubricating qualities. An ideal combination of these features is found in Post's "Motor" bearing metal. Made by a special Post formula, "Motor" bearing metal possesses far greater lubricating qualities than the best genuine or specification Babbitt and is far more enduring. For this reason Post's "Motor" Metal is used for the armature bearings of the largest roads.

Nothing but the highest grades of virgin raw materials enter into Post Metals

*"Post's ZERO and MOTOR Metals for MILEAGE"—
Standard for a Third of a Century.*

E. L. Post & Co., Inc., Sole Manufacturers
50 CLIFF STREET NEW YORK CITY



You Will be Interested in it too

The New Sterling Catchers and Retrievers contain novel features that will interest you:

- Retrieving Spring adjusted to meet any trolley pole tension.
 - Action of this spring does not affect service spring.
 - Absolutely prevents skipping of pole after it leaves wire.
 - Little mechanism, few parts easily cared for.
 - Guaranteed for 5 years.
- Write for full details.

STERLING Retrievers and Catchers

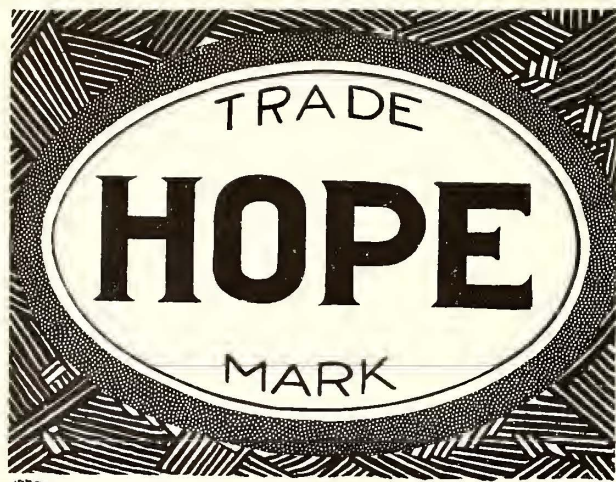
**The New Haven
Trolley Supply
Company**
New Haven, Conn.

STERLING
Trolley Wheels

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A Mark That All Coil Winders Know and Respect

Every time a new lot of tapes and webbings come into your armature and coil repair shop the old and experienced hands will eagerly note the trade-mark label to see if it is HOPE. They know that

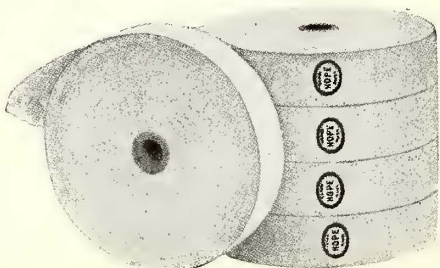
HOPE TAPES and WEBBINGS

make their work easier and better because the Hope brand lays flat and evenly, does not coil nor ravel at the edges, and is tough and strong, so that they can draw it tightly without fear of breaking it. They realize that the difference in cost due to quality is far more than made up by the increased production and better service the above qualities make possible. Ask your men what they think of HOPE TAPES and WEBBINGS. Then let us figure on your needs.

HOPE WEBBING CO.

Main Office and Works
Providence, R. I.

396-398 Broadway, New York



There's no leak proof ring but the **LEAK-ROOF** Ring — insist

This is the

Made in
all sizes



Easily
Adjusted

Piston Head Packing Ring for Air Compressors

HERE IS WHAT IT DOES

It ensures full pressure in the shortest time—saving power, reducing wear and tear on compressor mechanism and motor. It eliminates all cylinder scoring and saves the expense of renewals and replacements.

AND HOW IT DOES IT

The **LEAK-ROOF** Packing Ring is made of two pieces only—each section of equal strength and so interlocked as to form a single unit ring with sealed expansion vents. It has no segments—no springs to lose temper and fail, causing gaps that leak pressure and corners that score the cylinder. It is made of special Processed Gray Iron—wonderfully tough, smooth and permanently elastic.

A test by a leading air compressor manufacturer demonstrated that the use of **LEAK-ROOF** Packing Rings produced 90 lbs. pressure from zero, in two-thirds the time required by segmented packing rings—and with check valve removed, held the pressure 33 1/3% longer. We shall be glad to send you a copy of the test chart, and a trial set of rings FREE, so that you may make any test you wish.

SEND FOR FREE BOOKLET

It tells all about piston rings and why you should equip your engine with the **LEAK-ROOF**. How it will pay you in fuel economy and prolonged motor life. Write for it.

*Sold by all up-to-date dealers, garages,
repair shops and marine stores*

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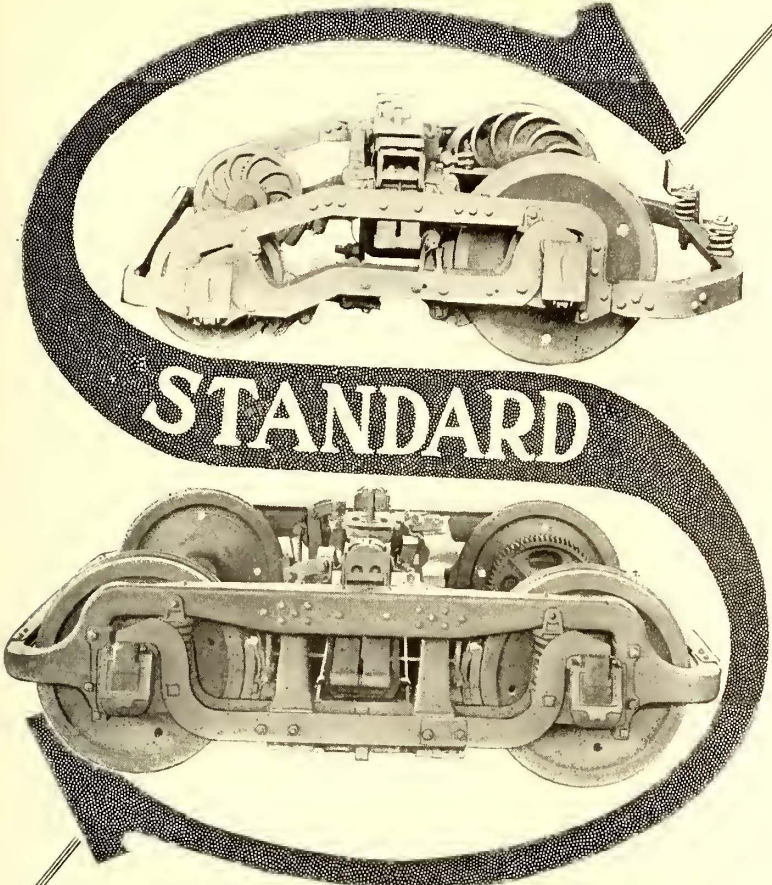
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Look for the name **LEAK-ROOF** stamped on the Ring

Standard Trucks for Every Service

THIS STANDARD O-36 SINGLE MOTOR DOUBLE TRUCK meets the demand for a "Light Weight" Maximum Traction Double Truck. It weighs 4500 pounds (per truck) with one-wear steel wheels. The brake shoes are carried on the equalizer bars. Holes in the levers and brake rigging are steel-thimbled and the bolts are case-hardened. Journals are carefully machined and burnished. It will carry safely car bodies weighing from 16,000 to 22,000 pounds; maximum load at king pins of 36,000 lbs. These trucks are in service in New York, Jacksonville, Springfield, Worcester, Savannah, Newark, Washington, Dayton, Houston and Jackson, Michigan. THIS IS THE LIGHTEST WEIGHT TRUCK OF THIS TYPE MANUFACTURED. Also made 45,000 capacity—the O-45 truck.

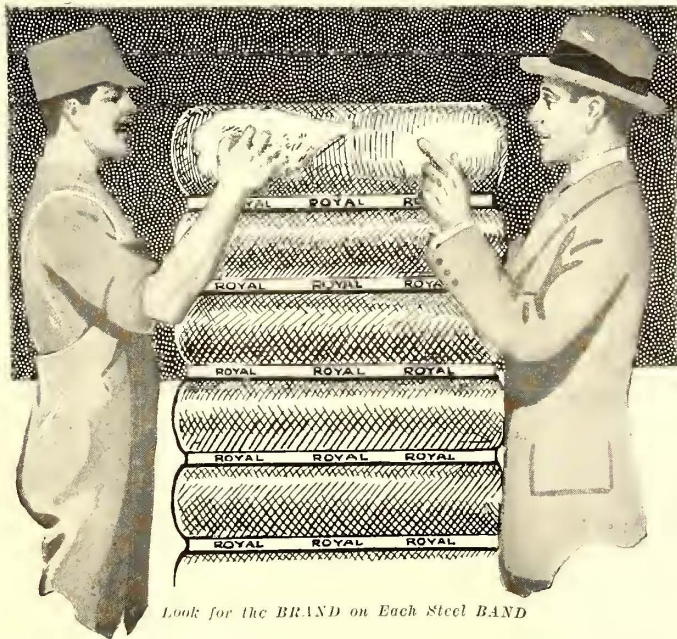
THE STANDARD C-50-P "LIGHT WEIGHT PRESSED FRAME" DOUBLE TRUCK meets the demand for a Safe and Durable Light Weight, "Suburban" Inside Hung Motor, Double Truck. The Side Frames, End Frames and Transoms are pressed from sheet steel plates into Channel-shaped sections, which form gives the lightest practicable weight of metal for the required strength. The Brake Rigging is Solid Forged Steel, same as on all of our trucks. Steel thimbles and case-hardened bolts are used on all wearing parts. These trucks are in service in Pittsburgh, Newark, Indianapolis, Mansfield, Pittsfield, Springfield and Worcester.



STANDARD MOTOR TRUCK COMPANY, Frick Bldg., PITTSBURGH, PENN.

Pacific Coast Agents: Eccles & Smith Co., Inc. Offices, San Francisco, Cal.; Los Angeles, Cal.; Portland, Ore.

New York Office: 170 Broadway. Works: New Castle, Pa. Chicago Office: Fisher Building



Look for the BRAND on Each Steel BAND

The One Standardized Brand **ROYAL** Cotton and Wool Waste

Now offers you in addition to the Highest Quality Waste, these three vitally important features:

Standardized Quality. For your convenience, it has been divided into 12 grades—6 white—6 colored. Select the most desirable for your purpose, and our grading system assures you of the same quality continually.

Standardized "Tare." The Tare (wrappings) is guaranteed 6% or under, because we use only clean, light Burlap and new Steel Bands, weighing less than the old Burlap and Rope in general usage. Check the "Tare," and, if over-weight, obtain a refund for the difference.

Standardized Weight. Order the exact weight desired—you'll get just that poundage. Orders are not "padded" as our Waste comes in *Guaranteed Actual Weight Bales.*

Royal is positively the softest, most absorbent, highest quality Waste—made from the cream of the Waste of good cotton and wool. It is thoroughly refined—all foreign matter such as wood and metal splinters, dust, dirt and grease, is removed. Pressed into neat, compact Bales that take up least room.

Ask Your Jobber or write for the "Royal" Sampling Folder No. 46 showing 12 grades of Cotton Waste. Samples of Wool Waste mailed on request.

ROYAL MANUFACTURING CO., Rahway, N. J.
Chicago Office, People's Gas Building



BP Motor Gearing

THE high surface hardness combined with great strength and refinement of structure results in gear mileage, which will approximate the life of the average railway axle. At the same time the relatively low cost assures more economy ultimately, than any other grade of gearing now on the market.

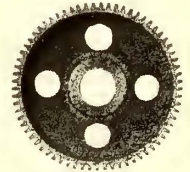
BP Gears and Pinions provide an economical and efficient motor gearing.

Address Dept. E.

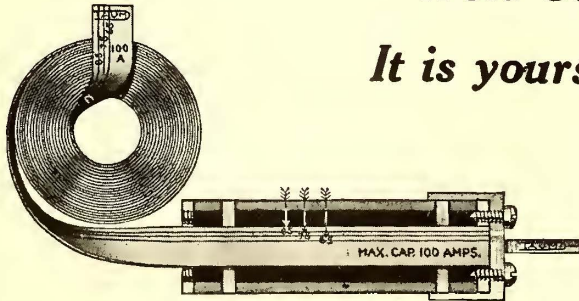
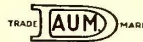
N u t t a l l

Pittsburgh

Made in U. S. A.



**A Free Sample of the
"DAUM" Refillable Cartridge Fuses
will convince you
It is yours for the asking.**



A Daum fuse strip. You do not have to carry different fuses for different amperage.

The cost of the "Daum" is 1/30 of that of regular cartridge fuses, the former costing one and one-third cents for 100 amperes, 250 volts; while the regular fuses cost forty cents. Our guarantee on all purchases. Money back if the fuses are unsatisfactory.

A. F. DAUM COMPANY

Sole Manufacturers, Pittsburgh, Pa.

Makers of the First Successful Refillable Fuse on the Market.

Members Society for Electrical Development

319 E. Relliance St., Pittsburgh, Pa.
A. F. DAUM CO.,
Send me sample fuse and catalogue without obligation.
Name..... amp..... volt..... size.....
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THE "STANDARD" BRAND ON YOUR MATERIAL IS AN ASSURANCE OF EVENTUAL ECONOMY



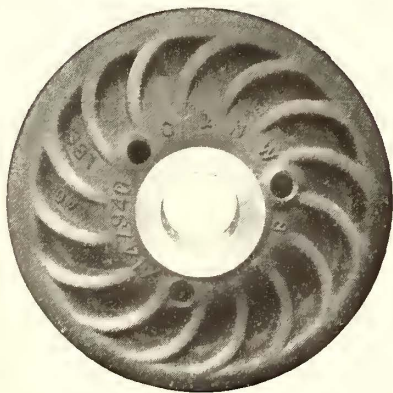
STANDARD STEEL WORKS CO.

Portland, Ore.
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MORRIS BUILDING
PHILADELPHIA

Chicago, Ill.
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Safety and Economy in Electric Railway Wheels



Electric railways strive to maintain their rolling stock with the least possible expense; that is, they must keep their cars out of the repair shops. To do this necessarily means they must use wheels that will not require frequent renewals.

F. C. S. Wheels

are one-wear wheels that do not have to be shopped for frequent turning,—all that is necessary to remove flat spots is to run the car onto a pit grinder for twenty to forty minutes at night when in the barn and the wheels are ground truly cylindrical and are as good as new, saving the expense of removal from truck.

The composition of the flange and tread insure a hard wearing surface indicative of long service.

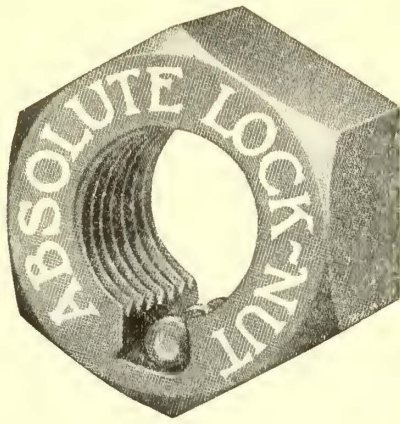


Tests that have been made prove that brake shoe wear on chilled iron wheels is twenty to twenty-five per cent. less than on any other type of wheel.

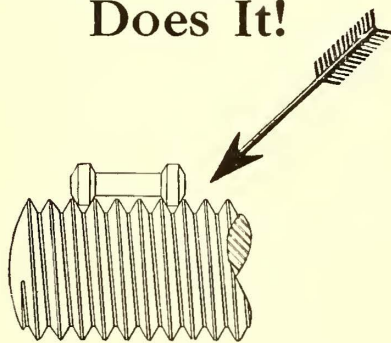
F. C. S. wheels are designed to meet the demands to be imposed upon them by the weight of car, speed, brake pressure, condition of track, etc., on each individual system, therefore insuring safety to a maximum degree.

GRIFFIN WHEEL COMPANY

PLANTS: Chicago Detroit Denver Los Angeles St. Paul Tacoma Kansas City Boston



[This Rolling Wedge Does It!



That's the Reason for the Absolute Locking, Safety, Security and Economy of the "ABSOLUTE" Lock-Nut

Observe the recess which has been cut across the nut at right angles to the threads. The floor of this recess slopes. Notice also the rolling wedge. When the nut is being applied the pin rests in a deeper part of the recess and rolls with the bolt.

The moment the nut starts to back, it immediately encounters the resistance caused by the rolling pin wedging itself into the higher level of the sloping floor of the recess. The result—all motion is stopped. The nut is locked absolutely. The greater the pressure tending to back the nut, the tighter it locks.

Vibration tightens the *Absolute*. Rust and dirt do not destroy its action.

Easily removed by inserting a common nail alongside the rolling wedge, preventing it from wedging.

It's as strong as any bolt. Write for results of tests.

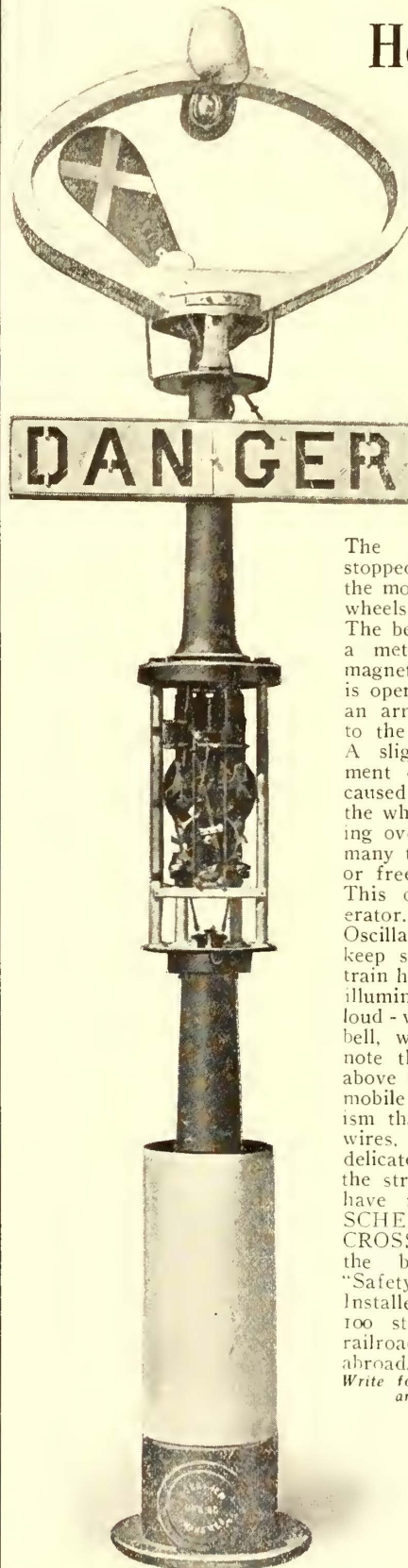
The *Absolute Lock Nut* is nut and lock-nut, all in one. Saves in bolt length and time of application, as well as insures safety and certainty.

Costs no more than nut-locks. Write for catalog describing it.

The American Lock-Nut Co.
Pullman Station, Chicago

Maximum Certainty and Safety with Minimum Installation and Maintenance Cost

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Does not interfere with track circuits and is not operated by trolley current. Free from electrical troubles.

The bell is started, stopped and wound by the movement of the car wheels over the track. The bell is connected by a metallic circuit with magneto generator which is operated by means of an arm clamped rigidly to the base of the rail. A slight lateral movement of the rail head, caused by the pressure of the wheels of train passing over it, is multiplied many times at the outer or free end of the arm. This operates the generator.

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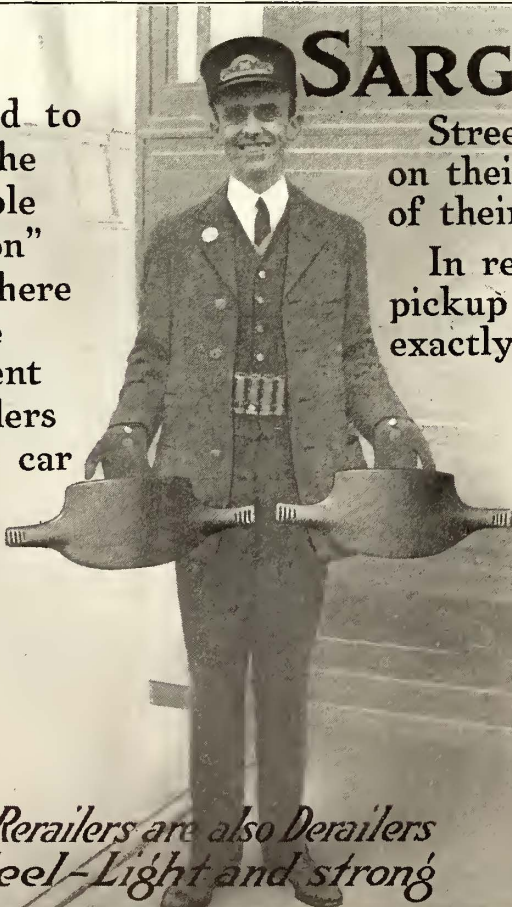
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No need to call the "trouble wagon" when there are Sargent Rerailers on the car

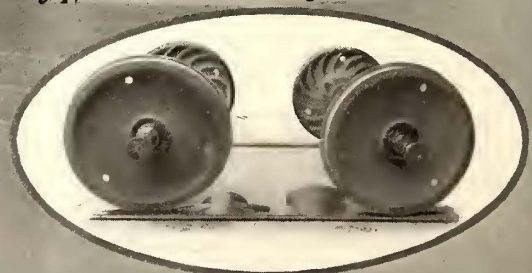


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Street car wheels off the track rest on their flanges with the broad surface of their treads raised.

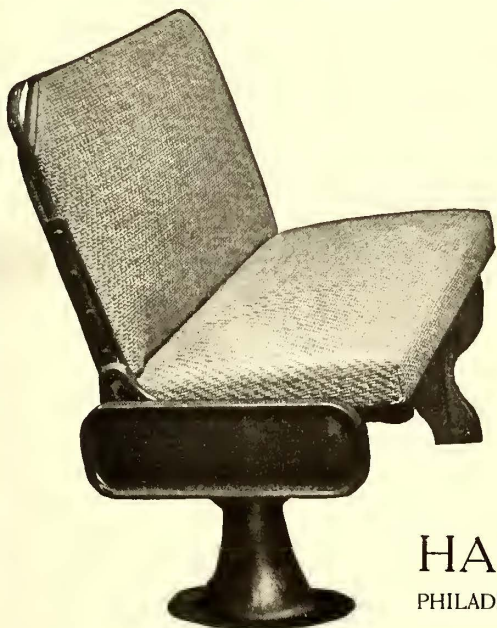
In rerailing, the wheels roll onto the pickup ends of the Sargent Rerailers exactly as they roll on their treads on the rails.

Contrast the natural ease of this operation with the awkward performance of rolling wheels up on their flanges over the ordinary type of shell replacer.



*Sargent Rerailers are also Derailers
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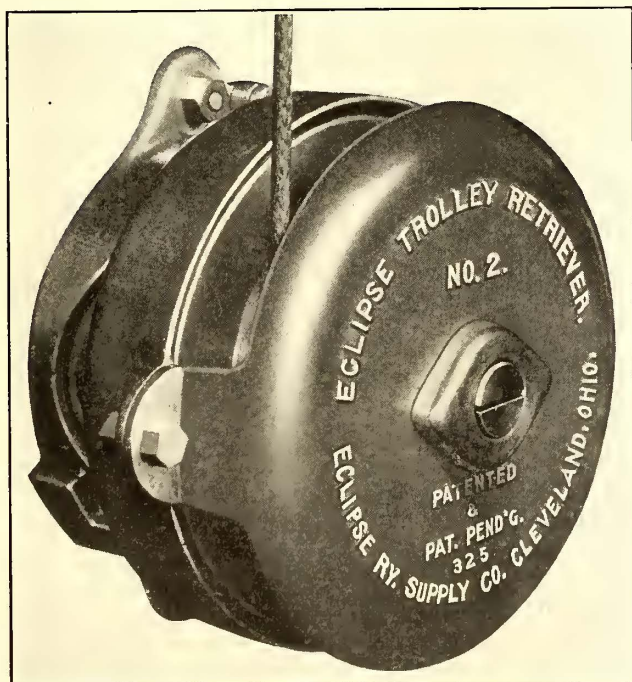
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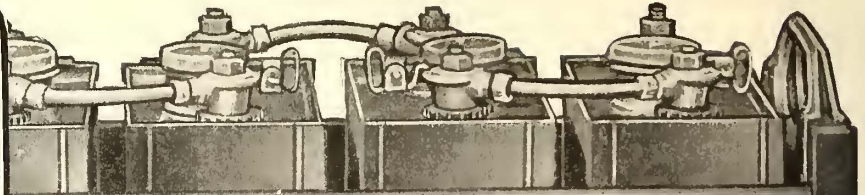
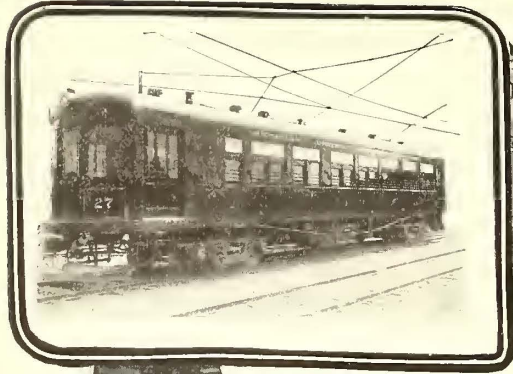
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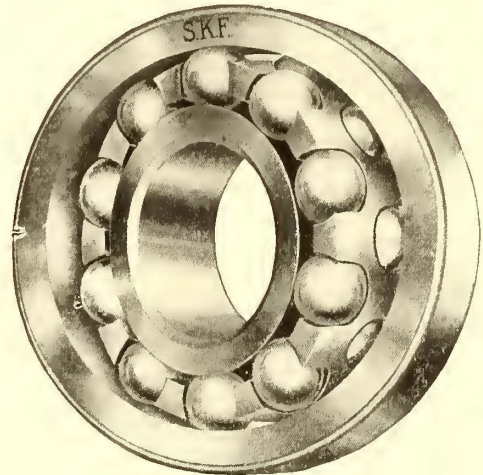
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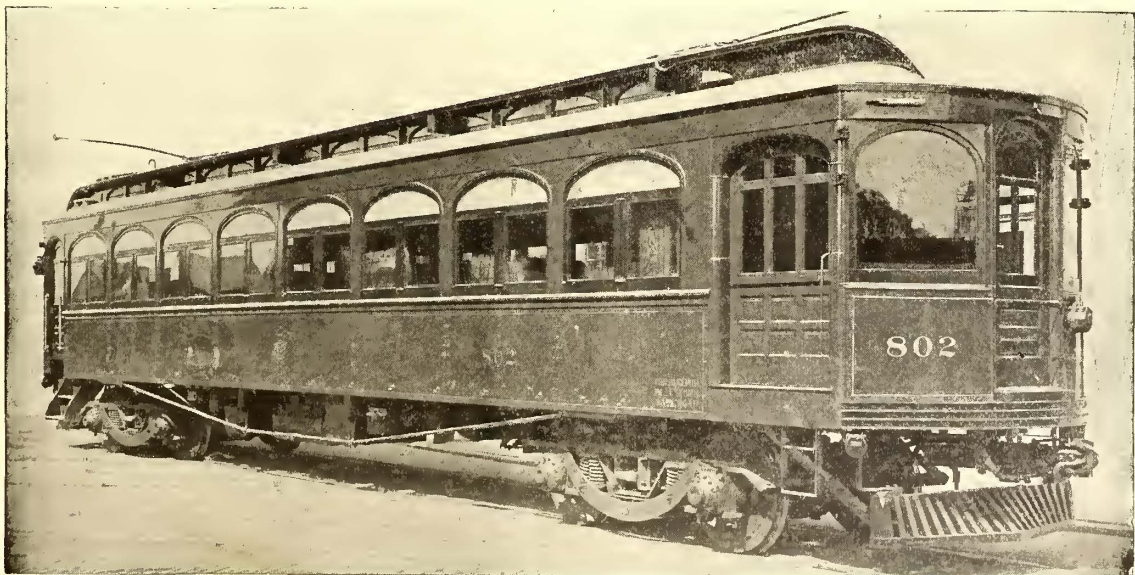
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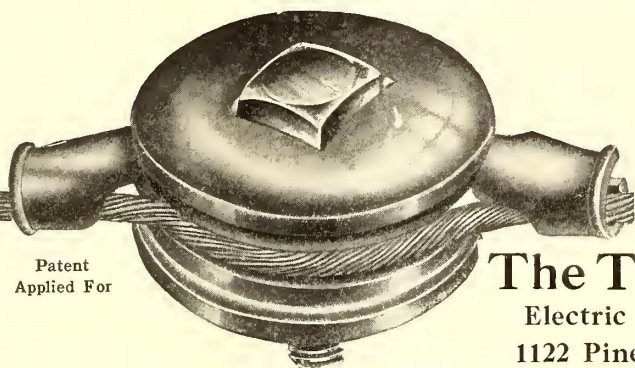
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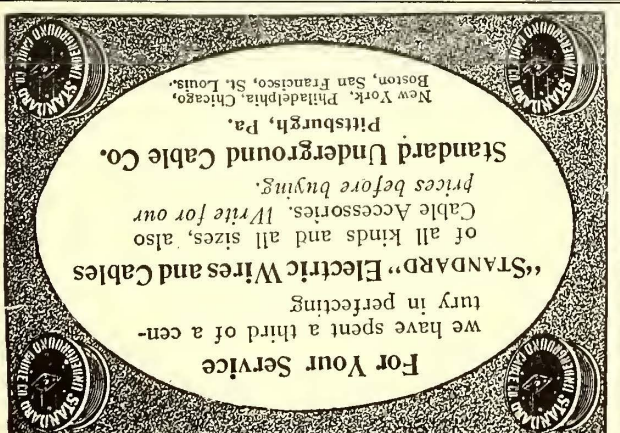
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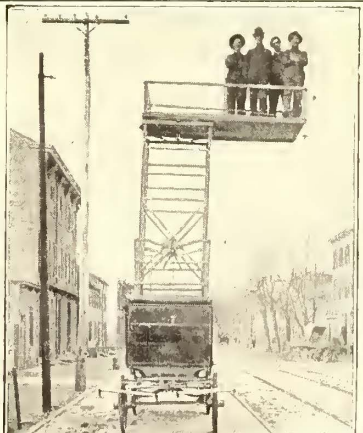
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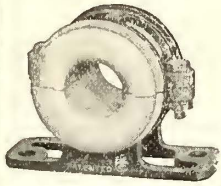
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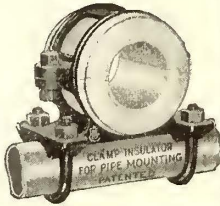
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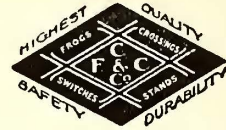
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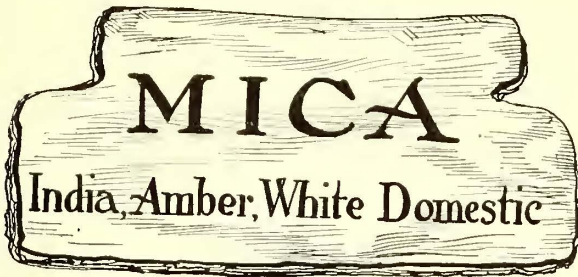
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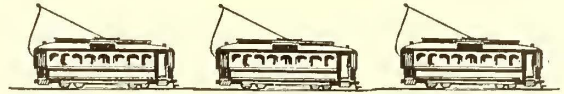
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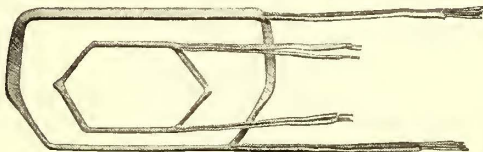
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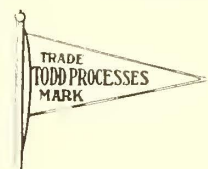
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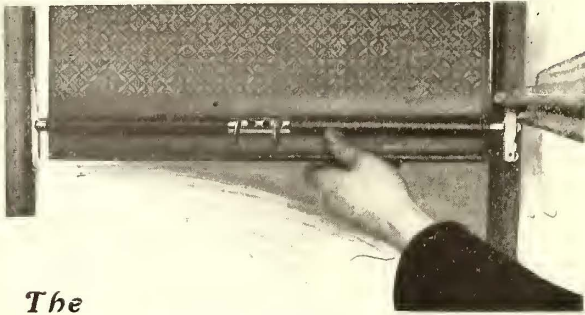
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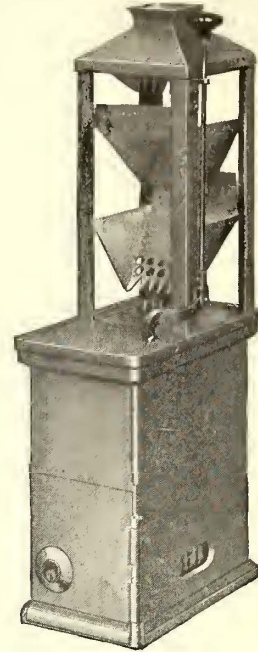


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Service and Durability — The Test of Economy
AMERICAN VULCANIZED FIBRE
will meet both requirements of this test if you will use it for Track Insulation. Write for our Bulletin “For Safeguarding Safety Signal Appliances.” Send us blue prints of your fibre parts and let us quote you prices.
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Manufacturer of
Car Gongs of all kinds
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IMMEDIATE DELIVERY ON
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Order from our Chicago or Elsmere factory, whichever is nearer, and delivery will be made without delay. Include an order for Disfico Horn Insulation for repair work.
DIAMOND STATE FIBRE CO.
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A 63% SAVING in Fuse Costs

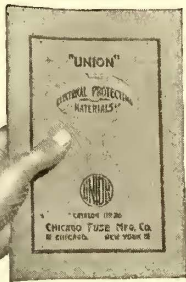
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The UNION Indicating FUSE

"The Dependable Fuse"



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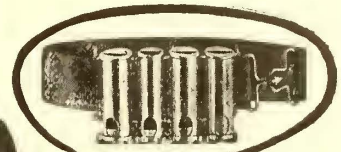


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Carefully assembled. Built of high grade materials. Positive in action.

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One hand's free with the

Rapid Ready Charge Carrier

With this device the conductor readily makes his change with *one hand*. No bungling around, fishing into various pockets for coins of different denomination. He has one hand entirely free to ring up fares, assist passengers, distribute transfers, etc.

No prepayment system complete without one.

Catalog describes it fully—write today.

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SAFETY FIRST—ECONOMY NEXT

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

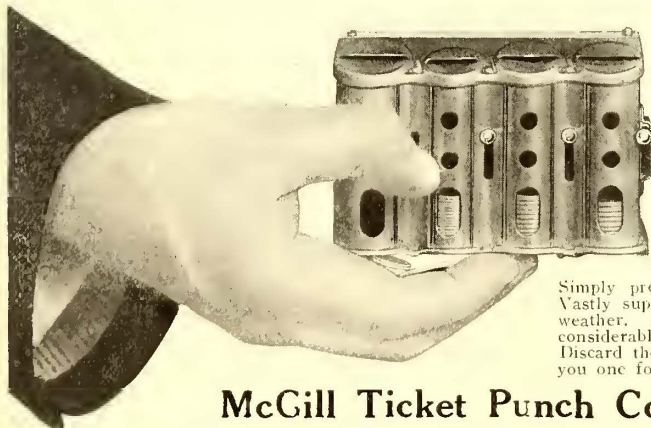
The only good Renewable Fuse on the market is marked "Economy"

Write for Catalog No. 2 and Bulletin

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

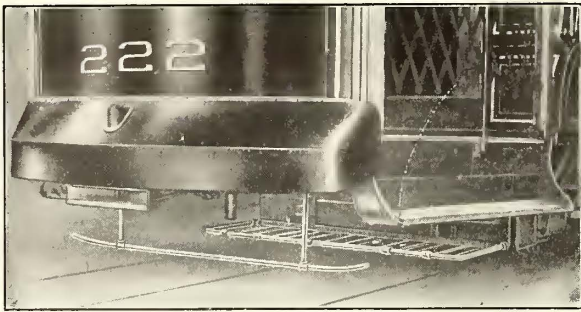
It Throws the Coins Into the Conductor's Hand

The McGILL Improved Change Carrier



Simply pressing down on the thumb lever ejects the coins rapidly and easily. Vastly superior to any other method. Can be operated by gloved thumb in cold weather. Saves conductors many valuable minutes during rush hours as well as considerable annoyance on every trip occasioned by fumbling in making change. Discard the old type. It's obsolete compared to this improvement. We will send you one for examination.

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Protection on Curves

PARMENTER WHEEL GUARDS are *always working*. They cover the rail on curves as well as on tangent track, for they ride close to the wheels and close to the paving. They have proven efficient at all speeds up to fifteen miles an hour.

Your claim agent will be glad to have our interesting data.

Parmenter Fender & Wheel Guard Co.

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9269

2

Why Not Buy Trolley Base and Retriever All in One



That's
What You
Get In

The WASSON Air-Retrieving Trolley Base

It performs the double function. It combines the ordinary trolley base with a retrieving mechanism operated by air. It's the "last word," the latest development in the field. It means maximum efficiency in car operation, as far as the trolley can contribute toward it. It means rapid transit without fear of jumping trolleys. It means freedom from damaged or torn down overhead if the trolley should leave the wire. Try it out. If it does not "make good" it costs you nothing. Order one today.

The Wasson Engineering & Supply Co.
Milwaukee, Wis.



If It's a "Globe Ventilator Car" it's a *ventilated* car. Fine design on perfect ventilating principles at surprisingly low cost. "Globe" for Air Comfort.

Globe Ventilator Co., Troy, N. Y.

1

The Kalamazoo Trolley Wheels

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



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

The Peter Smith Heater Company leads the world on heating City and Interurban Electric cars of all sizes and makes. Ask us to prove this statement. We have the experience back of us.

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1759 Mt. Elliott Ave., Detroit, Mich.



SIMPLEX ROLLER BEARING TROLLEY BASE

Safest—most economical. Tension INCREASES as pole goes UP, decreases as pole comes DOWN. No more bent poles or knocked down wires. Full particulars from THE TROLLEY SUPPLY CO. Canton, Ohio

Ventilation—Sanitation—Economy—Safety

All Combined in

THE COOPER FORCED VENTILATION HOT AIR HEATER

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

We Also Manufacture Pressed Steel Hot Water Heaters

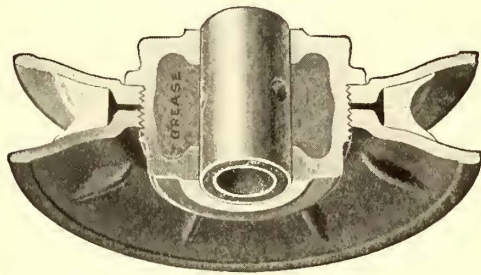
THE COOPER HEATER CO., CARLISLE, PA.

UNION SPRING & MANUFACTURING CO. SPRINGS COIL AND ELLIPTIC

M. C. B. Pressed Steel Journal Box Lids
General Office, Oliver Bldg., PITTSBURGH, PA.

Works: New Kensington, Pa.
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No Lubrication



Universal Trolley Wheel

It lubricates itself. Large grease cups in the hub provide lubricant as long as the wheel lasts, and some of our users tell us that its life is twice as long as many.

Built with a special harp, contact spring, bushing and pin, that all make a saving in time and cost.

THE PRICE WILL INTEREST YOU.

The Universal Trolley Wheel Co.
Northampton, Mass.

AUTOMATIC VENTILATOR CO., Sales Agent
2 Rector Street, New York City

9484

IF you are using any other type of conduit than Duraduct for your lighting and heating systems, you are wasting money.

DURADUCT

Reg. U. S. Pat. Off.

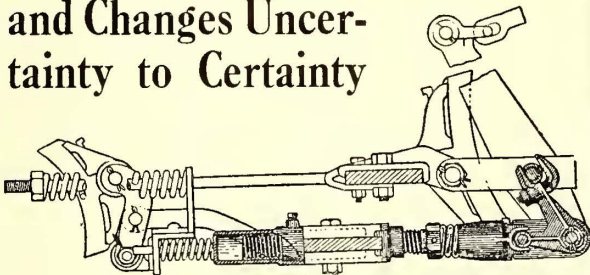
Flexible Non-Metallic Conduit will give 100% in efficiency—saves 66 2/3% in cost—and 85% in weight. It is also easier and cheaper to install.

Tubular Woven Fabric Co., Mfrs., Pawtucket, R.I.

A. HALL BERRY, General Sales Agent

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Eliminates the "Man Factor" and Changes Uncertainty to Certainty



The ANDERSON Automatic Slack Adjuster

Keeps the Brakes Always in Proper Adjustment

Each device can be installed on any type of truck in about 15 minutes without involving changes in the brake rigging. Once installed requires no further attention, but is itself always "on the job" automatically compensating for wear of the brake shoes. This device keeps the brakes in proper adjustment at all times.

Write for full description.

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OMAHA, NEB.

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

2

BRAKE SHOES

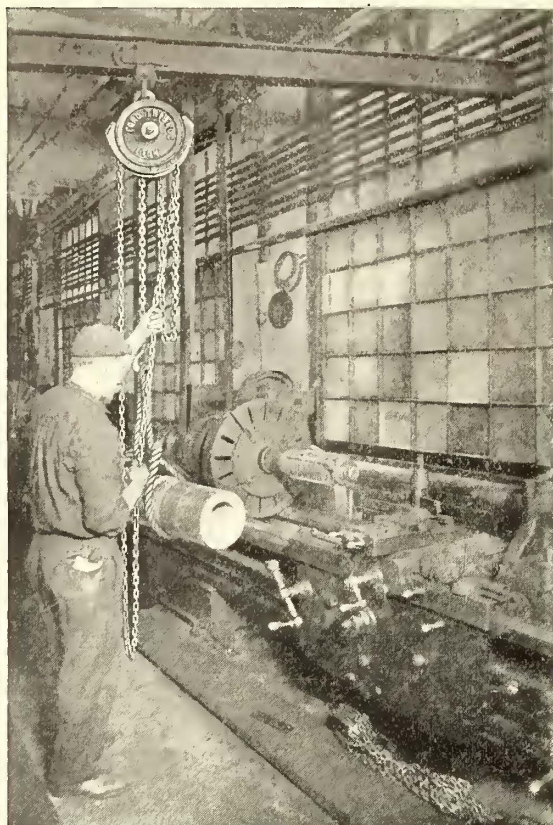
The Brake Shoe Business

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

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

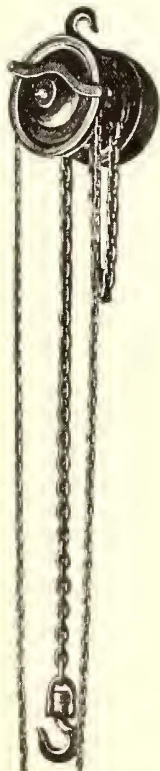
30 Church St., New York McCormick Bldg., Chicago
71607

1



Time is saved: work is speeded by using

FORD TRIBLOC CHAIN HOISTS



No matter what size you need or how severe the service you will find the Tribloc a most satisfactory and efficient Chain Hoist.

It is built in sizes from ¼-ton to 40-ton capacity. It has planetary gearing (which is enclosed in a dustproof steel case), steel parts, a 3½ to 1 factor of safety in its weakest parts, and eighty per cent of the power applied to the hand chain is converted into lifting energy.

The chains and hooks used on the Ford Tribloc are of the best material and workmanship procurable, and all our claims are backed by a five-year guarantee.

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Ford Chain Block & Manufacturing Co.

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¼ to 2 Ton Tribloc Hoist

E. G. Long Company

EDWARD H. MAYS, President
Offices, 50 Church Street New York

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Leaf and Coil Springs

MCB Pressed Steel Journal Box Covers

Full Power with High or Lower Adjustment

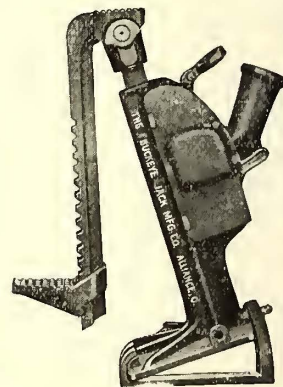
Many emergencies requiring a powerful jack present a difficulty in bringing the jack to bear on the load. The

Buckeye Emergency Jack No. 239 Special

saves time, strength and trouble. The many positions to which it is adjustable easily solve perplexing lifting problems. Full details in our catalog. Write for it.

The Buckeye Jack Mfg. Co.

Alliance, Ohio



7179 3

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One of the largest steam roads in the country uses TULC No. 2 VH in the switch and lock movements, switch cylinders and signal mechanism. The reason as given by the Purchasing Agent was "TULC is economical in that a small quantity only is needed for lubrication."

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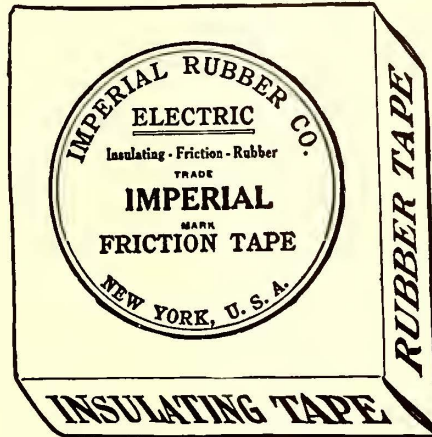
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USING THE

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MACHINES, TOOLS AND SUPPLIES

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A. G. E. ARMATURE MACHINE FOR BANDING, SLOTTING AND GRINDING

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that the most satisfactory varnish it could put inside and outside of all its steel cars, including the new all-steel trailers which it is providing for its summer suburban traffic is



This was the only manner in which the railroad, in common with many other carriers, could combat the checking of the paint on the steel surface, which resulted from the excessive expansion and contraction inevitable in a steel structure.

The saving in repainting to the roads using Valspar makes a big item.

Are you one of the savers?

Write for the new book on steam and electric railway car painting. It is free.

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MAC GOVERN AND COMPANY, INC.

114 LIBERTY ST., NEW YORK CITY, Phone, 3375 Rector

60 Cycle Turbo-Generator Units FOR IMMEDIATE DELIVERY FROM STOCK

One 1800 KW. (.8 P.F.) General Electric,
 ATB, 2-pole, 2300 volts, 3600 R.P.M.

Turbine, Curtis, 3-stage.

Dimensions:

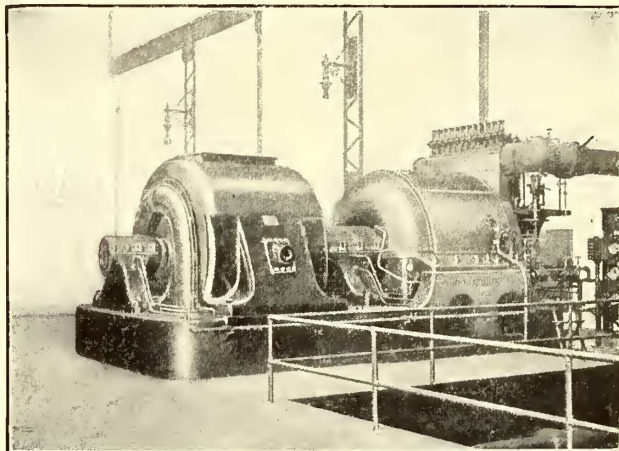
Length, 18' 5".

Width, 7' 9".

Height, 7' 5".

Net weight, 66,000 lbs.

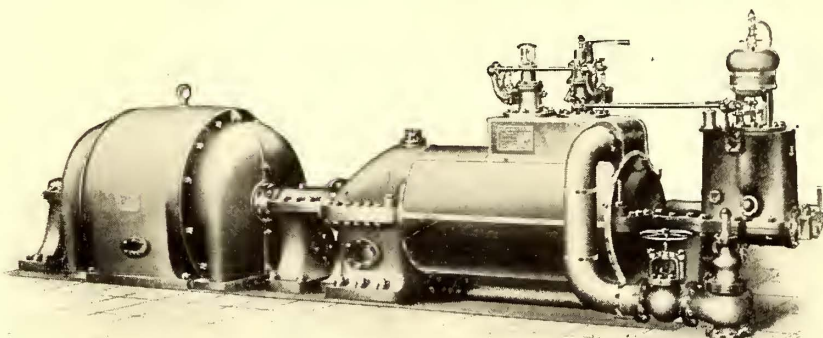
Switchboard with instruments.



Three 500 KW. Westinghouse-Parsons, 2-pole, 440
 and 2300 volts, 3600
 R.P.M.

Condensers, Bulkley Baro-
 metric.

Switchboards with instru-
 ments.



One 500 KW. (.8 P.F.) General Electric
 ATB, 4-pole, 2300 volts, 1800 R.P.M.

Turbine, Curtis.

Dimensions:

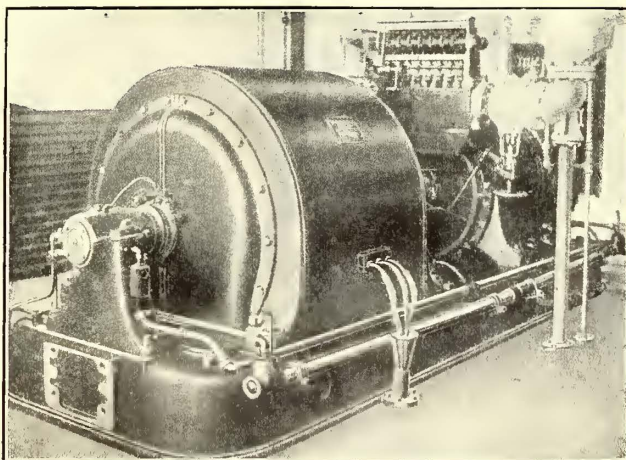
Length, 12'.

Width, 6' 11".

Height, 7' 7".

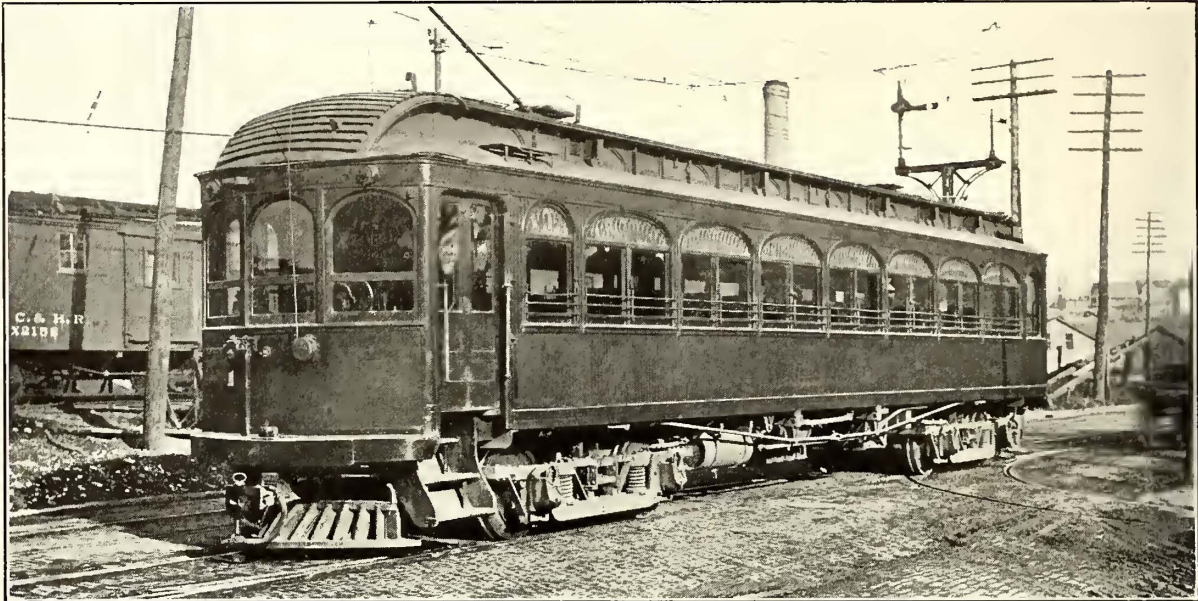
Net weight, 35,000 lbs.

Switchboard with instruments.



Write for our complete catalog. Please
 send us details of anything you desire to
 buy or sell in the way of generators, motors,
 generating sets, rotaries, transformers,
 engines, etc.

FOR SALE



20-Combination Interurban Cars-20

Builder, Kuhlman Car Co.
 Length over corner posts, 43'
 Length over all, 53' 6"
 Width over all, 8' 5"
 Pilots, wood
 Sanders, air
 Heaters, electric

Headlights, Crouse-Hinds arc
 Seats, Main Compartment, leather
 Seats, Smoking Compartment, rattan
 Seating Capacity, 58 passengers
 Trolley Retrievers, Earll
 Toilet, dry hopper
 Draw Bars, Ohio Brass Co. M. C. B.

Air Brakes Westinghouse A.M.M. Combined Straight and Automatic

Trucks

Builder, Baldwin M. C. B.
 Wheel Diameter, 37"
 Wheel Type, Rolled Steel
 Wheel Tread, 3"

Wheel Flange, 3"
 Wheel Base, 7'
 Axle Diameter, 6"
 Journals, 5" x 9"

Electrical Equipment

Motors, 4 West. 119
 Capacity, 125 H.P. each

Control, West. Type A. L.
 Circuit Breakers, two

Above cars have smoking compartments, and are equipped for train line operation. The wiring is installed in conduit throughout.

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W. R. KERSCHNER COMPANY, INC.

Hudson Terminal Building, Room 1882, 50 Church Street
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60 Cycle, Rotary Converters

- 2—General Electric 1000 K.W., 600 v., 360 R.P.M., type "H.C." comp. wound, 6 phase. Complete with air cooled 2300 v. trans., reactances and panels.
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25 Cycle, Rotary Converters

- 1—500 K.W. General Electric, 3 phase, 25 cycle, 600 volt D.C., 370 volt A.C., 375 R.P.M.

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- 1—250 K.W. Genl. Elect., 3 ph., 25 cycle, 500 R.P.M., 600 volts.
Can also furnish transformers—all voltages.

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

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Generator—West'gh'se 70 K.W., 350 volt, 200 amp. series wound.
Motor—West'gh'se 105 H.P., 575 volt, 950 R.P.M., type "SA" shunt wound.

Complete with coupling and panel.

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Cars, Motors, Rails, Generators—Everything for Track, Rolling Stock, Power Plant. Send us your requirements.

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Railway & Power Equipment Co.
(Charles F. Johnson)

Established 1901

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Blue List RPECO Specialties

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**OPEN and CLOSED
MOTOR and TRAIL**

Write for Price and Full Particulars to

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Philadelphia, Pa.

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**FOR ALL THE STANDARD
STREET RAILWAY MOTORS**

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CLEVELAND ARMATURE WORKS, Cleveland, O.

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.

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

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ELECTRICAL engineer and superintendent, technical graduate, with 15 years' practical experience engineering, construction and operation; railway, lighting and power systems. Now with large company, desires change. A1 references. Box 692, Elec. Ry. Jour.

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HIGH grade man desires position as secretary or assistant to busy executive. Fully experienced and thoroughly trained in management of various departments. At present operating official of system of city and interurban lines. Age 35, health good and am willing to go anywhere. Address Box 694, Elec. Ry. Jour.

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45 Ft. Interurban Car

Combination Passenger & Baggage. Seating Capacity 50; Baggage Room 8 ft. 1 in. **5,000 Gal. Pneumatic Sprinkler Car** 30 ft. Over All; All-steel construction. Must move them at once. **WRITE or WIRE.**



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AT BARGAIN PRICES—One 120 KW, Westinghouse, 133 Cycle Single Phase Alternator. One 200 KW, Westinghouse, 133 Cycle Single Phase Alternator. One 300 KW, General Electric, 133 Cycle Single Phase Alternator. Address "H. F. W., Jr.," 309 Colby-Abbot Bldg., Milwaukee, Wis.

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Approximately 75 T. R. W. and Duncan 500 volt, 2-wire meters from 2 1/2 to 150 amperes in first class mechanical and electrical condition. Have been recently tested and calibrated. Selling on account of changing customers to A. C. Address bids to Meter Department, Lehigh Valley Light & Power Co., Allentown, Pa.

*Get Your Wants into
the Searchlight*

READY-REFERENCE INDEX

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

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

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

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

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

- Accountants.**
Greims Corporation, H. E.
- Acetylene Regulators.**
Imperial Brass Mfg. Co.
- Acetylene Service.**
Prest-O-Lite Co., Inc., The.
- Advertising, Street Car.**
Collier, Inc., Barron G.
- Alloys and Bearing Metals.**
(See Bearings and Bearing Metals.)
- Alloys, Steel & Iron.**
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Ohio Brass Co.
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Railway Improvement Co.
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Edison Storage Battery Co.
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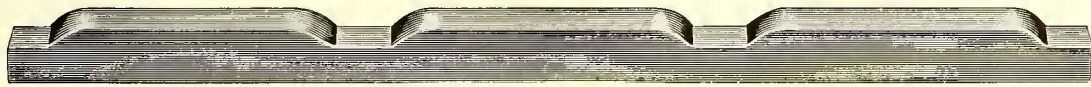


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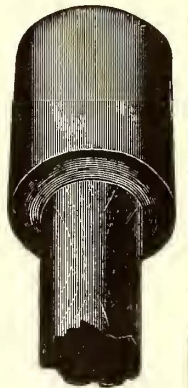
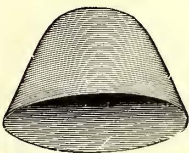
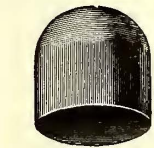
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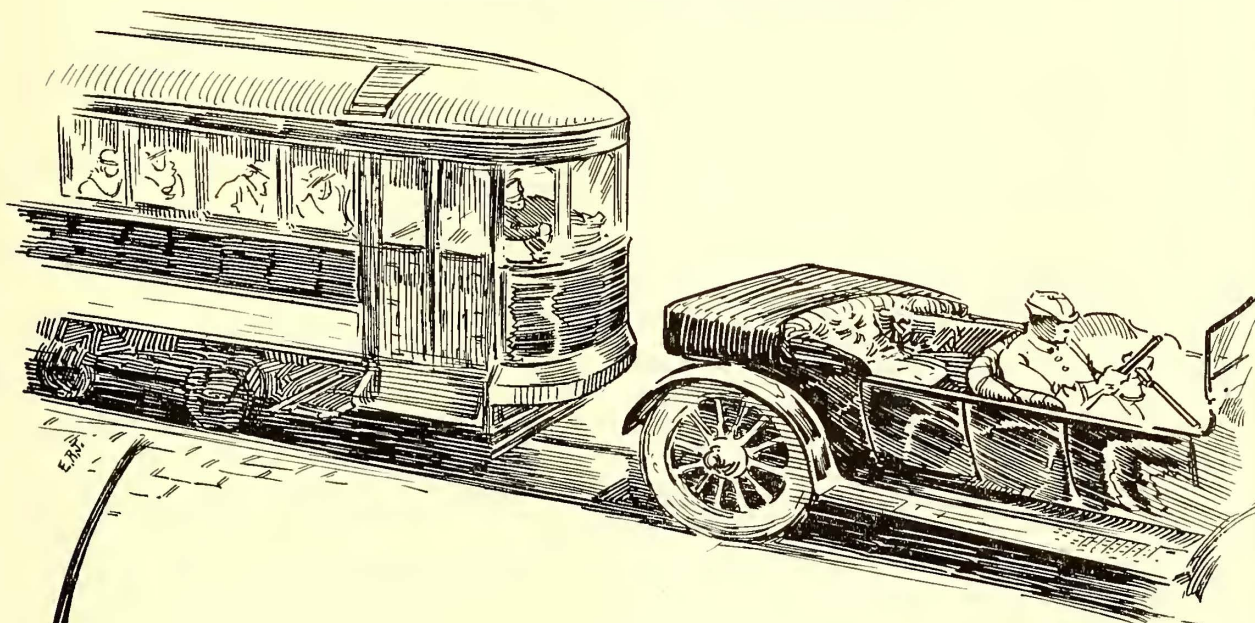
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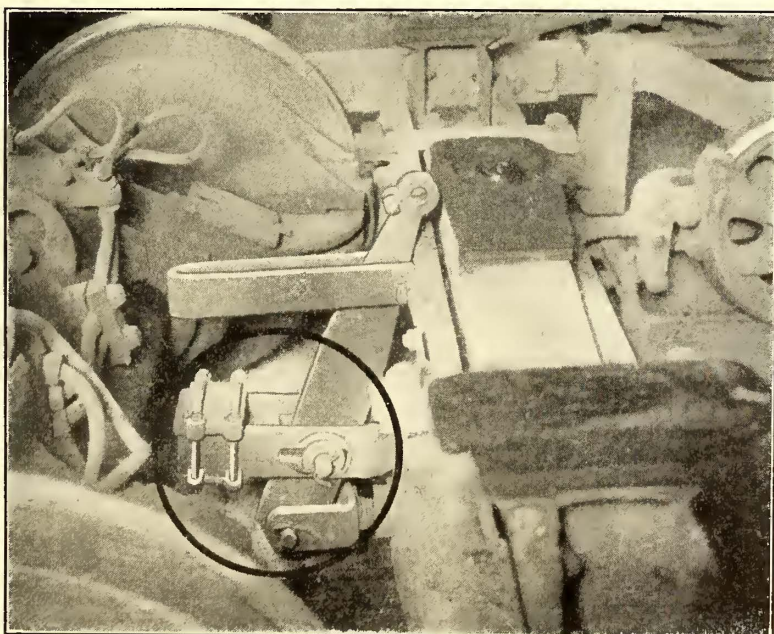
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Printing begins on Tuesday of each week.
 Changes of copy received up to 10 A. M. Monday will appear in the issue of the following week, but no proofs can be submitted for OK before publication.
 New Advertisements (not changes of copy) received up

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

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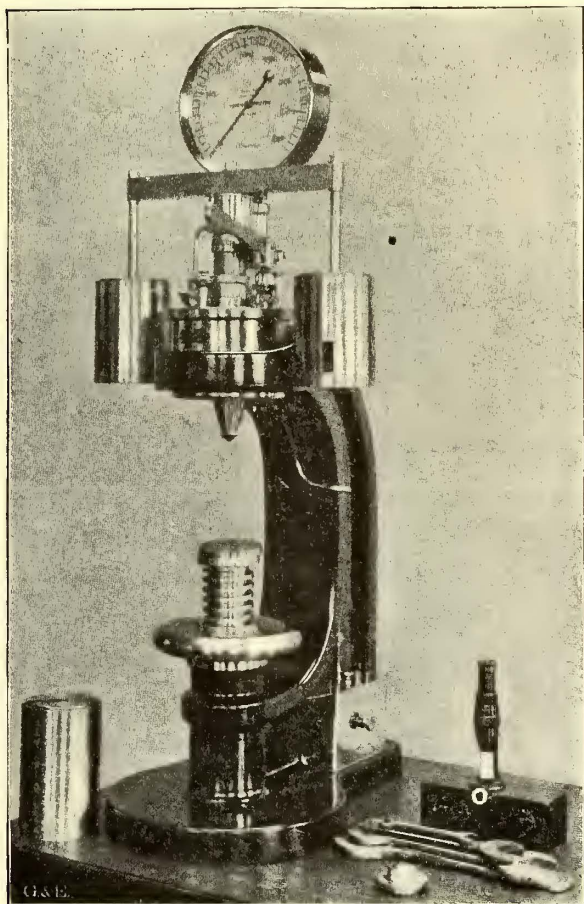
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TITANIUM IN RAIL STEEL

No. 17

Results of Hardness Tests



Courtesy Sauveur & Boylston

Hardness Tests are made on the well known Brinell and Schleroscope Machines—the results here shown are Brinell Tests.

STANDARD OPEN HEARTH			TITANIUM TREATED OPEN HEARTH		
Hardness			Hardness		
Head	Web	Flange	Head	Web	Flange
217	277	223	223	228	228
217	283	214	237	250	226
241	277	230	226	239	230
223	267	198	217	221	223
230	274	239	225	243	230
219	253	215	210	221	212
217	237	212	219	223	226
237	253	225	223	283	237
221	253	221	210	200	219
221	241	209	221	221	215
212	219	210	230	221	221
214	248	205	217	215	215
225	253	233	225	253	230
250	283	248	248	262	246
223	260	223	226	262	215
181	170	178	221	223	223
183	187	183	237	243	230
Averages:					
219	249	215	224	235	225

For details see our Bulletins
No. 1 to No. 7

These tests are particularly interesting as they illustrate so clearly two points.
1st. The greater uniformity throughout the entire section of the Titanium-Treated A-Rails.
2nd. The increased hardness of the heads of the Titanium-Treated Rails—additional evidence to prove why these Rails have greater wearing properties and longer life.

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We're properly equipped for **every** form of steel car construction.


The "Quality Shop" turns out a **better** car.

ST. LOUIS CAR COMPANY, St. Louis


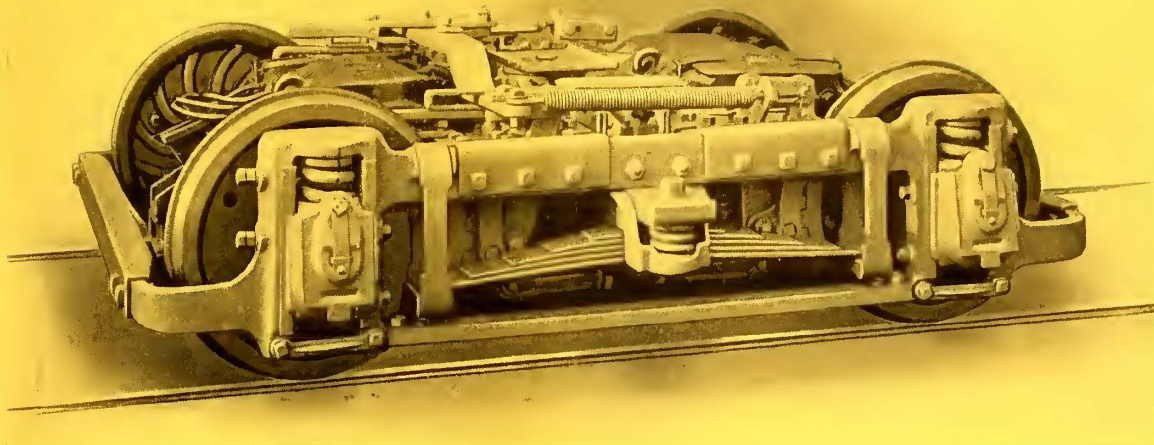
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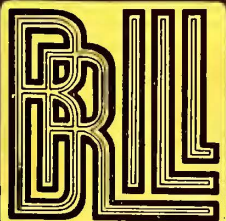


BRILL 77-E TRUCK

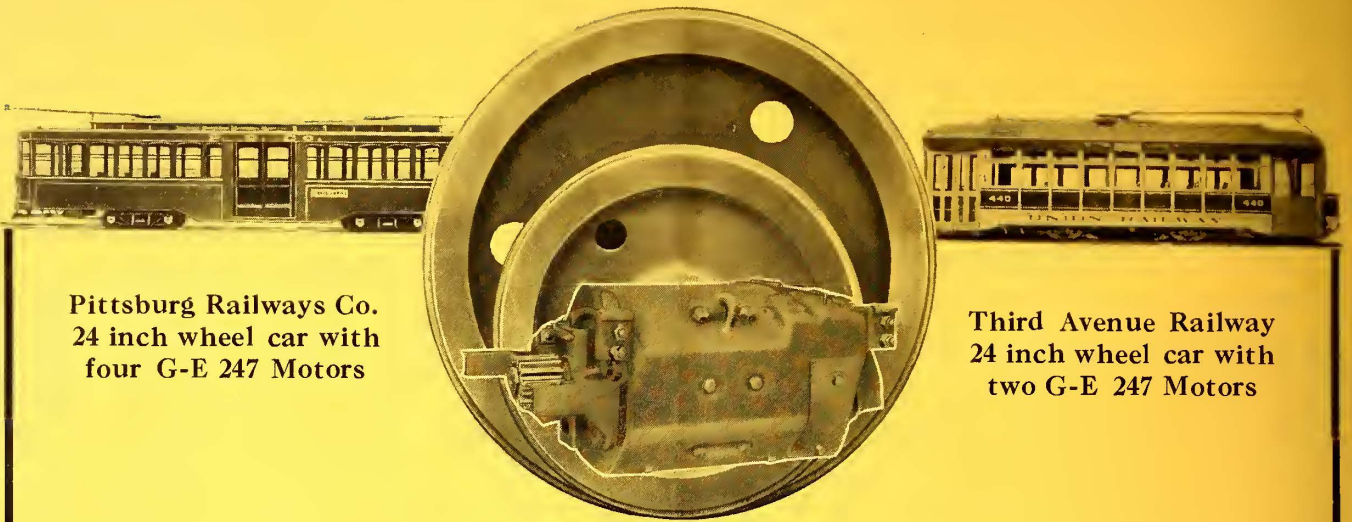



“THE illustration shows the Brill 77-E type of truck adapted to operate with 22-in. and 24-in. wheels and small inside-hung motors. The Brill solid forged side frames have very distinct advantages in this compactly constructed truck. Note the wide gusset plates which are depressed inside the side frames to carry the transoms low. Double-corner brackets give extra reinforcement to the transom connections. Extra clearance gained by the low end extensions and end frames is another apparent advantage. The ability to arrange the spring system to best advantage without being hampered by frame trussing and also to enable swing links to be placed at wide apart points on the frame is another feature afforded by the solid forged side frames. This spring suspension gives superior riding qualities to the truck and the combination of plate and coil springs graduates the spring action for light and heavy loads. In this particular truck for low carried cars, two coil springs are used under each end of the bolster in a spring seat which straddles the semi-elliptic spring and thus economizes space. The Brill Graduated Spring System means that the bolster coil springs are automatically put in action under light loads.”

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