

ELECTRIC RAILWAY JOURNAL

Volume 47
Number 1
January 1, 1916

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DANGER
LIVE WIRE
KEEP OFF

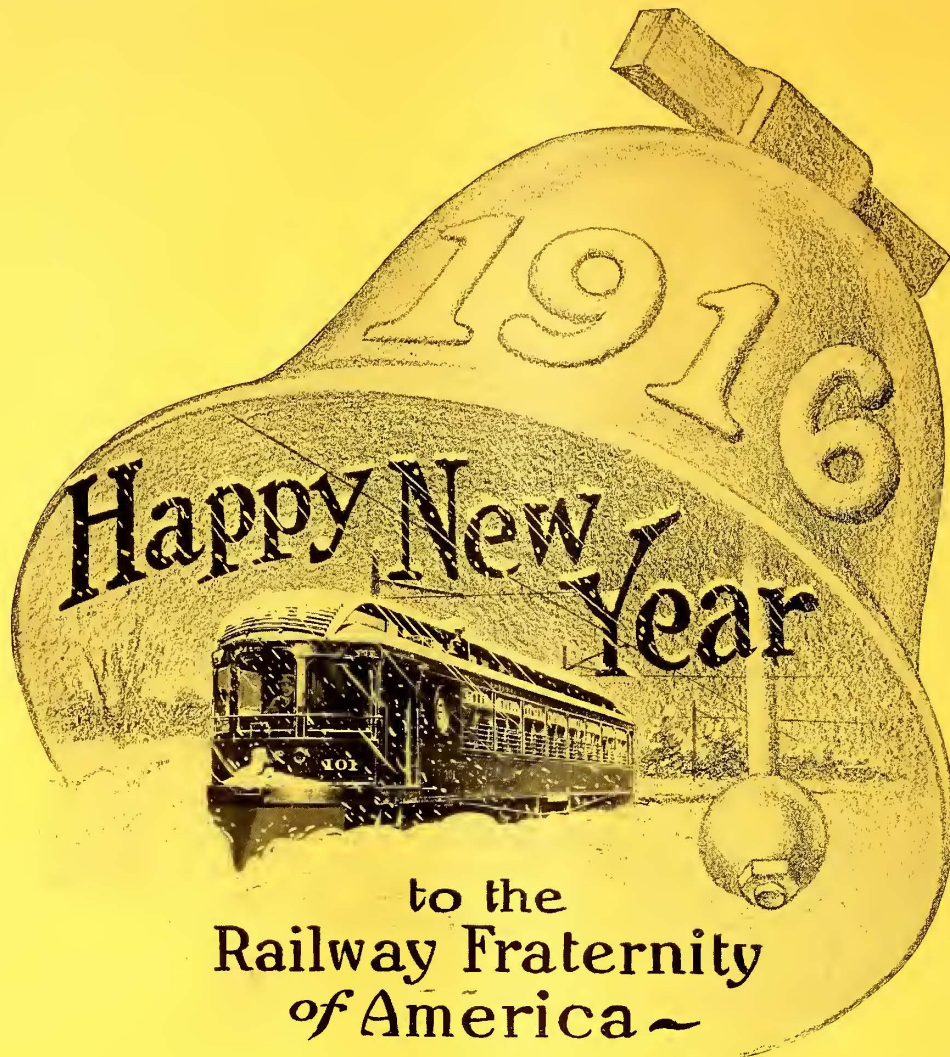
DANGER
LIVE WIRE



“PHONO-ELECTRIC” Contact Wire —the dependable overhead wire

Its quality has kept pace with every improvement in equipment
every increase in operating speed—every increase in car schedules.
You'll get longer service life from “Phono-Electric”. *It's Tough!*

BRIDGEPORT BRASS COMPANY, BRIDGEPORT, CONN.



THE reliable performance of Westinghouse HL Control and motors throughout many severe winters in the past, is a mighty big factor in making the outlook for the New Year bright and promising to those roads whose cars have modern Westinghouse Motor and HL Control Equipments.

They are prepared to buck snow and also maintain good schedules. Last winter when steam operated lines were tied up due to snow drifts, many interurbans equipped with Westinghouse HL Control and Motors maintained good schedules. That's the kind of service that attracts and holds passenger business.

Westinghouse Electric & Manufacturing Co.

Sales Offices in All
Large American Cities



East Pittsburgh,
Pennsylvania

Electric Railway Journal

New York, January 1, 1916

Volume XLVII No. 1

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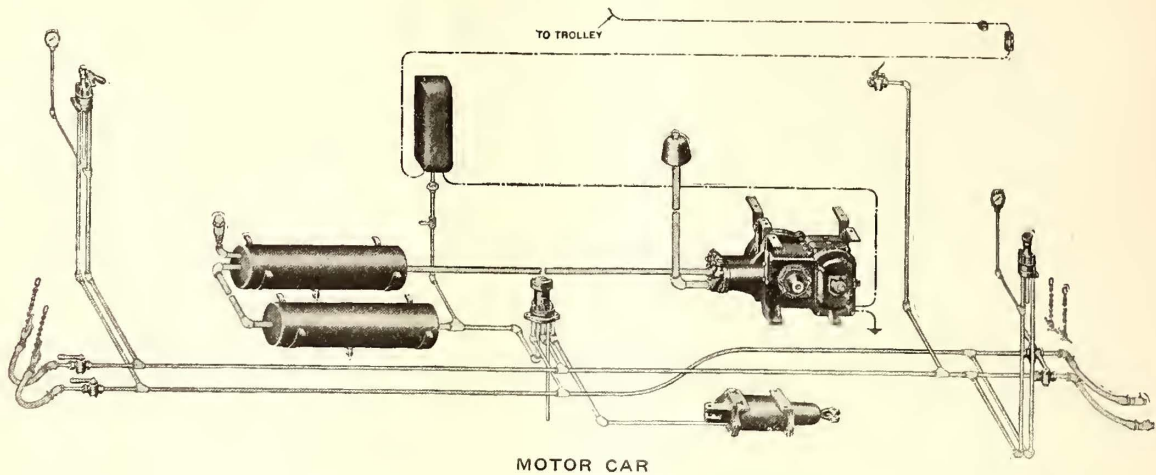
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No back volumes for more than one year, and no back copies for more than three months.

Circulation of this issue 7750 copies.

“Featherweight”

Straight Air Brake with Emergency Feature



MOTOR CAR

Economical Features

- 1—Low First Cost
- 2—Light Weight
- 3—Small Current Consumption
- 4—Low Maintenance
- 5—Long Life

Meets all requirements of city and suburban service where moderate speeds prevail. Possesses the flexibility of the simple, straight air brake in service application and release.

Carries the automatic, instant-acting, full-pressure features of the standard automatic air brake in emergencies.

Whether used normally on a single motor car, or on a two-car motor and trailer train during rush hours, it is equally effective and reliable, and retains at all times the integrity of its various characteristic features.

When each car is fitted with a conductor's application valve, the emergency brake may be applied by the conductor from any point in either car or on the car platforms.

Likewise, pressure escaping from the emergency pipe line, due to pipe breakage, hose rupture, or hose separation, will automatically cause an emergency application of the brake.

High speed suburban and interurban trains of three cars or more, whose more intensive service requires higher power and control, should be fitted with the corresponding type of Westinghouse standard automatic air brakes.

The specially exacting service of elevated, subway and electrified steam road divisions is admirably met by the Westinghouse electro-pneumatic brake.

Our engineering and inspection force of practical, "firing line" men is maintained at considerable expense to assist our patrons in working out all air brake problems of operation and maintenance.

These experts are yours. Use them.

Westinghouse Traction Brake Company

Works: Wilmerding, Pennsylvania

Pittsburgh: Westinghouse Building
Chicago: Railway Exchange Building



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

Westinghouse Type BR Trolley Frog



The Trolley Wheel

never travels on its
flanges while passing
under a BR Frog.

(The illustration to the
right shows why.)

BR Frogs can be installed
nearer to a point directly
over the track-switch point
than any other type.

This means longer life for the
frog; longer life for the trolley
wheel; higher speeds; and better
service all around.

Prove these statements by putting one in service

Westinghouse Electric & Manufacturing Co.
East Pittsburgh, Pa.

Atlanta, Ga.
Baltimore, Md.
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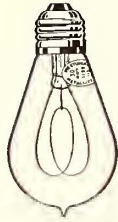
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Los Angeles, Cal.
Memphis, Tenn.
Milwaukee, Wis.
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Rochester, N. Y.

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Seattle, Wash.
Syracuse, N. Y.
Toledo, Ohio
Washington, D. C.
*W. E. & M. Co. of Texas

One Road Investigated Its Cost of Light

It Found:



CARBON
Lamps

\$35 per day
for current alone



MAZDA
Lamps

\$12 per day
for current alone

Westinghouse Mazda Lamps

Sometimes a really economical device does not yield **enough** of a saving to justify its adoption.

But the saving effected by Westinghouse Mazda Lamps is **large** enough to make their economy **profitable**, and the name Westinghouse is a guarantee of satisfactory lamp service.

Guaranteed by the Name

Westinghouse Lamp Co.

Atlanta
Baltimore
Boston
Buffalo
Butte
Chicago

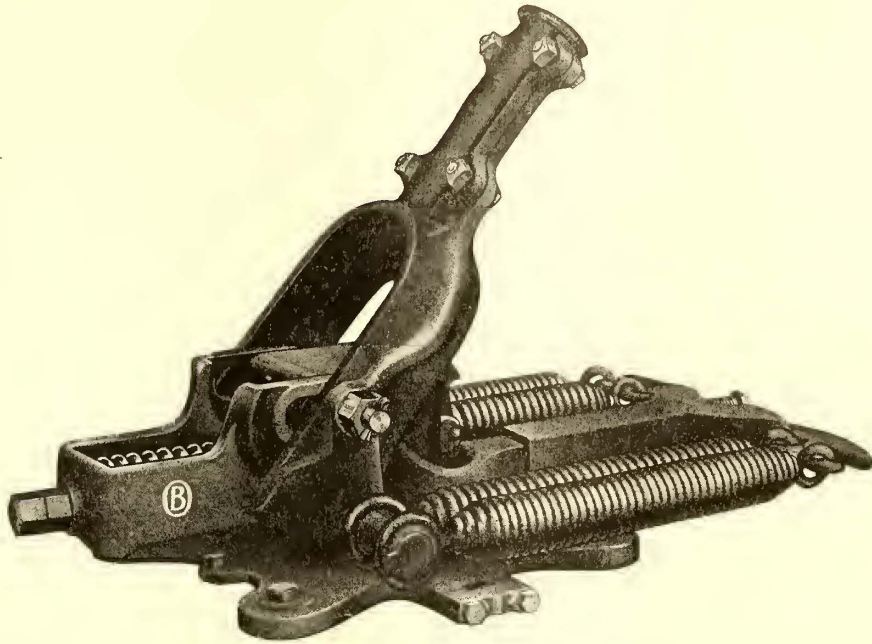
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Export Sales Dept., 165 Broadway, N. Y. C.
For Canada—Canadian Westinghouse Co., Limited, Hamilton, Ont.
*Westinghouse Lamp Corporation.



O-B Trolley Bases

PATENTED

For Satisfactory Service and Long Life

Light in weight, easily assembled and give uniform tension on trolley.

Roller bearings are set in an improved type of cage which keeps rollers upright and prevents jamming.

Bearings are easy of access at all times.

Sliding yoke construction relieves the bearing of unbalanced strains.

Buffer spring prevents bending of trolley poles.

Hook is provided for holding fork down for pole renewal in car barn.

Stem and turret are provided with steel bearing bushings which may be renewed when worn and thus greatly increase life of Base.

Tension springs are closed at the ends over drop forgings, thus minimizing spring breakage, and are provided with special bearing sleeves which prevent excessive wear between spring eye and fork.

A Trial Order Costs You Nothing

Form 1 Base for city and interurban service is 6 $\frac{5}{8}$ inches high; Form 2 Base for like service where exceptional clearance is necessary is 3 $\frac{3}{4}$ inches high.

THE OHIO BRASS COMPANY
Mansfield, Ohio

PUBLISHER'S PAGE

The Efficient Buyer

THE hardest man to sell is the one who is not certain as to what he needs—the man who has formulated no opinion.

It is next to impossible to get down to cases with him and to close the deal promptly because few men will buy until they have an opinion.

It is that man who consumes his company's time, his own time and the time of seller in having an opinion developed for him.

If he knew the fundamental facts concerning the material he is to buy—if he knew, even in a rough way, the relative values of different materials for the same service—if he knew what others were doing with such materials—he would then have an opinion advanced far enough so that he could conserve the time of all parties concerned when the necessity for making a deal arrived.

The object of nearly all advertising in Electric Railway Journal is to help formulate opinions.

The man who follows this advertising regularly is equipped to choose quicker and with better discrimination, than the man who is not a reader of advertising.

One of the objects of advertisers who use large space each week in Electric Railway Journal is to tell prospective customers important facts concerning their products in order to conserve the time of their salesmen and the time of the buyer.

This is one of the savings which help to make advertised materials cost less to the consumer because the producer has eliminated that most expensive cost—"missionary work."

The efficient buyer is the man who reads advertising regularly.

Electric Railway Journal

Member Audit Bureau of Circulations

The New Year

Basic conditions point to a most successful year in every industry.

Maximum profit will accrue to those who are best equipped to take that profit.

Good rolling stock will help your road to *earn*—good* automatic signals and good† automatic track switches will help it to *save*.

And of the three the latter two are most important.

Start the new year right—*earn* and *save*.

*United States Automatic Signals are *good signals*—more in use than all other electric railway automatics combined.

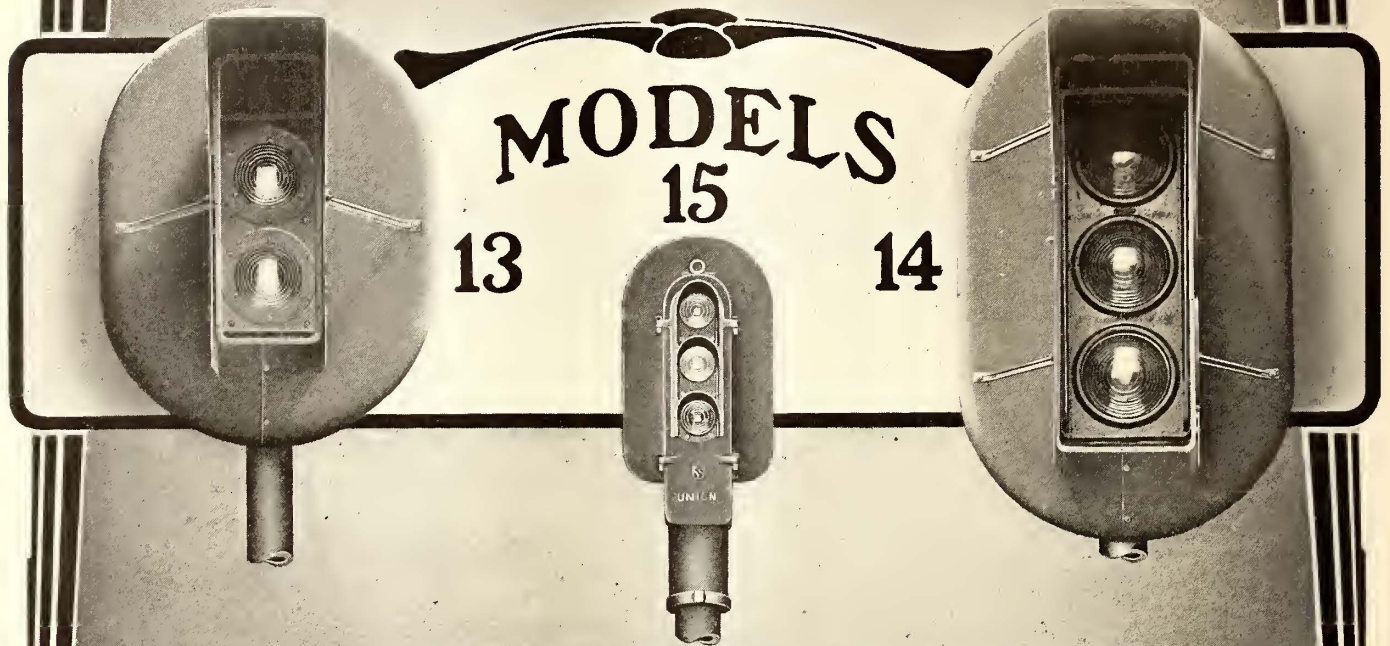
†The Collins Non-Splitting Non-Splashing, mercury sealed track switch has removed every criticism of automatic switches.



United States
Electric Signal Co.
West Newton, Massachusetts

Foreign Representatives:
Forest City Electric Services
Supply Co., Salford, England

LIGHT SIGNALS



COLOR LIGHT SIGNALS TO MEET EVERY OPERATING REQUIREMENT

MODELS 13, 14 & 15.

FOR BOTH DAY AND NIGHT INDICATIONS

TWO AND THREE LENS SIGNALS

Ranges under most exacting conditions from 500 to 2000 feet, depending on model used. Minimum power requirements for desired range.

High transmission or deep color lenses, arranged for maximum efficiency.

The Union Switch & Signal Co.

Founded by Geo. Westinghouse 1881.

SWISSVALE, PA.



Hudson Terminal Bldg.
NEW YORK

Peoples Gas Bldg.
CHICAGO

Canadian Express Bldg.
MONTREAL

Candler Annex
ATLANTA

Railway Exchange Bldg.
ST. LOUIS MO.

Pacific Bldg.
SAN FRANCISCO

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





Time is the essence of railroading

Why Coasting Recorders Save Maintenance

IT has already been shown that incipient car defects are betrayed by the sub-average coasting records of a car.

Yet this is not the most important source of reduction in maintenance expense.

Every equipment man knows that most burnt-out or baked armature and field coils and commutator flash-overs are due to mishandling of the controller.

With the Rico Coasting Recorder on his car, the motor-man has a powerful incentive to stick to correct principles.

By increasing his coasting through utilization of car momentum, he gives more cooling time to his motors.

By eliminating dragging brakeshoes he puts less work on his motors.

Added to these advantages are those due to the greater all-around skill in car operation which is fostered by the monitorship of the Rico Coasting Recorder.

Railway Improvement Co.

Executive Offices, 61 Broadway, New York

Chicago

Los Angeles

London



Time is the essence of railroading

The Correct Principle in the Correct Instrument

THE Rico Coasting Recorder has now been in use more than five years and in service on thirty-seven prominent railroads, checking the operation of more than 8000 cars in daily service.

It had the correct principle from its birth—that of measuring the time element factors. Like all other devices, experience has improved its mechanisms and broadened its usefulness.

The Rico Coasting Recorder can operate only to record the facts you want. Such records are in printed form and cannot be falsified.

The Rico Coasting Recorder may be of a design to give a printed record, which shows, in addition to the coasting time, the car number and the motorman's number, the elapsed running time, the stopping time and the number of stops.

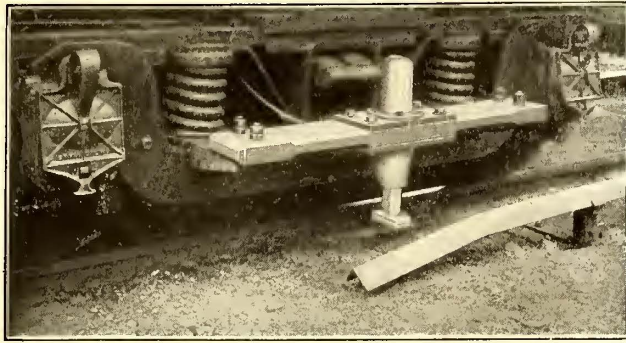
Railway Improvement Co.

Executive Offices, 61 Broadway, New York

Chicago

Los Angeles

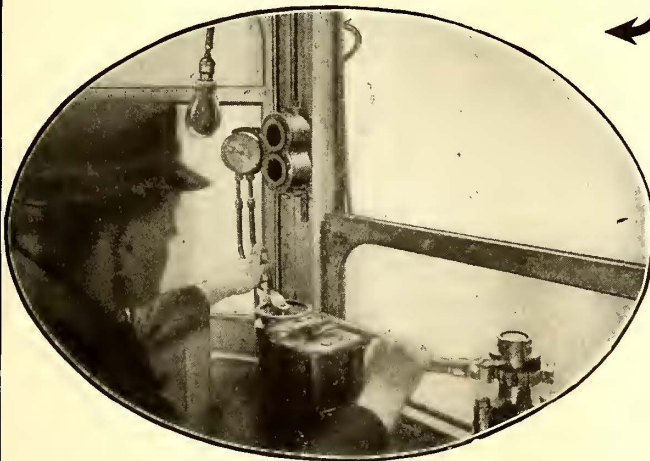
London



← Every Contact Here

Signals the Motorman

And Signals the Dispatcher



These Results Are Produced Automatically and Instantaneously

For the safe and expeditious movement of cars three things are necessary. First, that movements of every car shall be protected against movements of every other car. Second, that the dispatching authority shall have knowledge of the location of each car, and third, that the dispatching authority shall have communication with each car.

In other words, it is necessary to signal the car to protect it from other cars. It is necessary to know the location of cars to direct movements at all. It is necessary to communicate with the car, if any elasticity in operation is to be had, or in order to meet emergencies.

Under the operation of

THE SIMMEN SYSTEM

these three requirements are brought together in one **electro-mechanical automatic system**. Its operation is interlocked to prevent human error. Its automatic communications are direct from dispatcher to motorman, and from car to dispatcher, without the intervention of any third party.

Under the Simmen System, the same contact point which communicates the signal to the motorman's cab also signals to the dispatcher, automatically, the location of the car and makes a

permanent record of the time the car reached that location.

The Simmen System, therefore, not only automatically protects the car, but provides direct automatic communication between cars and dispatcher, enabling the latter to directly communicate new orders for meeting points, or to cover any emergency which may arise, thereby insuring that elasticity and expedition in operation which is necessary for the rapid, continuous and SAFE movement of cars.

Simmen Automatic Railway Signal Co.

1575 Niagara St., Buffalo, N. Y.

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



Two Sets of Poles
Double Expense.

One Set of Combination Poles.
One-half the Expense.

Elreco Combination Poles



render double service. They act as supports for overhead trolley span wires and also as ornamental lighting standards. This means economy. They save the cost of extra lamp poles—they eliminate obstructions in curb line—they save the cost of underground construction.

Two Special Features of Elreco Construction

Note the Chamfered Joint in the illustration on the left. This prevents accumulation of water and eliminates corrosion.

See the "Wire Lock" Swedge Joint. This prevents slipping down or "telescoping." The walls retain full strength.

Write for Catalogs

- Cat. 16* contains complete tables and data on Tubular Steel Poles and Fittings.
Cat. D. Cast Iron Lamp Standards, Combination Railway and Lighting Poles for Arc Lamps.
Cat. E. Single Light Standards and Combination Railway and Lighting Poles for Mazda C Lamps.

Electric Railway Equipment Co.

Cincinnati, Ohio

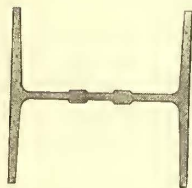
New York: 30 Church Street



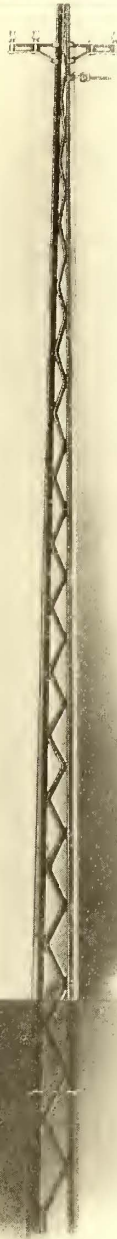
TROLLEY

POLES

Each Pole
is a
Continuous
Section of
Rolled
Open Hearth
Steel





Made
of One Piece
into a
Tapering
Truss

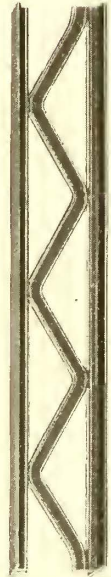


NOT
Fabricated

No Bolts 
To Loosen

No Rivets 
To Corrode

No Joints 
To Telescope

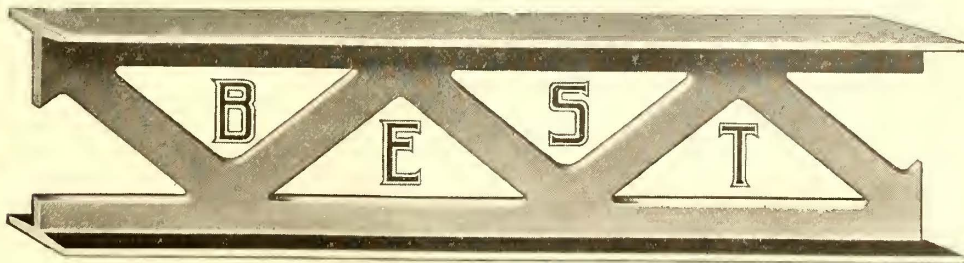


Cost and Weight
Approximately
60%
of the Usual Type
Trolley Pole of
Equivalent Strength

Bates **E**xpanded **S**teel **T**russ **C**o.

210 South La Salle Street

Chicago, Illinois, U. S. A.



STREET CAR RUNS AMUCK WITH NO MOTORMAN

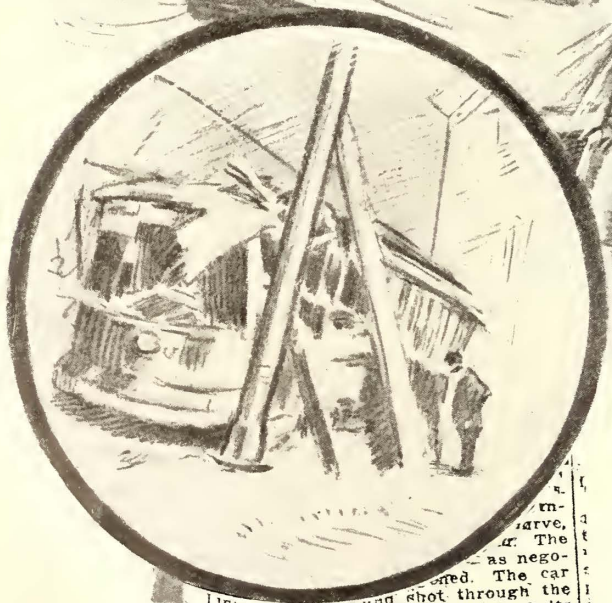
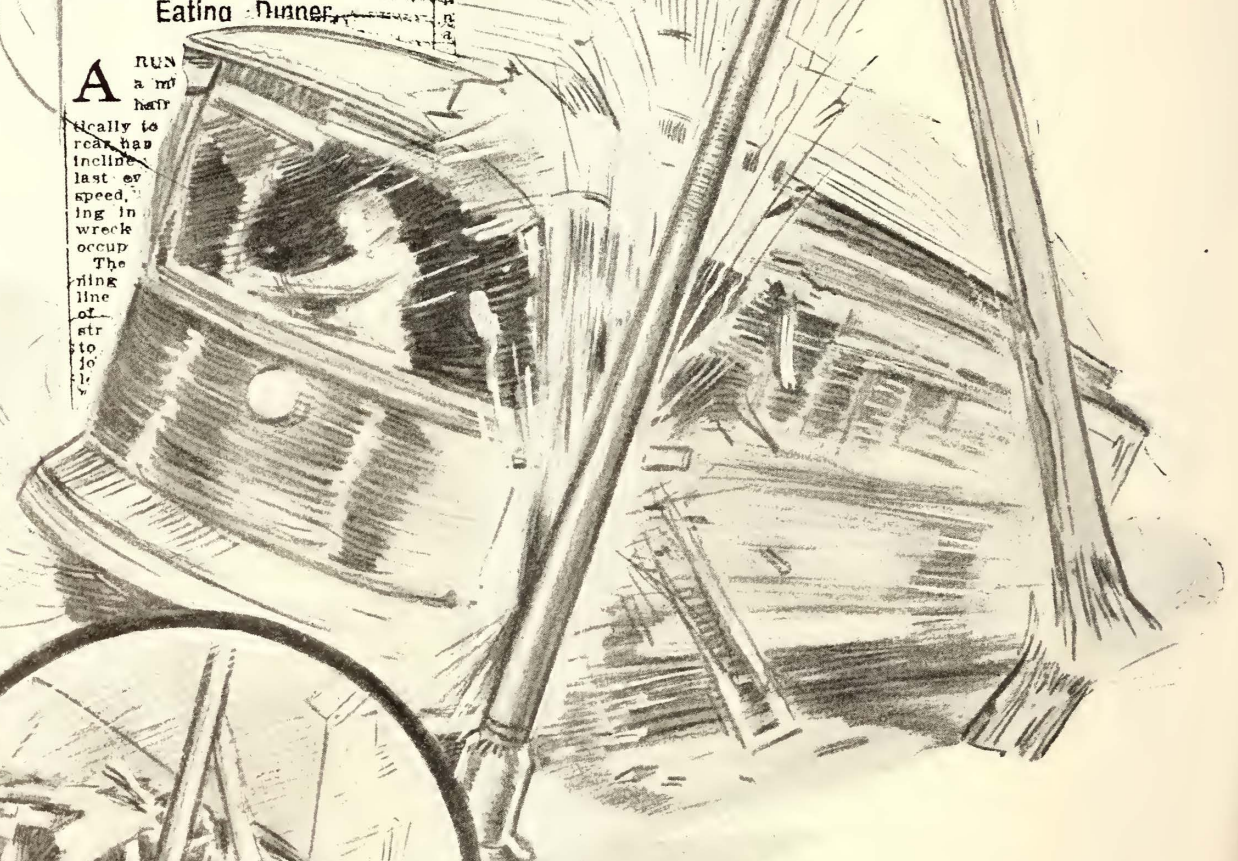
Dashes Down Steep Incline on Stanyan Street and Tears Into House

HAND BRAKES USELESS

Smashes Into a Residence While Occupants Are Eating Dinner

A RUN a m...
 locally to...
 incline...
 last ev...
 speed...
 ing in...
 wreck...
 occup...
 The...
 ring...
 line...
 str...
 to...
 jo...
 le...

CRASH



...m...
 ...arve,
 ...r. The
 ...as nego-
 ...ed. The car
 ...and shot through the
 ...air, cut a telephone pole off at its
 ...through an iron fence and
 ...the house. The
 ...ubber-



NATIONAL

DISTRICT SALES OFFICES: { Atlanta Boston Chicago Denver
 { Omaha Philadelphia Pittsb

the wooden pole snapped like a matchstick—the *steel* simply *bent*

It happened in San Francisco, on April 29th.

Going down-hill at terrific speed, the car left the track at the curve—hit the steel pole—was thrown to one side, and, striking a wooden pole, 10 inches square at the butt, sheared it off as though a shell had struck it!

The “NATIONAL” Tubular Steel Pole—the pole that turned the flying car from its course—was only bent out of line 12 or 15 inches; and the injury was so slight that it was not necessary to change the wires on it.

WHICH pole was the more economical?

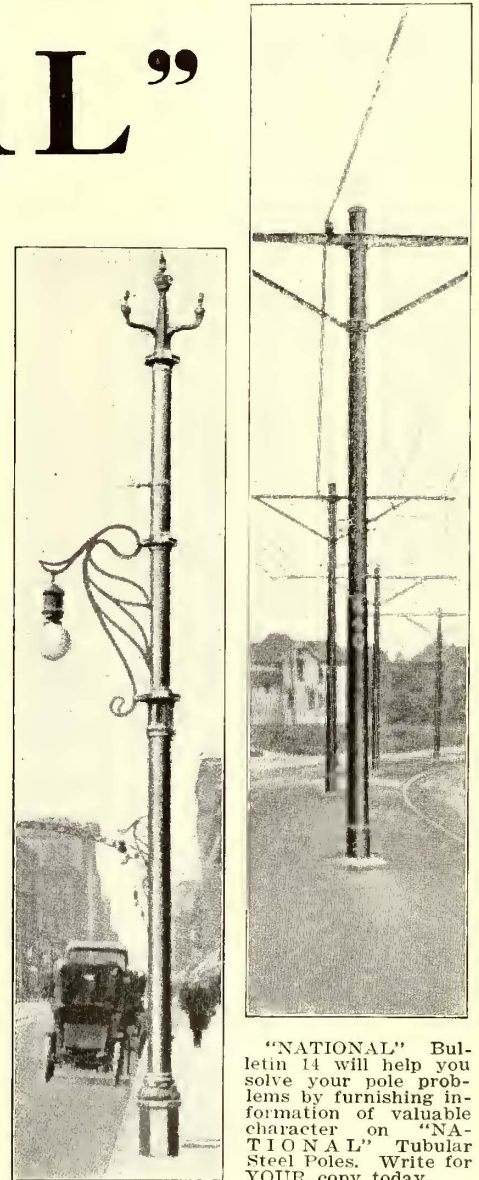
“NATIONAL” Tubular Steel Poles The “Safety First” Poles

are always ready for the stresses and strains of foreseen and unforeseen conditions—for expected and unexpected circumstances—for hurricane winds, drifting snow, runaway cars, motor trucks and the thousand and one factors that *at any moment* may determine whether or not your poles are going to *protect your lines from tie-up* or whether they are going down in ruin that reduces them to scrap and kindling.

“NATIONAL” Tubular Steel Poles are not only stronger—they are *lighter* than ordinary wooden or cast iron poles.

They are made of soft, mild steel, whose ultimate strength will not average less than 50,000 lbs. per sq. inch, elastic limit not less than 30,000 lbs. per sq. inch. *They will bend*, rather than break. *They can be repaired*, rather than replaced. *They return money on their investment*, rather than create renewal costs and cost of interrupted service.

Is YOUR SYSTEM protected with real “Safety First” poles—“NATIONAL” Tubular Steel Poles?



“NATIONAL” Bulletin 14 will help you solve your pole problems by furnishing information of valuable character on “NATIONAL” Tubular Steel Poles. Write for YOUR copy today.

TUBE CO. (General Sales Offices) Pittsburgh, Pa. (FRICK BUILDING)

Kansas City New Orleans New York
Salt Lake City St. Louis St. Paul

PACIFIC COAST REPRESENTATIVES:—U. S. Steel Products Company,
San Francisco Los Angeles Portland Seattle
EXPORT REPRESENTATIVES:—U. S. Steel Products Company, New York City



STREET CAR RUNS AMUCK WITH NO MOTORMAN

Dashes Down Steep Incline on Stanyan Street and Tears Into House

HAND BRAKES USELESS

Smashes Into a Residence While Occupants Are Eating Dinner

A street car... really to... incline... speed... in wreck... The sink... etr... to...

CRASH!



It pays to be **NATIONAL** Prepared

NATIONAL

DISTRICT SALES OFFICES: { Atlanta Boston Chicago Denver
Omaha Philadelphia Pittsburgh

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"NATIONAL" Tubular Steel Poles

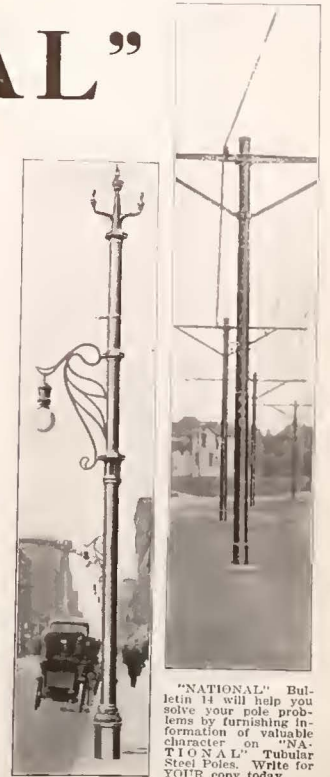
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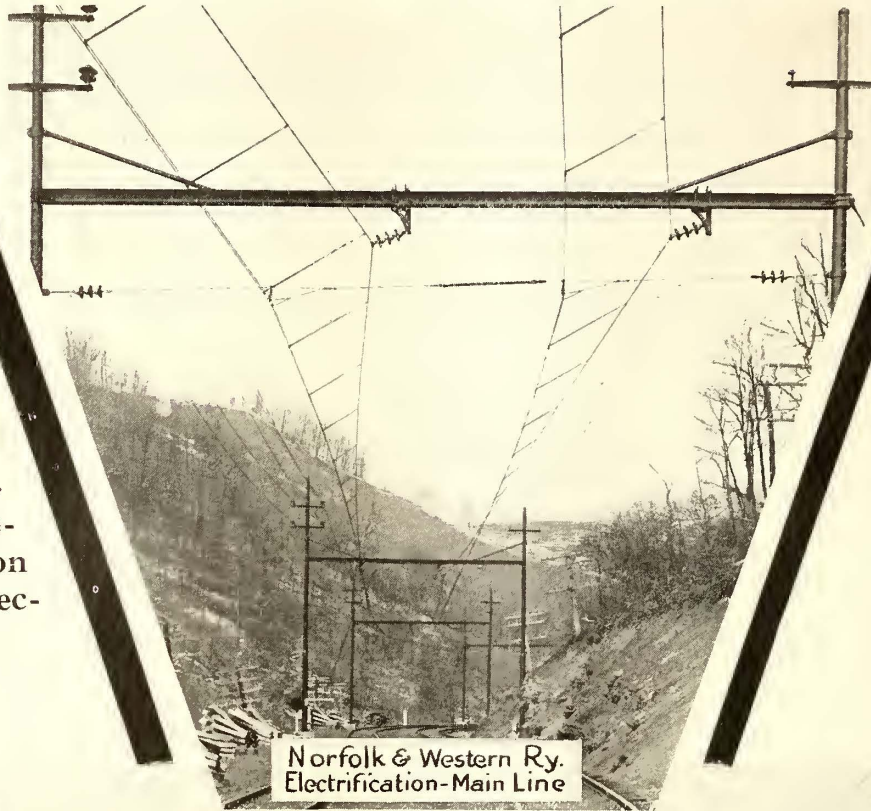
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PACIFIC COAST REPRESENTATIVES:—U. S. Steel Products Company, San Francisco Los Angeles Portland Seattle
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VICTORY INSULATORS

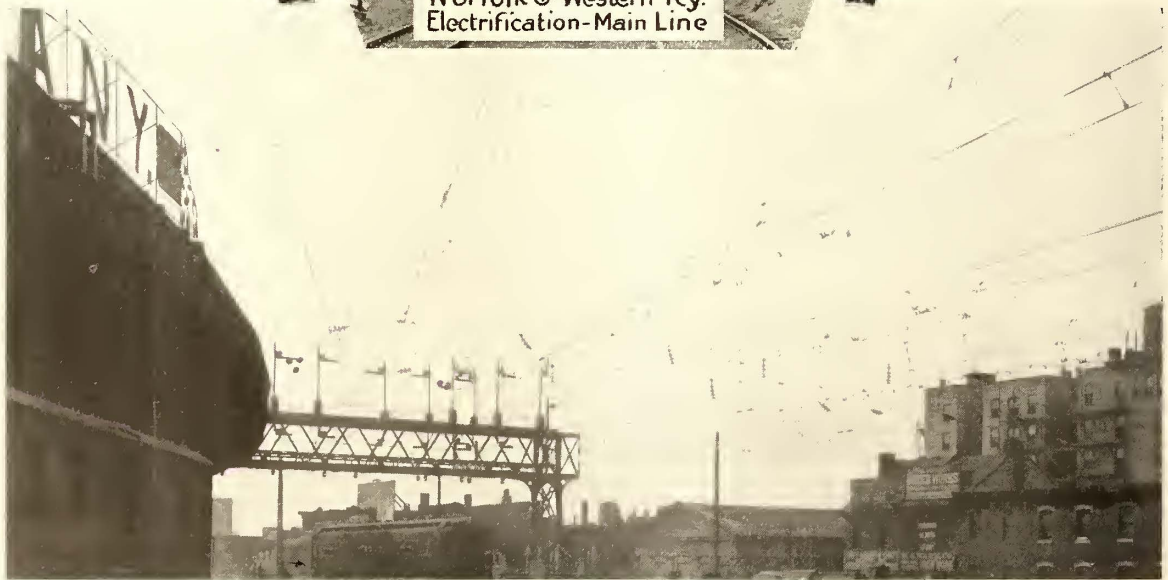
Notable electrifications of 1915 where Victor Insulators were selected because they afforded adequate and reliable protection from high electrical pressure.



Norfolk & Western Ry.
Electrification-Main Line

"THE INSULATOR BOOK" tells the story of insulator safety. Send for it.

The Locke
Insulator Mfg.
Co.
Victor, N. Y.



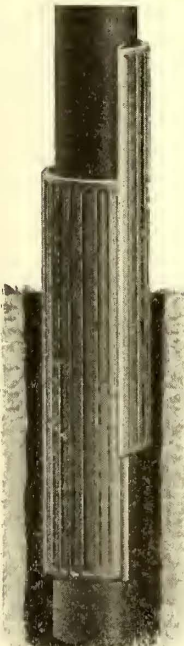
Pennsylvania Electrification

Philadelphia-Paoli Division

Specify **VICTORS**
for **1916**

DREW
ELECTRIC & MANUFACTURING CO.
INDIANAPOLIS, IND.

Money Savers for 1916

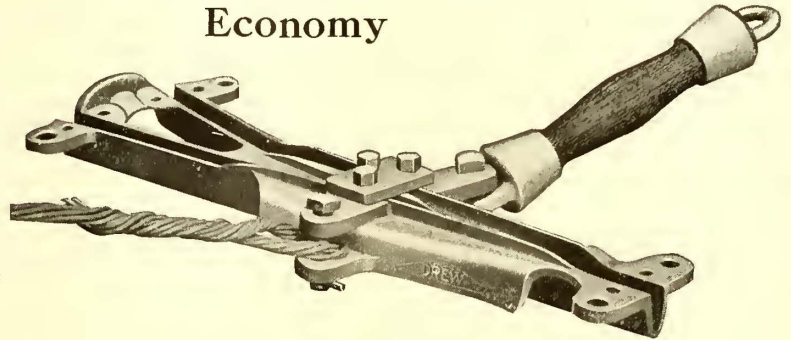


The Drew Pole Sleeve Saves

and saves big on the maintenance of poles. At little cost it makes a *new* pole of one that has weakened at the ground line. But on a new pole there's practically no limit to the life.

Ask us to furnish proof of its big economy.

Each Drew Product Provides a Distinct Worth-While Economy



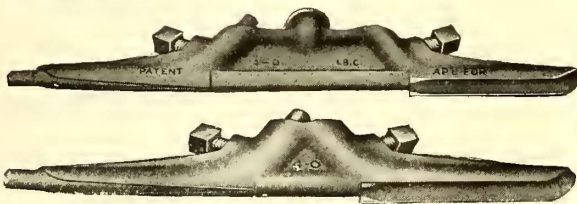
The New Drew Double-Ear Overhead Switch Saves

on overhead maintenance in this way:

The switch has a double ear or clevis on each side, with a cotter bolt for attachment to the supporting span. To renew either switch or trolley wire the bolts are removed without cutting the wire and putting in a new "make-up."

The runners extend nearly into the center of the pan and take the wear of the wheel, stop "dragging" and wear.

The Drew tapered, renewable approaches extend 6 in. each way from the frog, giving further protection in the wire and insuring smooth "take" and "leave." The cross-bar between runners prevents the trolley harp from fouling.



The Samson Splicer Saves

by providing a splice that offers no more resistance than air to the smooth running trolley wheel. The smooth, snug under-run eliminates arcing and hammering, and that makes the splice last and last.

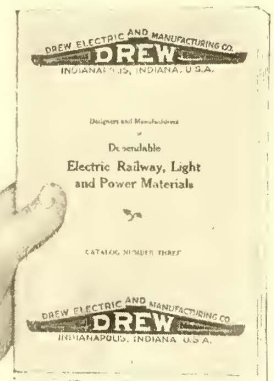
Send for this book today

—It is full of interesting data and will be your guide to
1916 ECONOMIES

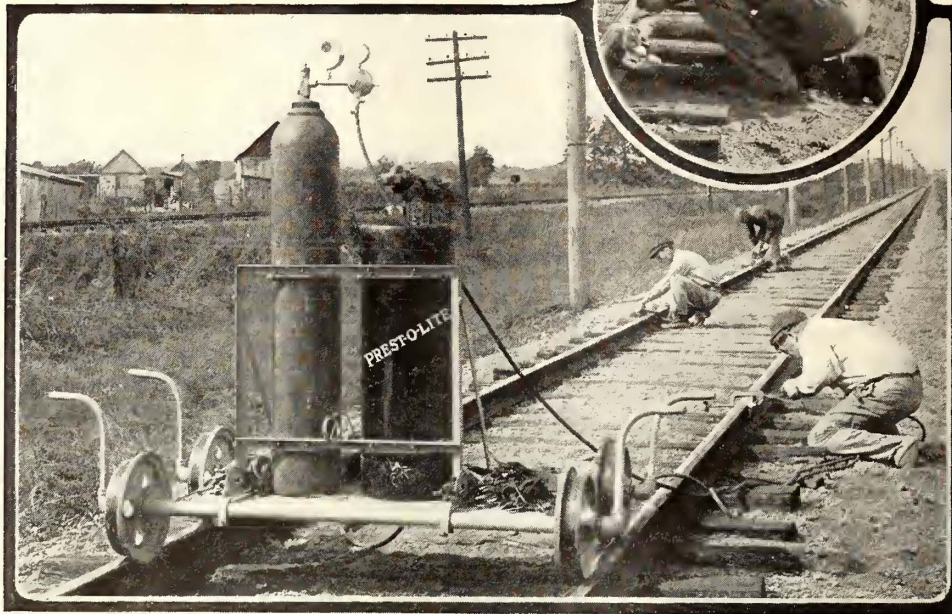
ASK NOW

The Drew Motor-man's Mirror Saves

on treasury drains via the claims channel. It reduces car step accidents by giving the motorman a view of the rear step or running board. More than 300 roads are saving money with Drew Mirrors.



For New or Old Track



PREST-O-LITE

Gas-Weld Rail Bonding

(Oxy-Acetylene Process)

To any road analyzing the great savings of efficiently bonded rails, the oxy-acetylene process has unique and unparalleled advantages.

The cost per applied bond is low, and the permanent electrical efficiency insures an economy that cannot be too highly appreciated. The overhead to be charged against bonding operations is very small, due to the very low cost of gas-weld equipment.

The purchase of the necessary equipment costs much less than would be paid for the lease or purchase of other bonding apparatus. We supply thoroughly high-grade oxy-acetylene welding equipment for \$60 (Canada \$75)—oxygen and acetylene on extremely liberal service basis—prompt service everywhere. This same portable welding outfit has enormous possibilities for savings in shop and yard repairs as well.

Only three men are necessary for a bonding crew. No pilot necessary. On straight ahead track a crew can readily apply 120 bonds in a 10 hour working day.

A searching study of the roads having used this process shows that the oxy-acetylene gas-weld rail bond is unsurpassed for permanency and lasting efficiency. Suitable types of bonds are easily obtained. The U. S. Bureau of Standards has officially reported that Prest-O-Lite Process gas-welded rail bonds have unusually high conductivity.

Our extensive literature on the applications of the Prest-O-Lite Oxy-Acetylene Welding Process in the electric railway field will interest you. Send for it.

The Prest-O-Lite Company, Inc.

The World's Largest Makers of Dissolved Acetylene

805 Speedway, Indianapolis
53 Branches and Charging Plants

Canadian Office and Factory
Merritton, Ontario

Do Your Next Bonding by the Prest-O-Lite Process





The Thermit Insert Weld Gives You

A Weld That Has Made Good
100 Per Cent Mechanical Strength
100 Per Cent Electrical Conductivity
Simple Yet Speedy Application
Less Traffic Interference with More Safety
Lowest Actual Cost and Longest Life
The Opportunity to Use the Best Alloy Rails

*We do not call the Thermit Insert Weld a Joint
Because we obliterate the Joint*

Goldschmidt Thermit Co.



The Thermit Insert Weld

gives you

A Weld That Has Made Good

The Thermit Insert Weld is not an experiment. Installations at Pittsburgh, San Antonio, Milwaukee, and other cities testify that it is a good weld made better, and for less money.

The Thermit Insert Weld has the same basic features of simplicity, ease of transport and convenience of application that made its forerunner so popular.

Its improvement in design makes it the only full-section weld.

While the base, web and lip of the adjoining rails are fused into one mass by the usual Thermit reaction—

The heads are butt-welded to an insert cut from a rolled section of like analysis.

This butt-weld, due to the cooling of the welding collar, makes the insert integral with the rail.

Its chief improvements in application are—

The use of head inserts of rolled steel of like analysis, making approximations to rail composition needless.

The preheating of Thermit additions with waste gases to cut Thermit requirements, say, by one-third.

The ramming of molds with a squeezing machine, the abolition of fire-clay for hand luting and the use of asbestos-molasses seals both to prevent run-outs and to give a smoother weld.

The result of the foregoing improvements in weld design and application is

A Better Weld at Lower Cost

GOLDSCHMIDT THERMIT CO.

WILLIAM C. CUNTZ, General Manager

90 WEST STREET, NEW YORK

329-333 Folsom St., San Francisco

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

7300 So. Chicago Ave., Chicago





The Thermit Insert Weld

gives you

100 Per Cent Mechanical Strength

The paradox of the mechanical joint is the weakening of the part to be strengthened.

Boring holes in rails for joint plates is like breaking a limb for the sake of applying a tourniquet.

Mechanical joints have other drawbacks—

The heads of abutting rails cannot stay in the same plane even if ground before jointing.

The joint plates cannot stay in alignment, because of variations in the profiles of abutting rails and because of the hammer blows set up by the car wheels.

As the rails of street railways are buried, it

is impossible from an operating standpoint, to tighten the joint bolts which invariably loosen under vibration.

The perfect mechanical joint would be one that transmitted the wave motion due to the wheels without the slightest change in direction or amplitude.

In other words, the change in section inevitable to any plate or bridge joint lowers the elasticity or shock-absorbing qualities of the rail as a whole.

Since it gives a truly continuous rail of uniform section and equal strength

The Thermit Insert Weld is 100 Per Cent Efficient Mechanically

GOLDSCHMIDT THERMIT CO.

WILLIAM C. CUNTZ, General Manager

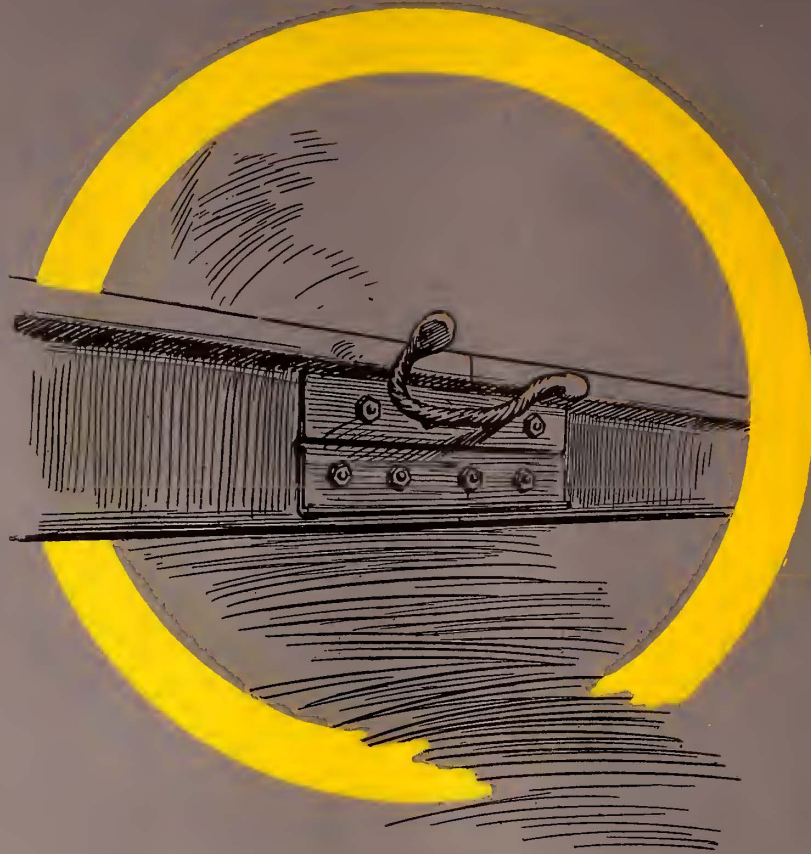
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329-333 Folsom St., San Francisco

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

7300 So. Chicago Ave., Chicago





The Thermit Insert Weld

gives you

100 Per Cent Electrical Conductivity

To conduct all of the return current to the power house is the function of a rail bond.

Failure to do so means more than the loss of energy; it means electrolysis and interference with nearby low-voltage circuits.

Therefore, the supplementing of the mechanical joint by an electrical joint—be it of solid copper, ribbon copper or strand copper.

It is easy to furnish enough copper to equal the conductivity of the rail—

The rub is so to secure the bond that no insulating film of air or oxide will deflect the flow of the return current.

Compressed and pin terminal bonds will work loose

or the metal will become fatigued (brittle) under vibration.

Soldered bonds call for the highest skill in application, yet are very liable to oxidization.

Brazed bonds are subject to vibration, corrosion, electrolytic action and theft.

Therefore, none of these bonds maintains its original efficiency indefinitely.

On the other hand, the Thermit Insert Weld does do so because it is simply the continuation of the running rail without plugs, pins, solder, amalgam or outside conductors.

The full section weld that makes it a perfect, non-shock mechanical joint also makes

***The Thermit Insert Weld 100 Per Cent
Efficient Electrically***

GOLDSCHMIDT THERMIT CO.

WILLIAM C. CUNTZ, General Manager

90 WEST STREET, NEW YORK

329-333 Folsom St., San Francisco

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

7300 So. Chicago Ave., Chicago





The Thermit Insert Weld

gives you

Simple Yet Speedy Application

The Thermit Insert Weld not only combines the functions of the mechanical joint and the rail bond, but it surpasses them in ease and speed of application.

You can do your Thermit welding at your convenience; not at another's! And at a speed which keeps pace with the other track work.

It calls for no mess of saws, drills, reamers, hydraulic presses, plates, bolts, washers, lock nuts, bonds and what not.

The equipment of a mold-squeezer, molds, crucibles, fire clay, Thermit, etc., is much simpler and not of a character to tempt robbery.

Furthermore, the Thermit Insert Weld is the only

one whose success depends upon a chemical reaction which is always uniform.

The success of this chemical reaction is assured in practice by the fact that we make up the Thermit in a package for each joint, and that the insert welded into the head of the rail is of the same character as the rail.

Therefore, the workmen's duties are restricted to making the molds correctly, to preheating properly and to grinding off the weld.

The chance of failure is a minimum because the weld depends upon

A Predetermined Chemical Reaction

GOLDSCHMIDT THERMIT CO.

WILLIAM C. CUNTZ, General Manager

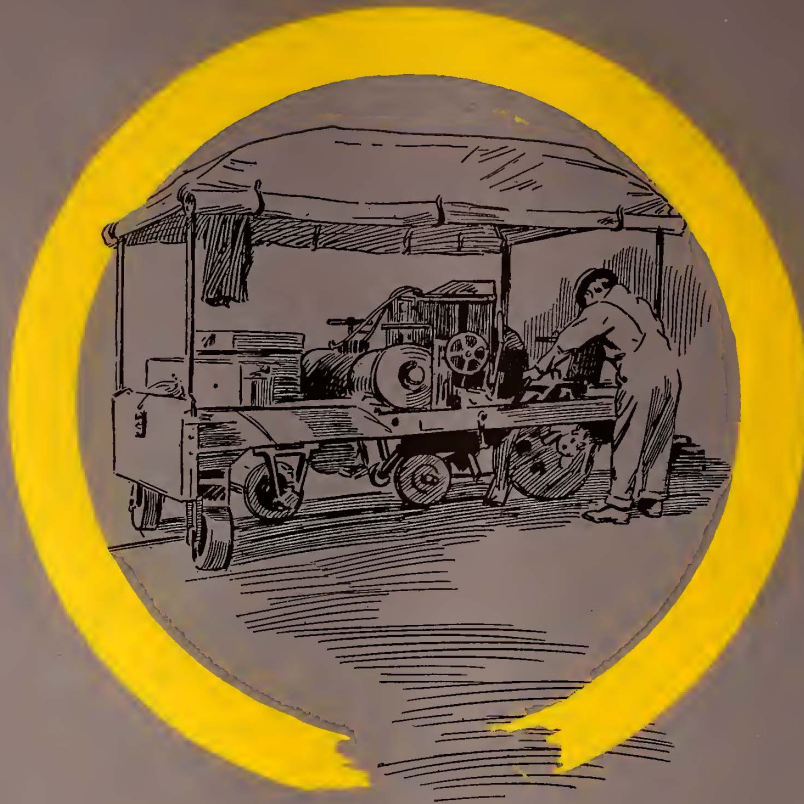
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The Thermanit Insert Weld

gives you

Less Traffic Interference With More Safety

The simple and portable character of the Thermanit welding outfit, including the grinder, is a strong point of merit.

Any of your old service cars will carry all the equipment, and it can be hauled even on its own wheels.

It follows then that you can weld your rails to meet the convenience of the revenue-producing department, shifting quickly from place to place as traffic conditions require.

Instead of tying up long stretches of track for days at a time.

Thermanit work also can be done in the open light of day when labor is cheaper and when the men do better work.

Thermanit welding demands no protective apparatus for the operators or the public.

As Thermanit welders use their eyes and ears in normal fashion at all times, their work does not suffer through impairment of sight or hearing.

Evidently the Thermanit Insert Weld also possesses the merit of

Less Traffic Interference With More Safety

GOLDSCHMIDT THERMIT CO.

WILLIAM C. CUNTZ, General Manager

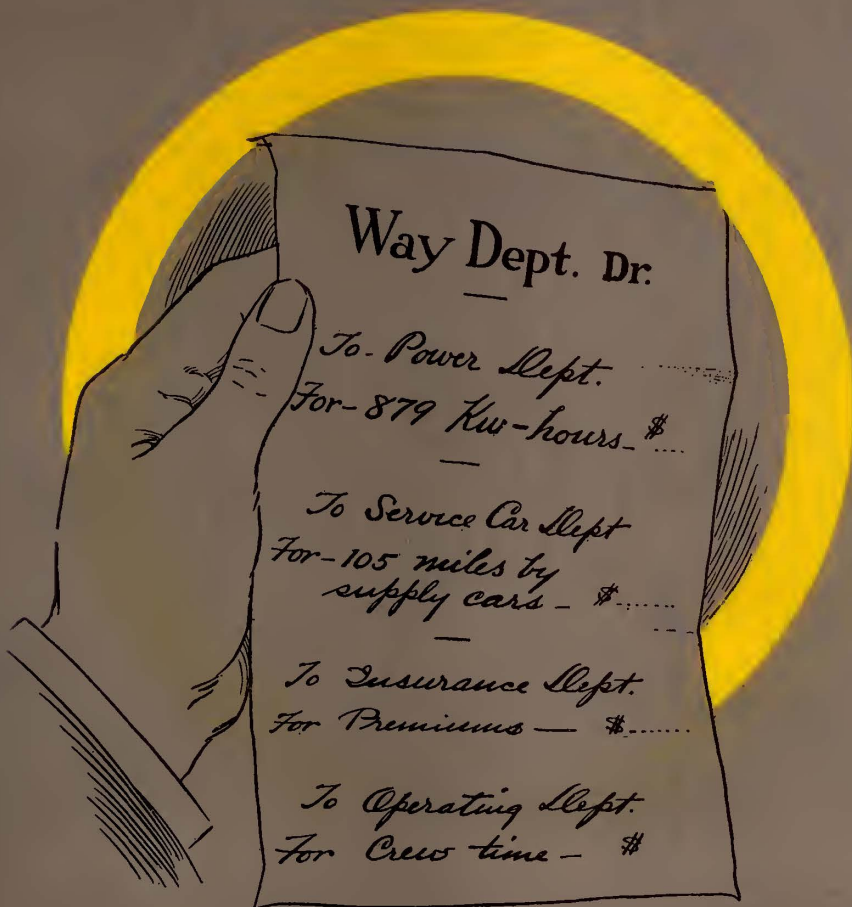
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The Thermit Insert Weld

gives you

Lowest Actual Cost and Longest Life

If inter-departmental accounting and overhead charges were put into practice on your system, the order of cost for different rail joints would show some startling changes.

The true cost of a rail joint is not the labor and material charge paid by the way department; it is the cost paid by the company as a whole.

How many engineers figure the item of current into their cost of electric welding as an item corresponding to the cost of the Thermit?

How many include an insurance item to cover damage to property and injury to men?

How many allow for the operating expense of the service cars used?

How many realize that the unit cost of the Thermit Insert Weld is practically the same for a few joints as for many?

How many remember that the life of the joint is the life of the rail and make an amortization charge accordingly?

How many penalize themselves for injuring the service of the transportation department by the use of complicated and non-portable equipment?

If such items are considered, it will be found that with due allowance for depreciation and maintenance, irrespective of its longer life,

*The Thermit Insert Weld Enjoys the
Lowest Actual Cost*

GOLDSCHMIDT THERMIT CO.

WILLIAM C. CUNTZ, General Manager

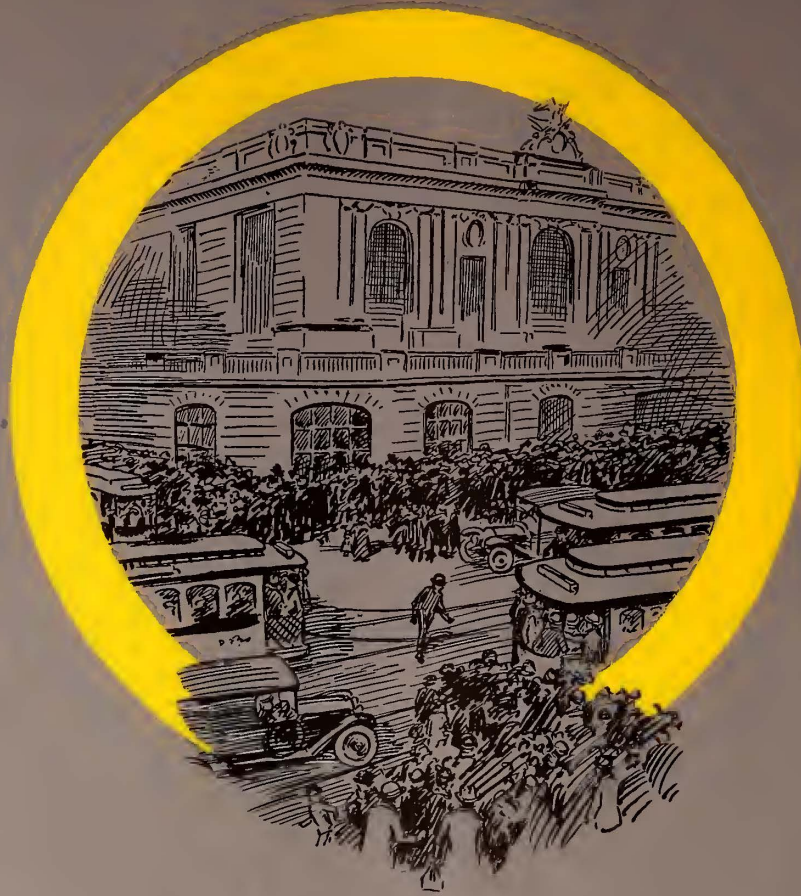
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The Thermit Insert Weld

gives you

The Opportunity to Use the Best Alloy Rails

The ideal rail joint has been defined as one that will live as long as the rail.

Hence the rail should be selected first and the joint afterward; not vice versa.

The fact that alloy steel rails may be harder to drill for plate joints and uncertain for electric welding should not discourage their use.

Actual installations have proved that the Thermit Insert Weld is as successful on

alloy or treated steels as it is on low-carbon open-hearth.

One reason is that the heat applied in Thermit welding is distributed over a wider area instead of being concentrated along certain lines or at certain spots. Thus the stresses due to temperature changes do not break down the fiber of the rail.

With any rail steel whatsoever, the Thermit Insert Weld is more than a junction; it is

A Continuation of the Rail Itself

GOLDSCHMIDT THERMIT CO.

WILLIAM C. CUNTZ, General Manager

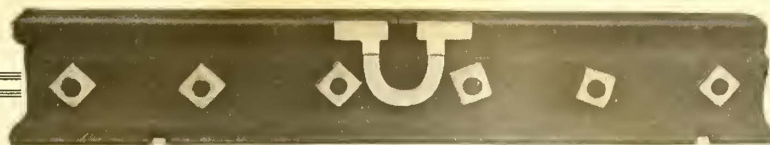
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“The Line of Least Resistance”

welds its rails with

Electric Weld Rail Bonds

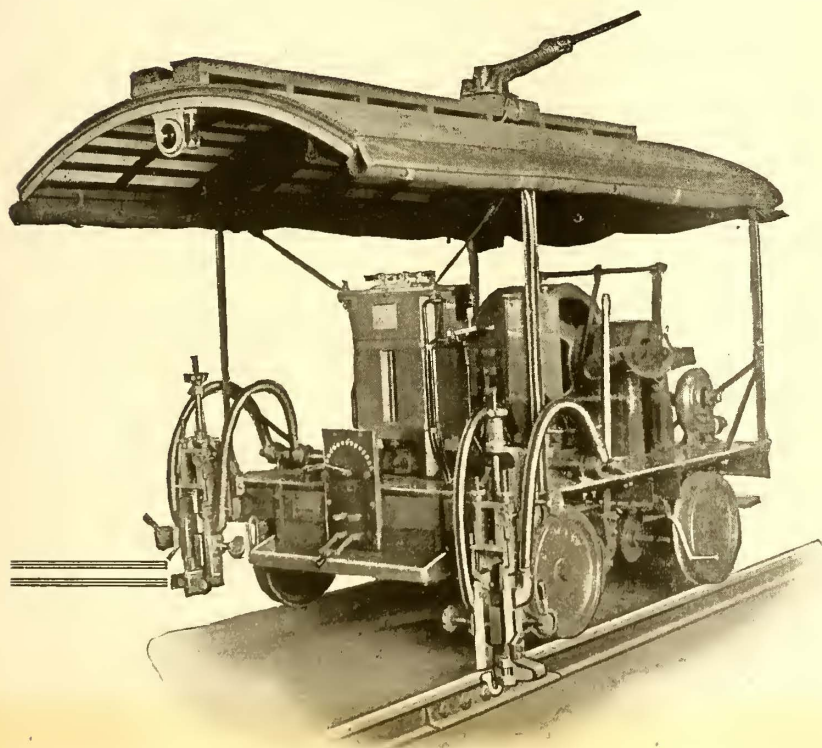
This type of bond gives the lowest permanent resistance to the return circuit because the union with the rail is an actual weld and cannot corrode.

ELECTROLYSIS CLAIMS

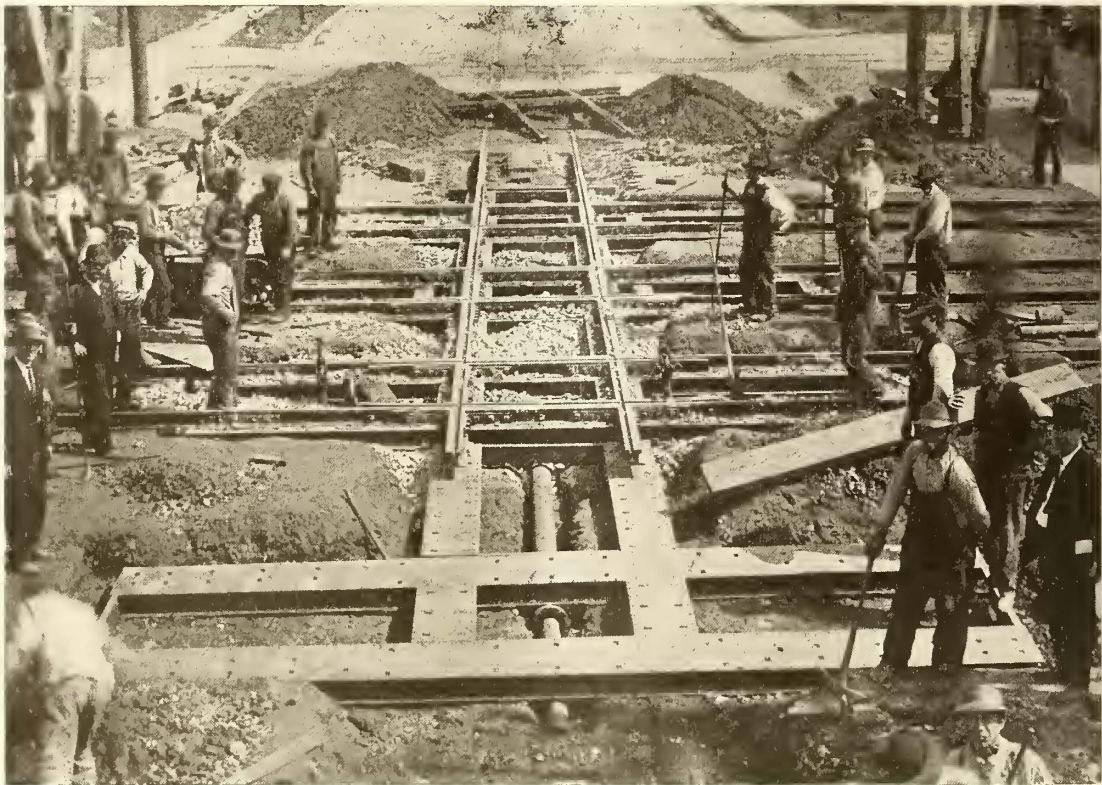
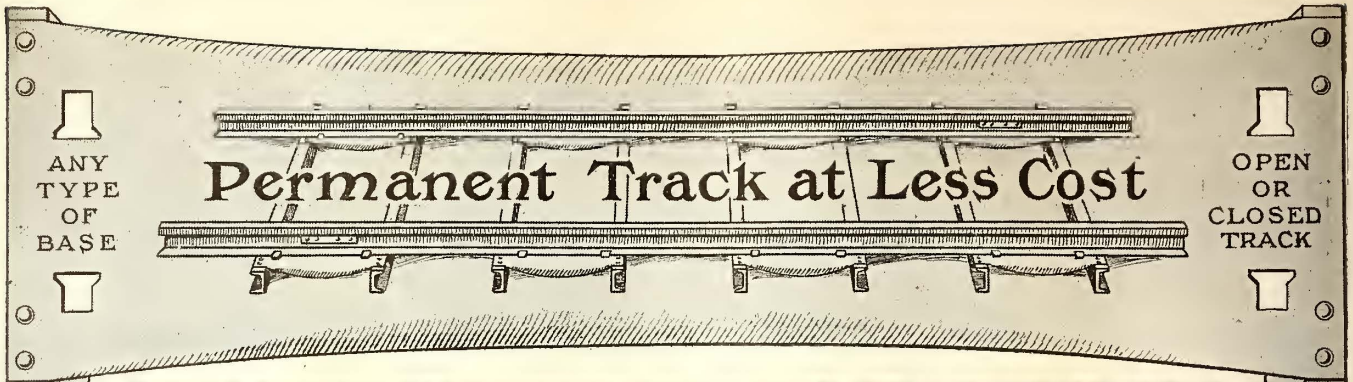
are an unheard of thing on a road that is bonded with Electric Weld bonds. The current stays in the rails because they form
THE LINE OF LEAST RESISTANCE.

Electric Weld bonds are made in shapes and capacities to meet all conditions.

Write us about your return circuit problems.



**The Electric
Railway
Improvement
Co.
Cleveland
Ohio**



Support Your Costly Crossings on INTERNATIONAL STEEL CROSSING FOUNDATIONS

It is hard to support heavy service straight track on wooden ties spaced as closely together as possible.

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

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

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

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

REPRESENTATIVES

Parrott & Company,
San Francisco, Cal.
Los Angeles, Cal.

Western Eng'g Sales Co.,
Seattle, Wash.
Portland, Ore.

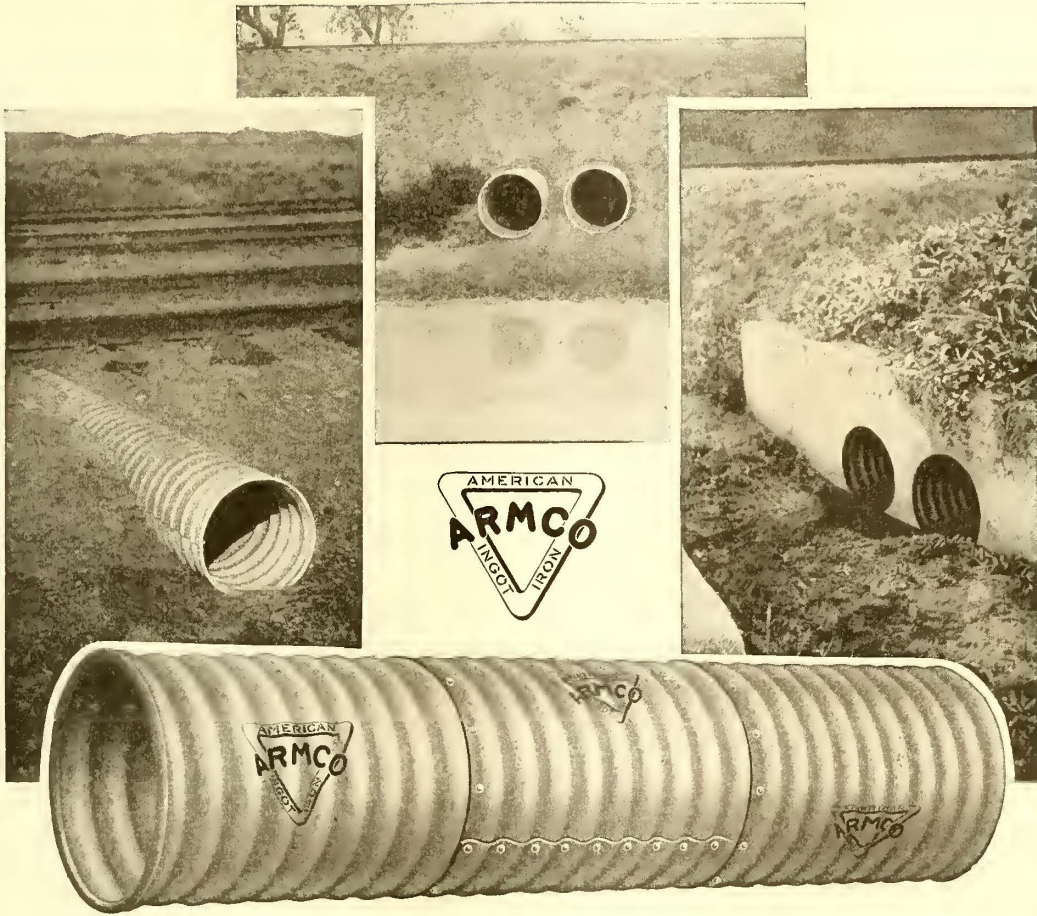
R. J. Cooper Co.,
Salt Lake City, Utah.

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

Maurice Joy,
Philadelphia.

William H. Ziegler,
Minneapolis, Minn.

ARMCO IRON Resists Rust



Economic Operation Demands **ARMCO AMERICAN INGOT IRON CULVERTS**

They maintain indefinitely a clear waterway under all characters of embankments, resisting corrosion in all soils and under all exposures because every impurity has been reduced to a minimum in the making of their material.

The record of "Armco" Iron is so convincing that if you have not secured the data we publish, *send for it today*. It may mean important savings for you.

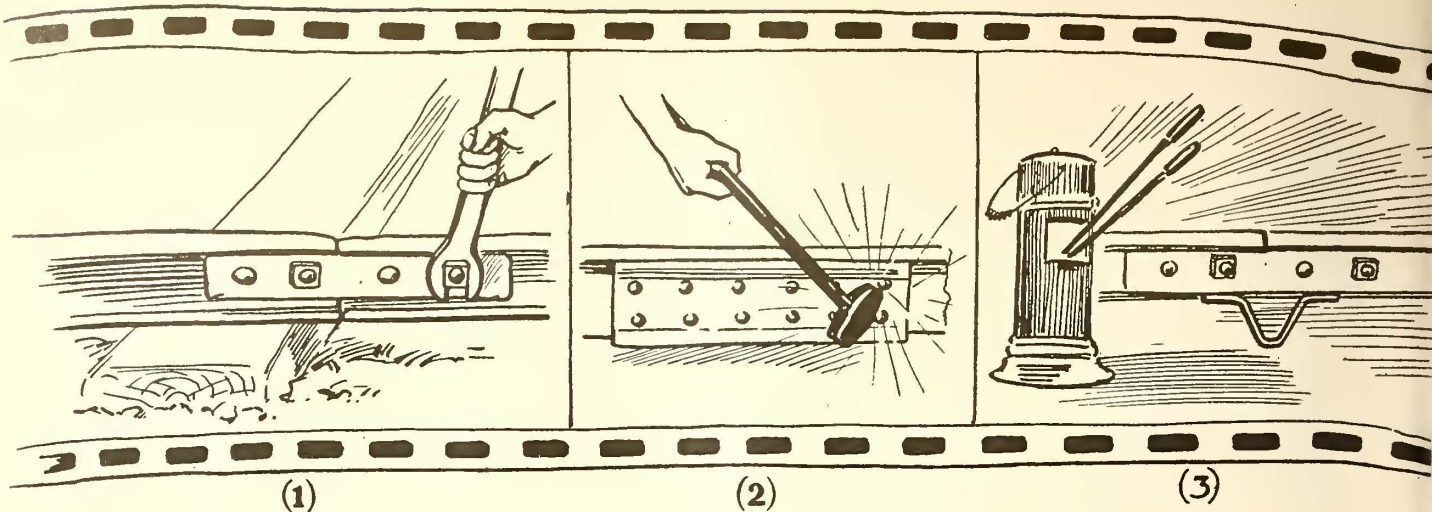
Write the Nearest Manufacturer for Particulars and Prices on Armco Iron Corrugated Culverts, Siphons, Flumes, Plates, Sheets, Roofing and Formed Products.

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 Mfg. 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
The Ohio Corrugated Culvert Co.
American Rolling Mill 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
Wyatt 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.



Moving Pictures of Progress

(1) The BOLTED FISH-PLATE served as joint and bond when electric traction came in the late 80's. Track was shaky and electrolysis troublesome.

(2) The RIVETED JOINT, poured with zinc, was a more costly rail fastening—but it gave good bond and made rigid track.

(3) It took four men to solder on these copper rail bonds, but they gave good service.

(4) The cast-welding cupola was a cumbersome affair, so some roads built a portable rig like that shown.

(5) Early electric welding outfits required three cars to hold the equipment and they blocked traffic effectively.

(6) Here is the whole outfit with which MODERN Electric Railways WELD and BOND their joints, as well as keep their track and equipment in repair.

(7) This shows the welding operation.

(8) Here is the finished "Indianapolis" joint—*Stronger* than the adjoining rail and with 100 per cent bonding efficiency.



Comparative Sales of Indianapolis Electrically Welded Joints.

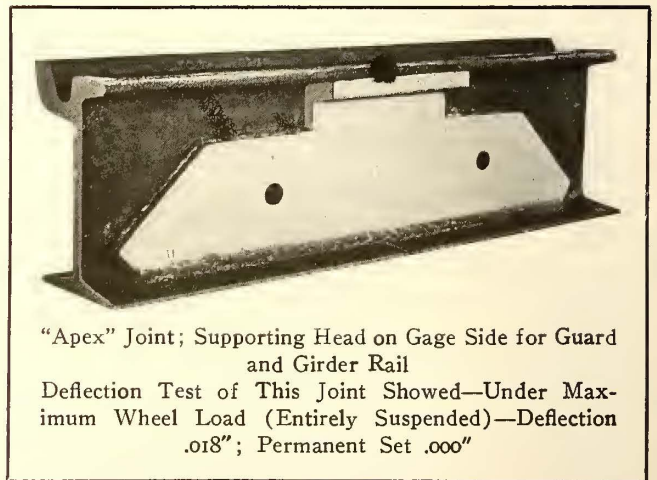
Cost Installed
6" to 9"
Tee
\$3.00
to
\$4.00



"Simplex" Joint for High Tee Rail
Conductivity Test of This Joint Showed 138 Against 100 on Unbroken Rail

Test of Bureau of Standards, Washington, D. C.

Cost Installed
6" to 9"
Girder
\$4.00
to
\$5.00



"Apex" Joint; Supporting Head on Gage Side for Guard and Girder Rail

Deflection Test of This Joint Showed—Under Maximum Wheel Load (Entirely Suspended)—Deflection .018"; Permanent Set .000"

Test of Robert W. Hunt & Co., Chicago, Ill.

Indianapolis Switch & Frog Co.

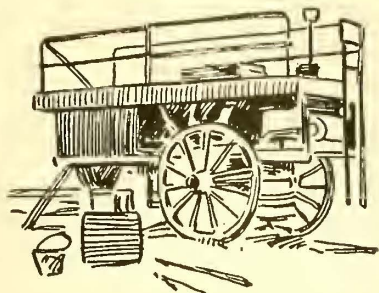
New York

Chicago

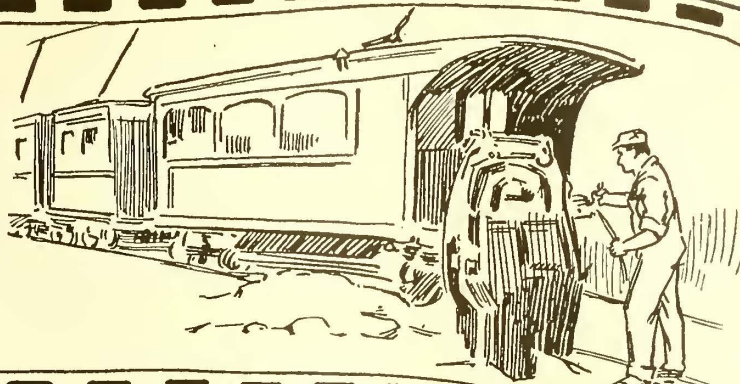
Kansas City

Seattle

Los



(4)



(5)

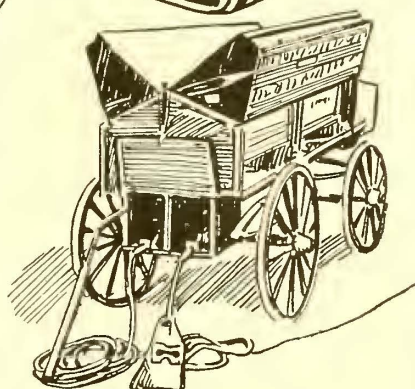
Featuring the "INDIANAPOLIS" Electric Welder and Welded Joints

THE welder that makes these joints, builds up cupped rails, repairs broken-down special work, restores old road and shop equipment to service. (7)

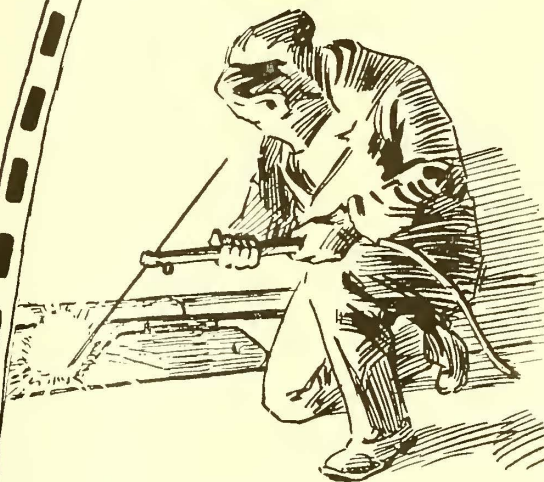
READ WHERE AND HOW. Get our free trial proposition. YOU DO NOT PAY FOR THE INDIANAPOLIS WELDER UNTIL IT PAYS FOR ITSELF.

Write us for this offer today.

Springfield, Ohio
Angeles San Francisco

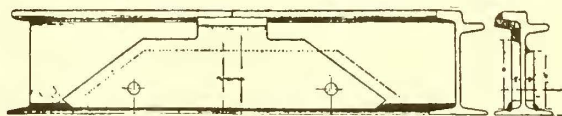


(6)



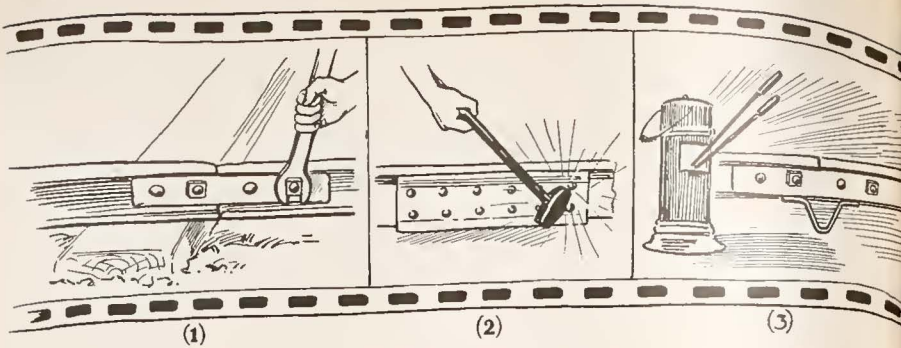
(8)

The "Indianapolis" Joint



High in Efficiency. Low in Cost

Passed by the
National Board of
ECONOMY
and
75 Leading Electric Railways



Moving Pictures of Progress

(1) The **BOLTED FISH-PLATE** served as joint and bond when electric traction came in the late 80's. Track was shaky and electrolysis troublesome.

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Cost Installed
6" to 9"
Tee
\$3.00
to
\$4.00



"Simplex" Joint for High Tee Rail
Conductivity Test of This Joint Showed 138 Against 100 on Unbroken Rail

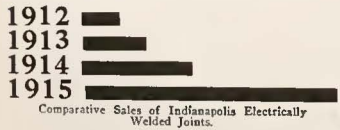
Test of Bureau of Standards, Washington, D. C.

Cost Installed
6" to 9"
Girder
\$4.00
to
\$5.00



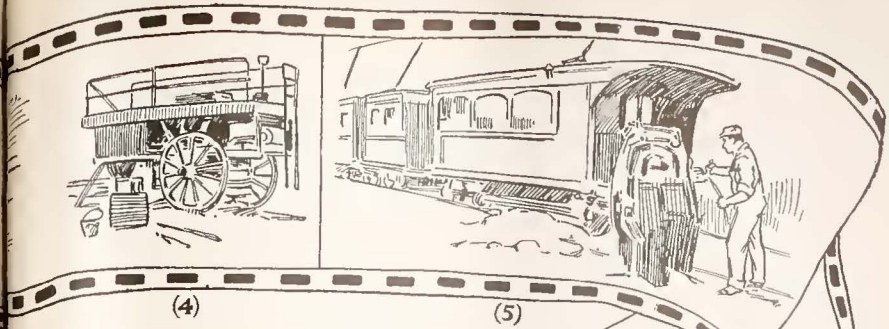
"Apex" Joint; Supporting Head on Gage Side for Guard and Girder Rail
Deflection Test of This Joint Showed—Under Maximum Wheel Load (Entirely Suspended)—Deflection .018"; Permanent Set .000"

Test of Robert W. Hunt & Co., Chicago, Ill.



Indianapolis Switch & Frog Co.

New York Chicago Kansas City Seattle Los Angeles

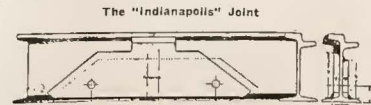
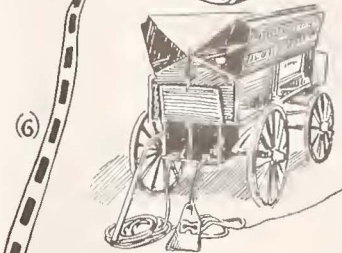


Featuring the "INDIANAPOLIS" Electric Welder and Welded Joints

THE welder that makes these joints, builds up cupped rails, repairs broken-down special work, restores old road and shop equipment to service.

READ WHERE AND HOW. Get our free trial proposition. **YOU DO NOT PAY FOR THE INDIANAPOLIS WELDER UNTIL IT PAYS FOR ITSELF.**

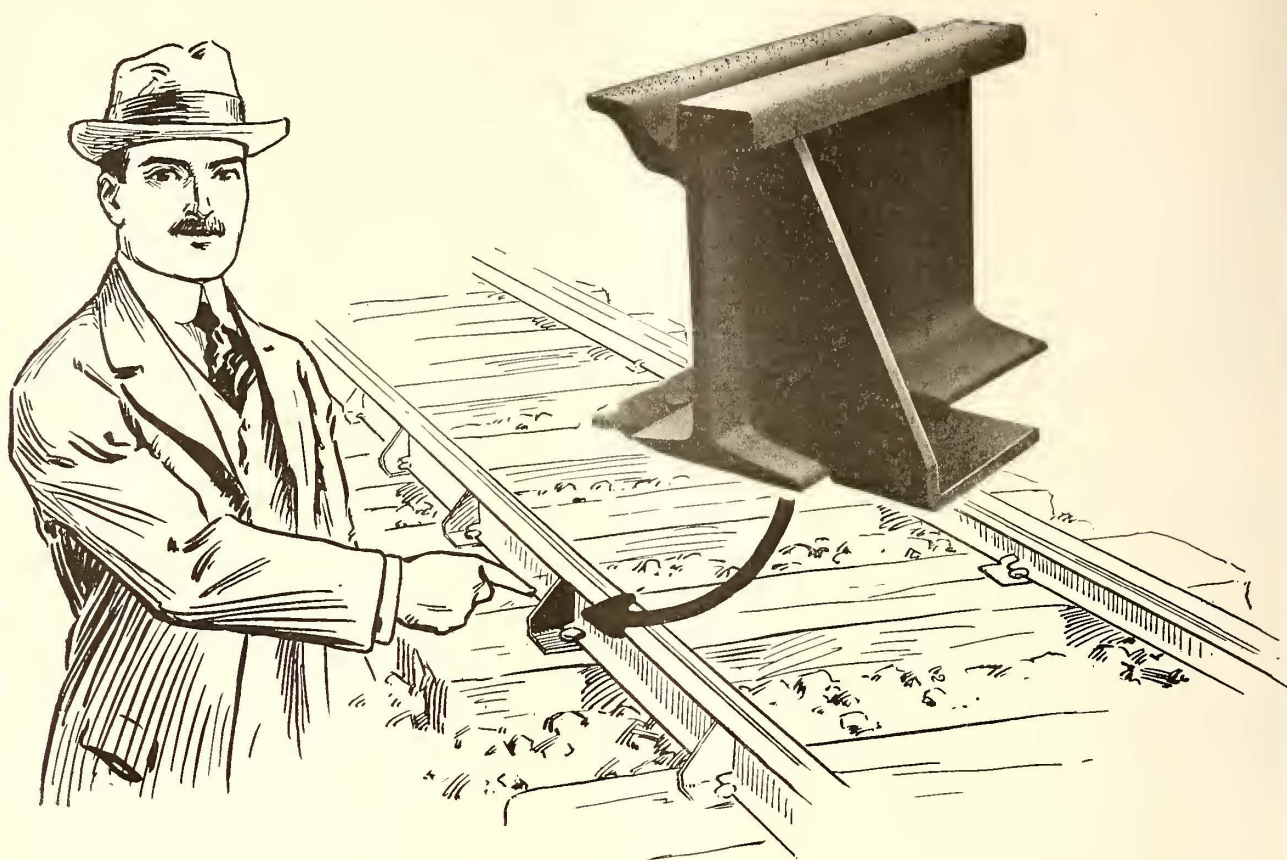
Write us for this offer today.



The "Indianapolis" Joint
High in Efficiency. Low in Cost

Passed by the National Board of **ECONOMY** and 75 Leading Electric Railways

Springfield, Ohio
Los Angeles San Francisco



“There’s Where I Save”—

said the Roadmaster

“I’ve cut out tie-rods altogether. These COMBINATION RAIL BRACES hold the track to gage and they stop the waste due to rusted threads.”

The Combination Rail Brace and Tie-Plate

takes the place of tie-rod, rail brace and tie-plate.

Rails are not weakened by drilling—there is no obstruction to paving between the rails.

Open hearth steel $\frac{3}{8}$ " or $\frac{7}{16}$ " thick for girder or "T" rails.

You will be interested in the Cost Data—Write for it today.

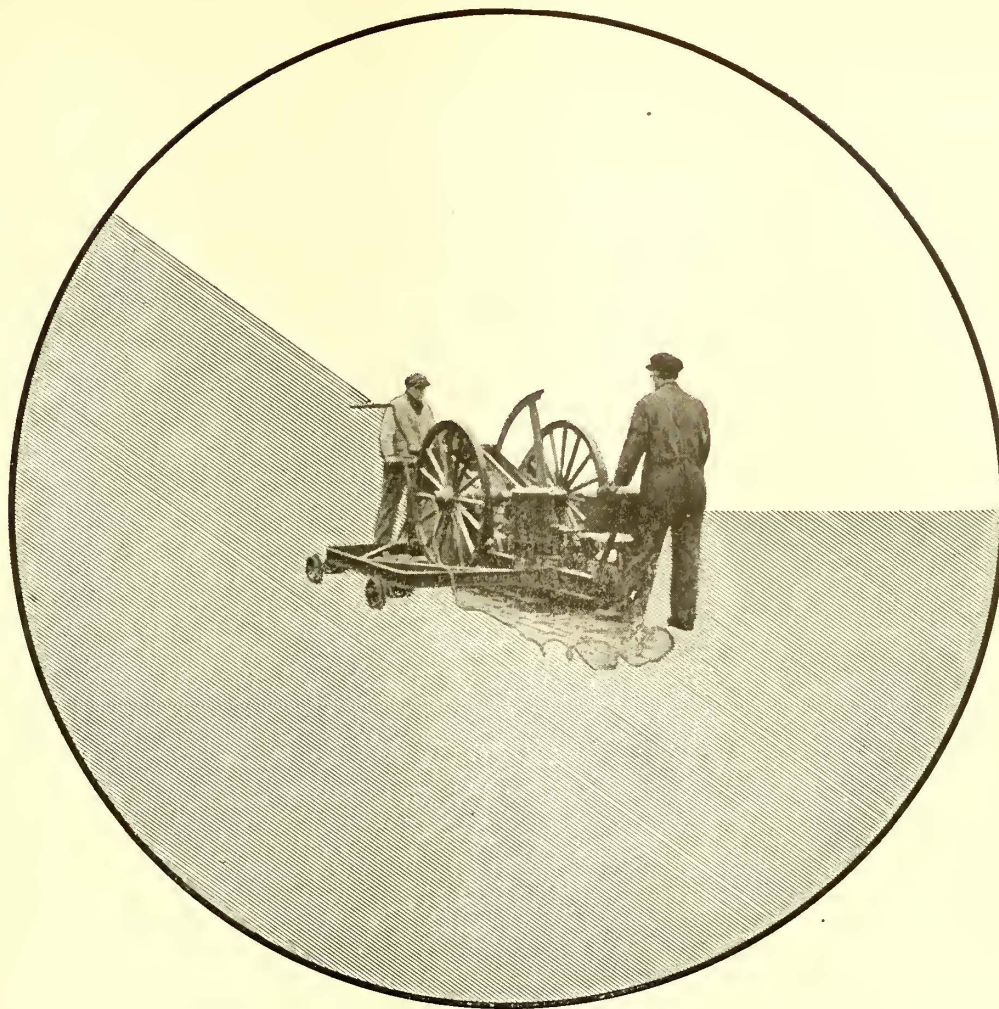
Steel Car Forge Company

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



Fully 60% of the past year's purchases of the
RECIPROCATING TRACK GRINDER
were made by roads which had
installed one on trial.

Has **your** road yet taken steps to make trial of this universal machine?

At no expense to you, you can have demonstrated the perfect manner in which this grinder will handle joints, welds, special work, corrugations—

—how unskilled labor can do the work without superintendence—

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Simply let us know that you wish such a demonstration to be made.

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Galena Service will set a standard for Lubrication

on your road, wherever oils are used.

We are ready to send experts to work with your men.

- in the power house.
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- to instruct them in the theory and practise of lubrication.
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- on a basis of absolutely **GUARANTEED SAVINGS.**

A Galena Contract promptly furnished—it puts our proposition clearly before you.

Galena-Signal Oil Co.

Franklin, Pa.

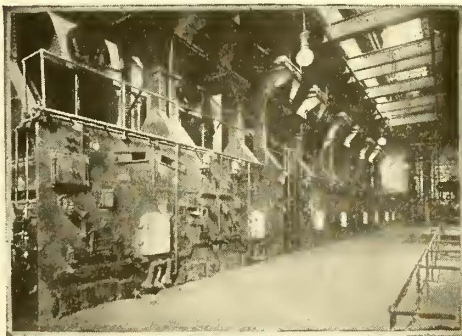
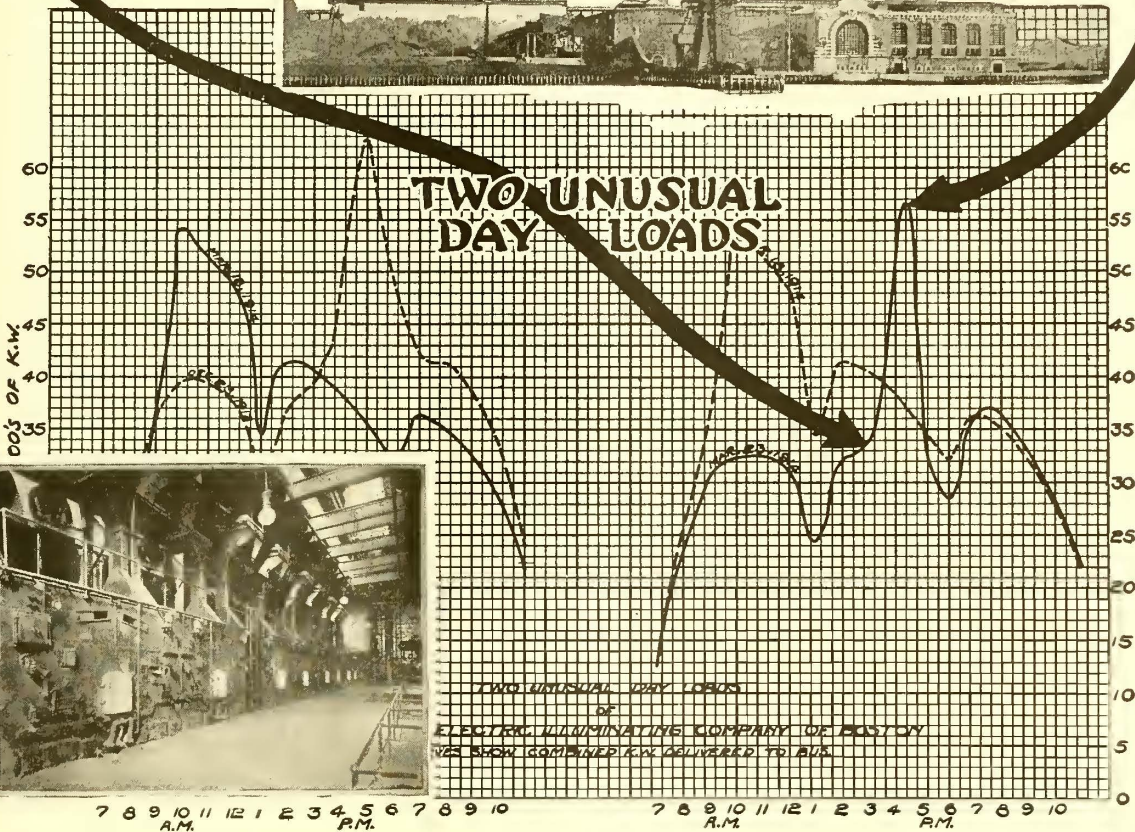
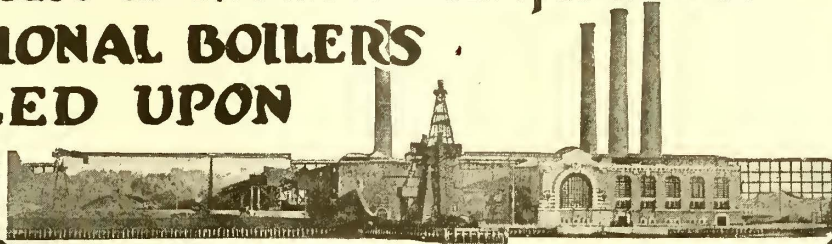


34,000 K.W. AT 3-15 P.M.

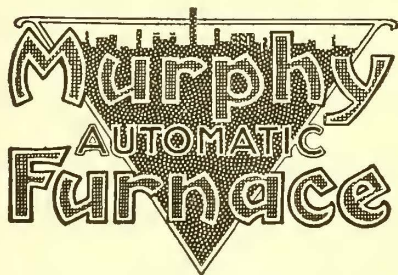
56,835 K.W. AT 4-15 P.M.

Rate of Increase at 3.55 P.M. 1000 K.W. per minute

NO ADDITIONAL BOILERS CALLED UPON



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Write for the whole story—ask for Special Bulletin "C."

How the Edison Illuminating Company of Boston handle their Peak Loads with MURPHY FURNACES

UP TO 200 PER CENT. of boiler rating the furnaces operate with natural draft. Above that with forced drafts. This Murphy Furnace Installation combines the high net efficiency and low cost of actuation only possible under natural draft conditions with the flexibility obtainable with forced draft.

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The Portland Railway, Light & Power Company, Portland, Ore., has always kept in close touch with the best railway motor practice.

That's one reason why it uses Deltabeston wire for rewinding the wire-wound field coils of its No. 58 motors.

If you have similar motors in service you can prolong their efficient usefulness by using

Deltabeston Magnet Wire

In the case of motors with ribbon-wound fields, rewind the fields and insulate the terminals with

Delta Tape and Delta Sheeting

The reliability and output of your motor depend upon their ability to resist heat.

D & W Products resist heat best.

Let us confer on the settlement of your motor troubles.



D & W FUSE CO.

Providence, R. I.



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Speed Up the Repair Shop

Use Columbia Specialties. They are time and labor savers built with an intimate knowledge of repair shop needs.

As an example, here is the

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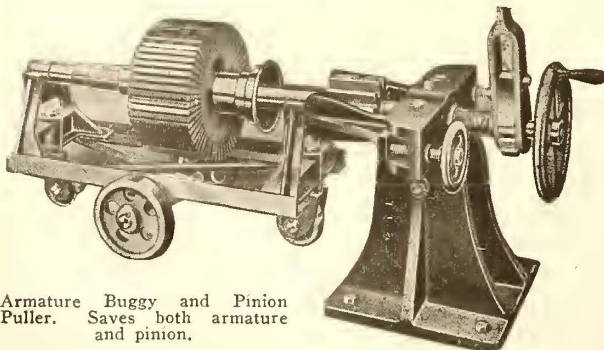
Adjustable Armature Buggy

It will take any size of armature. The bracket bearings are babbitted to prevent injury to the armature shaft journals. Merely loosening two thumb screws allows the bracket to be easily moved to any desired position.

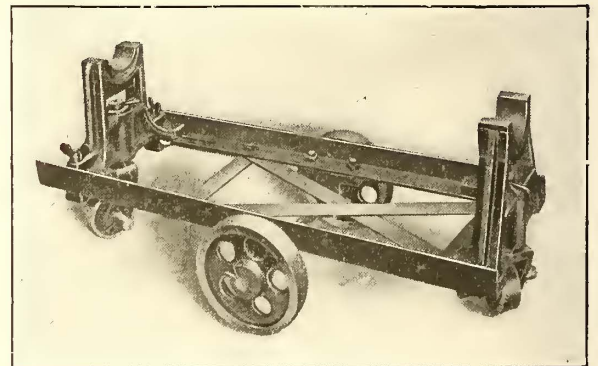
Send for the Bulletin.

A Good Combination:

Columbia Armature Buggy and Columbia Pinion Puller



Armature Buggy and Pinion Puller. Saves both armature and pinion.



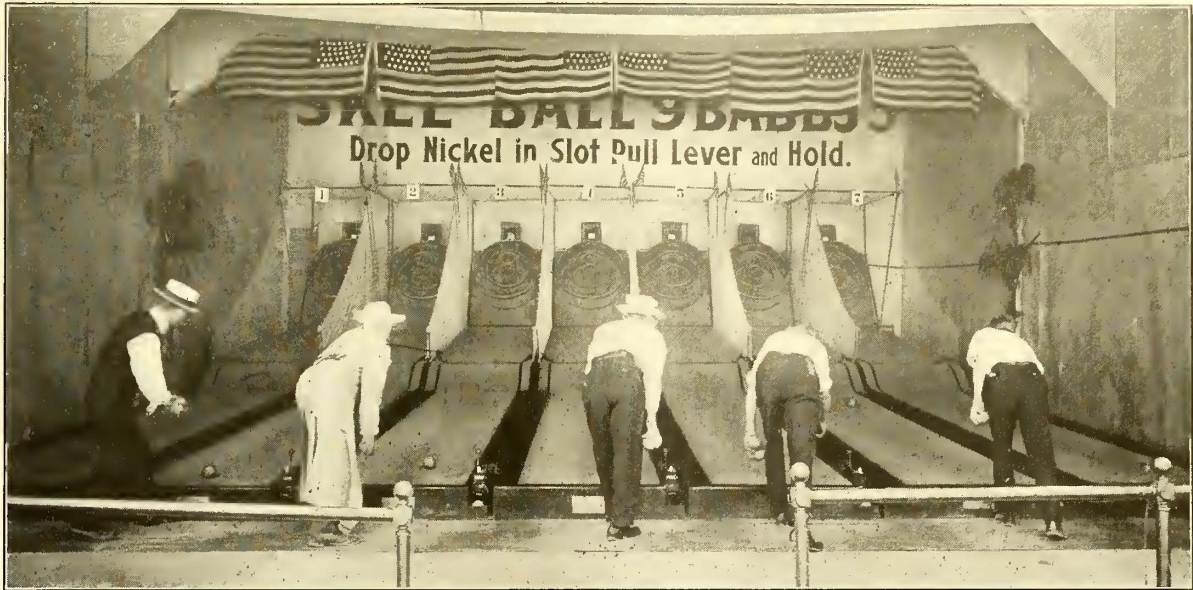
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Axle and Armature Straighteners, Bearings for Armatures and Axles, Armature Stands, Armature Buggies, Car Hoists, Car Replacers, Brake Appliances, Handles, Forgings for Rigging, etc., Babbiting Moulds, Lathe Chucks, Banding and Heading Machines, Coil Winding Machines for Field and Armature Coils, Coils for Armatures and Fields, Coil Taping Machines for Armature Leads, Car Trimmings, Car Signs (Day and Night), Commutators, Controller-Handles, Door Locks, Gear Cases (All Steel and M.I.), Pit Jacks, Grid Resistances, Signal or Target Switches, Pinion Pullers, Trolley Poles (Steel), Trolley Wheels, Tension Stands, N. W. Cartridge Fuses, Track, Special Work.

Columbia Machine Works & Malleable Iron Co.

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SKEE BALL ALLEYS



One of the Three Skee-Ball Batteries
in Riverview Park, Chicago

The owner wrote us under date of November 1st, 1915

“Our operation of the thirty-nine alleys purchased from you has proven the increasing popularity of this new game. The novelty and skill necessary, we believe, will cause this improved game of bowling to supersede the old play.

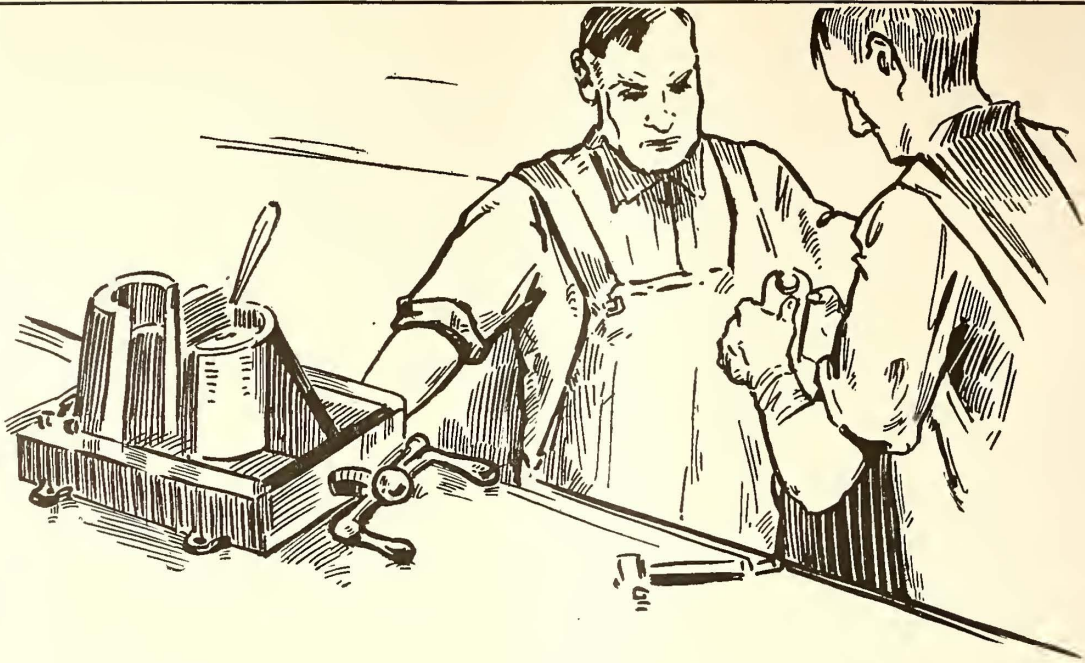
You have our order for one hundred and fifty additional alleys and we trust you will rush deliveries as fast as is possible. The great majority of our localities have been selected and we desire that you give our order your best attention.”

No Amusement Park is Complete without Skee-Ball

Place orders now for Spring delivery

Write for Illustrated Catalogue

THE J. D. ESTE COMPANY, 1534 Sansom St., Philadelphia



Journal Bearing Lining Metal

THE SPECIFICATION

THE TEST

of a Prominent Railway

"Journal bearing lining metal shall conform to the following specification: Babbitt metal—tin (New Straits) not less than 91.5 per cent; antimony (Cookson's) not less than 5.7 per cent nor more than 6.3 per cent; copper (best refined electrolytic) not less than 1.8 per cent nor more than 2.2 per cent. Impurities exceeding one-half of 1 per cent of the whole will not be allowed."

"Upon receipt of each shipment, samples will be taken by the *RAILWAY'S INSPECTOR* for analysis by sawing through the ingot crosswise from the top to the bottom of at least three ingots, selected at random. The three samples will be *MIXED AND ANALYZED.*"

THE CONCLUSION—Why you should do it too!

The company that drew this specification for babbitt metal knew just what it wanted. Better still, it knew just how to get what it wanted. To draw up a specification is but half the battle. You must also analyze the product offered to be certain that it answers your requirements and that you are getting exactly what you pay for. Our chemists and physicists are prepared not only to analyze your babbitt purchases, but also to aid you in selecting formulas which will economically meet your requirements.

Arthur D. Little, Inc.



An organization prepared to handle all work which calls for the application of chemistry to electric railway engineering—such as fuel, lubricant and water analyses for the power department, wire and insulation analyses for the distribution department, timber preservative and protective paint analyses for the way department, bearing and trolley wheel metal, lubricant, paint, varnish and other analyses for the car equipment department.

Correspondence regarding our service is invited.



93 Broad Street

Boston, Mass.



JOHNS-MANVILLE SERVICE



THERE are many good things in this world that we don't know about, simply because we have not interested ourselves in them. Sometimes these things concern us rather intimately.

In the Electric Railway Industry there is an interesting marketing idea that is of primary importance to you because its aim is to serve you with materials that are vital to your business.

This marketing idea is progressing on the basis of sound merchandise, nation-wide distribution and no risk selling. Its name is Johns-Manville Service. When you have occasion to buy electrical products remember what J-M stands for and profit by it.

In making "Noark" Fuses we do not flirt with safety, we court it,

and the result is evidenced in the build of the Fuse.

If the same care were exercised in the selection of fuses as in sprinkler systems and fire-proofing, perhaps these latter would be of less importance.



"A fuse is a fuse" is not the securest kind of an argument, especially when statistics show its fallacy.

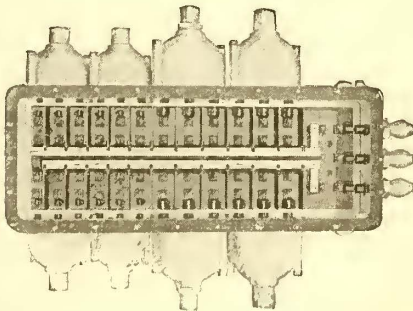
This does not mean that every "Noark" Fuse manufactured is absolutely perfect, but it does argue that before it gets out of the factory it must be.

We never were willing to let sales talk,

polished brass or attractive cartons take the place of quality. We have built up an enormous trade in "Noark" Fuses—because they make good in actual performance.

It's always easy to convince your customer of "Noark" superiority, and after the first sale this fuse sells itself. Can't we send you that first lot?

Subway Boxes usually known as "Special Work" are "Standard Apparatus" with us.



If you have found it necessary to design, develop and engineer your own underground distribution and junction boxes, you will be interested in examining the "Noark" Subway Box Line.

First of all, they are designed so as to meet the most exacting demands for current carrying parts, for careful assembly and ruggedness.

These parts have been so standardized that any type of box in any quantity can be delivered promptly.

Let us quote you on this year's extensions or replacements.

H. W. JOHNS-MANVILLE CO.

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Cast Steel Railway Gears

The General Electric Company is a pioneer manufacturer of cast steel railway gears. Having made the first electric railway motor in the United States, it is but natural that this company should give early attention to the question of gears for this class of work.

Neither money nor effort has been spared to produce gears of unqualified excellence, with the result that the cast steel gears put out by the General Electric Company today are the superior of any cast gear on the market.

Despite the modern tendency toward the specially treated G-E Grade M gear, there are still many railways that, on account of lower first cost, prefer to purchase the cast steel variety. It is to such roads that the General Electric Company offers its cast steel gearing. Do not buy gears until you have investigated G-E quality.

Ask for Bulletin No. A-4199.

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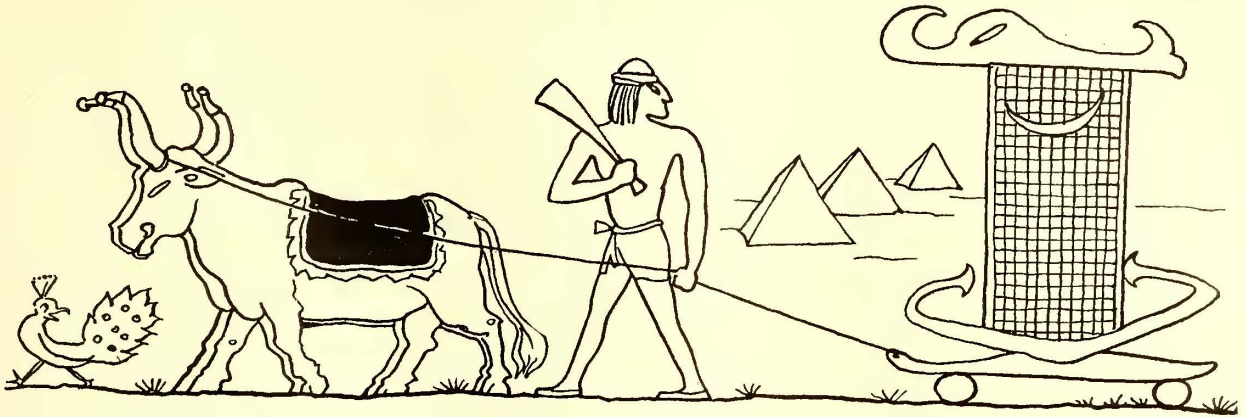
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For Michigan Business refer to General Electric Company of Michigan, Detroit.

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



The above hieroglyphics might represent what the driver said when the starter at the Nile carhouse gave him a bad order car for that heavy run to the Pyramids. Evidently, his "rolling stock" consisting of logs thrust across sledge runners didn't need much in the way of brakes.

Times have changed since then. In these days of speed with *safety*, the brake equipment is just as important as the motive equipment, even if it does cost a lot less money!

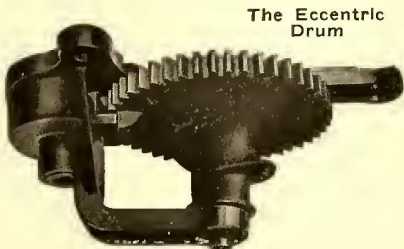
The Improved Peacock Brake is not only the best but the simplest and most powerful of hand brakes.

Instead of a train of cumbersome, sluggish levers attempting to concentrate power at the brake shoe, the Peacock is *geared* at the proper ratio and dispenses with one full turn of the handle as well as hundreds of pounds of effort.

Through the entire operation, the shoe pressure, governed by Peacock brakes is brought to the motorman's hand in so direct and frictionless a manner that he at all times has air-brake efficiency in the control of his car—the same sense of safety, the same sure feeling of full command of the situation.

Be sure you are well posted on this hand brake question. Be cock sure. Be Pea-cock sure.

Get the record of Peacock tests.



The Eccentric Drum

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Buffalo, N. Y.

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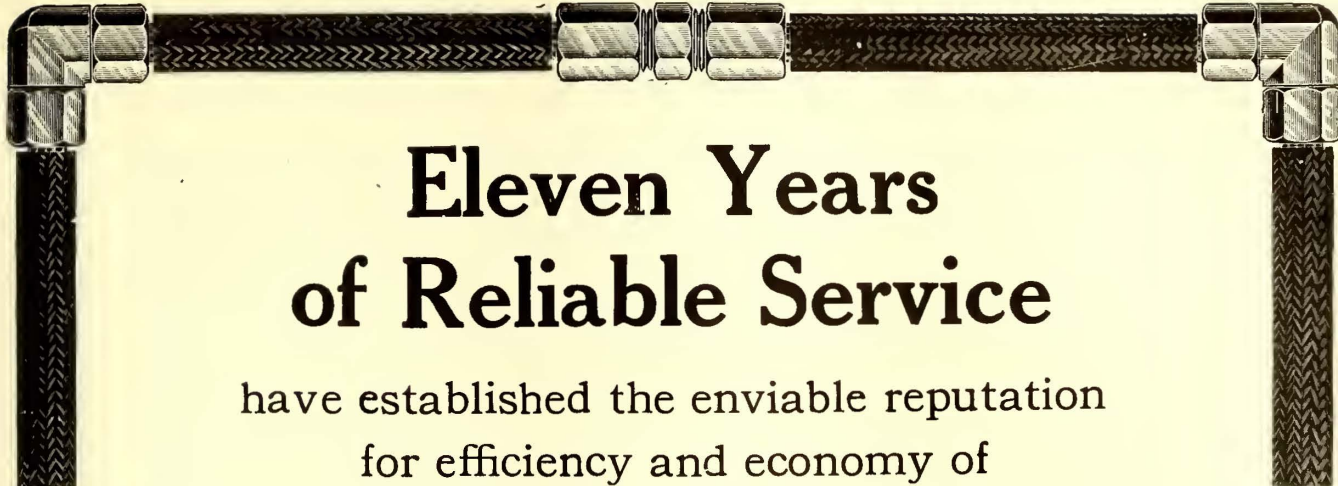
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Dossert solderless connectors made unnecessary the skill required to make a good soldered joint.

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Dossert solderless connectors made a wire or a cable once joined stay joined.


Dossert solderless connectors are made in every diameter and type called for in electric railway work in power station, substation, car and shop wiring.

At your service always!

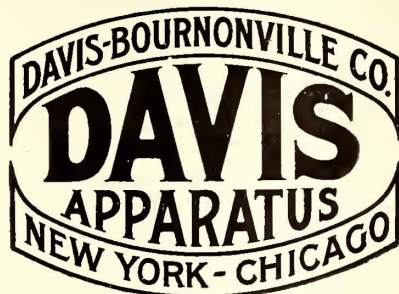
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H. B. LOGAN, President

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WELDING



CUTTING

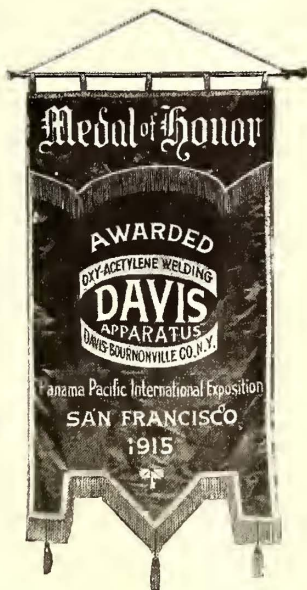
There is more Davis-Bournonville Apparatus in general use for oxy-acetylene welding and cutting than of any other.

It has been in general, practical use for welding and cutting longer than any other in this country.

Electric Railways are saving large sums annually by the use of "D-B" apparatus for reclaiming broken equipment, repairing track work, etc.

The largest locomotive and car-building shops are using it for welding and cutting on construction and repair work.

It is being used by metal workers for a greater variety of operations in manufacturing metal goods.



The Medal of Honor (higher award than the Gold Medal), the Highest Award for Oxy-Acetylene Apparatus at the Panama-Pacific Exposition, was awarded Davis Apparatus.

The largest foundries and steel mills in the country are using it for reclaiming defective castings, welding, steel cutting.

The largest ship-building and dry docks and all United States Navy Yards are using it for steel cutting and repairs.

The largest range boiler and steel tank manufacturers are welding their product with it.

The largest steel furniture, door, sash and frame makers employ it in manufacturing.

The largest automobile metal-body builders are using it extensively for welding.

The largest scrap yards are using it for cutting and wrecking.

Hundreds of small repair shops and garages are daily making profitable use of small outfits.

Concerns that have made oxy-acetylene welding and cutting the big success that it is, installed "D-B" apparatus because they gave efficiency of the apparatus and the value to be obtained from it first consideration in selecting equipment—because it provides the widest range of equipment made for obtaining the full value of the oxy-acetylene process—because the long practical experience of the "D-B" Company in its own welding shops and development and demonstration departments made it possible for the company to be of practical service to its customers.

These are reasons that will have weight with the prospective purchaser of welding and cutting equipment, whether his requirements are small or great.

Full information, catalogs, bulletins and co-operative service in determining the customer's application of the process will be given on request.

Davis-Bournonville Company

NEW YORK

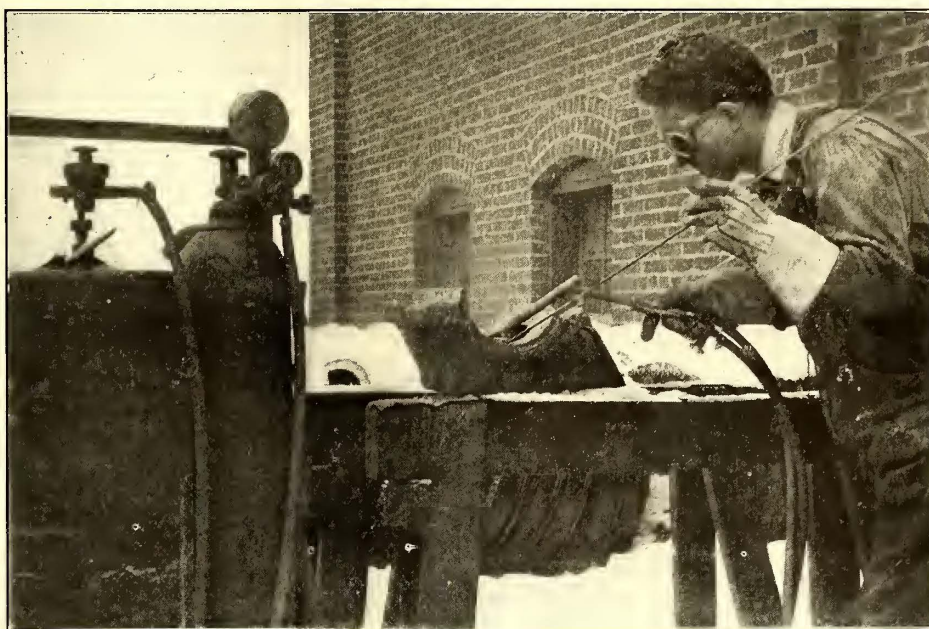
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“—etc.,etc.”

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 In Electric Railway Shops



Welding a Pin in Motor Bearing Cap for W. H. 121 Motor with Oxwelding Equipment.
 Anderson Shops of Union Traction Company of Indiana

Quoting a Letter From the Union Traction Company of Indiana:

“Other uses to which we put this apparatus are building up keyways on armature shafts, welding truck frames, building up motor lugs, axle bearings, armature boxings, welding of water jackets on gasolene engines of Roadway Department motor speeders, welding of small castings for various shop machinery and car equipment, etc., etc.”

A thousand words couldn't tell the story more completely. “—etc., etc.” is the only expression that suggests the unlimited range of profitable uses for Oxwelding Equipment—*right in your own shops.*

In repair work and maintenance of steel cars the equipment will pay for itself over and over, and in

addition the portable apparatus can be taken out on the line for track bonding, building up worn rails and switch points, etc., etc.

Let us send you our series of bulletins (No. 800). They'll acquaint you with possibilities you have never realized. Write today.

Oxweld Acetylene Co., 37th and Jasper Place, **Chicago, Ill.**
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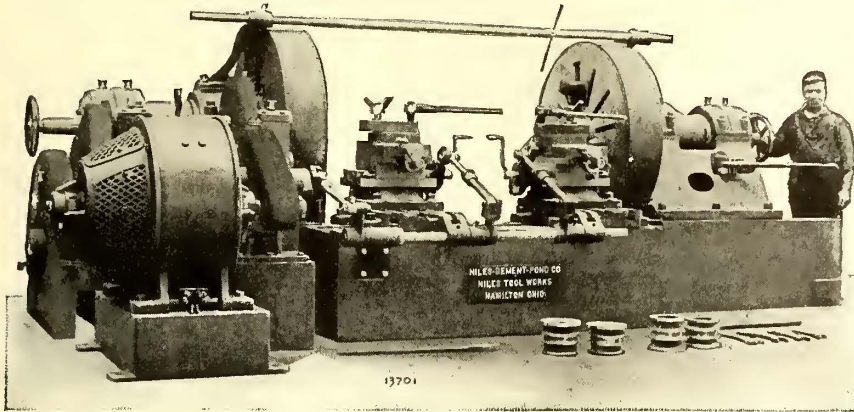
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The machine that will remove the flat spots, true up the wheels and return the cars to service in the shortest possible time.

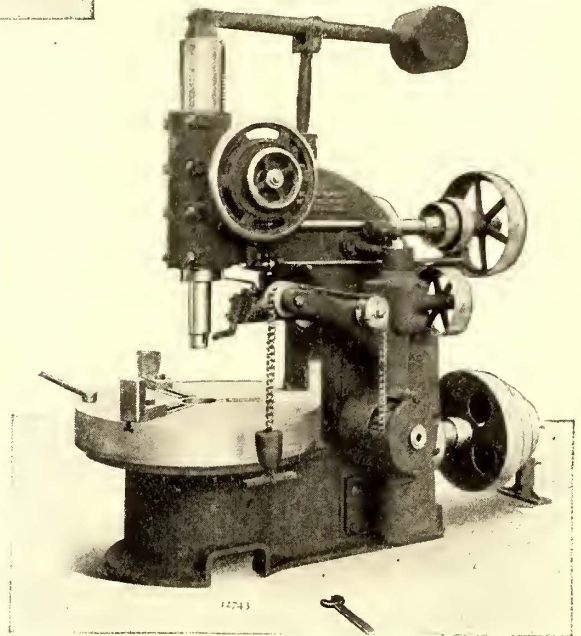
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Bement-Pond

Car-Wheel Borer

Table is fitted with 3-jaw, self centering universal chuck operated by one motion of a cam lever, which gives sufficient movement for firmly gripping the wheel. This chuck has proved most satisfactory, as it is quick operating and positive in action. Quick acting power crane is attached to machine for handling wheels to and from table.

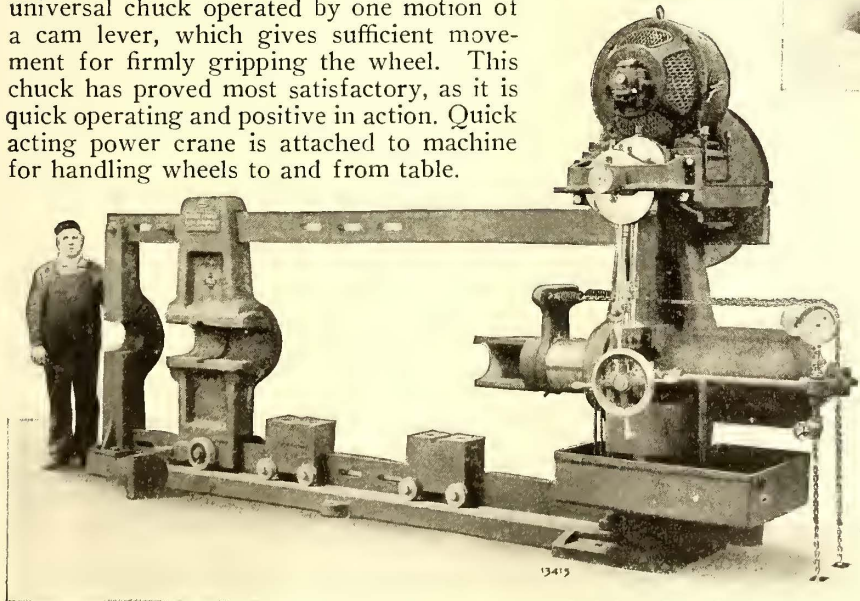


42" car wheel borer

Car-Wheel Presses

48" 300 and 400 ton presses are built with cast steel cylinders and resistance posts to enable them to withstand great pressures. Hence wheels can be kept very tight on axles and yet removed and forced on again quickly. Our presses are built throughout with the same care and precision used in making our high grade machine tools.

We also build axle lathes, standard boring mills, planers, shapers, lathes, milling machines, drills, etc.



48" 300 ton wheel press

Be sure to keep in your file—A complete set of catalogs and circulars. Drop a line to us now.

Niles-Bement-Pond Co.

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

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

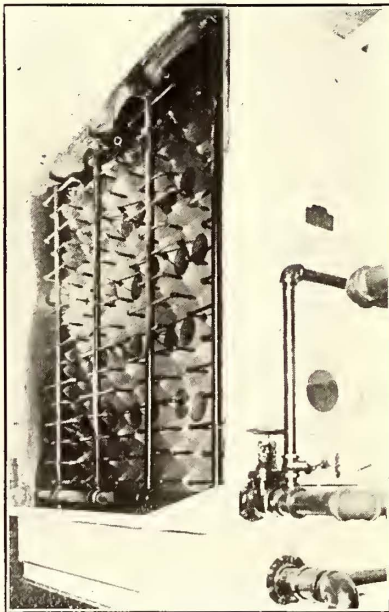
"SPRACO" COOLING SYSTEMS

SPRACO PRODUCTS

Will reduce fuel costs 15 per cent

For 1½ per cent of the output of the prime mover

TRADE MARK REGISTERED



Typical Washer for Washing and Cooling Air for Steam Turbine Generators.

Our apparatus can be installed at small cost to better the operating economy of existing Power Plants.

For but 1½ per cent of the output of the prime mover, the following results are possible:

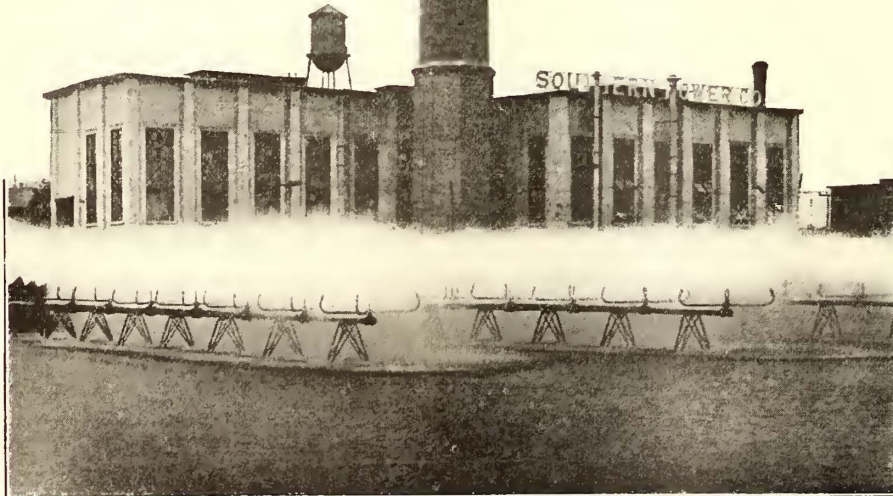
Lowering the temperature of the cooling water from—

103 deg. Fahr. to 83 deg. Fahr. the vacuum increases from 26 in. to 27 in. and the fuel decreases 5 per cent.

93 deg. Fahr. to 80 deg. Fahr. the vacuum increases from 27 in. to 28 in. and the fuel decreases another 6 per cent.

80 deg. Fahr. to 68 deg. Fahr. the vacuum increases from 28 in. to 28½ in. and the fuel decreases another 4 per cent.

Savings up to 15 per cent, combined with negligible water loss, are worth consideration.



Southern Power Company's Station, Greenville, S. C.

Take up with us the matter of

high vacuum and low fuel. It will be one of the best business moves you ever made—to get off a short note to us now, requesting data.

SPRAY ENGINEERING COMPANY

Engineers for
Spray Cooling Ponds, Irrigation Systems,
Air Conditioning, Aeration Reservoirs,
Odor Condensers, Gas Washing, Installations.

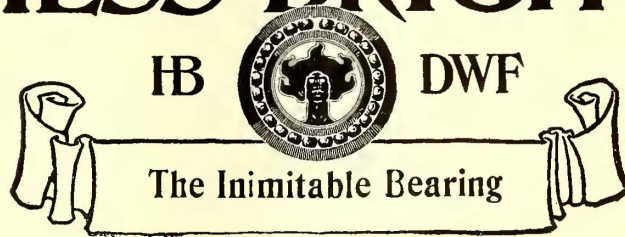
93 FEDERAL STREET
BOSTON, MASS.

Manufacturers of
Air Washers for Steam Turbine Generators,
Spray Nozzles and Spray Pond Equipments,
Paint Spraying Apparatus for Bods,
Trucks and Fenders, Humidifiers, Asphalt
Nozzles, Gas Washers, Park Sprinklers,
Aerating Nozzles.



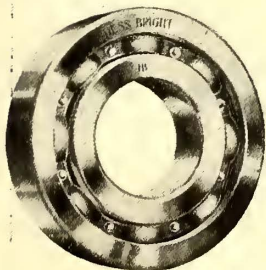
In the Repair Shop

HESS-BRIGHT

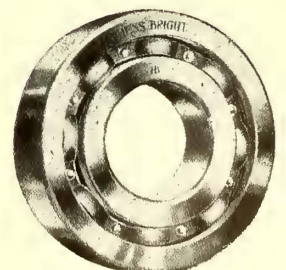


**will make motor-driven machines
give better service**

at less cost for operation, lubrication and maintenance. Whether used in machine or motor the result will be equally satisfactory--years of service have proved it.



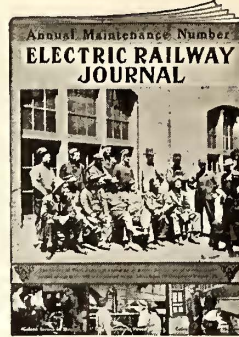
*Hess-Bright's Conrad Patents are
Thoroughly Adjudicated.*



THE HESS-BRIGHT MFG. CO.

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

Your Own



ELECTRIC RAILWAY JOURNAL

The advantages of being a personal subscriber for the Journal are these:

- You receive your own copy of the paper each week.**
- You have it to read when you want it and as long as you want it.**
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If you are **not** a regular subscriber, you probably see the Journal from time to time.

But there are times—and many of them—when you want to read the latest issue, and some one else has it.

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For less than six cents a week

you can be a personal subscriber—you can get all the news of the field while it is still fresh and valuable—you can have copies when you want them.

You will never miss the subscription price, but you miss a lot of things when you do not have your own copy of the Journal every week.

Better send your order today before it is forgotten. Use this → order form.

..... 1915
ELECTRIC RAILWAY JOURNAL, 239 W. 39th St., New York.

You may send ELECTRIC RAILWAY JOURNAL beginning at once for one year to address below. I will remit subscription price of \$3 within 30 days.

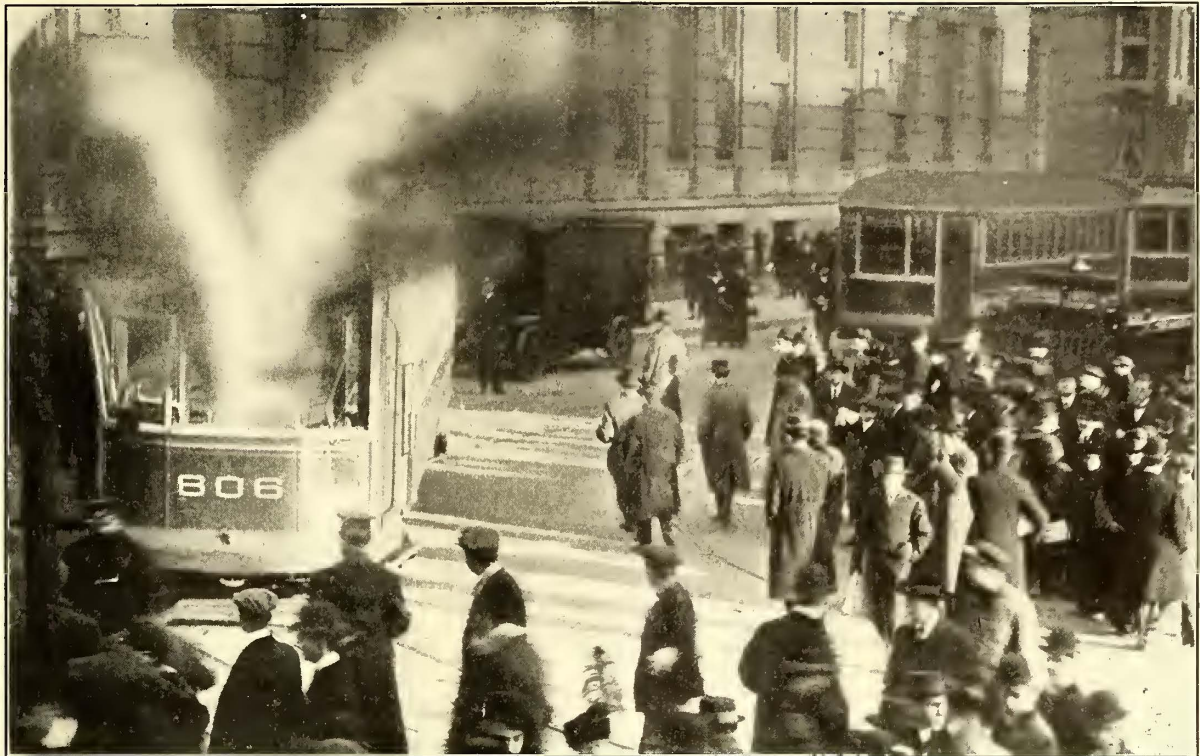
NAME

POST OFFICE.....

STREET ADDRESS.....

POSITION STATE.....

COMPANY



“Fires Often Occur on the Road”

Pyrene
TRADE MARK
Fire Extinguisher

In a paper read before the C. E. R. A., Mr. F. R. Daniels had this to say in part:

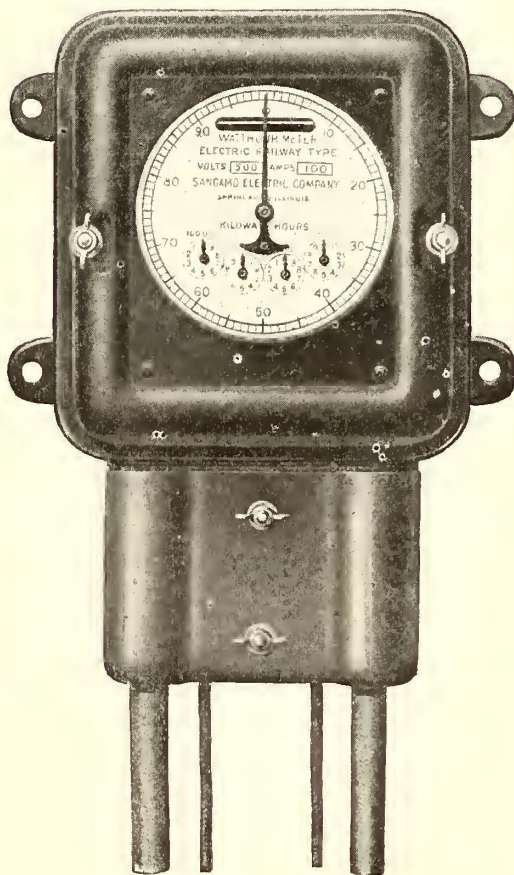
“Extinguishers on cars are of vital importance, as fires often occur on the road.

“It would be better if two extinguishers were carried instead of one.”

Pyrene Fire Extinguishers are standard car equipment on a number of roads which give careful thought to the safety of cars in service.

The Pyrene Electrical booklet was written for such roads. Write us for your copy.

PYRENE MANUFACTURING COMPANY
52 VANDERBILT AVE., NEW YORK
Branches in all large cities



ECONOMY

 BUILT LIKE A WATCH
METERS

You Have Modernized Your Equipment whenever results would warrant such action. You have scrapped old inefficient motors, installed Mazda lamps, reduced car weights, and made many other changes, which resulted in lower power and maintenance charges.

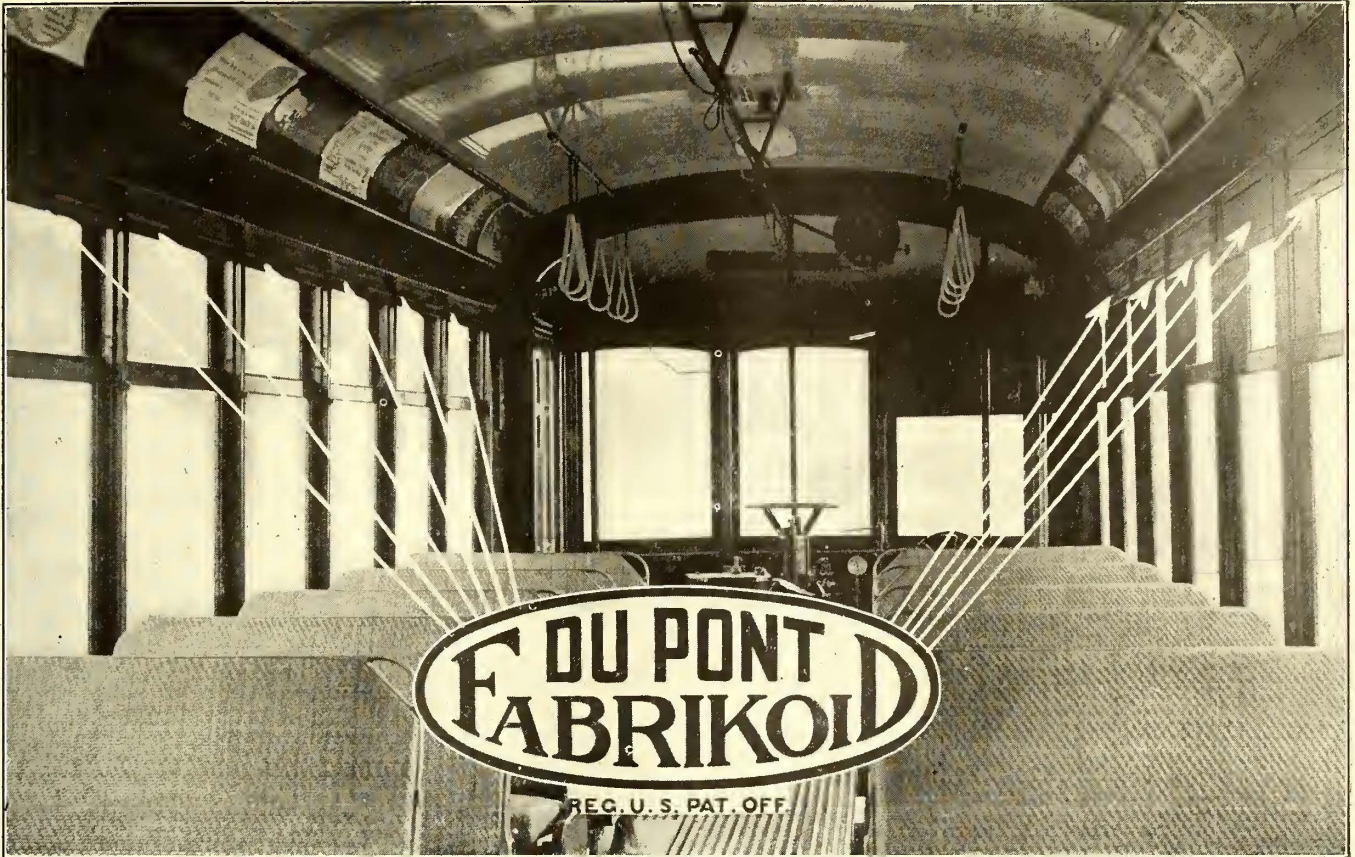
But Haven't You Neglected a most important phase of efficient management, the development of which means

The Modernizing of Your Men by teaching the advantages, possibilities and limitations of the equipment which they control?

There's a Way to accomplish this with a minimum of effort on your part and we'll be well repaid if we've helped you.

Let Us Show You how to educate your men with Economy Lectures and Economy Bulletins. Then let us tell you about our meters, our follow up system, and of the many more-than-satisfied users.

Sançamo Electric Company
 Springfield, Illinois



Another Electric Railway Company Specifies FABRIKOID for Car Curtains

The above photograph shows the interior of one of the thirteen new all-steel cars recently put into service by the Binghamton (N. Y.) Railway Company.

Weatherproof—Stainproof—Non-Shrinking—Durable

Winter snows or summer rain and sun have little effect on them. Impervious to moisture—they may be cleaned with soap and water.

Use FABRIKOID on Car Seats

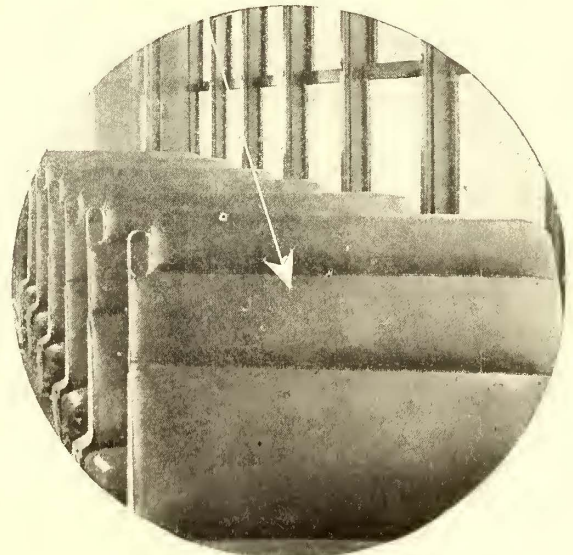
It does not crack, peel or split. Rich in appearance—low in cost and maintenance—gives long and satisfactory service.

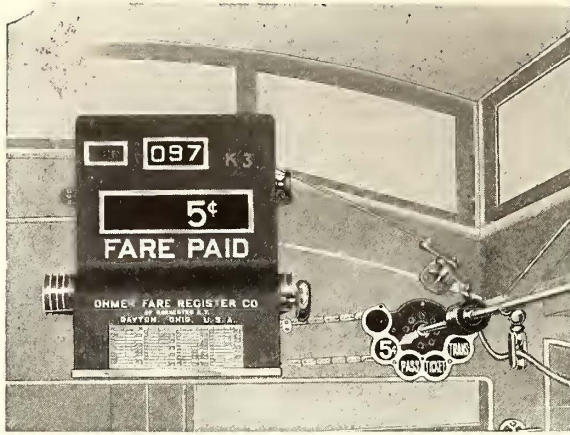
Write now for samples and prices.

DU PONT FABRIKOID COMPANY
Du Pont Building, Wilmington, Del.

Railroad Dept. Representatives:

WENDELL & MacDUFFIE COMPANY
63 BROADWAY, NEW YORK





Ohmer Fare Registers

Ohmer Fare Registers are made to meet every conceivable condition of electric railway operation. Whether you collect but one or two different denominations of fares, or whether you collect an almost infinite variety, you will find a particular type of Ohmer Register to meet your needs.

The Ohmer System of discipline, which is based upon the use of the Ohmer Register, has become a standard among progressive electric railway managers. Write us for full particulars about it.



Ohmer's Transfer Machine

MACHINE NO	FROM	TO	DIRECTION	TIME	CONSECUTIVE NUMBER	DATE
	KEDZIE	21 ST ST. NE		10 25 AM	0 2 0 5 2	SEP 11 15
ISSUED BY CONDUCTOR NO 27						
<small>This space may be utilized for displaying any information or limitations that may be desired printed on the transfer.</small>						
OHMER FARE REGISTER CO. DAYTON, OHIO U.S.A.						

Transfer as issued (Reduced)

Ohmer's Transfer Machine has been lately introduced to the electric railway industry. It puts transfer issuing and transfer accounting on a business-like basis, and cuts out transfer abuses. Time limitations are accurately and easily maintained, because the time is printed mechanically when the transfer is issued. All the data appears in plain bold type and the transfer can be immediately traced to the issuing conductor and to the issuing machine.

The operation of Ohmer's Transfer Machine means speed, economy and efficiency in transfer issuing and accounting.

Ohmer Fare Register Company, Dayton, Ohio, U. S. A.



What International Fare Collection Service Has Achieved at Boston

In the improvement of fare collection, in the acceleration of traffic and in the reduction of accounting cost.

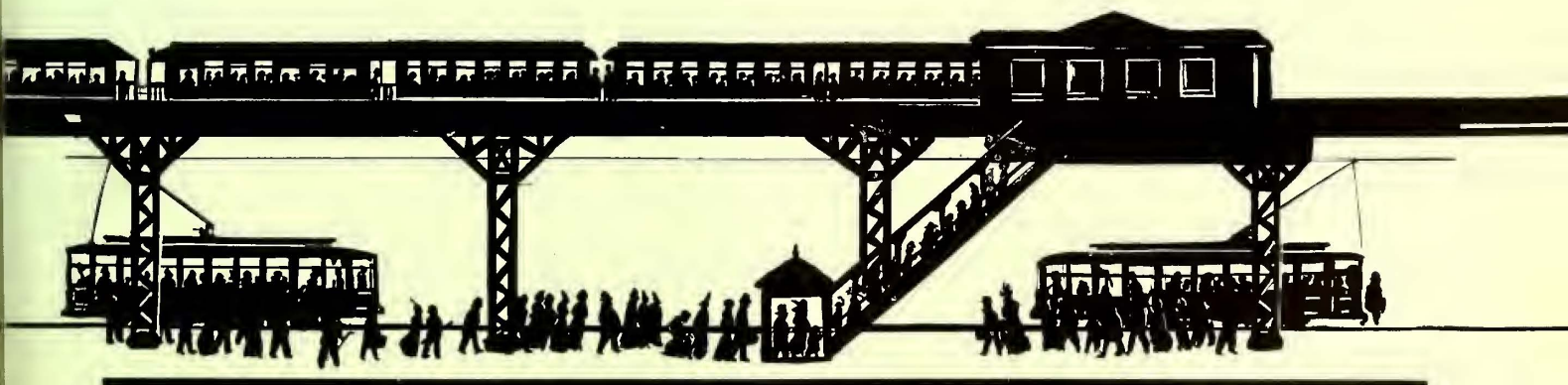
Through the use of motor-driven coin registers.

On a system comprising surface lines, subway lines and elevated lines.

On which cars are operated double-end, center-entrance, singly or in trains.

This record will convince you that International Fare Collection Service stands for more than the sale of a catalog product. It stands for

The Intelligent Study and Solution of Fare Collection and Traffic Problems





What the Motor-Driven Coin Register Is Doing On Prepayment Surface Lines

It accelerates passenger movement because the conductor can continue to make change and issue transfers without stopping to turn a crank or pull a cash register cord.

It registers each fare automatically upon tilting the inspection table and makes the money available for change immediately thereafter.

It registers only full fares and traps any pennies or mutilated coins substituted to secure a fraudulent count.

It permits the collection of each fare to be checked by the eye and at the only satisfactory time—just when the passenger is leaving the box.

It prevents the dishonest conductor from postponing the registration of fares to suit his manipulations.

It protects the honest conductor against the discrepancies which arise when the money deposited in a counting fare box is rung up separately afterward.

The International motor-driven coin register insures the speedy collection, simultaneous registration, and indisputable accounting of fares tendered on prepayment cars in city service.

The International Register Company

15 So. Throop St., Chicago, Ill.



What the Motor-Driven Coin Register Is Doing To Eliminate Tickets at Stations

Our station type motor-driven coin registers on the Boston Elevated Railway prove that ticket selling at stations means needless delay and expense.

Ninety per cent of the passengers go directly to the fare boxes instead of stopping for change!

That's why one machine at Park Street actually has passed 8000 people in one hour!

Every fare is dropped into a locked box subject only to the attendant's inspection while it is on a coin drum that can be stopped when a suspicious coin appears.

Out of \$340,000 in fares registered in November, 1915, by these station boxes, less than \$11 was in non-current coin, or slugs!

Collusion between ticket choppers and ticket sellers is no longer possible, and the substitution of transfers for full fare is also eliminated.

Each change-maker simply must turn in as much money as she receives on beginning work.

Aside from the saving in the printing, handling, auditing and destruction of tickets, two change-makers are found ample where formerly six ticket sellers were necessary.

The abolition of tickets makes a direct road for the passenger, from station to train; and a direct road for his fare, from the passenger to the treasurer.

The International Register Company

15 So. Throop St., Chicago, Ill.



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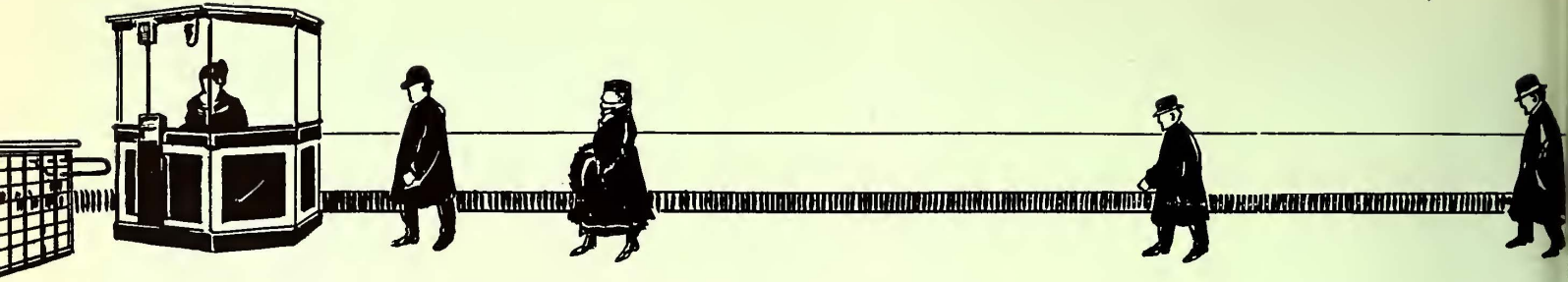
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The abolition of tickets makes a direct road for the passenger, from station to train; and a direct road for his fare, from the passenger to the treasurer.

The International Register Company

15 So. Throop St., Chicago, Ill.



What the Motor-Driven Coin Register Is Doing At a One-Person Turnstile Station

For service at light-traffic stations with but one attendant, we have built a motor-operated coin register into the booth in combination with a turnstile.

The first station of this type is now in service at Park Street north on the subway system of the Boston Elevated Railway, where 4500 fares are collected on a business day.

As at other Boston stations, no tickets are sold. The cashier never handles a fare, yet has perfect inspection of every coin tendered.

The passenger drops his fare into a hopper, but cannot pass until the change-maker releases the turnstile arm.

Every fare is registered twice—on the turnstile itself and on the International register connected to the motor-driven coin register.

There is no opportunity for the cashier to make an erroneous return.

There is no opportunity for the passenger to avoid paying fare.

The International Register Company

15 South Throop St., Chicago, Ill.

Harding—Electric Railway Engineering

By CHARLES F. HARDING, S.B., E.E., Head of the School of Electrical Engineering, Professor of Electrical Engineering, Purdue University. Second edition. 416 pages, 6 x 9, illustrated. \$3.00 (12/6) net, postpaid.

This second edition represents a complete revision of all the old material and the addition of much new matter relating to actual operating conditions.

The book covers the principles of team operation, power generation and distribution, equipment and types of systems. It is a thorough but concise study of engineering and economic problems encountered in modern railway traction. The treatment makes it of special value to all who are in any way interested in electric railways, whether in the business or engineering ends, and to those who are planning any development work.

Contents

PART I.—Principles of Train Operation.—History of Electric Traction. Traffic Studies (Predetermined). Traffic Studies (Existing). Train Schedules. Motor Characteristics. Speed Time Curves (Components). Speed Time Curves (Theory). Distance, Current and Power Time Curves (Theory). Speed, Distance, Current and Power Curves (Concrete Examples). Speed Time Curves (Straight Line). PART II.—Power Generation and Distribution.—Locomotive Train Haulage. Sub-Station and Power Station Load Curves. Distribution System. Sub-Station Location and Design. Transmission System. Power Station Location and Design. Bonds and Bonding. Electrolysis. PART III.—Equipment.—Signal and Dispatching Systems. Track Layout and Construction. Cars. Motors. Control Systems. Brakes. Car House Design. Electric Locomotives. PART IV.—Types of Systems.—Alternating Current vs. Direct Current Traction. Electric Traction on Trunk Lines.

A New Edition will be ready this month



Richey—Electric Railway Handbook

By ALBERT S. RICHEY, E.E., Consulting Engineer, Professor of Electric Railway Engineering, Worcester Polytechnic Institute. 832 pages, flexible leather, pocket size, over 600 illustrations, \$4.00 (17s) net, postpaid.

The standard work to-day for electric railway men. It contains a collection of practical data, formulas and tables classified and indexed for quick reference.

It covers Roadbed and Track, Buildings, Train Movement, Railway Motors, Controlling Apparatus, Current Collecting Devices, Trucks, Braking, Rolling Stock, Transmission and Distribution Signals and Communication.

Buck—The Electric Railway

By A. MORRIS BUCK, M. E., Assistant Professor of Railway Electrical Engineering, University of Illinois. 390 pages, 6 x 9, 193 illustrations, \$3.00 (12/6) net postpaid.

It covers thoroughly the underlying principles of electric railway design and operation.

Although intended primarily for the use in college classes, it contains much matter of interest to the practicing engineer. It should be especially useful to younger men in the industry and to companies who carry on educational work.

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We will send these books or any book published by the McGRAW-HILL BOOK COMPANY, Inc., to any subscriber to the Electric Railway Journal or any member of the American Institute of Electrical Engineers or American Electric Railway Association for ten days' free examination.

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"Walkover" Seats in Marshall, Tex., One Man Car

How are Your Car Seats?

Do they combine strength with lightness and promote the ease and comfort of passengers by utilizing every inch of space advantageously?

Now is the time to plan for better seating facilities on your cars.

WALKOVER PRESSED STEEL SEATS

are roomy and comfortable. They save space without crowding the traveling public. They are clean and sanitary. The solid brass handles on backs make "strap-hanging" unnecessary and also facilitate reversing seats for return trip. Their pressed steel construction gives greater strength and durability.



Latest Lightweight Transverse Stationary Seat.

**Save
15 to 25 lb.
Per Seat**

This lighter weight saves considerable drain on current at "traffic peaks." H and K seats are designed for all types of electric cars.

Write for Further Particulars

and let our engineers co-operate with yours in devising ways for improving the seating capacity of your cars.

Hale & Kilburn Co.

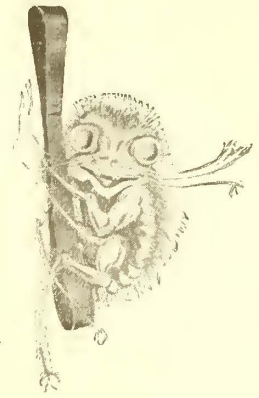
New York Philadelphia Chicago
San Francisco Washington

Subway Car with H & K Correct Posture Seats





**Detroit Discards
A Horse Car Relic
The Germ-Laden, Unsanitary
Leather Hand Strap**



**THE DETROIT
UNITED RAILWAY**

ordered

7400 No. 1A Rico Sanitary Straps

in December, 1915, to start the New Year
with more evidence of its
"Public-Be-Pleased Policy."



No. 1 A



No. 2



No. 3



No. 4



No. 5

**These Class A Cities are Now Using
RICO SANITARY STRAPS**

New York
Philadelphia
Chicago
San Francisco
Kansas City

Buffalo
Washington
San Diego
Atlanta
London, England.

Write for this



One-half of the city cars in the
United States are already
equipped with Rico Sanitary
Straps.

Let 1916 see the annihilation of
the microbe-laden horse-car
straps.

Railway Improvement Co.

**Rico Sanitary Strap Department
Executive Offices, 61 Broadway, New York**

Chicago

Los Angeles

London



SAMSON SPOT TROLLEY CORD

There is no better time to cut cord costs than *now*—the beginning of a period which will be compared with the previous year for results.

The smooth hard braid of Samson Spot Trolley cord saves loss due to abrasion.

Its water-proofness prevents swelling in the catchers.

In other words it enables you to *save* on cord costs—to make a better record.

The Colored Spots are our Trade Mark, used only with this extra quality.

Samson Solid Braided Bell and Register Cord gives equally good results on bell and register service.

Send for samples and prices.

**Samson
Cordage Works
Boston, Mass.**



What More Could You Want In a Trolley Catcher?

Positive Action—You get this in the Keystone because of the manner in which the centrifugal pawls engage with the fixed stops on the rear casing of the device. And because they are unailing in their operation.

Sensitiveness—It catches the pole in an upward movement of from three to five inches above the wire.

No Rebounding—In the Keystone the centrifugal pawl *slides* over the flat surface of the fixed stop when catching a flying pole. And the rebound has to be entirely out of the ordinary to make it let go. Keystone Catchers will not allow rebounding.

Strength and Simplicity—Note the ruggedness of every part of the Keystone Catcher. Witness the fact that it has fewer parts than any other catcher on the market; that not a screw is used in its entire construction; that no cushioning springs are used. All these are features of the strong, simple, durable and "fool-proof" Trolley Catcher—the Keystone.

Testimonials—Is stronger proof necessary than that they are used by such properties as American Railways Co., Philadelphia Rapid Transit Co., Washington Railway & Electric Co., International Railway Co., Buffalo, Dallas Consol. Elec. St. Ry. Co., and many more?

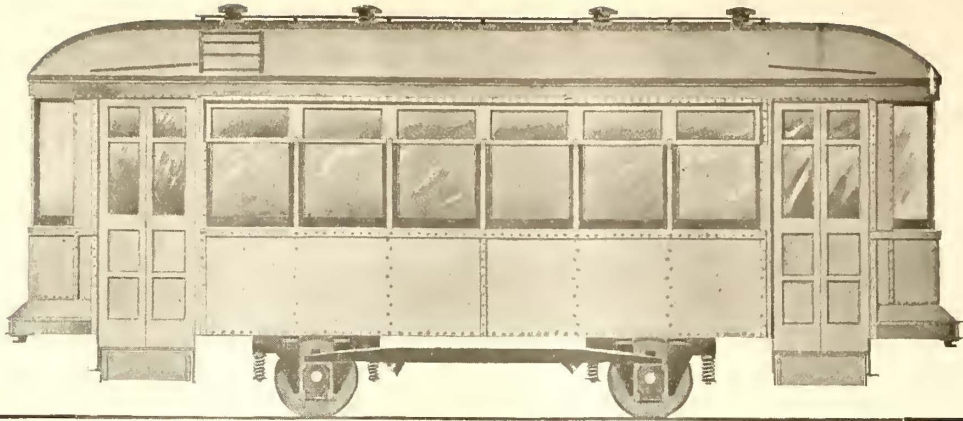
Guarantee—Keystone Trolley Catchers are sold on a 60-day trial basis, and every one guaranteed for a period of two years. Let us send you a sample machine. Put it in service and see for yourself how "It Watches the Trolley Pole, and Protects Your Overhead." Tell us to do this *now*.

ELECTRIC SERVICE SUPPLIES CO.
Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA
17th and Cambria Sts.

NEW YORK
50 Church St.

CHICAGO
417 So. Dearborn St.



Car Ventilating Statistics Show

- that fresh air heats quickly.
- that vitiated air cools rapidly.

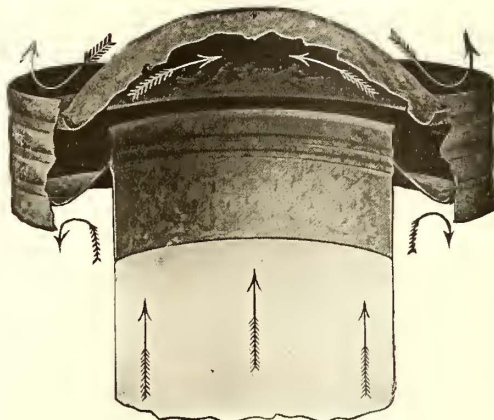
Boil down this subject of adequate car ventilation to its simplest form and you arrive at the conclusion:

“Globe” Ventilators

They provide for fresh air and expel foul air in just the right amounts to conserve the heat of your cars in all temperatures, whether running or standing.

Put on “Globe” Ventilators and you can forget about this subject of car ventilation.

They will not penalize you for upkeep and will work with

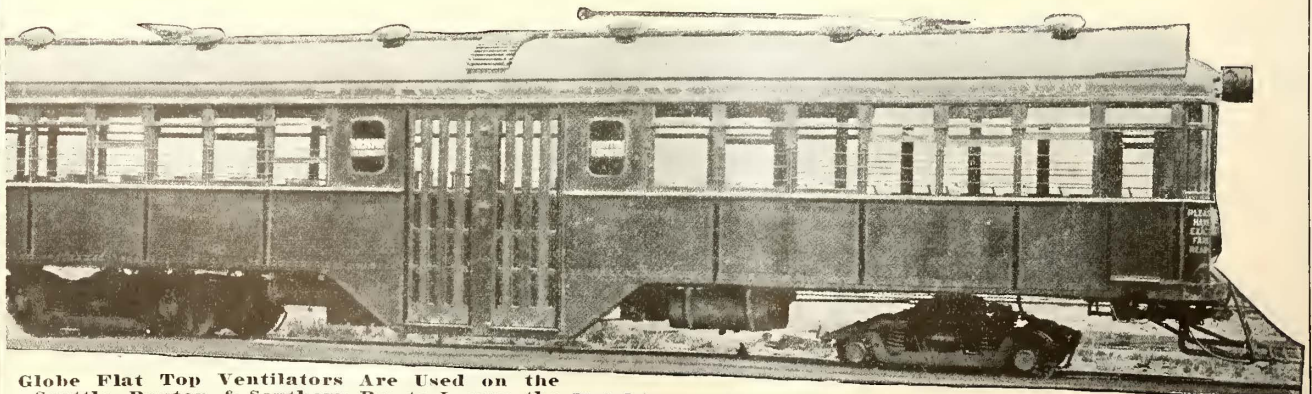


equal efficiency in any position or in any part of the car where an exhaust is required.

Hundreds of “Globe” users know this.

The “Globe” is the “Universal Ventilator”—it is as efficient on large double truck interurban cars, as on small single-truck city cars—Note the illustrations to prove this!

Globe Ventilator Co.
TROY, N. Y.



Globe Flat Top Ventilators Are Used on the Seattle, Renton & Southern Ry. to Lessen the Height.

Bang!



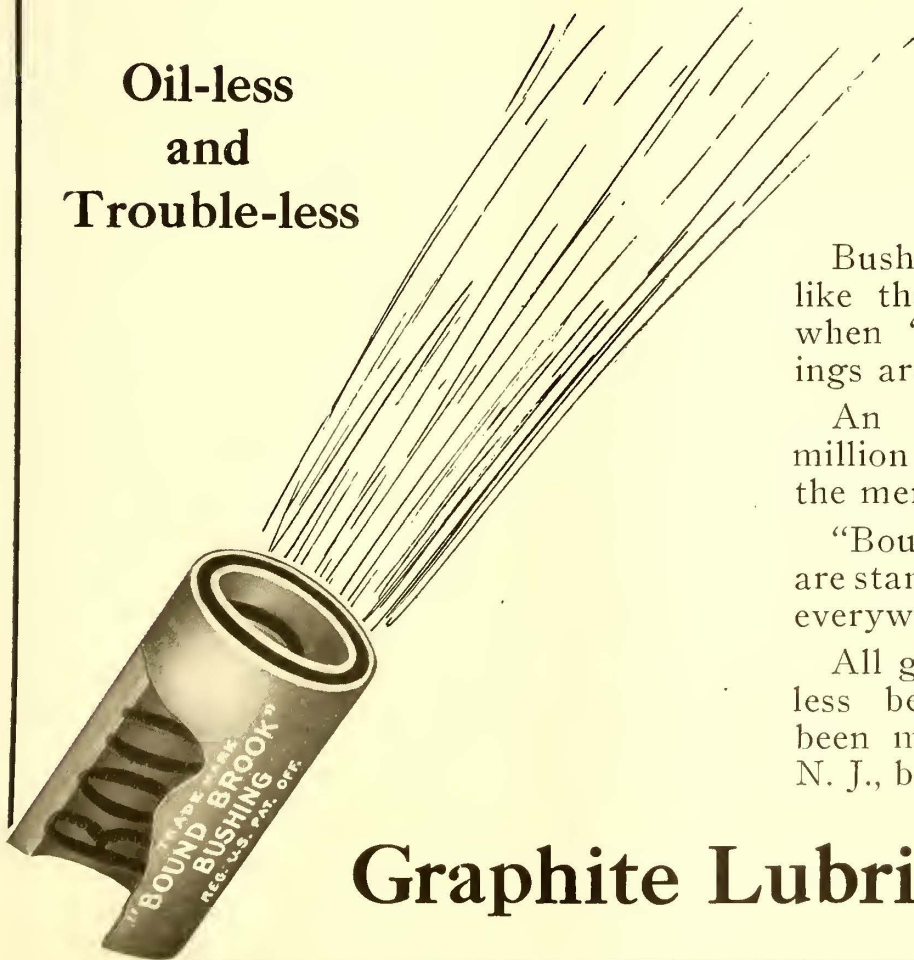
Trolley-wheel
bushing troubles
eliminated at one
shot—by

“Bound Brook”

TRADE MARK REG. U. S. Patent Office

Trolley Wheel Bushings

Oil-less
and
Trouble-less



Bushing troubles vanish like the tents of the Arabs, when “Bound Brook” Bushings are installed.

An output of over two million bushings a year proves the merits of our product.

“Bound Brook” Bushings are standard equipment almost everywhere.

All genuine graphited “Oil-less bearings” have always been made at Bound Brook, N. J., by the

Graphite Lubricating Co.

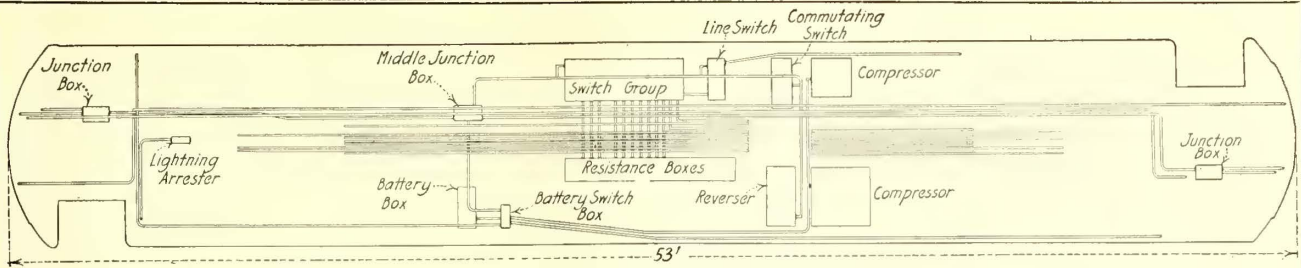
Let your 1916
car equipment
include

Providence Fenders
and
H-B Life Guards

The best form of
preparedness

Standard the world over

The Consolidated Car Fender Co., Providence, R. I.
Manufacturers of The Providence Fender and H-B Life Guard
Wendell & MacDuffie Co., 61 Broadway, New York
General Sales Agents



Urban or Interurban? DURADUCT

(Reg. U. S. Pat. Off.)

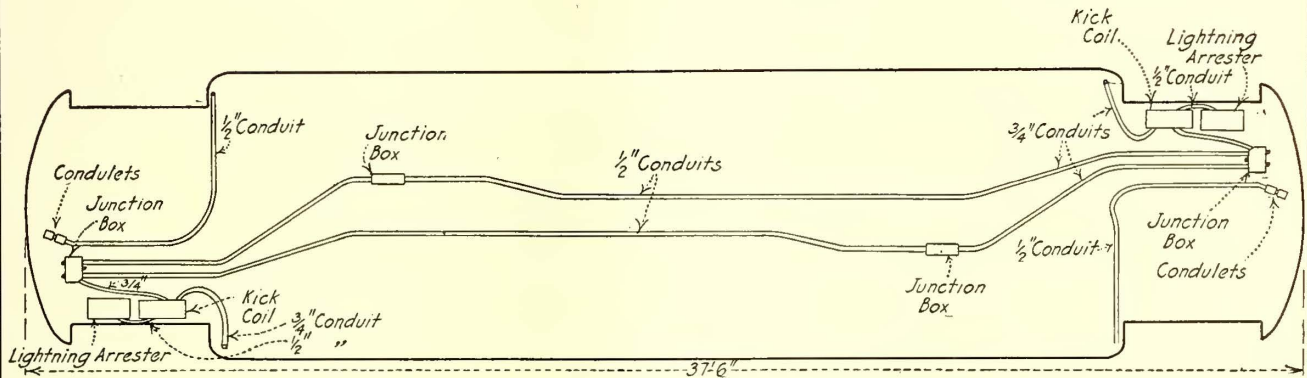
This water-proof, flame-proof, one-wall woven conduit is worth your consideration for both urban and interurban cars. The following is a tabulation of the conduit layout on such cars, both operated on the same property.

The city car carries two 40 hp. General Electric motors with K-36-J control. It has conduit only for the main motor circuits between the controllers and motors except that the 3/4-in. size is used for the trolley wire from the corner of the car to the controller.

The interurban car has four 125 hp. Westinghouse motors and multiple unit control. The motor wiring is carried in 1 1/4-in., 1-in. and 3/4-in. conduit; resistor leads in 3/4-in.; control circuits in 1 1/4-in., 1-in., 3/4-in. and 1/2-in.; air compressor circuit in 1/2-in. and 3/8-in.; signal circuit, 3/8-in.; main trolley circuit, 1 1/4-in.; light circuits, 1/2-in. and 3/8-in. Parallels of actual and possible weights follow:

INTERURBAN CAR

Size	Wt. per ft.	Length	Total Weight	Duraduct
1 1/4 in.	2.24 lb.	126 ft.	282.2 lb.	35.3 lb.
1 in.	1.67 lb.	11 ft.	18.3 lb.	2.1 lb.
3/4 in.	1.12 lb.	99 ft.	110.8 lb.	12.9 lb.
1/2 in.	.85 lb.	70 ft.	59.5 lb.	5.9 lb.
3/8 in.	.56 lb.	100 ft.	73.9 lb.	5.8 lb.
			544.7 lb.	62.0 lb.



CITY CAR

Size	Wt. per ft.	Length	Wt. of metal	Duraduct
1 1/4 in.	2.68 lb.	78 ft.	209.0 lb.	21.8 lb.
3/4 in.	1.12 lb.	14 ft.	15.6 lb.	1.8 lb.
1/2 in.	.85 lb.	28 ft.	28.8 lb.	1.9 lb.
			253.4 lb.	25.5 lb.

Duraduct would save 227.9 lb. on the city car and 482.7 lb. on the interurban car. Have you studied the possibilities of Duraduct in your case?

Samples upon Request

TUBULAR WOVEN FABRIC CO.

MANUFACTURERS

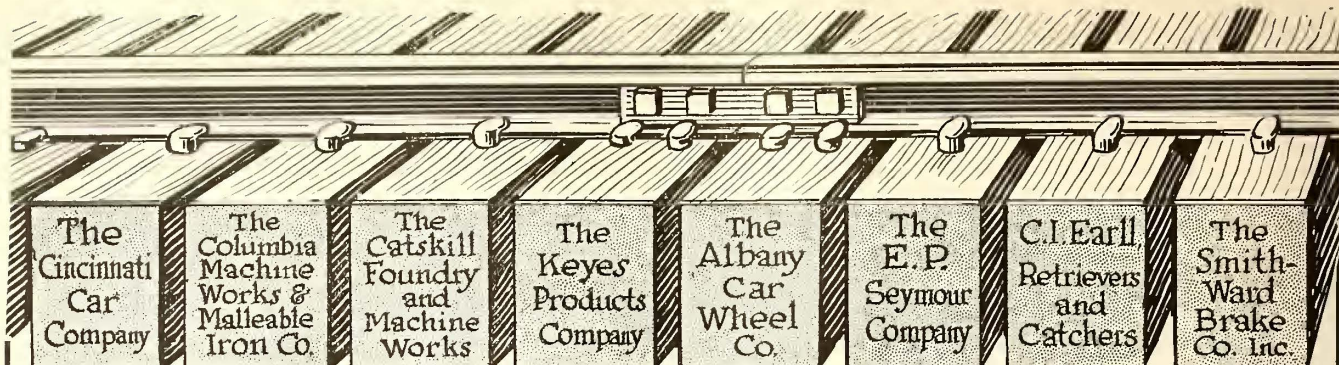
PAWTUCKET, R. I.

A. HALL BERRY, General Sales Agent

97 Warren St., New York

9 So. Clinton St., Chicago

Distributors for Canada: NORTHERN ELECTRIC COMPANY, Ltd.



Generous, Substantial Support

is what we enjoy at the hands of the progressive manufacturers of car or maintenance equipment, for whom we are exclusive Eastern agents.

The high standard of their products is a good, solid foundation for the uniform satisfaction of our customers.

We solicit correspondence relative to the products of any of these firms and will be pleased to answer questions relative thereto. Literature on request.

THE CINCINNATI CAR COMPANY

Cincinnati, Ohio
City and Suburban Cars, Wood and All-Steel

THE COLUMBIA MACHINE WORKS & MALLEABLE IRON CO.

Brooklyn, New York
Railway Supplies and Shop Machinery

THE CATSKILL FOUNDRY & MACHINE WORKS

Catskill, New York
High Grade Gears and Pinions

THE KEYES PRODUCTS COMPANY

New York, N. Y.
Nevasplit Car Headlining and Panels

THE ALBANY CAR WHEEL COMPANY

Albany, New York
Chilled Tired, Cast Iron Car Wheels

THE E. P. SEYMOUR COMPANY

Waltham, Mass.
Portable Rail Grinders

C. I. EARLL

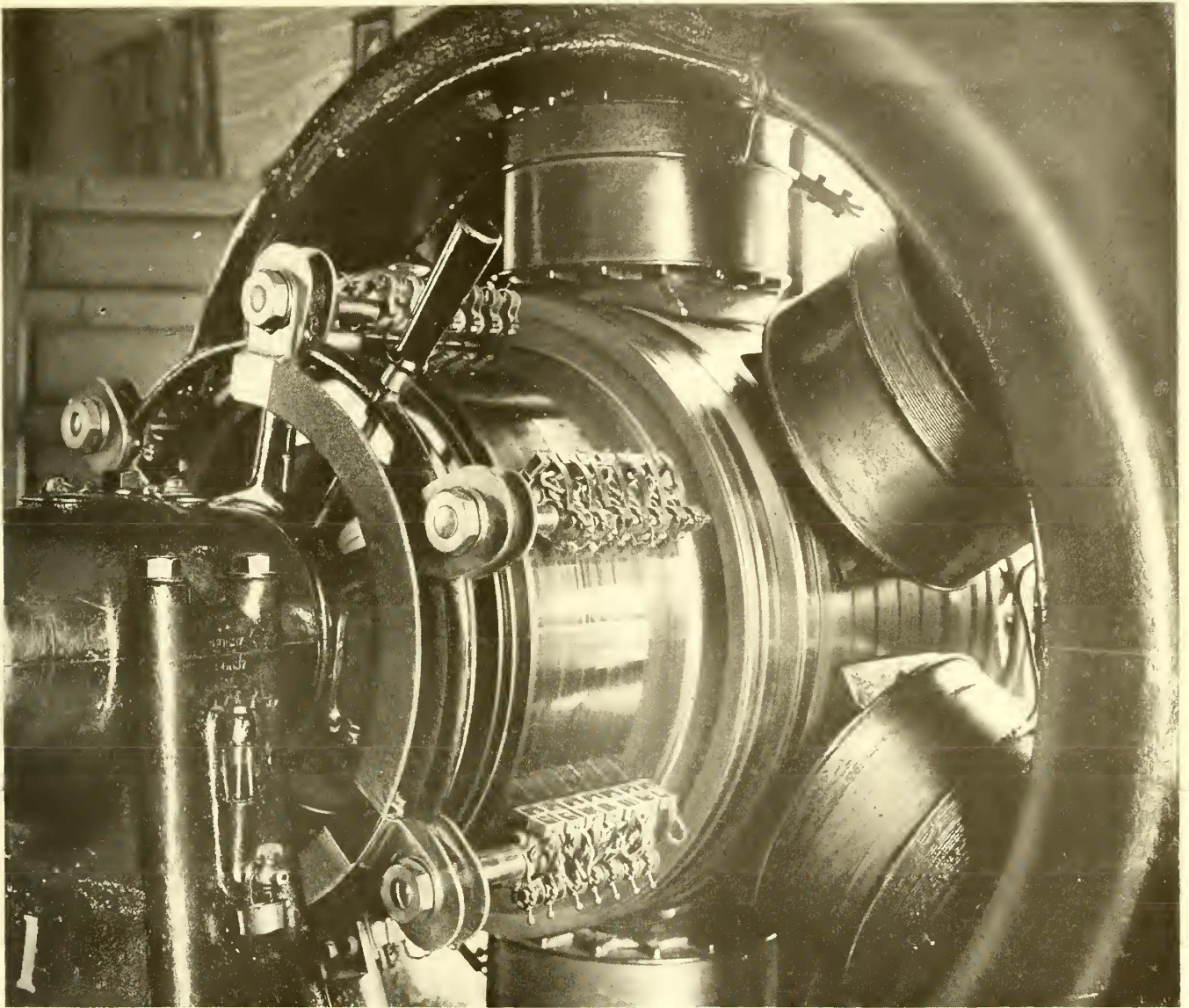
New York, N. Y.
Trolley Catchers and Retrievers

THE SMITH-WARD BRAKE COMPANY, INC.

New York, N. Y.
S. W. B. Slack Adjusters

W. R. Kerschner Co., Inc.

50 Church Street, New York



On Rotaries

—as on motors—the Uniformity and Efficiency of the Le Carbone carbon brush provides true economy.

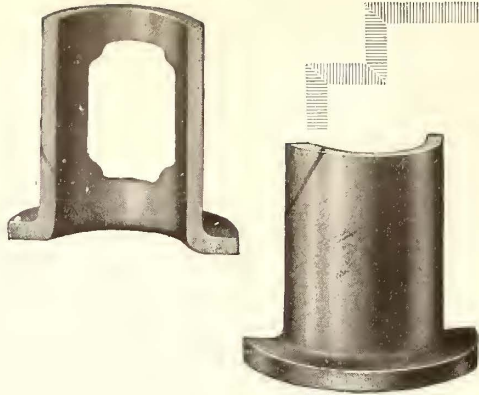
The Illinois Traction Company had trouble for three years with the rotary shown above. Le Carbone brushes corrected the trouble. The condition of the commutator now tells the story.

W. J. Jeandron

173 Fulton St., New York

Pittsburgh Office: 636 Wabash Bldg.,
W. P. Poynton, Engineer.

Chicago Office: 1657 Monadnock Block,
F. W. Lyon, Engineer.



Mileage Cost vs. Price Cost

The lowest ultimate cost per mile is the only correct basis for bearing specifications. That's why your orders should always read—

More-Jones "Tiger" Bronze Axle and Armature Bearings

"Tiger" Bronze is the product of our long experience in the combination and treatment of alloys plus an improved casting process. It creates a bearing structure of great strength and toughness, very long wearing and with superior anti-frictional qualities that reduce lubrication expense and save much wear on axles.

More-Jones Armature Babbitt Metal

represents the most durable, efficient and economical lining metal it is physically possible to produce for armature bearing service. Mileage cost will prove it the most economical. Any test will show its high efficiency. Learn why this metal predominates its field.

*Further information and
prices on application*

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.



Could Not Break B. P. Gear

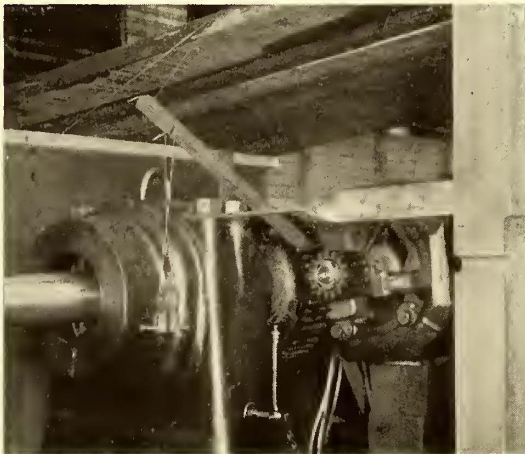


Fig. 1—Showing Motor Mounting

A large user of Nuttall B. P. Gearing made the following tests to determine the effects of passing various materials through the mesh. The tests were purposely carried beyond the point of failure and the conditions made more severe than might be expected in service, the intention being to continue them until some essential part of the equipment failed. A 48 horse power railway motor was mounted on and geared to a counter-shaft, supporting a 12,800 pound flywheel, equivalent, under the conditions, to a 25¾ ton car with 33 inch wheels.

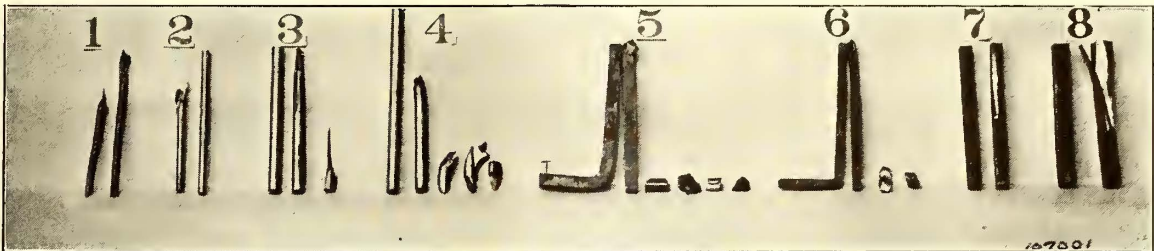
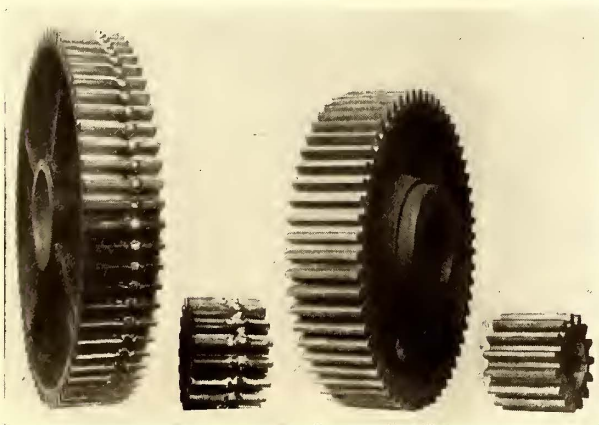


Fig. 2—Test Pieces Used

Figure 2 shows the test pieces before and after they were run through the gear mesh, and they are numbered in the order in which the tests are described. Figure 3 shows the effect of passing a piece of ½-inch square tool steel through the mesh of an untreated cast steel gear and untreated forged steel pinion, and Figure 4 shows a B. P. Gear and Pinion after all of the following tests:

- 1—¼" Round hot rolled steel. Test piece flattened and pressed to fit between teeth.
- 2—¼" Round cold rolled steel. Test piece flattened, as shown.
- 3—⅜" Round cold rolled steel. Test piece flattened, mashed and broken.
- 4—½" Round cold rolled steel. Test piece flattened, and broken in pieces.
- 5—⅜" Square cold rolled steel bent L shape, passed through parallel to teeth 2" from end of teeth. Test piece broken.
- 6—¼" Square tool steel, bent L shape, water quenched and passed through as in 5. Test piece broken. Gear teeth slightly burred.
- 7—⅜" Square tool steel. Test piece distorted and chipped.
- 8—½" Square tool steel. See 8, Figure 2. Teeth of gearing slightly burred, but absolutely undamaged. See Figure 4.



Untreated Steel
Fig. 3

B. P. Gear and Pinion after test
Fig. 4

This is unquestionable proof of the strength and toughness of B. P. Gearing, and in addition we guarantee it to have three and one-half times the wearing life of untreated cast steel. Send for Bulletin 17, or send a trial order subject to this guarantee.

Nuttall

Pittsburg

District Sales Representatives

Atlanta—George E. Watts, Candler Building.
Boston—Charles N. Wood Co., 79 Milk St.
Cincinnati—Monroe Brass & Wire Co., Traction Building.

New York—Electric Service Supplies Co., 50 Church St.
Philadelphia—Electric Service Supplies Co., 17th and Cambria Sts.
Pittsburgh—Union Electric Co., Terminal Warehouses.

Butte, Chicago, Dallas, Denver, Detroit, El Paso, Kansas City,
Salt Lake City, St. Louis, San Francisco, Los Angeles, Seattle—The Westinghouse Electric & Manufacturing Company.

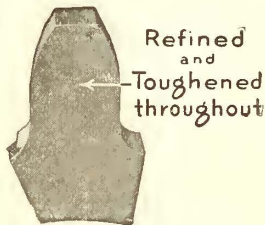
The Old Order Changeth

THERE was a time not long ago when gears of any sort were good enough to drive the cars of electric lines. A hundred thousand miles or less was pretty much a record then and really no one could complain.

Efficiency advanced in power—and costs, mileage, and replacements were scrutinized. The men who make the gears came forth with treated steel and showed there was a chance to save in costs of gears by greater strength and longer wear.

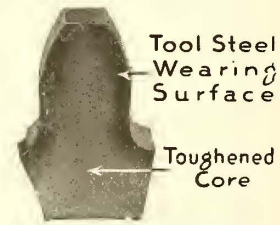
We were not premature to make the change. Experiments at our expense and not at others' were our first plan. Experience of twenty years did much to aid us in our aim. We knew our metals and our skill—and, more, we knew conditions that must be met in motor service.

It took not one but two kinds of gears to fill the bill. We call them Grade TREATED and Grade HARDENED. The first by special process is toughened with great strength and means long service. The second is hardened against wear and will withstand the steady grind. These are the gears of today. They multiply mileage by three—four—five—or more; reduce the number of replacements and cut down car schedules by their all-around dependability.



Grade TREATED

There are hundreds who are enjoying the new order in gearing. The service these gears are giving others should interest you.



Grade HARDENED

Write to us or our nearest representative about them. Ask for our treatise

"A Feature of Lowest Operating and Maintenance Cost"

THE VAN DORN & DUTTON COMPANY

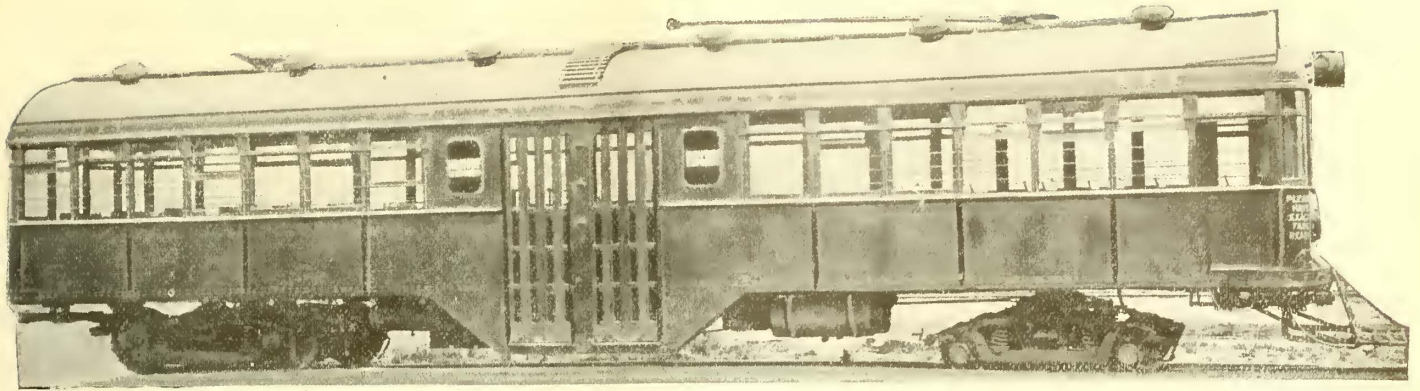
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Baltimore
Atlanta

CLEVELAND, OHIO

Denver
Salt Lake City
San Francisco

New England Representative: Frank Ridlon Company, Boston, Mass.
Canadian Representative: C. E. A. Carr, 2 Toronto St., Toronto, Ont.

GEAR SPECIALISTS



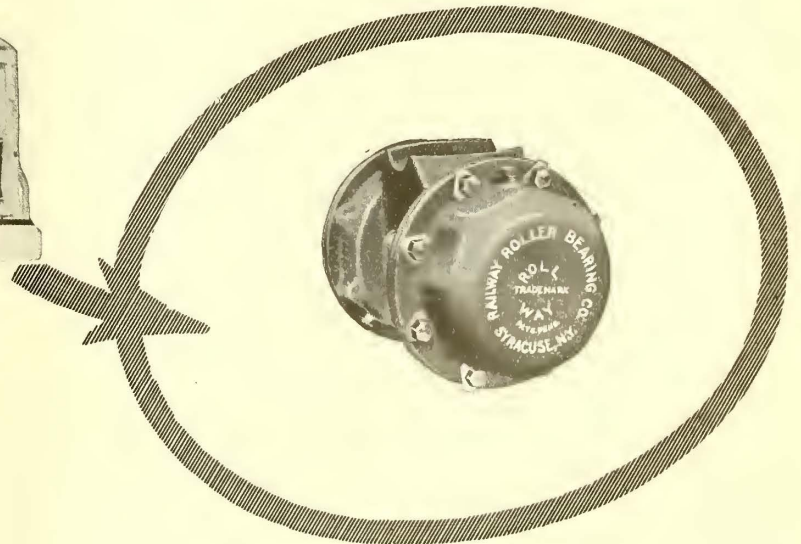
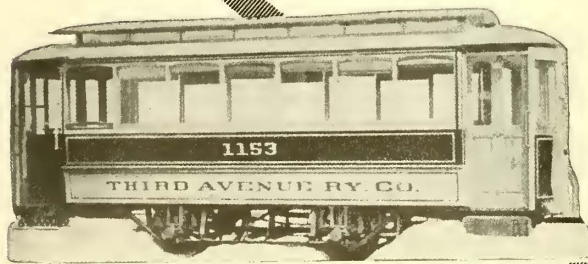
Operate Present Heavy Cars with Less Energy

Do not put off the use of anti-friction bearings until you buy new cars.
While you are considering the change to lighter rolling stock, consider the immediate economies possible on your present heavy cars by installing on them

Rollway Bearings

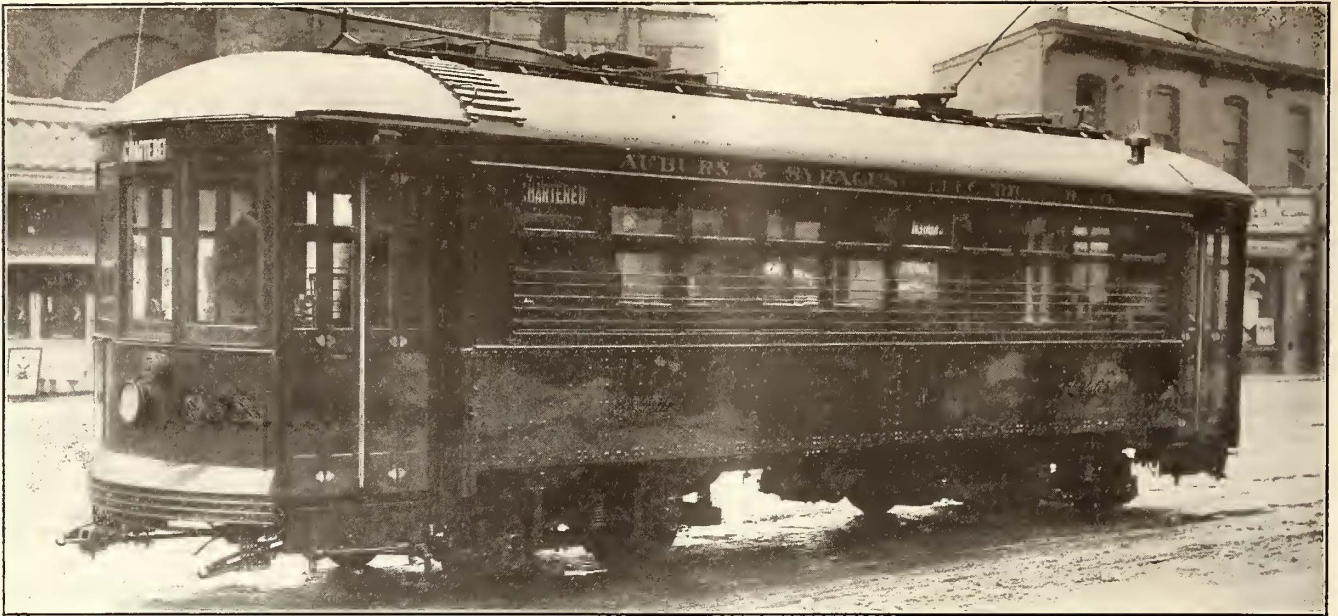
These bearings reduce energy consumption more than 15% over plain bearings. They reduce lubrication costs by minimizing friction. They lower bearing maintenance cost. On the Seattle, Renton & Southern (Car shown above) four years of service failed to show any appreciable wear of the Rollway Bearings.

Arrange to test a set in service.
Write.



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

Rollway Bearings for Journals and Motors



City Car of Empire United Railways Equipped with S-W Shim Slack Adjusters.

Why S-W Shim Slack Adjusters Pay on the Empire United Railways

Several of the Empire United Railways cars have S-W Shim Slack Adjusters. Here are some of the things they are accomplishing there:

City car No. 309 on the Auburn & Syracuse division is on an inspection basis of 1000 miles, but the brakes are left alone until the shoes have worn out—5500 miles!

Interurban car No. 201, Oswego & Rochester division, is inspected now every 2000 miles instead of every 1200 miles!

Best of all, City car No. 321, which operates as Fulton's only car for 14 hours a day at 12 m.p.h. schedule speed, no longer is taken to the Oswego shops every 5 days at a loss of 5 hours' service time and \$3.00 platform time. Instead of bringing the car to the inspector the inspector is brought to the car!

And the only time No. 321 is brought to Oswego is when the brake-shoes are worn out!

Let us show you where S-W Shim Slack Adjusters will cut costs for you!

Smith-Ward Brake Company, Inc. 17 Battery Place, New York

W. R. KERSCHNER CO., *Eastern Sales Agents*, 50 Church Street, New York City

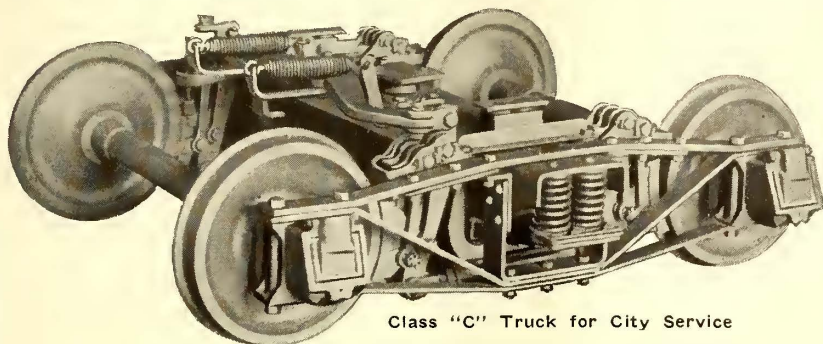
J. B. N. CARDOZA CO., *Southeastern Sales Agents*, Citizens' Bank Bldg., Norfolk, Va.



Interurban Car of Empire United Railways Equipped with S-W Shim Slack Adjusters.

BALDWIN

When considering the purchase of electric cars, every detail should be given careful consideration. Especially is this true of the trucks, which constitute the basis of the structure, and are practically electric locomotives. Yet too often various other car details—such as the body, the seats, the lighting, the motors, etc.—are decided upon before the trucks are given a thought.



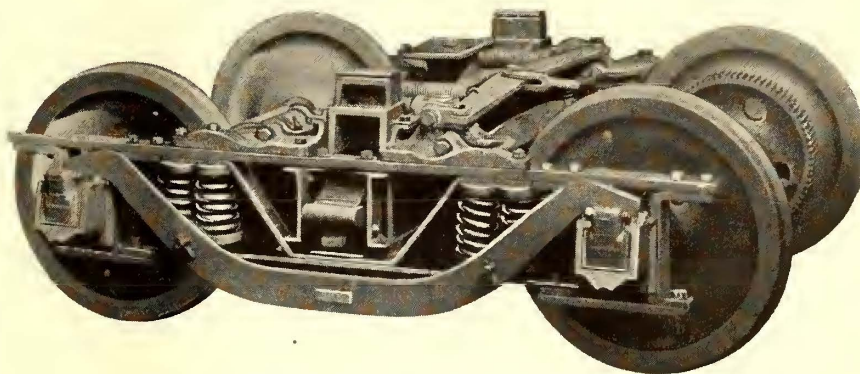
Class "C" Truck for City Service

The Baldwin Locomotive Works are specialists in truck design and construction. They are prepared to recommend a type of truck suitable for any service, provided full information is given regarding operating

conditions. This information should be available before the car bodies are designed, so that trucks, bodies and all the other features can be united to form a harmonious structure.

The illustrations show two types of Baldwin trucks—Class "66-18-C," for slow speed city passenger service, and Class "73-22-K," for medium speed suburban passenger service. The Class "C" truck possesses excellent

riding qualities, as the coil springs, which act as efficient shock absorbers, are mounted on the ends of the semi-elliptic bolster springs. Class "K" is a light-weight truck of the equalized pedestal type, equipped with coil equalizing beam springs and full elliptic bolster springs.



Class "K" Truck for Suburban Service

Baldwin trucks have four prominent characteristics: **Safety first; second, economical maintenance; third, simple construction; fourth, noiseless operation.**

Additional information may be obtained by writing to either the home office or the nearest representative.

THE BALDWIN LOCOMOTIVE WORKS

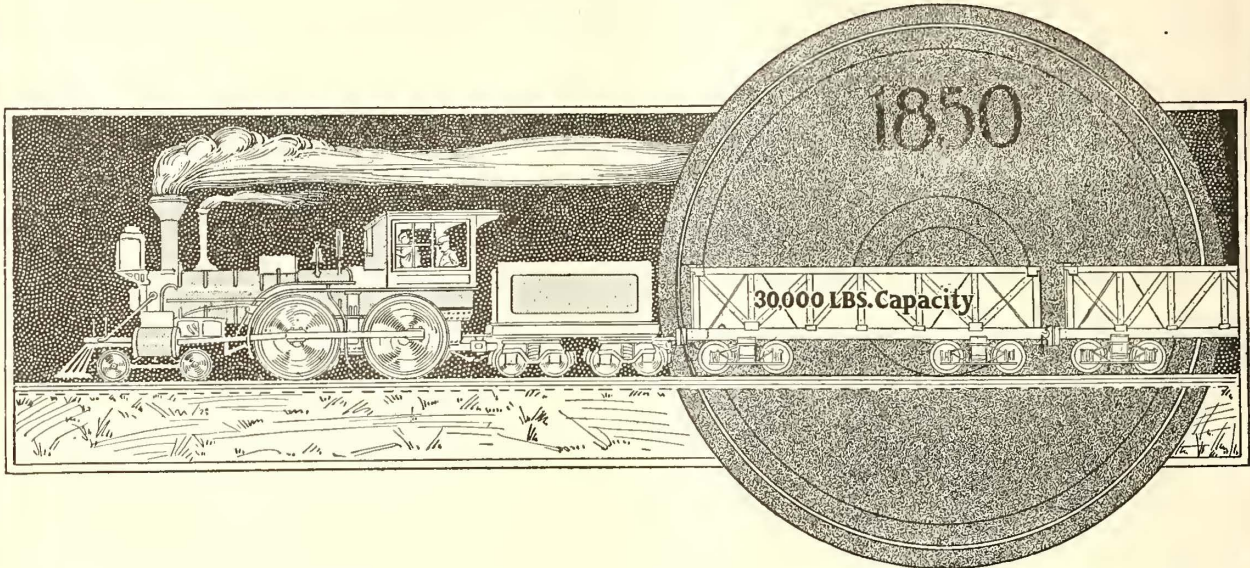
Philadelphia, Pa.

REPRESENTED BY

Charles Riddell, 625 Railway Exchange, Chicago, Ill.
C. H. Peterson, 1210 Boatmen's Bank Bldg., 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

The Wonderful Single Service Chilled Iron Wheel



The sudden cooling of molten iron when poured against a cold iron ring in the mould produces the chilled tread or running surface of the Chilled Iron Wheel.

The result is a clear white iron harder than tempered steel, about three-quarters of an inch in depth and extending all around the tread and flange.

The balance of the molten iron is poured into a sand mould and the cooling is retarded, producing a strong open fracture which is so desirable for axle fit and expansion stresses due to brake application.

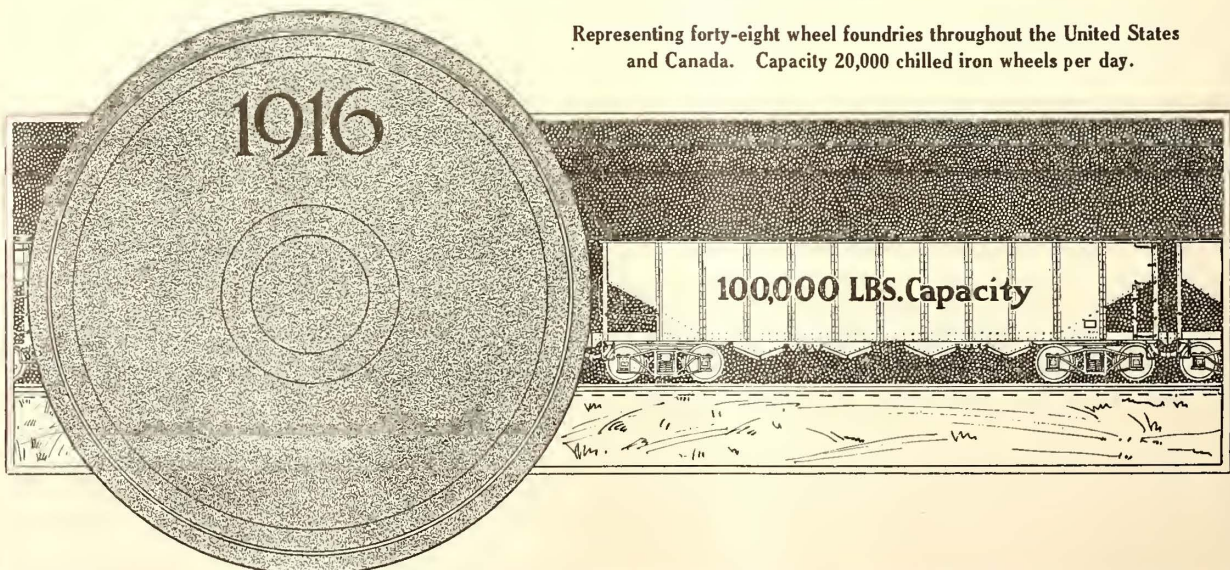
This graded hardness of structure is ideal for service conditions.

The wheel is poured in less than ten seconds.

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

ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS 1214 McCormick Building, Chicago

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



The Wide Use of the Storage Battery

A Story of Unusual Achievement

How much use could be made of water if there were no tanks, pails, buckets, etc., to hold it? A storage battery is to electricity what a receptacle is to water.

In this country "storage battery" and "The Electric Storage Battery Company" are inseparably associated. You can't think of one without thinking of the other, because for 28 years this company has produced by far the greatest part of all the storage batteries manufactured in this country.

Just consider this thought. If all the storage batteries made by The Electric Storage Battery Company were suddenly thrown out of service this whole country would be badly crippled. Think of conditions with the millions of Bell telephones out of service. Think of the electric lighting companies in New York, Chicago, Philadelphia, Boston and other large cities without a reserve supply of electricity in cases of emergency. Think of many of the railroads without signal apparatus with which to operate their trains. Think of submarines in the United States Navy without batteries for their operation when submerged. Think of thousands of electric delivery wagons and trucks suddenly made useless. Think of hundreds of thousands of automobiles without batteries for starting, lighting or ignition.

And again, don't get the idea that a storage battery is merely a wood or rubber receptacle containing plates of lead immersed in dilute sulphuric acid.

The big jobs and the important ones that storage batteries are doing every hour of the day prove that storage battery design and manufacture is of necessity a highly specialized and developed art. Storage batteries are and have been a most important factor in the growth and development of the electrical industry.

This Company, organized in 1888, is the oldest, the largest and the most experienced storage battery manufacturer in this country. The trade-marked names "Exide" and "Chloride Accumulator" are without doubt the most valuable storage battery trademarks in the country.

Engineering co-operation, battery instructions, descriptive literature covering batteries for any particular service—all are at your disposal. Write our office nearest you.

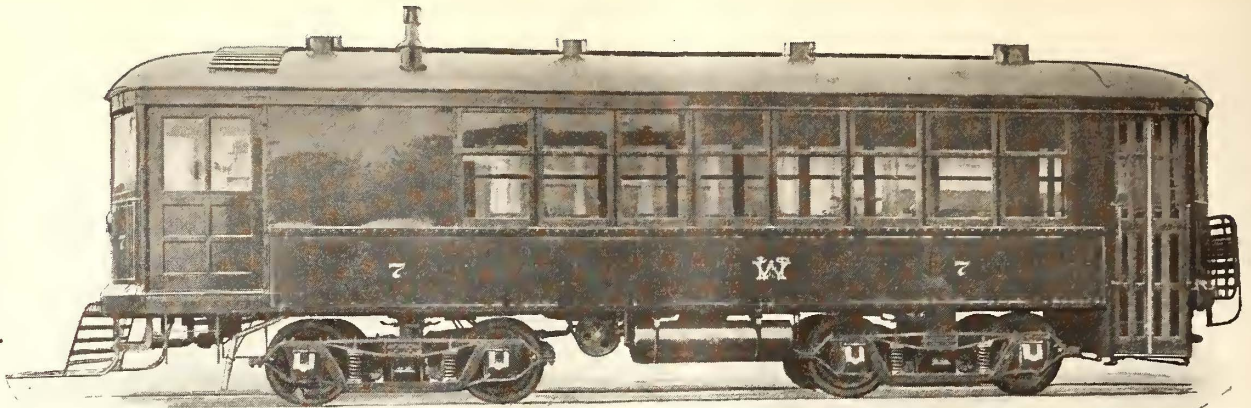
THE ELECTRIC STORAGE BATTERY CO.

Manufacturer of

The "Chloride Accumulator", The "Tudor Accumulator"

The "Exide", "Nycap-Exide", "Thin-Exide" and "Ironclad-Exide" Batteries

New York Boston Chicago Washington PHILADELPHIA, PA. Denver San Francisco Seattle St. Louis
Cleveland Atlanta Pittsburgh Detroit 1888-1916 Rochester Los Angeles Toronto



THE car illustrated above was recently put into service at Carrollton, Mo. It was specially designed to meet local conditions—conditions to be found in many of the smaller cities. The underframe is all-steel—sills continuous, full length—posts, steel “T’s”, from underside of sill to underside of sill, side girder $\frac{1}{8}$ ". Seating capacity 38.

Length over Buffers 38'0"

Length of Passenger Compartment 20'2"

Length of Baggage Compartment 10'9"

Trucks, St. Louis M.C.B.

For service requiring a light, substantial combination car this design is to be recommended.

For weights, etc., write the “Quality Shops.”

ST. LOUIS CAR COMPANY

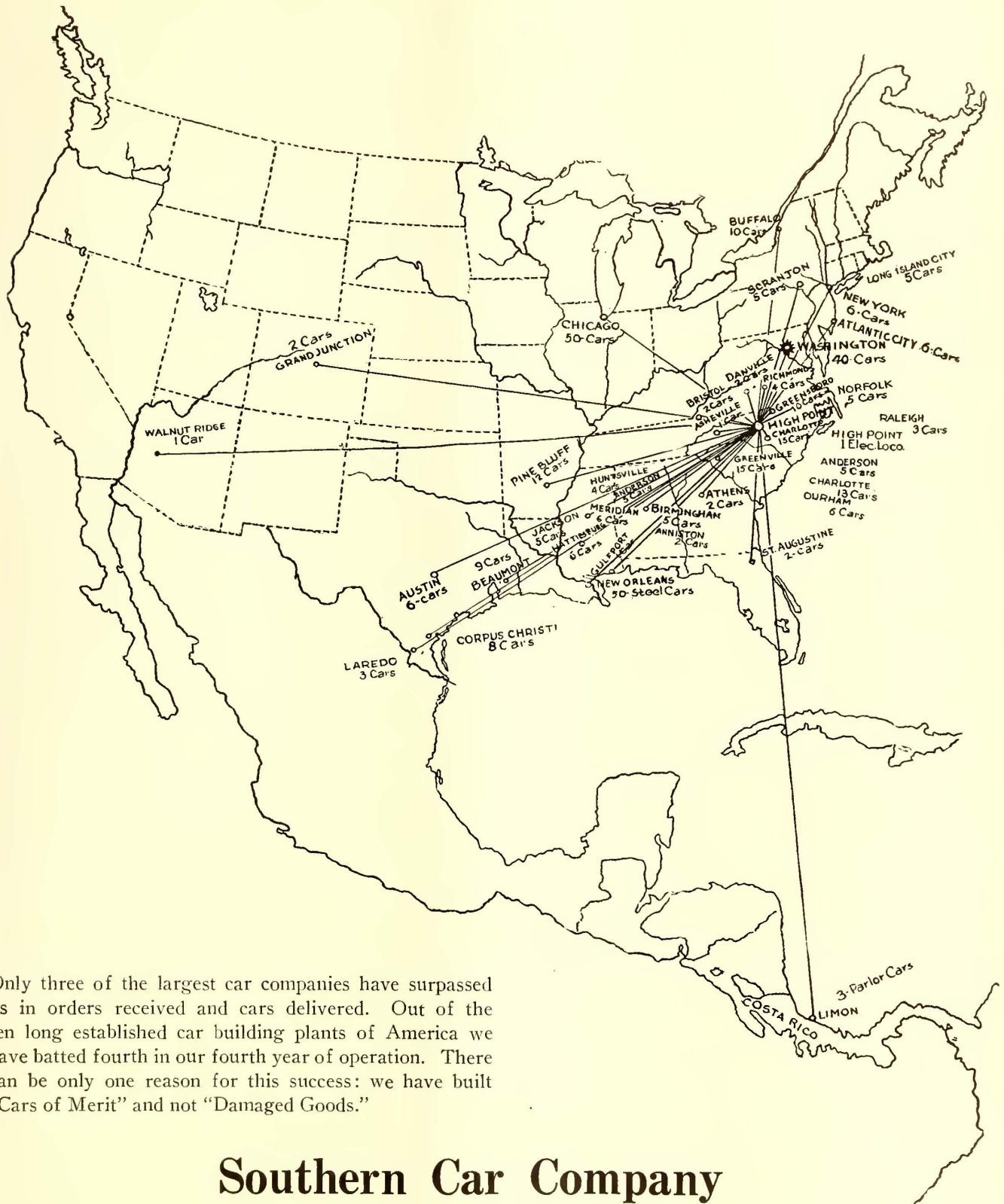
Electric and Steam Railway Coaches, Steel Cars, Trucks and Journal Bearings,
Curtains, Seats, Rattan, Bronze Trimmings, Miscellaneous Car Supplies

Eastern Representative:
WENDELL & MACDUFFIE Co.
61 Broadway, NEW YORK

Pacific Coast Representative:
GUS KOCH
797 Monadnock Bldg., SAN FRANCISCO

BASE BALL EXTRA!

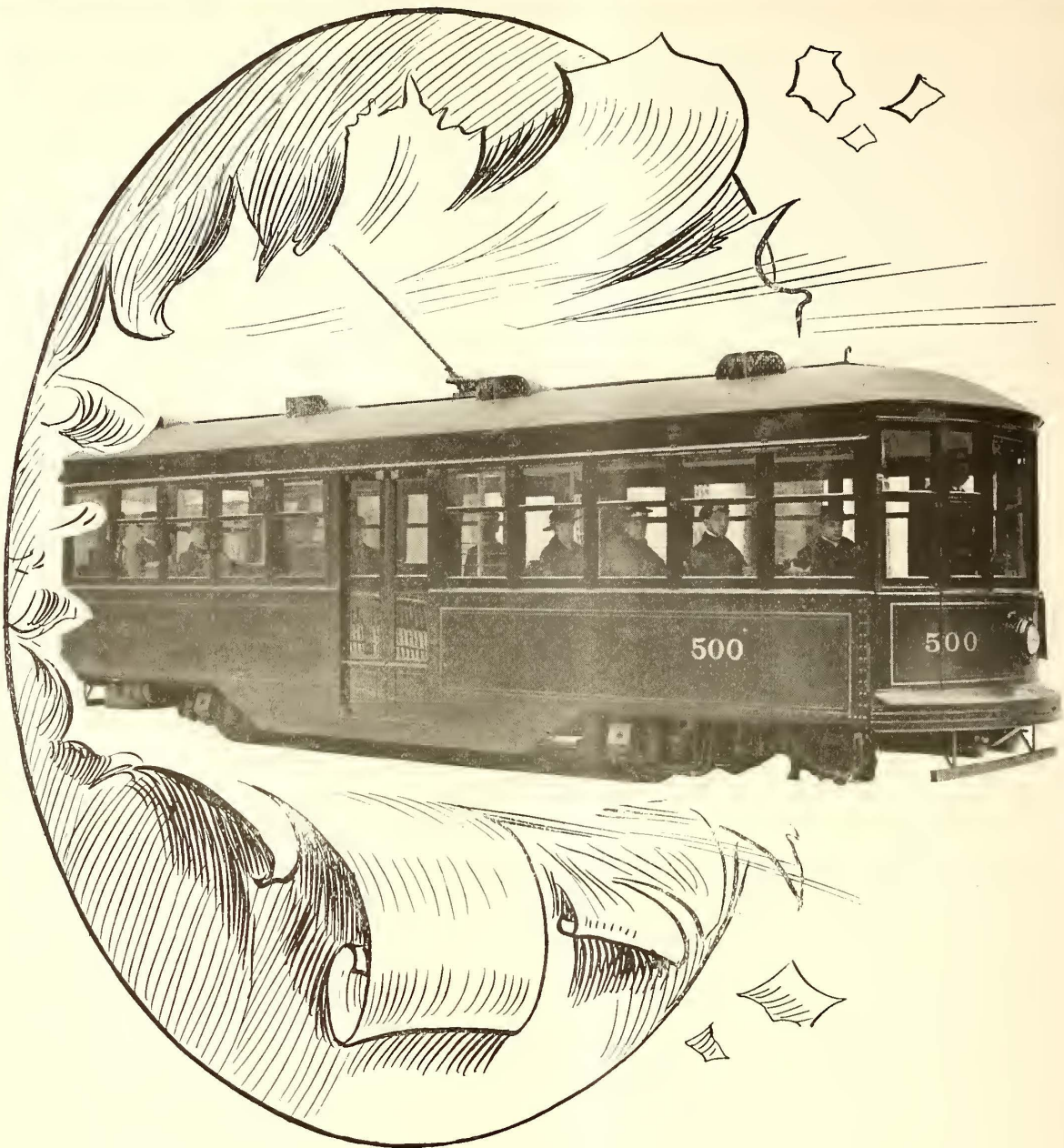
We have finished Fourth in Car Builder's League!



Only three of the largest car companies have surpassed us in orders received and cars delivered. Out of the ten long established car building plants of America we have batted fourth in our fourth year of operation. There can be only one reason for this success: we have built "Cars of Merit" and not "Damaged Goods."

Southern Car Company
 High Point, N. C.





Breaking into Public Favor
“LACONIA” THE LIGHTEST
 STEEL CAR MADE
 Center-Entrance, Single-Truck, Low-Step

Weighs 550 lb. per seated passenger, and seats 44 passengers—a gain in seating capacity of more than $37\frac{1}{2}$ per cent. over that of a standard type double-end car of the same length—33 ft. over buffers.

Is non-oscillating because of long wheel base,

reduces brakeshoe and wheel wear because of low center of gravity, and facilitates rapid loading and unloading, thus securing better schedules. Splendidly built.

Write for all facts on this fine car. There are lots of good things to tell.

LACONIA CAR COMPANY
 60 Congress Street, Boston, Mass.

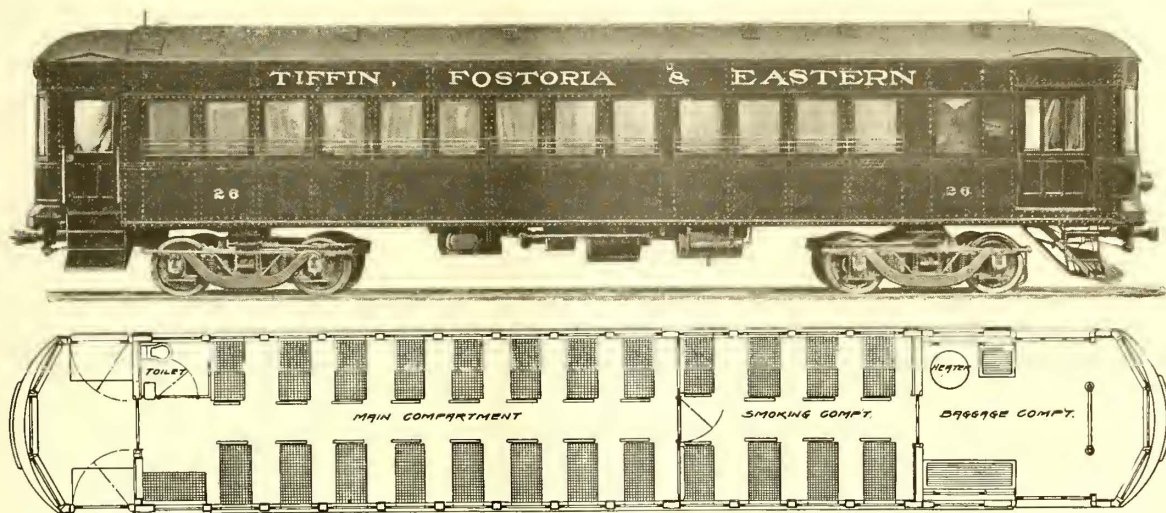
NILES 3-COMPARTMENT INTERURBAN CARS

After a recent head-on collision between a Niles "Commercial Shape" Steel Car and one composed largely of pressings from special dies, it was necessary to return the special car several hundred miles to the manufacturer for rebuilding; while the Niles car was quickly repaired in the railway shop.

When the anti-climber buffers engaged, the heavy steel roof supported on light single T posts of the special car, shot forward, shearing rivets between side posts, belt rails, and letter panels, distorting the car sides.

The light roof of the Niles car was crushed at one end, easily repaired and side walls practically uninjured.

The car shown below is a recent Niles interurban type, constructed as follows:



Length over buffers 54' 9 1/2". Seating capacity 56. Baggage capacity about 60 sq. ft. Weight of Car Body without appliances 21,188 lbs. Weight on track completely equipped 52,355 lbs.

FRAME: Entirely of structural steel beams riveted at all joints with angles or gussets so as to be easily taken apart for repairs. The underframe has continuous center sills to withstand buffing stresses. All posts are double with outside steel sheathing full height as gussets, thus providing light, stiff supports for the roof. **THERE IS NOT A PRESSING FROM SPECIAL DIES IN THE WHOLE CAR, YET IT COMPARES FAVORABLY IN WEIGHT WITH PRESSED STEEL CARS.**

FLOOR: Double wooden with two thicknesses of water-proof tar paper between; or

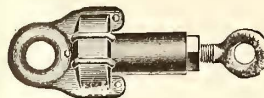
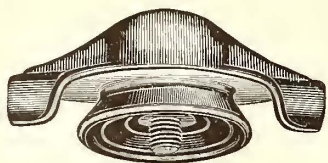
single with battleship linoleum smoothly cemented to top. Steel floors have proven cold, noisy and, if covered with cork, uneven and wavy.

ROOF: Steel rafters which firmly tie the girder sides together, sheathed outside and inside with light, non-conducting material with dead air space between for protection against trolley currents and extreme temperatures.

WINDOWS: Upper side sashes or "Gothics" have no use or value except outside appearance and have been omitted from modern steam railroad cars in order to save useless first cost and maintenance.

We make this type of car of any length desired

Niles Car & Mfg. Co., Niles, Ohio, U. S. A.



You Can Minimize Overhead Repair Work

and successfully cut maintenance costs if you turn to

The Macallen Line

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

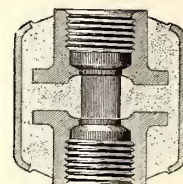
They are "specialty" products, designed and built to make "Macallen" the standard on American railways.

It will pay you to write for information and prices.



The Macallen Insulating Joint

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



May We Send Our Catalog ?



The Macallen Company
Macallen and Foundry Sts., Boston



TROLLEY WIRE

Round Grooved and Figure 8

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

That one is more economical than another—

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



Weatherproof Wires and Cables

Star Brand

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

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

Read the words in the cut of the star.

American Electrical Works

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

Phillipsdale, R. I.

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



The STANDARD for RUBBER INSULATION

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

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

Samples and Estimates on Application

THE OKONITE COMPANY,

253 Broadway, New York

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

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

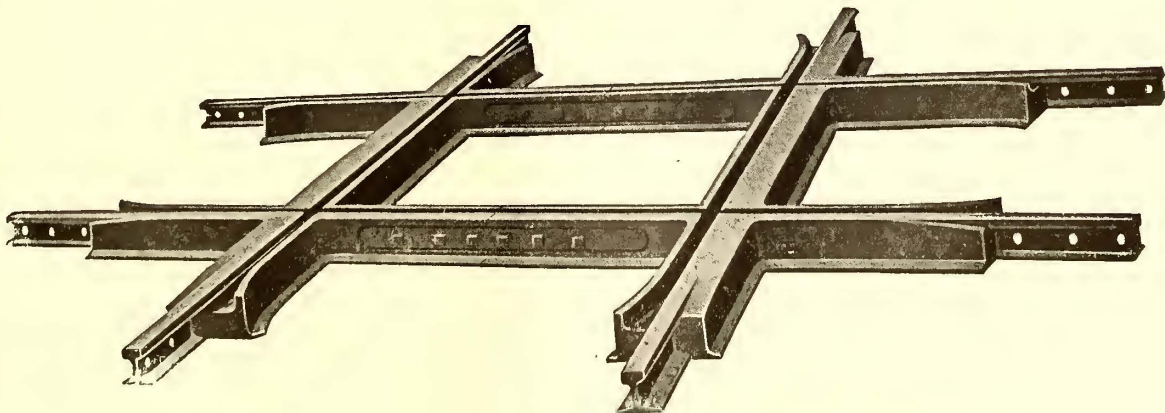
Novelty Electric Co., Philadelphia, Pa.

Pettingell-Andrews Co., Boston, Mass.

Frogs, Crossings, Switches and Mates for Electric Railway Service

Products of the Highest Grade Workmanship and Material.

May we Estimate on Your Requirements?



BARBOUR-STOCKWELL CO.

205 Broadway, Cambridge, Mass.

*Let Us Figure
On your
requirements for
line construction
material and
supplies.*

Western Electric Stocks

are complete and carried in our thirty distributing houses, one of which is near you.

Prompt shipments are thus insured at all times.

**Wire, Insulators
Suspensions, Poles
Brackets, Ears
Trolley Poles
Everything for the
line or the car.**

Get prices from our nearest house.

Western Electric Company

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

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



YOU'LL BE INTERESTED

In Statement by

*Chief Engineer of Street Railway
In Large Middle West City*

concerning the

THEW Electric Railway Shovel

YOU will want to read his frank endorsement because it pertains to that for which you are always on the lookout—equipment for building modern electric railways more economically.

This chief engineer, whose name is withheld because of his company's policy is in a position to know the facts, as they have used the shovel for over 3 years. Among other things he wrote:

"An Extremely Efficient Machine"

"Removes Old Concrete, Ties and All"

"Showed a Saving of \$500 per Mile"

***"8 to 10 Miles of Single Track
Should Pay for Shovel"***

The THEW Electric Railway Shovel

(To which the above statements refer)

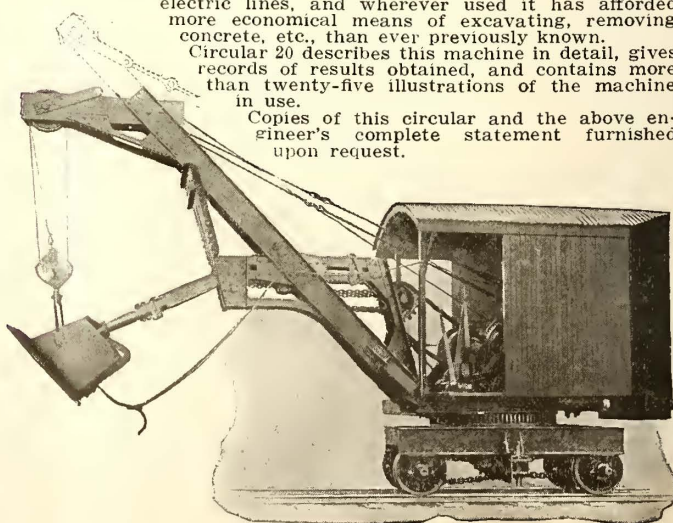
is an evolution of the Thew Steam Shovel, which has been most favorably known for more than 20 years, and the Thew Electric Shovel, first introduced twelve years ago.

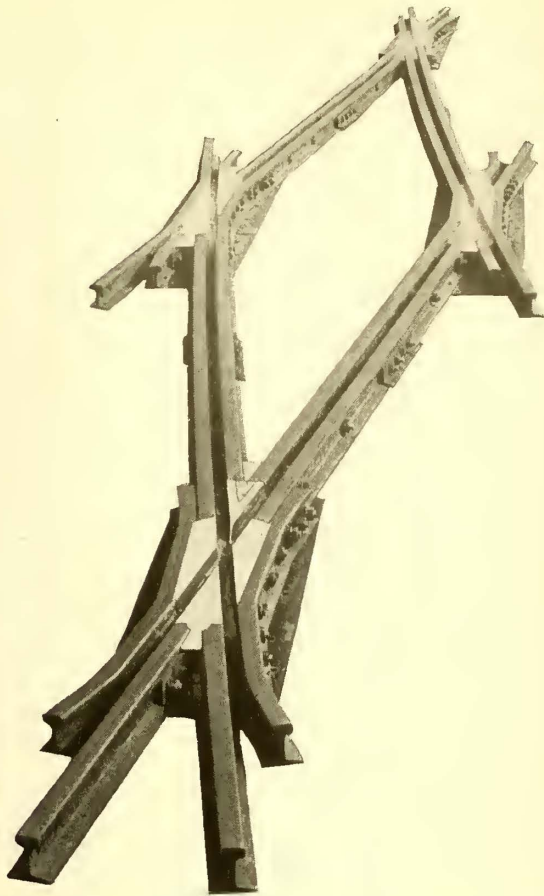
It combines fundamental principles of both these machines together with many improvements which adapt it particularly for electric railway service.

This shovel has now been quite generally adopted by electric lines, and wherever used it has afforded more economical means of excavating, removing concrete, etc., than ever previously known.

Circular 20 describes this machine in detail, gives records of results obtained, and contains more than twenty-five illustrations of the machine in use.

Copies of this circular and the above engineer's complete statement furnished upon request.





Bolted, manganese steel insert crossing in standard T-Rail. Best type for heavy interurban service in open track construction. Installed at Corina Junction on the lines of the Pacific Electric Railway, Los Angeles, California.

The Falk Co., Milwaukee

Eastern Representatives:

Wendell & MacDuffie Co., New York

Western Representative:

Alphonse A. Wigmore, Los Angeles

Economical Power Generation For Electric Railways

You can lower the maintenance cost and increase the efficiency of your power-plant by equipping the boilers with

Foster Patent SUPERHEATERS

The installation of Foster Superheaters in many prominent railway power-houses, by the U. S. Government at Panama and in U. S. Navy Yards, and by many other users of power—were made because they secured better steam conditions—produced more power with less fuel—and saved wear and tear on turbine blades and engine cylinders.

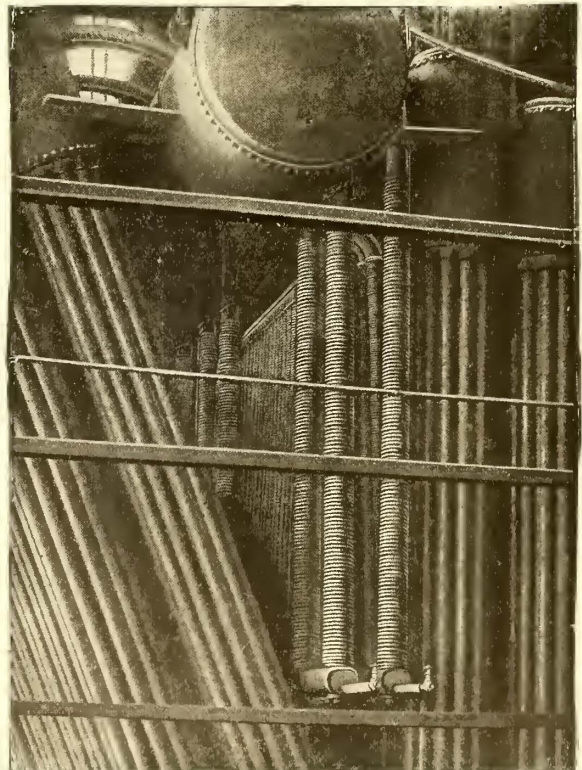
No steam power plant is getting the maximum of energy from coal unless it is thus equipped.

Write *now* for catalog and learn the facts about *Foster Superheaters*.

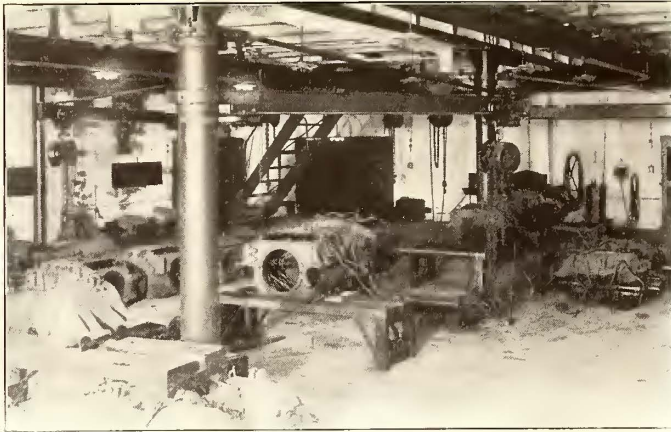
Power Specialty Co.
111 Broadway, New York City

Branch Offices :

Boston, Chicago, Pittsburgh, Philadelphia, San Francisco



Foster Superheaters combined with Bigelow-Hornsby Water Tube Boilers as installed at the plants of the Rhode Island Company, at Providence, R. I., New York, New Haven & Hartford R. R. Company at Cos Cob, Conn., Boston & Maine R. R. Co. at Zylonite, Mass., The Connecticut Co. at Waterbury, Hartford Electric Light Co., Rochester Railway & Light Co. and many others.



Your Motors
can easily be made
oil-proof
water-proof
acid-proof
but you must use

Packard

**Black Elastic
Baking Varnish**

Get a sample of this varnish and try it.

The Packard Electric Company

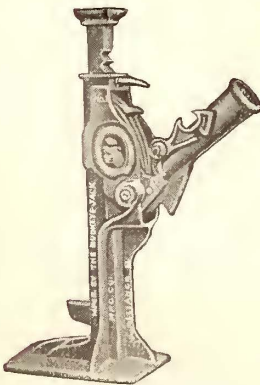
525 Dana Ave., Warren, Ohio

(83)

In an emergency

You need the Buckeye Jack No. 239 "Special." It is quick and sure in action. You shove it into place and adjust instantly—it "takes hold" of the load—any load from most any angle—and lifts it clear in a jiffy!

Buckeye Jacks for Road or Shop



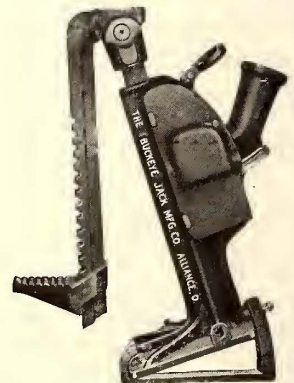
No. 1—Double Acting Trip—
for Track Work

are made of the best materials for their purpose. They are made to give great lifting strength—easy to adjust in close quarters.

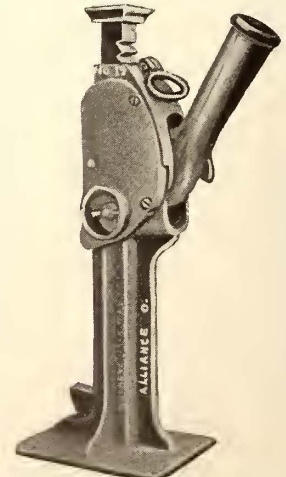
Get the Buckeye Red Book for full particulars—write for it now.

The Buckeye Jack Mfg. Co.

Alliance, Ohio



No. 239—Buckeye "SPECIAL"
an EMERGENCY JACK



No. 19—15 Tons for Shop Work

FORD TRIBLOC

A Safe and Dependable Chain Hoist

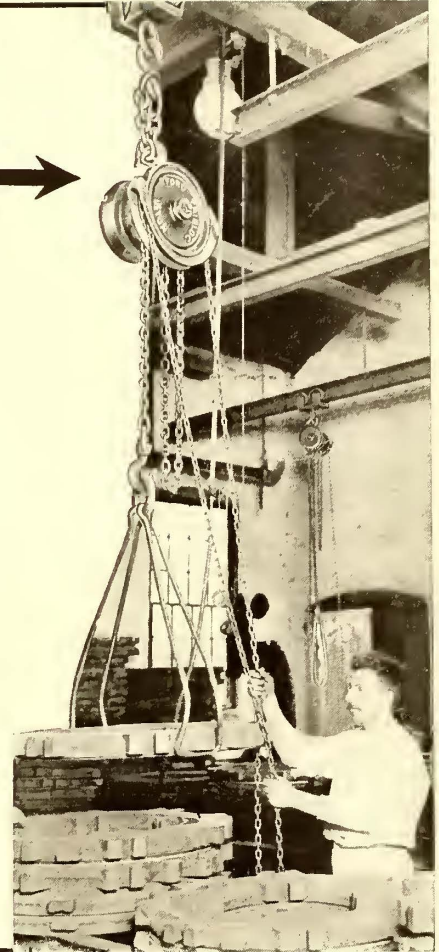
The Patented Loop Hand Chain Guide protects the working parts and adds to the safety of every Ford Tribloc Chain Hoist.

Much of the breakage in the ordinary chain hoist is due to the old-fashioned "strap guide." The Loop Guide practically eliminates damage due to hand chain gaggling.

It has planetary gearing (which is enclosed in a dust-proof 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.

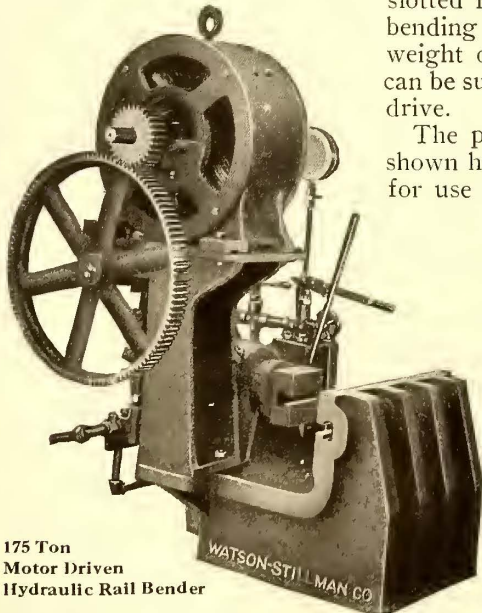
We also build Screw Hoists, Differential Hoists and Steel Plate Trolleys. Our Catalogue describes them all. Write for your copy now.

Ford Chain Block & Mfg. Company
 PHILADELPHIA 142 OXFORD STREET PENN.



You Can Bend Rails Quickly and Economically With a Watson-Stillman Hydraulic Rail Bender

The electric rail bender shown here is designed for use in the shop where quantity production is desired. The 3½ H.P. motor drives a two plunger pump, which gives the ram a force of 175 tons. The ram head and jaw are slotted for the insertion of bending blocks for any weight of rail. Belt drive can be substituted for motor drive.

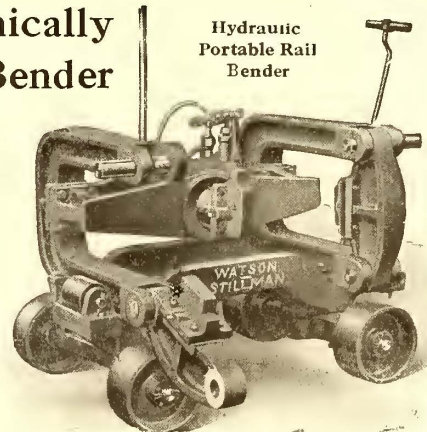


175 Ton Motor Driven Hydraulic Rail Bender

The portable rail bender shown herewith is designed for use on the road. It is

equipped with interchangeable formed bending blocks, and will make any bend without buckling. The hinged yoke permits the rails to be put in sidewise. It can also be used for other heavy bending.

We build many other handy tools for the railway shop. Such as—Crank Pin Presses, Wheel Presses, Forcing Presses, Forging Presses, Jacks, Pit Jacks, Punches, Shears, Pumps, Accumulators, etc.



Hydraulic Portable Rail Bender

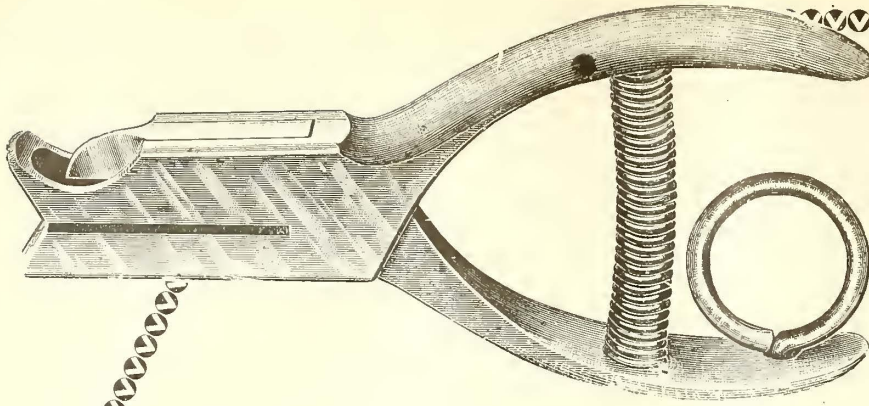
Write for Catalogs.

The Watson-Stillman Co.

46 Church St., New York

Chicago, McCormick Bldg. Kansas City, Geo. T. Cook
 Pittsburgh, Brown & Zoriman Denver, L. C. Ullrich
 St. Louis, Corby Supply Co. Atlanta, Sterling G. Turner





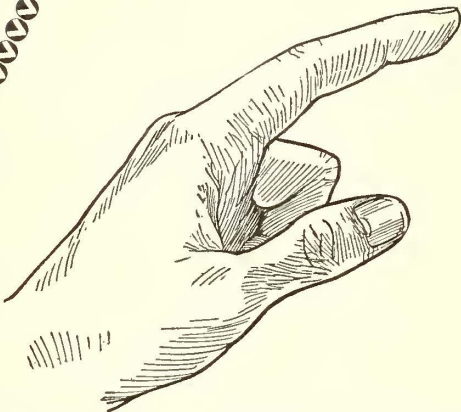
B-V Visible Punch

The Punch with the Open Sight

Tickets and transfers are time-consuming elements on a busy line. The time spent in punching them depends largely upon the kind of punch your conductors use. A speedy punch means better service to your public. B-V Visible Punches mean the best service because they are the fastest punches. *Fast* because equipped with the B-V *open sight*, which enables the conductor to quickly and accurately punch precisely the right spot in a minimum of time. And their *tool steel* dies insure long wear.

Bonney-Vehslage Tool Company

124 Chambers Street, New York. Factory, Newark, N. J.



Having Trouble With Over-Lapping and Non-Uniform Tariffs?

Then you are invited to consult our Service Department—without any compensation or obligation on your part.

Our staff numbers experts who have made all questions relating to fares their special study. Their experience is at the disposal of those who have tariff conditions that stand in the way of efficient operation.

At your service

—WITHOUT COMPENSATION

—WITHOUT OBLIGATION

Write us.

The Bonham Recorder Co.
Hamilton, Ohio

A REASON—Sargent Rerailers are clear to the understanding of any Street Railway man
SOME PROOFS—Inquiries become orders if trial is given
MORE REASONS—Lighter, cheaper, surer. Steel castings

Sargent Company,
 Fisher Bldg.,
 Chicago, Ill.

Gentlemen:-
 Please send me the price of your Rerailers shown in the accompanying illustration. Give price for single one to be delivered, to be used as a sample.
 Yours truly,

Make Your Crew Happy With a Pair
 One (2) pair SARGENT street car on paved streets. Kindly advise us approximate date.
 Sargent Company, Fisher Building, Chicago, Ill.
 Kindly send us price and circular of your Sargent Rerailer.
 Yours truly,
 5 pair Sargent Car Replacers \$3
 14 O.B. Chicago



61 pairs Sargent re-rails accordance with the following schedule

13 prs.	Dec. 15, 1915
13 "	Jan. 15, 1916
13 "	Feb. 15, 1916
13 "	Mar. 15, 1916
13 "	Apr. 15, 1916
16 "	MAY 15, 1916

1 Pr. Sargent Re-Railers. \$3.00 (\$2.50 if 10 pr. purchased). Subject to return if not satisfactory.
 ORDER
 By *J. K. ...*
 PURCHASING AGENT

SARGENT CO., CHICAGO, ILL. MAY 21 1915
 Please send to THIS COMPANY THE FOLLOWING Material, and forward bill of same in accordance with instructions back of this order.
 See Notice on back, which please read carefully.
 10 Sargent Rerailers.

Specify Real Roof Covering—Bayonne!

The Old Specification:

Roof Covering—"Boards to be of whitewood free from knots or shakes, 1/2 in. thick, 2 1/2 in. face, tongued and grooved, nailed to each carline, and covered with No. 6 cotton duck canvas of sufficient width to cover roof without piecing. Roof to receive one coat of pure raw linseed oil with three coats of pure carbonate of lead mixed with raw linseed oil."

Make it read like this:

Roof Covering—"Boards to be of whitewood and covered with

BAYONNE CAR ROOFING

Painting to consist of one coat to conform to the color of the car."

Bayonne car roofing is a self-contained product which requires no treatment by you or your car builder. Just apply it, and your cars are effectively insured against rain, sleet, snow and excessive sunshine.

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 Cheesecloth and Bunting

See This New Safety Device

RECTIFIER

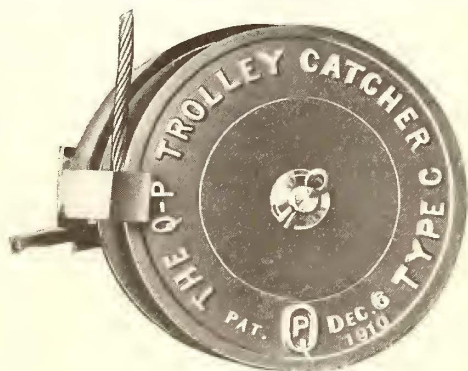


Eliminates "Frozen Air"

- 1—Prevents or eliminates frost or ice formation.
- 2—No moving parts.
- 3—Absolutely automatic.
- 4—Positively no obstruction to air passage.
- 5—Cuts grease, oil and gum in air system and valves.
- 6—Suitable to existing or new cars.
- 7—Exceedingly small space required (4½ in. x 12½ in.).
- 8—Obviates maintenance expense and service interruptions.
- 9—Thoroughly tested and proven in actual service.
- 10—Malleable iron and brass throughout.
- 11—Tested with 200 pounds hydraulic pressure.

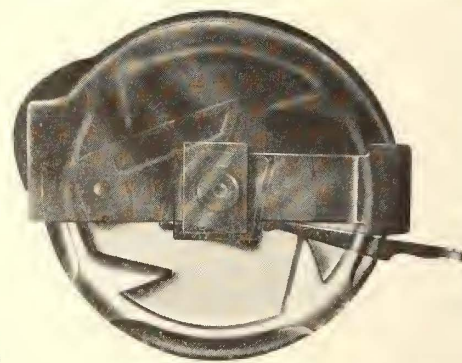
Send for illustrated pamphlet and description.

National Safety Device & Mfg. Co. 2415 Smalley Court, Chicago, Ills.



General View Q-P Catcher

When You Install Q-P Trolley Catchers



Showing Mechanism Q-P Catcher

the first cost is virtually the final expense.

Is this true of the trolley catchers you now have in operation?

Have you considered the relation between initial cost and yearly maintenance?

The Q-P Trolley Catcher has but *three moving parts*, which include only *one spring*.

The resultant reduction in maintenance expense is obvious.

Q-P Trolley Catcher parts are of generous and substantial design. Yet the complete weight of this catcher is only 10½ lbs., constituting another item of operating economy.

Buy the Sensible Device

Reduce Your Maintenance Costs—Install the Q-P

Lord Manufacturing Company, 105 West 40th Street, New York City

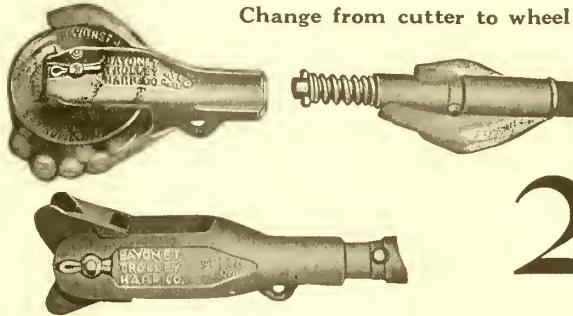
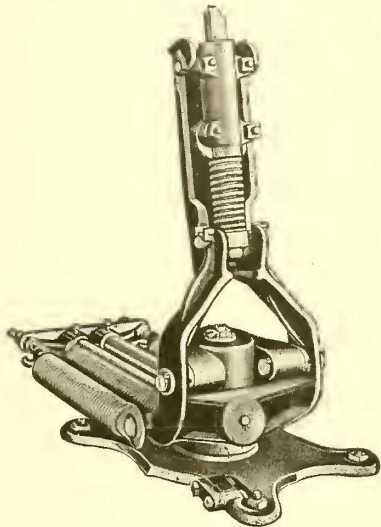
Sole Agents in U. S. for the Q-P Catcher

OVER 80% PROFIT ON TROLLEY WHEELS

is being saved by removing them entirely from the pole during sleet storms and replacing with a Bayonet Detachable Harp Head containing our Sleet Cutter which reduces pole end weight, increases pressure against wire, does not clog up with ice, has two cutters in one, when one side wears out turn harp head over and use the other—double the service at half the cost of other cutters. Saves your wire as well as your wheels.

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

Change from cutter to wheel in 20 seconds.



25c

No rusty nuts to unscrew, no hunting the monkey wrench to take off that damaged trolley pole. No tools. Just your hands. No special tools or hammers necessary to change a trolley wheel. No patching up or lubricating trolley on top of car. Do this at the work bench where it can be done right. Wheels running in Bayonet Harps give a third more mileage and if they are Bayonet wheels you will get double your present mileage. Bayonet stands for efficiency and economy. We give you better service and more improvements for your money than anyone. *Sold subject to approval. Satisfaction or no money.*

Bayonet Trolley Harp Co.

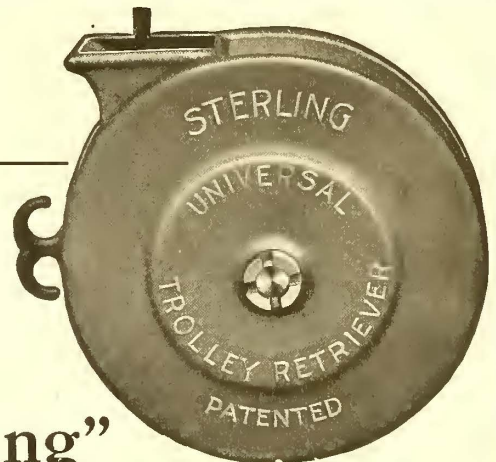
Springfield, Ohio, U. S. A.

Boosters of Car Crew Efficiency

“Sterling”

Trolley Retrievers and Catchers

Their big feature—Reliability. They never “walk up,” “miss fire” or skip. Few parts are used. These carry extra factors of strength. Easily inspected.



“Sterling”

Single and Double Fare Registers

Easy to read from the end of the longest car. Positive registration—always. Cannot be operated the wrong way.

Full geared. Interlocking mechanism cannot be upset. Patent hammer prevents broken bells and hammers.

Get the Catalog of the complete line.



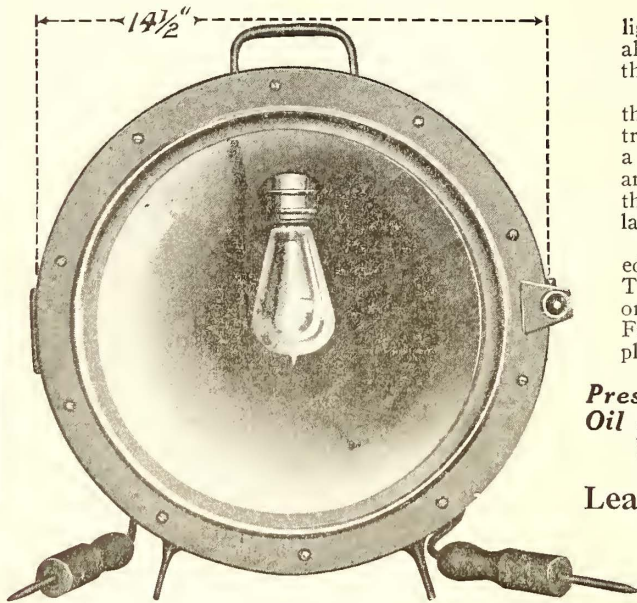
THE NEW HAVEN TROLLEY SUPPLY COMPANY

NEW HAVEN, CONN.

Manufacturers of Fare Registers and Railway Supplies

Focused at the factory and STAYS focused

The "Perfect" Headlight



Throws a brilliant beam of light from 800 to 1,000 feet ahead of the car, straight down the track.

The light does not vary from the point intended when the trolley goes off or encounters a section insulator. This is another advantage possessed by the "Perfect" over the arc lamps.

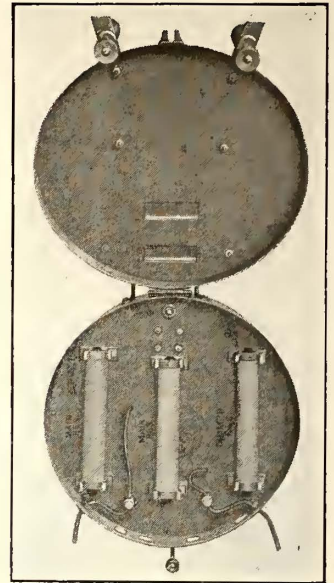
Burns a 100-watt concentrated filament lamp at one amp. Two main resistance units and one for dimming in city limits. Fuses can be removed and replaced like cartridge fuses.

Pressed Steel—Dust, Oil and Waterproof—Weight 25 lbs.

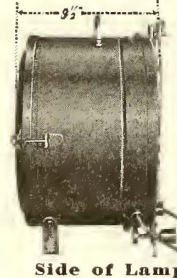
Leaves nothing to be desired

Get full details

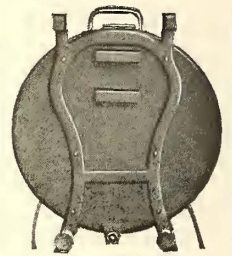
The Trolley Supply Co., Canton, Ohio, U.S.A.



Resistance Section



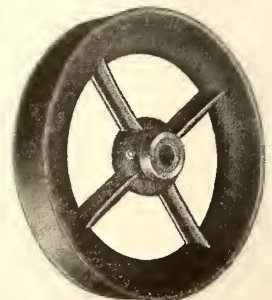
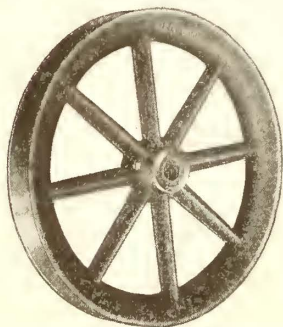
Side of Lamp



Back of Lamp

For High Speed Operation

—Large Diameter Kalamazoo Trolley Wheels



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

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

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

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

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

Write Today.



STAR BRASS WORKS

KALAMAZOO, MICHIGAN

Look for this →

It is a brand of quality. It means good workmanship and the best of *durable* material which makes it the most economical in the end. Let us quote on your needs.



Axles, Castings, Gear Blanks, Forgings, Pipe Flanges, Rings, Ring Dies, Roll Shells, Rolled Steel Wheels, Steel Tired Wheels, Springs and Tires.

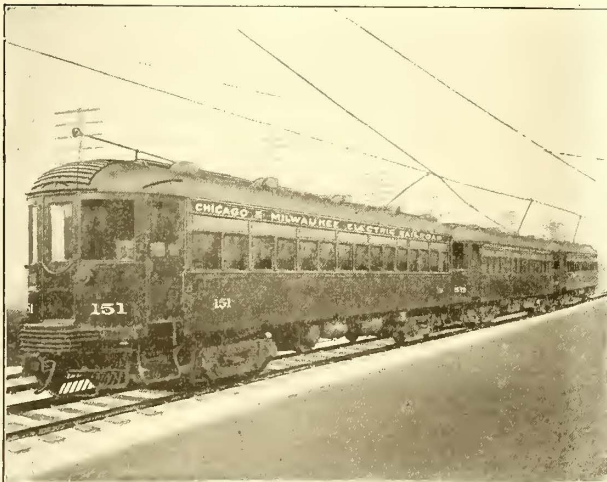
STANDARD STEEL WORKS CO.

Portland, Ore.
San Francisco, Cal.
City of Mexico, Mex.
St. Louis, Mo.

MORRIS BUILDING
PHILADELPHIA

Chicago, Ill.
New York, N. Y.
Richmond, Va.
St. Paul, Minn.
Pittsburgh, Pa.

Steel for Service



"For the present, the cars will be used in an hourly limited train service between Evanston, Ill., and Milwaukee, Wis., a distance of 73 miles. The limited trains in this service run through the densely populated suburban section immediately north of Chicago and through a number of manufacturing centers between this district and Milwaukee. Present schedules require two hours and eighteen minutes to make this run, which contains a maximum of twenty stops, but with the new equipment it is planned to reduce the time to one hour and fifty-five minutes. With this fast schedule, speeds up to 65 m.p.h. will be the rule, single cars and multiple-unit trains being operated according to the varying requirements of the daily service."

From Electric Railway Journal,
Sept. 4, 1915.

Such service requires the very best equipment.
Cars are mounted on rolled steel wheels and heat treated axles.
There's a reason.

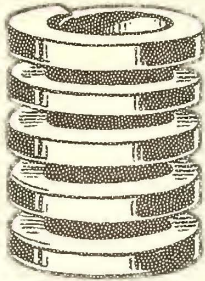
The mark of
quality



It protects the
user

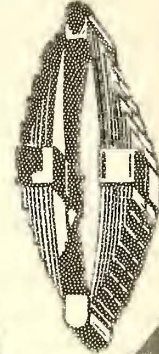
Carnegie Steel Company
PITTSBURGH, PA.

UNION SPRINGS



M.C.B. Pressed Steel Journal
Box Lids

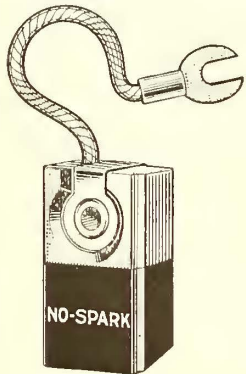
Kensington Pressed Steel
Journal Boxes



Union Spring & Mfg. Co.
General Office, Pittsburgh, Pa.

Works: New Kensington, Pa.
50 Church St., New York.
Fisher Bldg., Chicago, Ill.
Todd Bldg., Louisville, Ky.
Mutual Bldg., Richmond, Va.

Coil and Elliptic



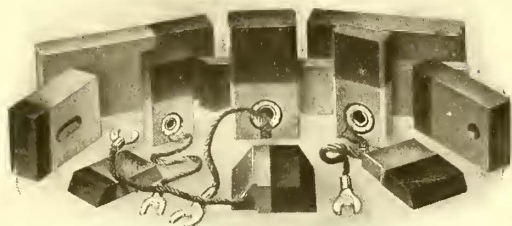
Costs You Nothing
if you don't want to keep them



Put a test set of
**No-Spark
Carbon Brushes**

on a motor. Then watch the commutator of that motor. A rich chocolate brown gloss will cover its surface. It's your guarantee of long life for commutator and brushes. Unless you make a point to observe that commutator *you're likely to forget it*, because it will require no attention. The commutator will need no truing. The brushes will need no changing for months. Arrange to get that test set—
NOW.

Calebaugh Self-Lubricating Carbon Co., 1502 Columbia Ave., Philadelphia, Pa.



Regardless of excellent design in other particulars, your motor or generator will be reduced by inefficient commutation to the plane of the poorest machine.

DIXON'S GRAPHITE BRUSHES

keep a good commutator in condition for maximum service. They contain no abrasive material to cause excessive wear and scoring and prove their worth in decreased repair bills. Our Electrical Service Department will be glad to send booklet No. 108-M upon request.

Made in JERSEY CITY, N. J., by the

Joseph Dixon Crucible Company



Established 1827



M-18



Adhmi

Over in India you can hire a servant for almost nothing per week. And there are lots of them too. "An easy solution of the servant problem!" you unthinkingly exclaim.

No, sir. Emphatically NO! You see it's like this. The servants are specialists; each proud in his restricted sphere of activity in serving—the master of the boots, the master of the pup and so on *ad nauseam*, so that when you mobilize your flock and totalize their stipend you are paying more than you would for an acclimated servant in suburban New York.

And reasoning along the same lines don't think for a minute that because a carbon brush is cheap that you're going to get off easy on brush bills. You are NOT. That's the crudest kind of folly. You are going to pay a *whole lot* more *per annum* for such brushes than you would pay per annum-and-a-half for *prescribed* Morganite brushes.

Have you ever thought that back in your very own plant you might be financing a carbon brush leak? Ask us to submit some figures on the subject.



Factory, Brooklyn, N. Y.

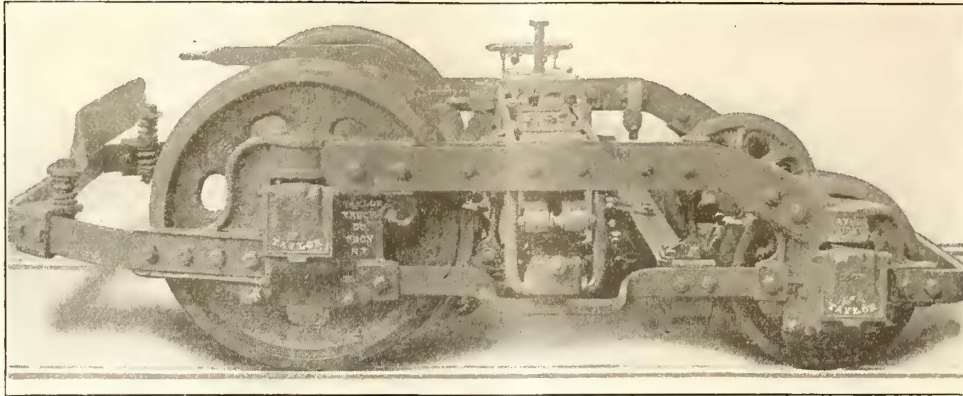
AGENTS:

Lewis & Roth Co., 312 Denckla Bldg., Philadelphia
 Electrical Engineering & Mfg. Co.
 First National Bank Bldg., Pittsburgh

Canadian Representative:

Neville G. Johnson, 43 Hillsboro Ave., Toronto

TAYLOR MAXIMUM TRACTION TRUCK



12 FACTS REGARDING "TAYLOR-MADE" TRUCKS

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

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

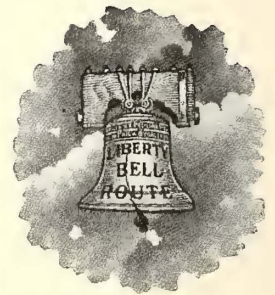
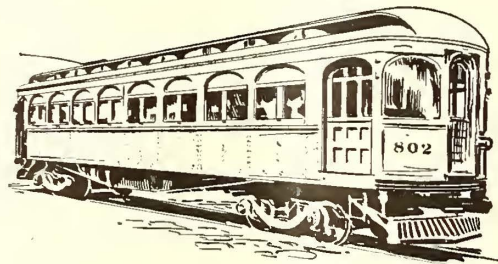
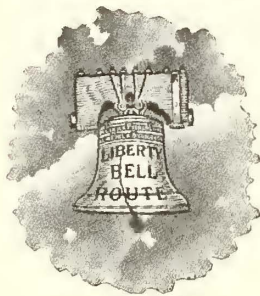
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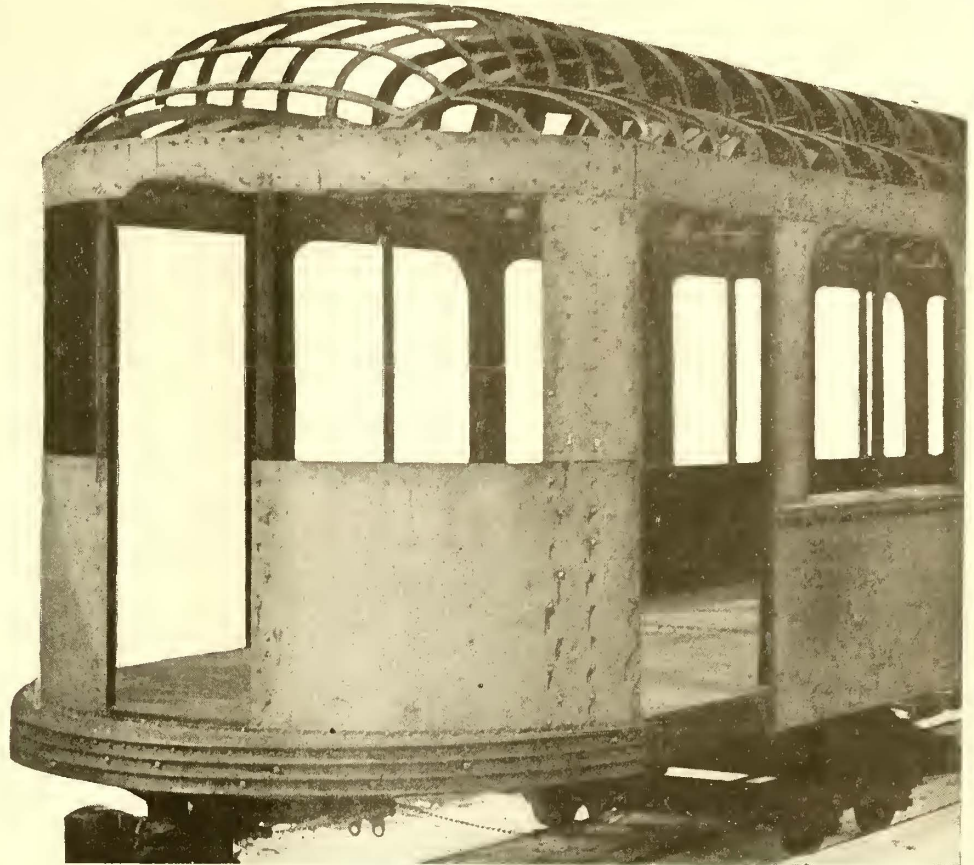
BEMIS CAR TRUCK CO., SPRINGFIELD, MASS.

Jewett Steel Cars

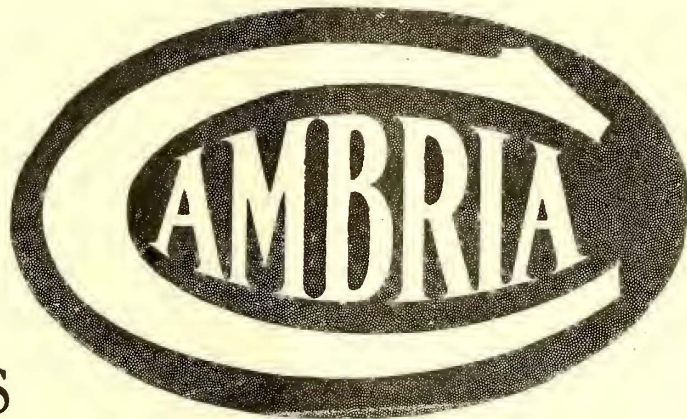
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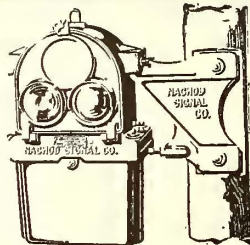
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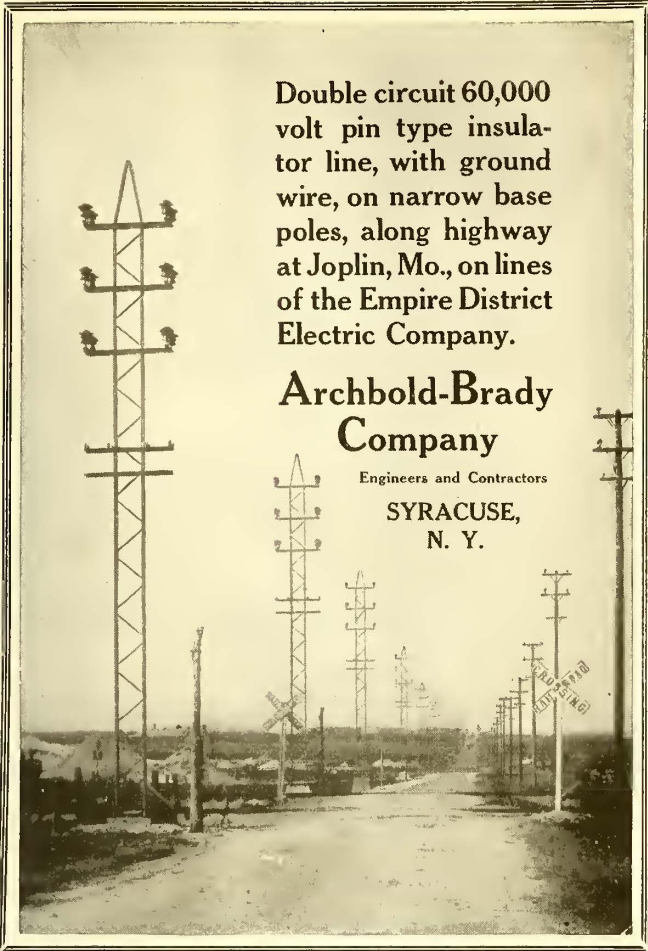
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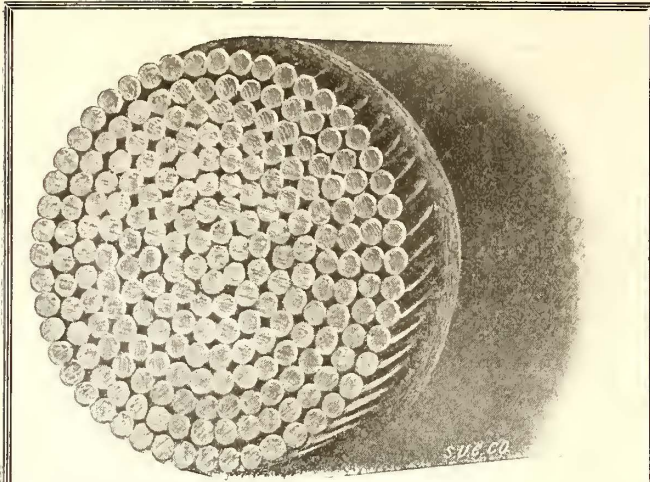
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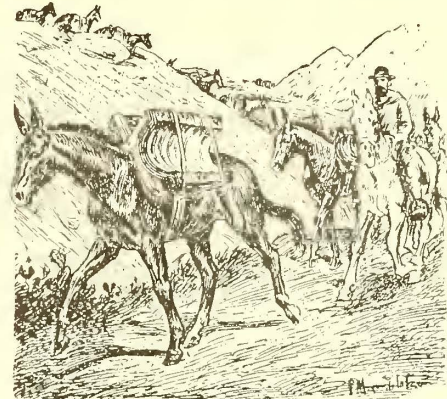
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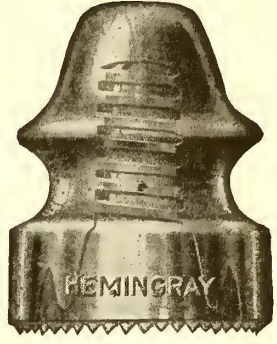
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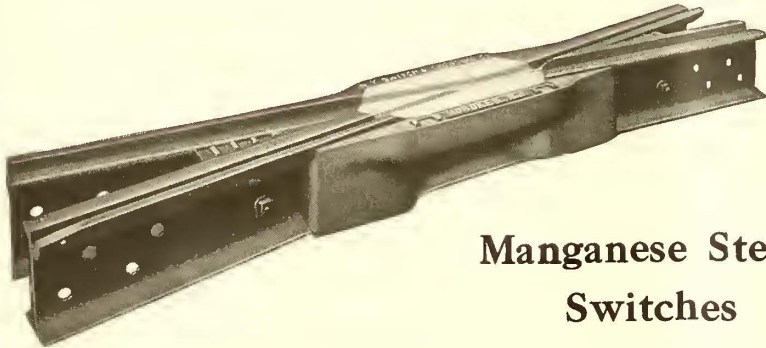
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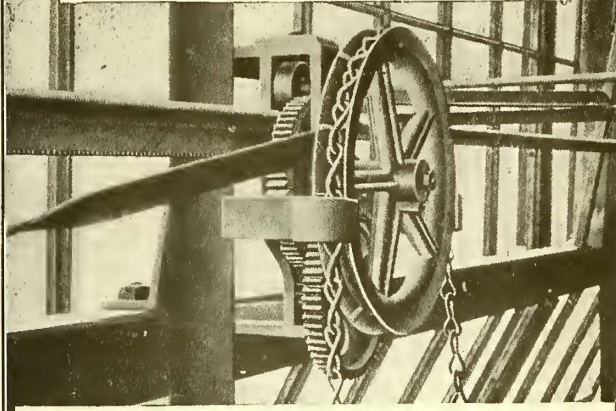
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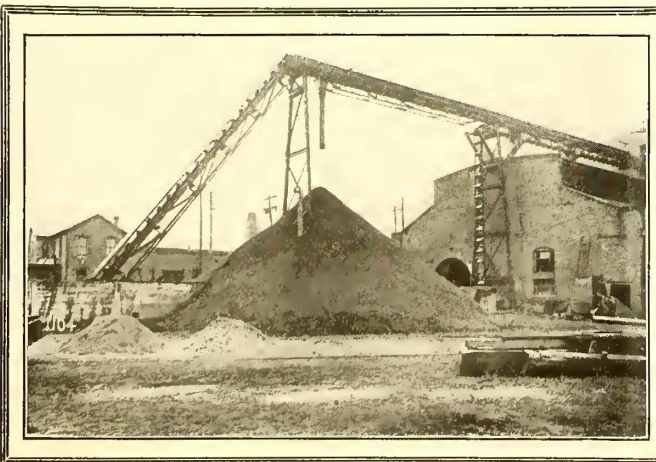
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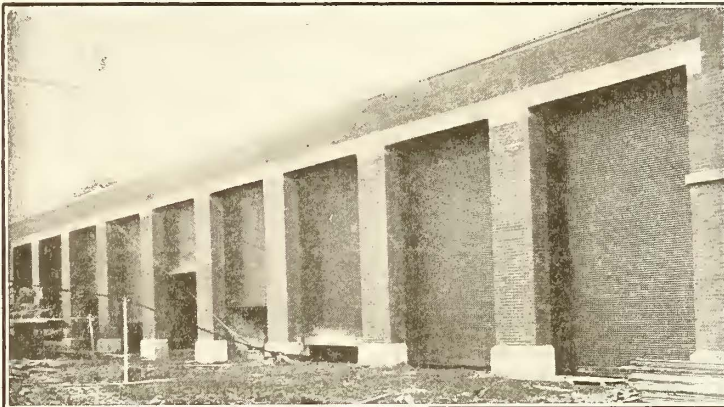
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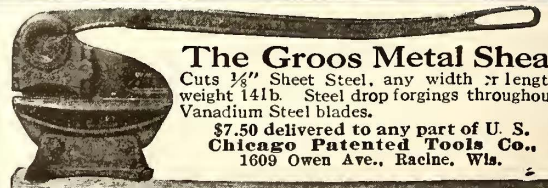
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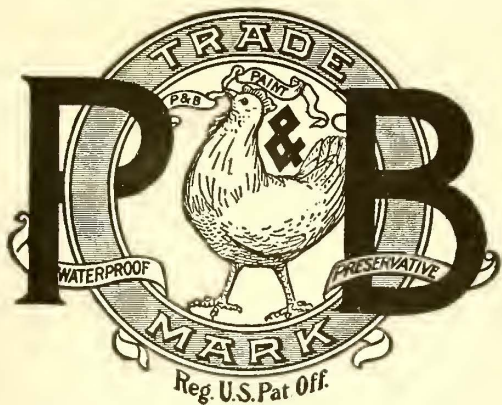
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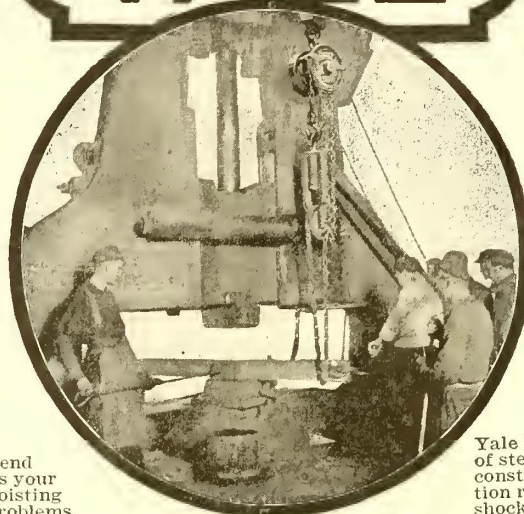
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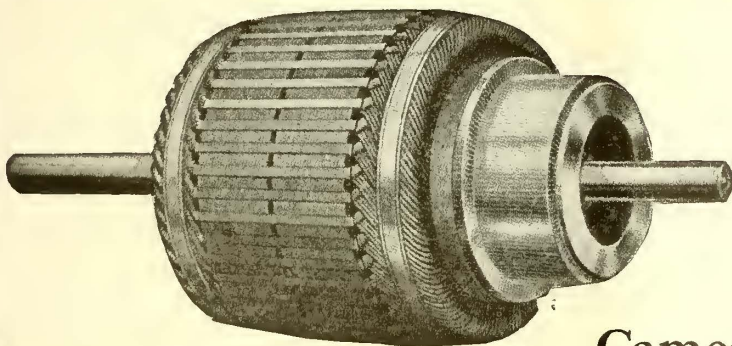
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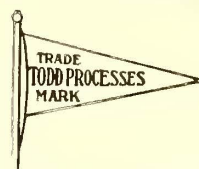
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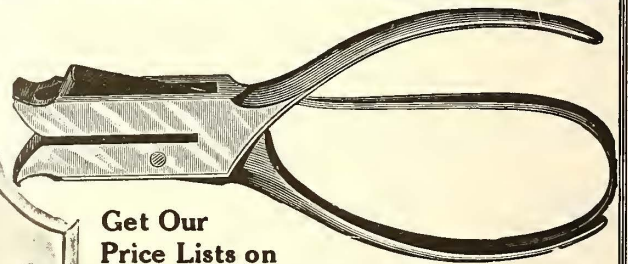
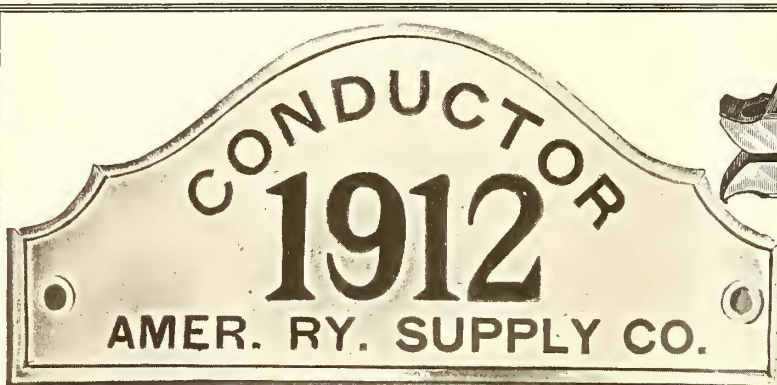
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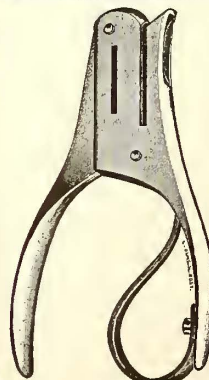
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SPECIAL shade rollers for cars, that will last and give satisfaction for years, and yet cost but little more than the poorest you can buy, are made by the Stewart Hartshorn Co., E. Newark, N. J. This company is by far the largest shade roller manufacturer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

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R **THE RAILWAY SUPPLY & CURTAIN CO.**
CHICAGO
CAR CURTAINS & FIXTURES FOR ALL PURPOSES
MAKE THE BEST
CATALOGUE ON REQUEST



Our forty years of successful punch making are well demonstrated in the perfection of our product, which is Standard throughout the world.

These punches prove the most efficient, because they operate quickest and easiest, and the most economical because they wear longest.

Let us show you WHY.

Punchmakers since '72.

R. Woodman Mfg. & Supply Co.

63 Oliver St., Boston, Mass.

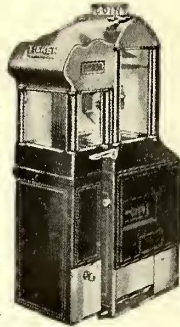


E. G. Long Co., 50 Church St., New York City
Eastern Electrical and Export Representatives.

The JOHNSON Registering Fare Box



—increases fare receipts 2 to 15 per cent.
—is the fare box you can rely on for certainty, accuracy and economy.



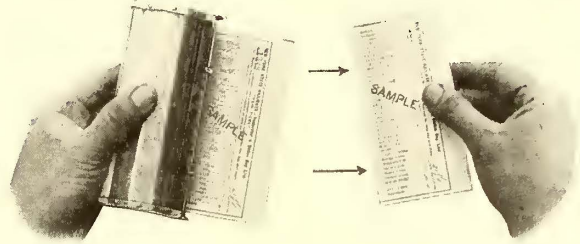
Johnson Fare Box Company
Jackson Blvd. and Robey St.
CHICAGO

For Cash Fares

30 Church St., NEW YORK

For Cash Fares and Tickets

Tickets that MEAN Something



The new Macdonald Cash Receipt Holder provides a permanent record of that most vital item—CASH FARES. It enables the auditor to have information as to the point of origin and destination of train fares. It is all the art of railroading has developed to date—SPEED AND SAFETY.

A sample holder mailed on request.

The Macdonald Ticket & Ticket Box Co.

Cleveland, Ohio

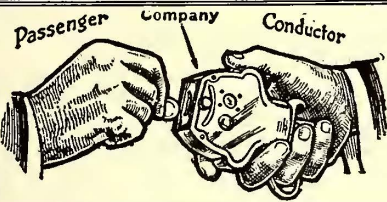
TICKETS as well as CASH FARES



Try these boxes on your one-man cars

Cleveland Fare Box Co.
CLEVELAND, OHIO

MASON SAFETY TREADS—prevent slipping and thus obviate damage suits.
KARBOLITH CAR FLOORING—for steel cars is sanitary, fireproof and light in weight.
STANWOOD STEPS—are non-slipping and self-cleaning.
Above products are used on all leading Railroads. For details address
AMERICAN MASON SAFETY TREAD CO.
Main Offices: Lowell, Mass. Branch Offices: Boston, New York City, Chicago, Philadelphia, Kansas City, Cleveland, St. Louis.



Direct Automatic Registration By the Passenger
Rooke Automatic Register Co.
Providence, R. I.

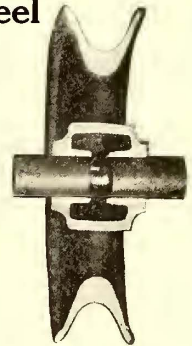
Grease Lubricates the HENSLEY Trolley Wheel

A one piece casting with a grease cavity in the hub. Can be filled in 3 seconds through the end of the spindle. Gives continuous "force feed" lubrication.

Made to any dimensions to fit any Harp. Longest life with least wear on trolley wire.

Ask for our trial proposition.

Hensley Trolley & Mfg. Co.
Detroit, Mich.



The Peter Smith Heater Company's Forced Ventilation Hot Air Heaters are approved by the Board of Underwriters', also they are protected with patents in United States and Canada. Catalogue and detail data will be furnished you upon request.

THE PETER SMITH HEATER COMPANY
1735 Mt. Elliott Ave., Detroit, Mich.



Railway Headlights
Used by 225 Railroads

For City and Interurban Cars, Locomotives, Mines, Marine and Industrial Use



Indianapolis

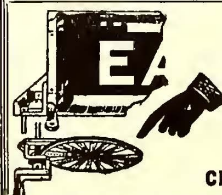
Ventilation—Sanitation—Economy—Safety

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.

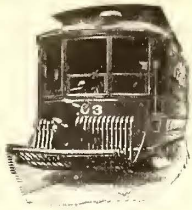


See the Crank of the

CREGHEAD DESTINATION SIGN

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

CREGHEAD ENGINEERING CO., CINCINNATI, O.



Eclipse and Acme Fenders Give Immunity from Accident Suits

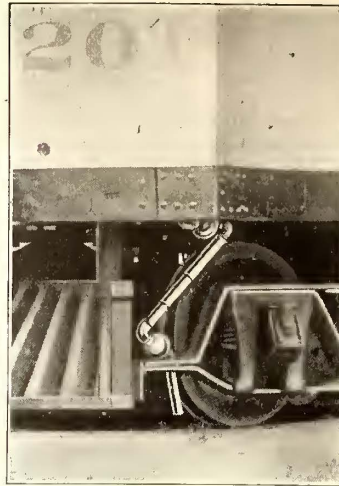
The function of any fender is to protect the human body from the first impact with car body. That the "Eclipse" does this successfully up to speeds of thirty miles per hour is being demonstrated daily throughout the country.

The Eclipse Trolley Retriever

is designed for any range of service. Retrieves in less than three inches. Compulsory set; weak spring controlled by thumb nut on face of casing. No tools required for winding or adjusting. Fool proof. Furnished with open or closed rope drum. Use knotted rope or ferrule, as preferred. Less parts than any other retriever on market.

Will send sample for trial.

ECLIPSE
RAILWAY SUPPLY CO.
Cleveland, O.



Safety on the Curve

When wet rails render brakes useless and motormen must have a sanded curve, you can depend upon

The Haese Track Sander

It puts the sand directly on the rails. It can't miss them because the flexible, telescoping spout is fastened near the base of the truck, directly above the rail.

The position of the Haese Sander is independent of the position of the car body. That's what you want. Write for all the facts. Do it NOW!

The Haese Track Sander Co., Inc.
311 26th Avenue, Milwaukee, Wis.

"UNION" Special for the Electric Railway Service



Non-arcing Enclosed Fuses

By refilling will save you an average of 58% in the cost of new fuses.

Fuses of guaranteed correct rating, insuring true and economical protection.

Made under the best manufacturing conditions and of thoroughly inspected materials. Properly tested before leaving factory.

Other capacities of 600 Volt and 250 Volt. N. E. Code Standard.

Get our latest catalogue, 26-R, for your file.

CHICAGO FUSE MFG. CO.
1016 Congress St., Chicago



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

E. G. Long Company

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

SPRINGS
CASTINGS
FORGINGS

Peckham Truck Parts
Diamond Truck Parts
Car and Truck Accessories

ELECTRICAL REPRESENTATIVES

Union Spring & Mfg. Co.
 Leaf and Coil Springs

MCB Pressed Steel Journal Box Covers

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.

Awarded Gold Medal, Panama-Pacific Exposition.

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

30 Church St., New York McCormick Bldg., Chicago
 71607 1

Speer
G

—the economical railway motor brush

There's always a limit to carbon brush economy—Speer's G has reached that limit:

Get a set for trial.

Speer Carbon Co., St. Marys, Pa.

3316

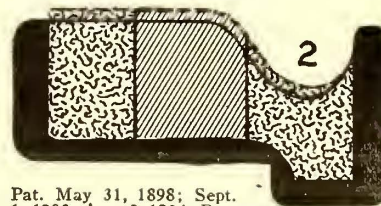
TULC

LUBRICATION on some systems costs more than on other systems. Lubrication on systems using TULC costs less than on those using running oil.

THE UNIVERSAL LUBRICATING CO.
 Schofield Building CLEVELAND, O.

Wheel Condition No. 2

When the Flange and outer portion of tread need truing use this style of



Pat. May 31, 1898; Sept. 1, 1903; Aug. 2, 1904; Dec. 29, 1908; June 15, 1909; April 21, 1914.

Wheel Truing Brake Shoe

You need not keep a crew of men for wheel removal and machines for wheel truing if you use our wheel Truing Shoes.

Wheel Truing Brake Shoe Co.
 Detroit Michigan

SEARCHLIGHT SECTION

ARCHER & BALDWIN

114-118 Liberty Street New York City

TELEPHONE 4337-4338 RECTOR

Rotary Converters, Alternating Dynamos,
Motor Generator Sets, Direct Current Dynamos,
Transformers, Alternating Motors,
Railway Motors, Direct Current Motors,

ALSO ENGINES, BOILERS, CONDENSERS,
HEATERS, ETC.

Send for catalogue giving complete list.

MACGOVERN AND COMPANY INC.

FRANK MACGOVERN, Pres. & Gen. Mgr.
114 LIBERTY STREET NEW YORK CITY
'Phone, 3375-3376 Rector

60 CYCLE ROTARY CONVERTERS

- 1 1000 KW. Gen. Elec., type HC, form P, 6 phase, 1667 amps., 600 volts D.C., 360 R.P.M.
- 2 500 KW. Gen. Elec., type HC, form P, 6 phase, 870 amps., 575 volts D.C., 600 R.P.M., with end play and speed limit device.
- 2 300 KW. Gen. Elec., type HC, form P, 6 phase, 500 amps., 550 volts D.C., 900 R.P.M., with end play and speed limit device.
- 1 200 KW. Westinghouse, 3 phase, 600 volts D.C., 900 R.P.M., with starting motor.

Immediate Delivery

THIS IS OF NECESSITY ONLY A PARTIAL LIST—
SEND FOR CATALOG

CARS FOR SALE

OPEN and CLOSED
MOTOR and TRAIL

Write for Price and Full Particulars to

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg. Philadelphia, Pa.

COMPLETE ARMATURES FOR SALE

FOR ALL THE STANDARD
STREET RAILWAY MOTORS

GET OUR PRICE WE CAN SAVE YOU MONEY

America's Greatest Repair Works

CLEVELAND ARMATURE WORKS, Cleveland, O.

POSITIONS WANTED

A THOROUGHLY experienced auditor and traffic manager desires a position with an interurban electric railway or light and power company. Ten years in last position; resigned to look after estate and property interests. Was a member of the Central Electric Railway and Traffic Associations and can furnish the best of references. Box 914, Elec. Ry. Jour.

ENGINEER manager, age 33, with ten years' excellent experience in construction, operation and executive railway work, desires position with larger company. Experience includes valuation work for purpose of capitalization, management and rebuilding of run down properties, and supervision of new construction. Best of references from present and past employers. Box 909, Elec. Ry. Jour.

GENERAL auditor, 34, wide and varied experience with steam and electric railways, city and interurban, light and power and gas undertakings. Address Slaney, Box 64, Kerrisdale, B. C.

LAWYER and electrical engineer, six years law practice, almost four years with large electrical manufacturing company, desires to make a connection in Philadelphia or New York, either professional or in a business capacity, where such experience would be of especial value. Box 905, Elec. Ry. Jour., Real Estate Trust Bldg., Philadelphia, Pa.

MASTER mechanic open for position; eighteen years' experience; American and married. Thoroughly experienced in maintenance, rebuilding and shop management, costs, etc. A-1 references. Box 913, Elec. Ry. Jour.

Get your Wants into the Searchlight

ADVERTISING RATES

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

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

All advertisements for bids cost \$2.40 an inch.

Advertisements in display type cost as follows for single insertions:

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

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

POSITIONS WANTED

SUPERINTENDENT electric railway; 18 years' experience transportation and claims, desires to change; best of references from past and present employers. Box 845, Elec. Ry. Jour.

MISCELLANEOUS

Wanted—Used Baggage Car

Good second-hand baggage and express car for interurban service; 40 to 50 feet in length; equipped with four 75 to 100 hp. motors; straight and automatic air equipment; trucks with M. C. B. wheels; Kankakee and Urbana Traction Company, Urbana, Ill.

FOR SALE

Storage Battery Car—For Sale

Same type as the successful Third Avenue cars. Equipment in excellent condition. Laboratory tests show batteries in first class condition and to have good life in them. Invite inspection. Change to trolley type of car cause of discontinuing its use. Will sell cheap. N. C. Public Service Co., Greensboro, N. C.

RAILS

Some wonderful bargains



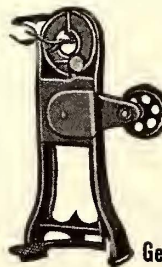
Locomotives—Cars—Equipment

Armature Coil Taping Machine

Saves Time, Labor and Money

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

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



THE ART OF BUYING

is as much a reality as is the Art of Selling. Advertising of the right kind helps the *buyer* as much as it does the seller. The Electric Railway Journal Service Department helps advertisers prepare advertising copy of real interest and use to Journal readers.

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

ELECTRIC RAILWAY JOURNAL

239 West 39th Street, New York

THE CINCINNATI CAR COMPANY

WORKS:

WINTON PLACE
CINCINNATI, OHIO

Insure Your Cars Against Deterioration

Buying JONES CARS is that form of insurance. You do not figure the life of a Jones Car by single years, but by decades. You do not reckon to get so much service and then stop. *You do not know when your service from a Jones Car will cease.*

Thus figured, the cost of a Jones Car becomes a small factor in the general cost of equipment. The economy of a Jones Car is all the greater because of the low yearly maintenance cost.

The Secret of This Permanence

There is none. The fact is simply that Jones Cars have been built so long that cumulative experience was bound to count. The mistakes in car building were all weeded out long ago.

Men, methods, materials—they find their highest expression in

“Jones Car of Permanence”

Correspondence solicited.

J. M. Jones' Sons Company

Builders of Cars for Electric Railways Exclusively

Established 1839

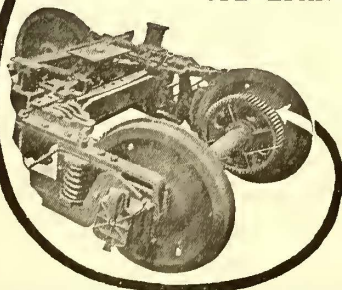
Incorporated 1911

Watervliet, N. Y.

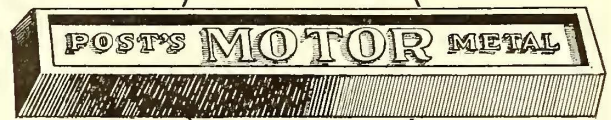
Reduce Gear and Pinion Maintenance

WHITMORE'S GEAR PROTECTIVE COMPOSITION

Whitmore Manufacturing Co.
Lubricating Engineers
CLEVELAND, OHIO



For
Armature



Bearings

For Mileage

Post's ZERO and MOTOR metals have been standard for a third of a century in shops where mileage records are attained.

Nothing but highest grade of virgin raw materials used.

Write us for details.

E. L. Post & Co., Inc.

Sole Mfrs.

50 Cliff St., N. Y. City

For
Car



Axles

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.

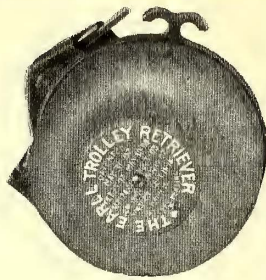
As far as possible advertisements are so arranged that those relating to the same kind of equipment or apparatus will be found together.

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.

- Acetylene Apparatus.**
(See Cutting Apparatus, Oxy-Acetylene.)
- Acetylene Service.**
Davis-Bournonville Co.
Oxweld Acetylene Co.
Prest-O-Lite Co., Inc., The.
- Advertising, Street Car.**
Collier, Inc., Barron G.
- Air Cleaners.**
Lord Mfg. Co.
- Alloys and Bearing Metals.**
(See Bearings and Bearing Metals.)
- Alloys, Steel and Iron.**
Titanium Alloy Mfg. Co.
- Amusement Devices.**
Este Co., The J. D.
- Anchor, Guy.**
Johns-Manville Co., H. W.
Ohio Brass Co.
Western Electric Co.
Westinghouse Elec. & M. Co.
- Anti-Climbers.**
Railway Improvement Co.
- Automobiles and Busses.**
Brill Co., The J. G.
- Axle Straighteners.**
Columbia M. W. & M. I. Co.
- Axles, Car Wheel.**
Bemis Car Truck Co.
Brill Co., The J. G.
Cambria Steel Co.
Carnegie Steel Co.
Cincinnati Car Co.
Hadfield's, Ltd.
National Tube Co.
Niles Car & Mfg. Co.
St. Louis Car Co.
Standard Steel Works Co.
Taylor Elec. Truck Co.
Westinghouse Elec. & M. Co.
- Babbling Devices.**
American General Engrg. Co.
Columbia M. W. & M. I. Co.
- Badges and Buttons.**
American Railway Supply Co.
International Register Co., The
Western Electric Co.
Woodman Mfg. & Sup. Co., R.
- Bankers and Brokers.**
Coal & Iron National Bank.
Halsey & Co., N. W.
- Batteries, Dry.**
Johns-Manville Co., H. W.
Western Electric Co.
- Batteries, Storage.**
Electric Storage Battery Co.
Western Electric Co.
- Bearings and Bearing Metals.**
Ajax Metal Co.
American General Engrg. Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Long Co., E. G.
More-Jones Brass & Metal Co.
Post & Co., E. L.
St. Louis Car Co.
Taylor Elec. Truck Co.
Westinghouse Elec. & M. Co.
- Bearings, Center.**
Baldwin Locomotive Works.
- Bearings, Oilless, Graphite, Bronze & Wooden.**
Graphite Lubricating Co.
- Bearings, Roller and Ball.**
Hess-Bright Mfg. Co.
Railway Roller Bearing Co.
- Bells and Gongs.**
Brill Co., The J. G.
Electric Service Supplies Co.
National Tube Co.
St. Louis Car Co.
Trolley Supply Co.
Western Electric Co.
- Benders, Rail.**
Niles-Bement-Pond Co.
Watson-Stillman Co.
Zelnicker Sup. Co., W. A.
- Blasting Powder & Equipment.**
DuPont de Nemours & Co., E. I.
- Blow Torches for Soldering and Brazing.** (See Cutting Apparatus, Oxy-Acetylene.)
- Blowers.**
General Electric Co.
Westinghouse Elec. & M. Co.
- Boilers.**
Babcock & Wilcox Co.
- Boiler Cleaning Compounds.**
Dearborn Chemical Co.
Johns-Manville Co., H. W.
- Boiler Coverings.**
Johns-Manville Co., H. W.
- Boiler Tubes.**
National Tube Co.
- Bond Clips.**
Electric Railway Improve. Co.
- Bond Testers.**
American Steel & Wire Co.
- Bonding Apparatus.**
Davis-Bournonville Co.
Electric Railway Improve. Co.
Ohio Brass Co.
Oxweld Acetylene Co.
Prest-O-Lite Co., Inc., The.
- Bonding Tools.**
American Steel & Wire Co.
Electric Railway Improve. Co.
Electric Service Supplies Co.
Ohio Brass Co.
- Bonds, Rail.**
American Steel & Wire Co.
Electric Railway Improve. Co.
Electric Service Supplies Co.
General Electric Co.
Johns-Manville Co., H. W.
Ohio Brass Co.
Western Electric Co.
Westinghouse Elec. & M. Co.
- Book Publishers.**
McGraw-Hill Book Co., Inc.
- Boring Tools, Car Wheel.**
Niles-Bement-Pond Co.
- Braces, Rail.**
Kilby Frog & Switch Co.
Steel Car Forge Co.
- Brackets and Cross Arms.** (See also Poles, Ties, Posts, Etc.)
Bates Expanded Steel Truss Co.
Craghead Engineering Co.
Electric Railway Equipment Co.
Electric Service Supplies Co.
Int'l Creosoting & Constr. Co.
Lindsay Bros. Co.
Ohio Brass Co.
Western Electric Co.
- Brake Adjusters.**
Smith-Ward Brake Co., Inc.
- Brake Shoes.**
Amer. Brake Shoe & Fdy. Co.
Barbour-Stockwell Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Long Co., E. G.
St. Louis Car Co.
Taylor Elec. Truck Co.
Wheel Truing Brake S. Co.
- Brakes, Brake Systems and Brake Parts.**
Brill Co., The J. G.
British Westinghouse Elec. & Mfg. Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Jones' Sons Co., J. M.
Long Co., E. G.
Lord Mfg. Co.
- National Brake Co.**
National Safety Device Co.
St. Louis Car Co.
Taylor Elec. Truck Co.
Westinghouse Trac. B. Co.
- Brooms, Track, Steel or Rattan.**
Western Electric Co.
Zelnicker Sup. Co., W. A.
- Brush Holders.**
Anderson Mfg. Co., A. & J. M.
- Brushes, Carbon.**
Calebough Self-Lubricating Carbon Co., Inc.
Dixon Crucible Co., Jos.
General Electric Co.
Jeandron, W. J.
Morgan Crucible Co.
Speer Carbon Co.
Western Electric Co.
Westinghouse Elec. & M. Co.
- Buckets, Grab.**
Beaumont Co., R. H.
- Bumpers, Car Seat.**
Electric Service Supplies Co.
Imperial Rubber Co.
- Bunkers, Coal.**
Beaumont Co., R. H.
- Bunting.**
Boyle & Co., Inc., John.
- Bushings, Fibre.**
Diamond State Fibre Co.
- Bushings, Graphite and Wooden.**
Graphite Lubricating Co.
- Bushings, Manganese.**
Bemis Car Truck Co.
- Bushings, Rubber.**
Imperial Rubber Co.
- Buttons.** (See Badges and Buttons.)
- Cables.** (See Wires and Cables.)
- Carbon Brushes.** (See Brushes, Carbon.)
- Car Equipment.** (For Fenders, Heaters, Registers, Wheels, etc.—see those headings.)
- Car Trimmings.** (For Curtains, Registers, Doors, Seats, etc. See those headings.)
- Cars, Passenger, Freight, Express, etc.**
American Car Co.
Brill Co., The J. G.
Cambria Steel Co.
Cincinnati Car Co.
Jewett Car Co.
Jones' Sons Co., J. M.
Kuhlman Car Co., G. C.
Laconia Car Co.
Niles Car & Mfg. Co.
St. Louis Car Co.
Southern Car Co.
United Electric Car Co., Ltd.
Wason Mfg. Co.
- Cars, Self-Propelled.**
British Westinghouse Elec. & Mfg. Co.
Electric Storage Battery Co.
General Electric Co.
- Castings, Brass.**
More-Jones Brass & Metal Co.
- Castings, Composition or Copper.**
Anderson M. Co., A. & J. M.
- Castings, Gray Iron and Steel.**
Amer. Brake Shoe & Fdy. Co.
American Gen'l Eng'g Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Falk Co., The.
Hadfield's, Ltd.
Jones' Sons Co., J. M.
Long Co., E. G.
St. Louis Car Co.
St. Louis Steel Foundry.
Standard Steel Works Co.
Union Spring & Mfg. Co.
- Castings, Malleable and Brass.**
Amer. Brake Shoe & Fdy. Co.
American Gen'l Eng'g Co.
Bemis Car Truck Co.
Hadfield's, Ltd.
Long Co., E. G.
St. Louis Car Co.
- Catchers and Retrievers, Trolley.**
Earl, C. I.
Eclipse Railway Supply Co.
Electric Service Supplies Co.
Long Co., E. G.
Lord Mfg. Co.
New Haven Trolley Supply Co.
Ohio Brass Co.
Trolley Supply Co.
Wood Co., Chas. N.
- Celling, Car.** (See Headlining.)
- Chain & Belt Machinery.**
Beaumont Co., R. H.
- Charging Sets, Storage Battery.**
General Electric Co.
- Checks, Employees'.**
American Ry. Supply Co.
- Cheese Cloth.**
Boyle & Co., Inc., John.
- Chemists.**
Little, Arthur D., Inc.
- Circuit Breakers.**
Cutter Electrical & Mfg. Co.
General Electric Co.
Western Electric Co.
Westinghouse Elec. & M. Co.
- Clamps and Connectors for Wires and Cables.**
American Gen'l Eng'g Co.
Anderson M. Co., A. & J. M.
Dossert & Co.
Electrical Engrs. Equip. Co.
Electric Service Supplies Co.
General Electric Co.
Klein & Sons, Mathias.
Ohio Brass Co.
Standard Railway Supply Co.
Western Electric Co.
Westinghouse Elec. & M. Co.
- Cleaners and Scrapers, Track.** (See also Snow-Plows, Sweepers and Brooms.)
Brill Co., The J. G.
Cincinnati Car Co.
Ohio Brass Co.
Van Dorn & Dutton Co.
Western Electric Co.
- Cleats, Car Wiring.**
General Electric Co.
- Clusters and Sockets.**
General Electric Co.
- Coal and Ash Handling.** (See Conveying and Hoisting Machinery.)
- Coasting Clocks.**
Railway Improvement Co.
- Coil Banding and Winding Machines.**
American Gen'l Eng'g Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Western Electric Co.
- Coils, Armature & Field.**
Cleveland Armature Works.
Columbia M. W. & M. I. Co.
D & W Fuse Co.
General Electric Co.
Mica Insulator Co.
Western Electric Co.
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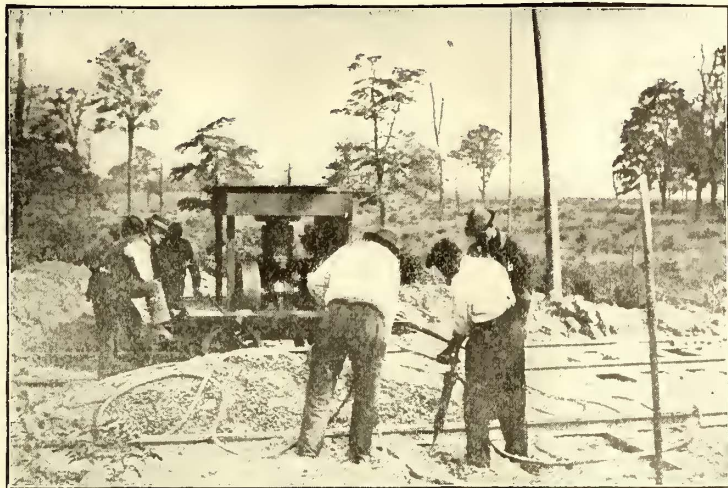
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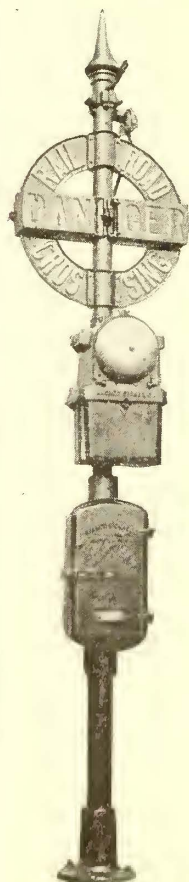
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Barrett's PAVING PITCH



Rockingham Road, Davenport, Iowa. Brick pavement filled with Barrett's Paving Pitch.

A Brick Pavement that is Quieter

THE noisiness of brick pavement is to many property owners a great objection. This objection, however, is based primarily upon pavements the joints of which are filled with cement rather than with Paving Pitch.

The use of Paving Pitch for the joints largely overcomes this objection of noisiness.

Pitch is a non-conductor of sound. The pitch filled pavement does not echo and ring the way a cement filled pavement does, as the sound of the blow of a horse's hoof will not pass from brick to brick when every brick is surrounded with plastic, elastic Paving Pitch.

Cement filler transforms the brick into a single monolithic sounding board, whereas with Pitch Filler the only noise is that of the horse's hoof upon the single brick which it happens to be striking. This is very noticeable in cases where a cement filled pavement adjoins a Pitch filled pavement—when a wagon passes from one to the other there will be a noticeable change in tone, the Pitch filled pavement being decidedly quieter.

Pitch also is better than cement as a filler because it provides adequately for the expansion of brick in hot weather.

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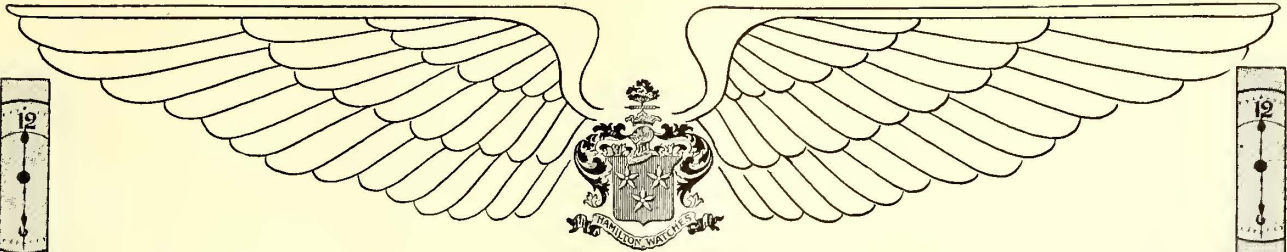
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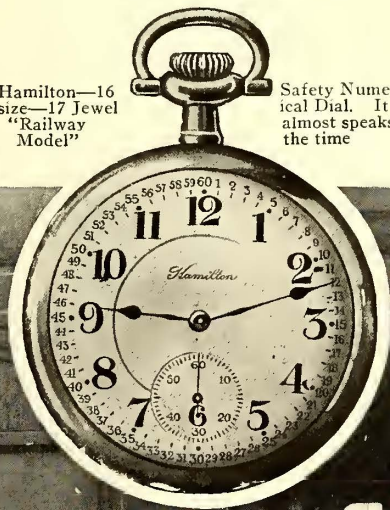
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Mentz Photo

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That eliminated joint plate breakage.

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