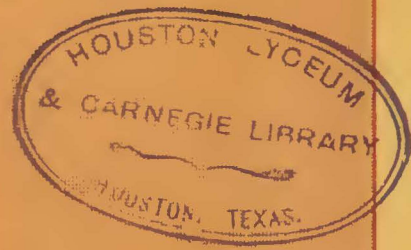


# ELECTRIC RAILWAY JOURNAL



**REINFORCED**  
*Concrete Slab.*  
 Steel Bearing Plates  
 at 3 foot intervals.  
 156 sq. in. of bearing  
 per track foot.  
 468 sq. in. of bearing  
 under every joint.  
 Reinforced Trans-  
 verse Beam.  
 Factor of Safety of  
 10 in loading of  
 concrete.  
 12 years of Service  
 under heaviest  
 equipment.  
 Rail tilting feature for  
 1-2/3c. per track  
 foot.  
 6 to 12c. per foot labor cost installed ready  
 for concrete.  
 \$2,000 to \$5,000 per mile lower in first cost  
 than wood ties in concrete.  
 Costs no more than wood ties in rock ballast.  
 Most efficient tie in point of weight per foot  
 of track.

*This Time  
 Make It*  
**“Concrete and  
 Steel Ties”**

**Y**OU may have used  
 concrete ballast in  
 Paved Track Construc-  
 tion, but unless you have  
 used the Steel Tie de-  
 signed especially for this  
 excellent type of track  
 foundation, you have  
 found it expensive and  
 not justified by increased  
 life.

Glance over the specific  
 reasons for the success  
 of Steel Twin Tie Track  
 in the opposite column.

If Steel Twin Tie Track represents the highest  
 attainable combination of permanence and econ-  
 omy, of course, you want it for your new con-  
 struction.

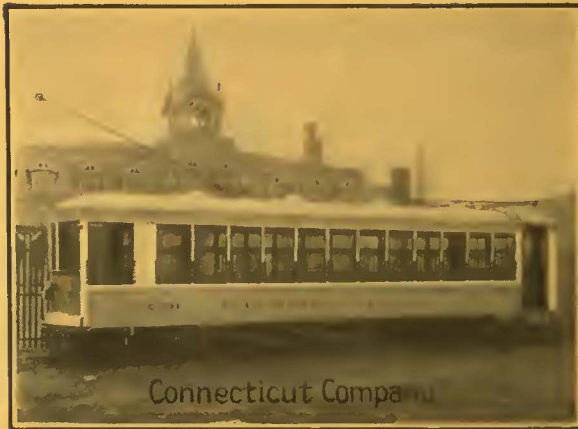
To render full co-operation in your complete  
 investigation of its performance and costs is our  
 desire.

*Estimates, cost data and price at  
 your material yard on request.*

**The International Steel Tie Co.**  
 Cleveland

# Steel Twin Tie Track

# Light Weight Cars



Connecticut Company

*The Trend of Thought Is  
Always for the Best*



Cincinnati Car



Chicago Surface Lines

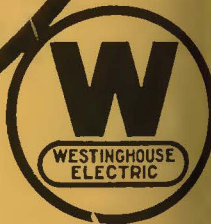
Lighter weight cars are the best for modern transportation because:

1. They are more economical.
2. They are competitive with other newly created types of vehicles.
3. They provide a more efficient means for rendering universal service.
4. They are less expensive in first cost and for maintenance.
5. They may be operated with greater frequency.
6. They provide greater flexibility for handling periodic congestions.

Westinghouse has long since been prepared for this modern trend. There is a motor size which is standard and has proved its merits in actual service for every railway requirement. They embody every modern refinement.

Westinghouse HL Control needs no introduction other than to say that it represents the latest word in multiple-unit control, the same as it did twelve years ago.

Westinghouse Electric & Manufacturing Company  
East Pittsburgh, Pa.



# Westinghouse

# ELECTRIC RAILWAY JOURNAL

HENRY W. BLAKE and HAROLD V. BOZELL, Editors

HENRY H. NORRIS, Managing Editor

## CONTENTS

Editorials ..... 665

Electric Locomotives for Chile Freight Service..... 667  
 BY F. E. WYNNE.  
 Details of road and switching locomotives soon to be delivered to Chilean Railways are given. Designs provide for incorporation into present system while not preventing further standardization.

Further Electrification Promises Congestion Relief..... 672

Gasoline Rail Car Operated at 40 Cents a Mile..... 672  
 Another example of the increasing popularity of the single self-propelled unit on steam railroad sections where traffic is light and frequent service is appreciated.

Zone Passes for Beaver Valley..... 673  
 The fare per zone on a cash basis is 5 cents, but unlimited-ride service on transferable passes has been made available for specific sections of one, two or more zones.

Wages Lag in Living Costs and Prices Decline..... 675

Control Equipments for the Frankford Elevated..... 676  
 BY S. B. SCHENCK.  
 Electro-pneumatic, battery operated unit switch control with many special features was chosen. Interchangeability with existing equipments of the Market Street lines can be had with few changes.

Letters to the Editors..... 679

Electric Railway Publicity..... 682

Association News ..... 684

American Association News ..... 686

News of the Electric Railways..... 687

Financial and Corporate ..... 690

Traffic and Transportation ..... 694

Personal Mention ..... 697

Manufactures and the Markets ..... 698

## A Limitation on Our Service to You— The Second-Class Postage Rate

A SERIOUS handicap to the publishing business in the service to its readers and customers is the present high second-class postal rate.

During the war the second-class postal rates, or those paid by the newspapers of the country, were increased on a sliding scale, until now they amount to four times the pre-war charges. While paying this high special tax, the publishers have also been paying all the other taxes levied upon industry as a whole, and are still suffering under high costs for labor, paper and other essentials.

This increased tax when most other taxes are being reduced is not only unfair, but it is unwise, and imposes a limitation upon the service which publications that go by mail can render.

At present the industries of the country are trying to get on their feet. If orders are placed, mills can begin running again and unemployment grow less. It will readily be admitted that the present, at any rate, would be an unwise time to keep war time taxes on traveling salesmen or on the introduction of efficient methods of production. Yet this is just what the present postal rate on second-class mail matter is doing. The advertising pages of a periodical are traveling salesmen, while the reading pages, at least of a technical paper, stimulate the introduction of more efficient means of production.

Again, the taxation of the publications may be likened to the taxation of education. A bill to tax schools would be abhorrent, yet but 7 per cent of the boys and girls of this country go beyond the grammar grades. The rest of their education must come from reading, and higher postal rates mean a tax on their principal means of self-education.

Some large magazines have been forced out of the mails and now are being distributed by express, motor truck, freight or other means. Unfortunately, some of the most necessary publications cannot be shipped in bulk lots in this way. Among this class of papers are the business and technical papers going to retailers, factories and professional men, the farm papers which are raising the standards of agriculture, the religious papers which promote the spiritual life of the country, the fraternal publications which bind together groups of men and women for their common good, the educational papers, and many others of similar kind.

In a later issue a statement will be given of what the publishers are asking Congress to do.

McGraw-Hill Co., Inc., Tenth Ave. at 36th St., New York

Cable Address: "Machinist, N. Y."

JAMES H. MCGRAW, President  
 ARTHUR J. BALDWIN, Vice-President  
 MALCOLM MEIR, Vice-President  
 EDWARD D. CONKLIN, Vice-President  
 JAMES H. MCGRAW, JR., Sec. and Treas.

WASHINGTON:  
 Colorado Building

CHICAGO:  
 Old Colony Building

PHILADELPHIA:  
 Real Estate Trust Building

LEVELAND:  
 Leader-News Building

ST. LOUIS:  
 Star Building

SAN FRANCISCO:  
 Biltmore Building



Publishers of  
*Engineering News-Record*  
*American Machinist*  
*Power*  
*Chemical and Metallurgical Engineering*  
*Coal Age*  
*Engineering and Mining Journal-Press*  
*Ingénieur International*  
*Bus Transportation*  
*Electric Railway Journal*  
*Electrical World*  
*Electrical Merchandising*  
*Journal of Electricity and Western Industry*  
 (Published in San Francisco)  
*Electrical Review and Industrial Engineer*  
 (Published in Chicago)  
*American Machinist—European Edition*  
 (Published in London)

LONDON:  
 6 Boulevard Street, London, E. C. 4  
 Member Audit Bureau of Circulations  
 Member Associated Business Papers, Inc.

The annual subscription rate is \$4 in the United States, Canada, Mexico, Alaska, Hawaii, the Philippines, Porto Rico, Canal Zone, Cuba, Honduras, Nicaragua, Dominican Republic, Salvador, Peru, Colombia, Bolivia and Shanghai, China. Extra foreign postage in other countries \$3 (total \$7, or 29 shillings). Subscriptions may be sent to the New York office or to the London office. Single copies, postage prepaid, to any part of the world, 20 cents.

Change of Address—When change of address is ordered the new and the old address must be given. Notice be received at least ten days before the change takes place. Copyright, 1922, by McGraw-Hill Company, Inc. Published weekly. Entered as second-class matter, June 23, 1908, at the Post Office, New York, under the Act of March 3, 1879. Printed in U. S. A.



#### READY FOR SERVICE

Some of the 50 large new all-steel cars going into operation on the Frankford Elevated Railway, Philadelphia.

## —all equipped with ELECTRO-PNEUMATIC

Westinghouse Electro-Pneumatic brake equipment (Schedule AMUE) is recognized as an essential factor in the successful operation of modern high-speed elevated and subway trains.

Representing the highest development of the automatic brake plus the feature of electric control, the Electro-Pneumatic brake provides for instantaneous and simultaneous application of all brakes throughout the train, insuring short, smooth station stops and the shortest possible stops in emergency.

These are features which vitally affect the entire system of modern train operation in congested centers.

Electro-Pneumatic brakes not only save money; they point the way to increased earnings as well.

**Westinghouse Traction Brake Company**  
General Offices and Works: Wilmerding, Pa.



Boston, Mass.  
Chicago, Ill.  
Columbus, O.  
Denver, Colo.  
Houston, Tex.

#### OFFICES:

Los Angeles  
Mexico City  
St. Paul, Minn.  
St. Louis, Mo.  
New York

Pittsburgh  
Washington  
Seattle  
San Francisco

# WESTINGHOUSE TRACTION BRAKES



O-B Extruded Ear—Patented

An extruded brass runner on which is clinched and riveted a sherardized malleable iron boss. Boss threads are filled with grease at the factory.

## Grooved trolley wire needs O-B Extruded Ears

Clinch an O-B Extruded Ear on grooved wire and it is there to stay.

Absolutely accurate in contour, the lips fit into the groove exactly. The metal is tough, dense, tenacious. It hangs on. It resists wear.

These qualities are natural results of the extrusion process. Brass—red-hot and not molten—is forced through a die under enormous pressure. Denseness, toughness, strength and accuracy are literally squeezed into the metal.

Grooved trolley wire especially needs the compact strength of O-B Extruded Ears. They have made wonderful records for long life on all styles of wire.

O-B Extruded Ears installed on wire. Notice the close fit and good wheel clearance.



*Look in Catalog No. 18, pages 323 to 327.*

The **Ohio** **(B)** **Brass** Co.  
Mansfield, Ohio, U.S.A.



New York Philadelphia Pittsburgh Charleston, W.Va. Chicago Los Angeles San Francisco Paris, France  
Products: Trolley Material, Rail Bonds, Electric Railway Car Equipment, High Tension Porcelain Insulators, Third Rail Insulators

# *Insurance plus Marsh & McLennan Service*

OTHER THINGS BEING EQUAL—Marsh and McLennan would not be carrying the insurance for a great number of the largest public utilities in America.

The public is no more interested in where you buy your insurance than they are interested in where you buy your rails or cars or other equipment.

Marsh and McLennan solicit your insurance solely because they can render you a service that will decrease your insurance costs.

On one large eastern Corporation, for example, we were able to reduce the insurance rate from \$17.50 per thousand to \$4.30 per thousand. Why not buy your insurance where you can buy the most for your money?

We will be glad to outline this service to business executives who are interested in reducing insurance costs.

## **MARSH & McLENNAN** 175 W. Jackson Blvd. Chicago, Ill.

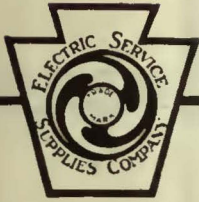
Minneapolis  
New York  
Detroit

Denver  
Duluth  
Columbus

San Francisco  
Seattle  
Cleveland

Winnipeg  
Montreal  
London

# Endorsed by Universal Preference



## KEYSTONE CAR SPECIALTIES

- Illuminated Destination Signs
- Steel Gear Cases
- Motormen's Seats
- Faraday Car Signals
- Lighting Fixtures
- Golden Glow Headlights
- Headlight Resistances
- Air Sanders
- Trolley Catchers
- Shelby Trolley Poles
- Rotary Gongs
- International Fare Registers
- Fare Register Fittings
- Samson Cordage
- Air Valves
- Cord Connectors
- Trailer Connectors
- Automatic Door Signals
- Standard Trolley Harps
- Standard Trolley Wheels

THE fingers of both hands would probably exaggerate the number of railway properties operating cars not equipped with Keystone Car Specialties. Some of the products herein enumerated will be found on nearly every car operated today. Look around and you will particularly note that Keystone-Hunter Illuminated Destination Signs, Golden Glow Headlights, Faraday High Voltage Car Signal Systems, Safety Car Lighting Fixtures and Keystone Steel Gear Cases are the rule rather than the exception. Operators prefer them and car builders approve the choice.

*Ask for the respective data sheets*

### ELECTRIC SERVICE SUPPLIES CO.

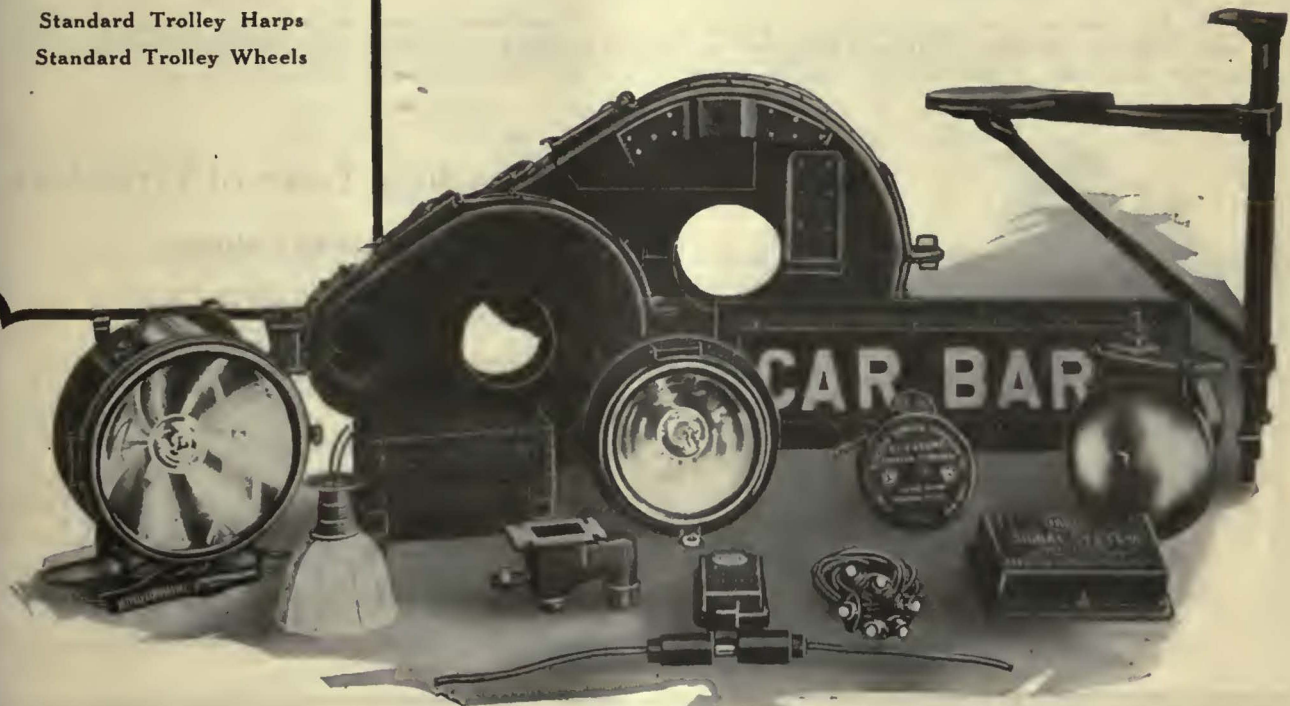
*Manufacturer of Railway Material and Electrical Supplies*

PHILADELPHIA      NEW YORK      CHICAGO  
17th and Cambria Streets    50 Church Street    Monadnock Bldg.

*Bronch Offices: Boston, Scranton, Pittsburgh*

*Canadian Distributors:*

Lyman Tube & Supply Co., Ltd., Montreal, Toronto, Winnipeg, Vancouver





Ajax Electric Arc Welder

# Let's Go

into the question of welding

What are the vitally important features a railway man demands in his choice of welding equipment? Are they not, first of all, sufficient amperage to make a deeply-penetrating weld under any conditions, and next, low cost of handling and maintenance?

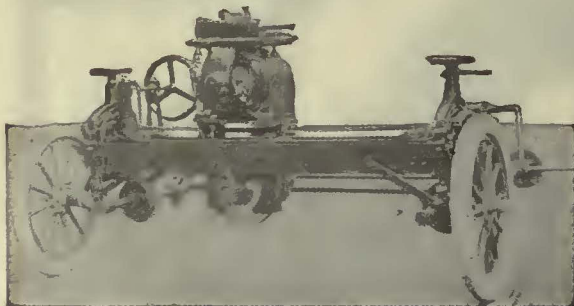
## The Ajax Electric Arc Welder — *meets all these requirements*

The highest capacity welder of its class. Its normal rating is 333 amperes at 600 volts; where the line voltage falls as low as 300 it still gives over 200 amperes. Thus a deeply-penetrating, firm and solid weld is certain under worst conditions.

The Ajax Welder is so rugged and simple in construction that any reasonably intelligent work-man can be taught to operate it efficiently and rapidly. It is so

light that two men can pick it up and carry it anywhere. In case an accident damages a coil anyone can install a new one quickly. There's nothing else to get out of order!

Its usefulness extends to bonding, welding fish plates, building-up cupped joints and broken special work, repairing castings and in general shop work.



Universal Rotary Track Grinder

## A Leading Line of Grinders

Atlas Rail Grinder

Reciprocating Grinder

Universal Rotary Track Grinder

*Send for catalogues.*

# RAILWAY TRACK-WORK COMPANY

3132-48 E. Thompson St., Philadelphia, Pa.

AGENTS:

Chas. N. Wood Co.  
Boston

Electrical Engineer & Mfg. Co.  
Pittsburgh

Atlas Railway Supply Co.  
Chicago

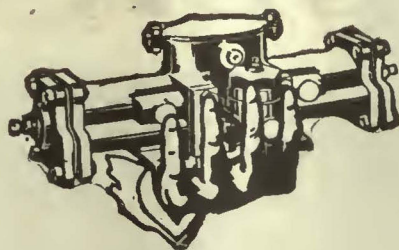
P. N. Wood  
New Orleans



*Modernize!*

!

*Pneumatize!*



## That "flying-leap" passenger!

You can't get rid of him.

Nor do you want to!

Because his objects are truly worthy ones—namely—to save a few seconds time for himself and deliver to you an extra fare!

But—you can make your car safe for him—so safe that there will be no possibility of trapping him in doors or steps.

—and at the same time you can do this without putting any burden of watchfulness upon your conductor or in any way distracting his attention from the main issue of getting all the fares—when you equip your cars with the

## National Pneumatic "Rushhour" Line

Door and Step Control  
Motorman's Signal Lights

Door and Step Operating Mechanisms  
Safety Interlocking Door Control

Multiple Unit Door Control

In such cars, the entire control of doors and steps and go ahead signals are vested in the mere turn of a lever-handle or the pressing of a button. From the lone "flying-leaper" to the massed formation of

the rush-hour you can eliminate accidents and secure the utmost in revenue, on cars that are modernized — *pneumatized*. Think it over.

Manufactured in Canada by  
Dominion Wheel & Foundries, Ltd.  
Toronto, Ont.

National Pneumatic Company, Inc.

50 Church St., New York

Edison Bldg., Chicago

Works: Rahway, N. J.

# TIE SERVICE



*(Recent photograph showing creosoted pine ties supplied by this company in track, New Orleans Street Ry. since 1899)*

International Creosoted Ties still in track after twenty-three years' continuous service and good for many years more.

*Quick shipments from seasoned ties in stock*

**CREOSOTED**

POLES

PILING

TIES

TIMBERS

**INTERNATIONAL CREOSOTING AND CONSTRUCTION CO.**

General Office: Galveston, Texas

Plants—Texarkana—Beaumont—Galveston, Texas

# "ONCINAWILE"

## Being a Letter From a Motorman to His Friend George Who Has Left Railroading to go to Farming

East St. Louis, Feb. 16th, 1922.

Dear George:

It seems like it was just a short time ago since you was ding-dinging to me from the back end of old 600. But when I was looking back at my time cards, George, I see it has been over nine (9) months since you wrote time cards with me.

A lot of water has gone under the bridge since then George, and a lot of things has happened. I got a new uniform and cut my thumb on the star on my eating tobacco, and bumped smack into a guy with a load of coal at the bottom of the viaduct. He tries to cross the street in the middle of the block, and the track's greasy, and there we are, or was. And you know George I don't like to write accident reports.

There's something else happened, too, George. I wished you had been here, because you always was poking around trying to find out what made the car go.

They've put a meter on the car what measures the juice it takes to make it go. It's a right nice looking iron box with some figures on it to tell you how much you take, and a black thing in it that goes around when you use the juice. And, George, you ought to see it go when I'm getting up on the bridge. And they've been telling us how to do it, and not make that hand go so fast. You know, George. I've been running cars a long time, and when they first put these things on, I guess maybe I told them so and if they thought they could tell me anything about running a car, they've got another think coming. But they keep on talking and the boys got talking too, and I had to hear it or put cotton in my ears, and you know a motorman can't go around all day with cotton in his ears.

Well the first thing they tells us was that every time that little black ding-bat went around once it meant that the guy at the power house spit on his hands and shoveled in five (5) pounds of coal. He's no particular friend of mine George, so that didn't bother me much till I got home and was fixing the furnace and I put a shovelful in and looked at it and looked at the coal pile and I did a little figuring on the side of the coal bin, and I just had a ton put in, and I'll be darned if that wouldn't only run 600 a day, counting what I was using and what Bill was using who relieves me, as you remember George.

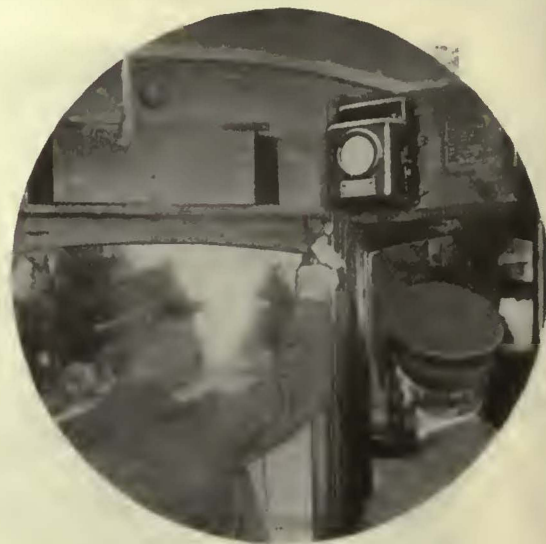
Well, then they told us that when we are feeding her up we ought to stop on each point, but keep on going, and I had to laugh when I think how Bill just shoves it right around, and old Mike goes to sleep on each point. Here they both were wrong and I was just about right, because you know I keep my feet stepping.

But they got me on one thing, George. You remember that time we was ahead of time, and I was loafing along on seven (7) points, and you came up and told me something was getting hot. And we stopped and got out and looked and those things under the car was smoking. George, we sure was wasting juice. That's what made those things so hot. Well, that's what they told us, not to run on resistance points.

They was one thing they told us that sounded mighty reasonable. And that was to run on half speed when we had a buck traffic, because they said you didn't use so much juice, and you don't stand so many chances to hit something.

And I noticed that the ding-bat on the meter don't go near so fast when I'm running at half speed.

Then they told us a lot about coasting and that when we was coasting we was getting something back we already paid for. And if that pit man would keep my brakes so they don't get so hard, maybe I'm not some little coaster, George. You remember the time I bumped into Ed on 272. They'll never



catch me again like that, 'cause I lay back from anybody ahead of me now, George, and coast along and then if they stop sudden, like Ed did, I don't bump into them, 'cause I got lots of room to stop. And if they don't stop I just keep coasting along, saving juice and giving that guy at the power house a vacation, even if he isn't any particular friend of mine.

But when they got talking about braking I sets up, because I thought I just about invented the air brakes. They tell us not to fan the air, which is O. K. with me and then they tells us to use only one application for stops, and right away I set back again, because you know George, I never did believe in that one application stuff. And, George, I'll be darned if the instructor didn't come out and ride with me and show me about it. And he said he knew I wasn't braking right, because I used so much power. That had me guessing for a long time, George, how he could tell what I was doing with my brakes, just because I used a little more juice than the rest of the gang. But after he told me about how if you put too much juice into the car you got to take it out by the brakes, and likewise backwards, that is, if you take out too much with your brakes you got to put more in with the controller, then I begins to try this one application stuff, and believe me George, I'm some little one applicationer now.

Then, George, they got talking about how the conductor can help save power, by giving good snappy bells. I was wishing then I had you back on the back end, because you never was asleep on your feet like some people I could mention.

Well, George, they put up a list showing us how much juice we was using, and here I was at the bottom of the list, and I just stayed there till that fellow came out and told me about my air like I told you already. And now I'm batting third or fourth but there's a couple of fellows I can't head-off. I guess it's like playing pool, George. You always could edge me out no matter how hard I tried.

I hope everything is going O. K. and that the cow you had sick is better now. Tell the Missus I still slow down at the corner on the supper trip looking to see her come running out of the house with your dinner pail.

Your old pal,  
Jerry.

Courtesy "Oncinawile" Company publication of East St. Louis & Suburban Ry. & Lt. Co. users of

**ECONOMY POWER SAVING METERS**

Sold by

Economy Electric Devices Co., Chicago, Ill.



One-half of a single-track crossing constructed by means of Thermit welding for Omaha & Council Bluffs Street Railway, Omaha, Neb.

## Thermit Shop-Built Frogs **\$60** Cost Only About

Although this cost for a square frog is only a fraction of that of solid manganese and manganese hard center special work, the long life of Thermit-welded frogs and crossings has been conclusively proved again and again by many installations which have held up admirably for years under heavy traffic.

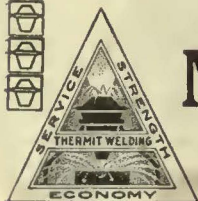
The earliest Thermit frog ever installed is still in perfectly satisfactory condition after over six years of service in a large middle-Western city.

Any damage to the points can be repaired at minimum expense by the addition of metal by means of the electric welder.



Let us send you a Thermit outfit at once and let our experienced track engineers instruct your men in constructing a Thermit crossing by using simply the rail which you have on hand, your own track labor and the Thermit outfit and materials.

*Send for our Rail Welding Pamphlet 3932.*



# Metal & Thermit Corporation

120 Broadway, New York

PITTSBURGH

CHICAGO

BOSTON

S. SAN FRANCISCO

TORONTO





In this installation at Miami, Fla., a single line of Bates Expanded Steel Poles carries trolley wire, feeders, transmission lines, telephones, and ornamental lighting brackets.

The appearance of this line, in a neighborhood where appearance counts, is superior to other types of pole line construction, and besides the good will value, this line costs less than any other type, *including* wood pole lines.

Note that all the surfaces of the pole are readily accessible for painting. A coat of paint at intervals is the only maintenance required.

## The Public You Serve Is Your Judge

Of all the property of a utility the pole lines come most before the eye of the public — the public whose good will is vital from every point of view.

The appearance of a Bates Pole line is an asset. The trim, smart appearance remains with age. Every Bates Pole is symmetrical, obviously sturdy, and yet unobtrusive. Their clean lines often permit the use of a heavily loaded line in places where any

other construction would be an eyesore.

An investment in a Bates Steel Pole line remains through a long life at par. Its value does not fluctuate, is not subject to heavy depreciation charges. Bates Poles will be standing a generation after a wood pole line has come to the end of its life.

And, the Bates Steel Pole first cost is now *below* that of an equivalent wood pole, (not to say other steel types).

**B**ates **E**xpanded **S**teel **T**russ **C**o.

208 South La Salle Street, Chicago, U. S. A.

*District Sales Offices in all Principal Cities.*

Send for the Bates Steel Pole Treatise if you are not familiar with Bates Poles. Or, consult our engineers if yours is a special problem.

**BATES ONE PIECE EXPANDED STEEL POLES**

**Sliding Shoe a Better Collector\***

BY C. M. BANGE  
Master Mechanic Interstate Public Service Company, Scottsburg, Ind.

MY PAST experience with the sliding contact shoe has consisted merely of several tests to determine if a saving could be made by its use, which test at that time did not make the showing expected. Since coming to the Interstate Public Service Company, I find the sliding contact shoe filling the place of the trolley wheel where the current carrying capacity is the prime factor required. This the sliding shoe successfully performs while the trolley wheel proves a failure. When under headway our limited cars draw approximately 400 amp. and

\*Abstract of discussion on "Merits of Sliding Contact Shoe" at the annual convention of the Central Electric Railway Association, Indianapolis, Ind., Jan. 26, 1922.

The  
Interstate  
Public Service Co.

uses

# MILLER TROLLEY SHOES

## Here Are Some Comments

Perhaps you didn't read Mr. Bange's entire paper presented at the C.E.R.A. Meeting and printed in the Electric Railway Journal. Here are a few quotations which will interest you:

"It was found that . . . a standard 6-in. trolley wheel would build up in the groove instead of wearing away. Difficulty was experienced in keeping the wheel on the wire. A wheel . . . very soon becomes out of true and causes a drumming noise.

"The sliding contact shoe overcame all these objections: arcing at wire is hardly noticeable even on a dark night; speed has very little effect on its sticking to the wire. . . .

"From a mechanical and electrical standpoint the sliding contact shoe seems nearly perfect. . . . As the shoe does not revolve, it is possible to connect it directly to the harp with a shunt, thereby eliminating all pins and bearing trouble.

"There are fewer parts to maintain.

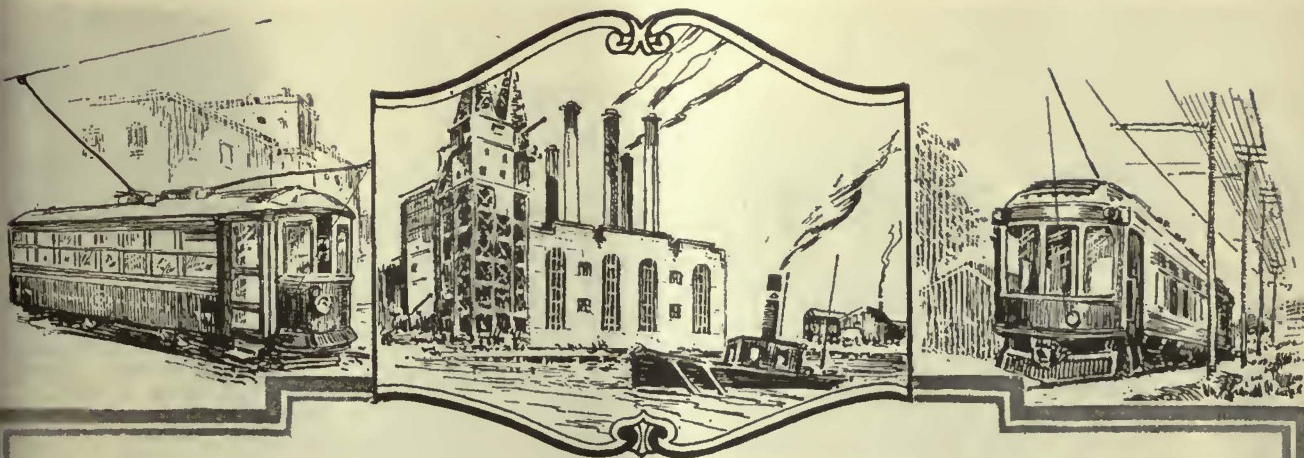
"And a careful inspection of the trolley wire has shown no undue wear from the use of shoes.

*Isn't this worth trying out?*

*Write Us!*

**Miller Trolley Shoe Company**  
Boston—21, Mass.





## Why trolley cars grind their teeth



Of course trolley cars have teeth—gear teeth. And unless they are properly taken care of, trouble and expense follow.

Also, like human beings, about four out of every five suffer from lack of care—at least until someone learns the right way.

The chief reason for the premature wearing out of gear teeth is that they get the wrong kind of lubricant:—

**A. One that is *too thin***

**B. One that is *too heavy***

The "A" kind leaks out of the gear box (which is never too tight after any amount of service), or is splashed around on the *inside*, and there is really no point to putting lubricant on the walls of the gear case.

The "B" kind drops to the bottom of the gear case and after a while the gears just cut a channel through it, and so run nearly dry.

And what is just as bad, such products hold in suspension dirt and particles of worn metal producing a very appreciable abrasive effect.

What's right then?

Plainly stated—the answer is—

### The Direct Application of Texaco Crater Compound.

And records drawn from hundreds of thousands of car miles prove it.

Here's how it works—

A small quantity of Texaco Crater Compound is put directly onto the uppermost gear teeth.

A few revolutions and all the teeth of all the gears are coated with a protective film of Texaco Crater Compound.

This film is enough for perfect lubrication. It checks wear.

It doesn't hold chips or dirt.

It doesn't fling around the casing.

It stays on the job—on the teeth—for a long time.

When the car is inspected, your men notice the condition of the gears and, if required, they add a little lubricant.

This method has proven itself the most effective and economical.

And you don't waste lubricants—yet you save gears.

**Just say "DEMONSTRATION"**  
—select one car—or a dozen—they will stop grinding their teeth—Texaco Crater Compound will show the way.

There is a Texaco Lubricant for every purpose  
Rolling Stock, Power Plant, Substation everywhere.



# THE TEXAS COMPANY

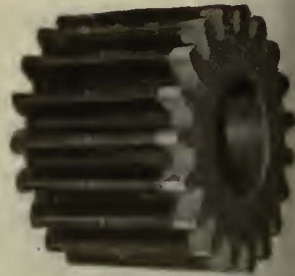
DEPT. R-J, 17 BATTERY PLACE, NEW YORK CITY

HOUSTON - CHICAGO - NEW YORK

OFFICES IN PRINCIPAL CITIES



"Tool Steel" Quality T. S. Q. "Tool Steel" Quality



White paint illustrates softened end of teeth on motor side of pinion. This eliminates chipping. (Patent pending)

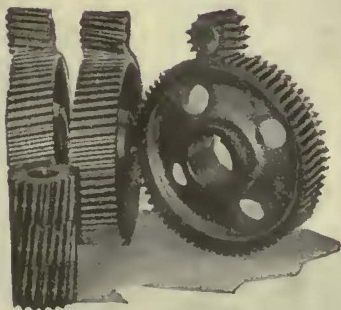
"Tool Steel"

# HELICALS

are just as superior  
in quality as

"Tool Steel"

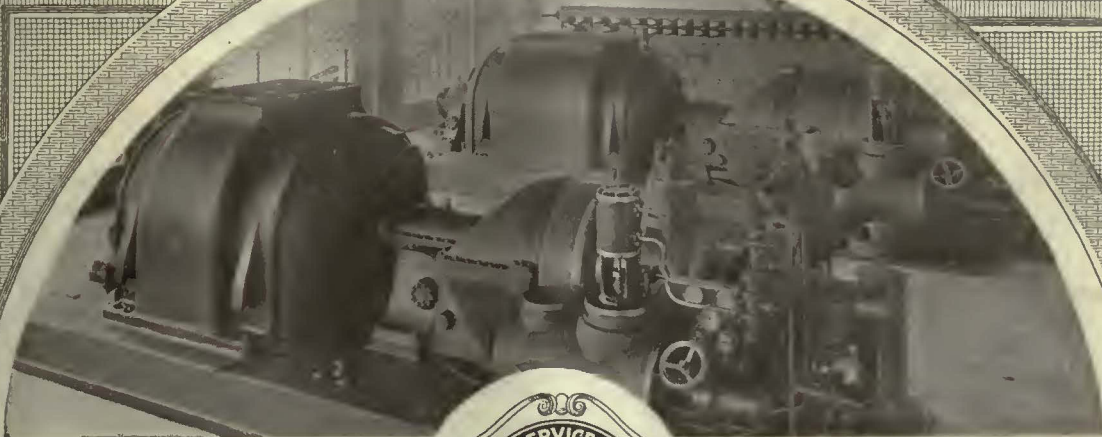
SPURS.



"Tool Steel" Helical gears—  
in sets, or interchangeable  
with other makes.

"Tool Steel" Quality T. S. Q. "Tool Steel" Quality





## Galena Turbine Oils

Made from specially selected stocks that are marketed only by this company. Purest of straight mineral oils, filtered, non-emulsifying and free from acid.

Galena Turbine Oils — light, medium, heavy — and Galena White Turbine Oil must, from the crude to the finished state, conform with Galena Quality specifications. Suitability for the work required is the first consideration.

These oils are giving exceptional service on both unit and gravity systems in turbine lubrication and the lighter grades have demonstrated the value of oil quality, where used in high speed light turbines, reciprocating engines and fast running machinery of all kinds.

*In the world of lubrication Galena Quality  
is always interpreted as "The Best."*



### Galena-Signal Oil Company

New York    ▾    Franklin, Pa.    ▾    Chicago  
and offices in principal cities    ▾



*The spirit of true leadership is not merely to get to the front but to stay there*



## Yesterday and Today in Railway Motors

The GE-800 of 1894 weighed 1930 pounds, which was at that time a comparatively light-weight motor.

The GE-258 motor of today weighs but 885 pounds and is capable of as much work as its distant predecessor.

The old motor was fully enclosed and had no commutating poles, whereas the self-ventilation and commutating poles of the GE-258 give it so liberal an overload capacity that it has become the favorite motor for safety cars and light-weight interurban cars where schedule speeds combined with maximum reliability are controlling factors.

**General  Electric  
Company**

General Office  
Schenectady, N.Y.

Sales Offices in  
all large cities

# ELECTRIC RAILWAY JOURNAL

Consolidation of Street Railway Journal and Electric Railway Review  
HENRY W. BLAKE and HAROLD V. BOZELL, Editors

N. A. BOWERS  
Pacific Coast Editor  
H. S. KNOWLTON  
New England Editor  
G. J. MACMURRAY  
News Editor  
PAUL WOOTON  
Washington Representative  
ALEXANDER McCALLUM  
British News Representative  
ROBERT M. HAIG  
Special Consulting Editor

HENRY B. NORRIS  
Managing Editor  
HARRY L. BROWN  
Western Editor  
W. W. SQUIER  
Associate Editor  
CARL W. STOCKS  
Associate Editor  
DONALD F. HINE  
Associate Western Editor  
L. E. PLIMPTON  
Editorial Representative

Volume 59

New York, Saturday, April 22, 1922

Number 16

## Purchase of Detroit Lines Approved by Voters

MAYOR COUZENS of Detroit will soon be free to put into full effect his idea of how best to run a municipal street railway. At the election there on Monday the voters cast their ballot to sustain him in his effort to municipalize the entire city system. The Detroit United city lines will be taken over at the price of \$19,850,000, to be paid with a down purchase of 2,770,000, the rest of the price to be paid in installments. The present municipal system will now be tied in with the lines which the Detroit United has been operating, and the United States will witness the most important experiment in municipal ownership of a city railway system so far made in this country.

Jim Couzens is a big man. He has a genius for getting things done. The wisdom of his ways may be open to question, but there is no controverting the fact that the work of building the municipal road so far constructed during his administration of affairs in Detroit has been carried out with celerity. While he is in office his best efforts will undoubtedly be devoted to the careful management of the road along sound lines. But Jim Couzens is an anachronism in American public life. When the day arrives that he goes out of office Detroit's troubles will begin in earnest. For if Detroit runs true to American political form the likelihood is very remote of that city electing as his successor a man with other his qualifications for office or his determination. It is here that danger lies ahead for Detroit.

## One Fare Surely Hasn't Hurt San Diego Building!

ONE of the most common and plausible arguments urged against the graduated fare is the real estate man's assertion that it is a sure way toward congestion. Of course, what is worrying Mr. Realtor is that the electric railway charges a higher fare to the long-haul riders he himself will be deprived of some earned increment on his land. Be that as it may, San Diego is furnishing an emphatic denial of the congestion argument.

It will be recalled that on Jan. 1, 1920, the San Diego Electric Railway inaugurated a zone fare system in which a universal 5-cent fare was succeeded by a basic fare of 5 cents for either of two zones (inner and outer), while a two-zone ticket could be bought for 7½ cents. The new system was a success from the first, judged by the fact that both revenue and riders increased appreciably.

Now comes a review of realty developments in San Diego during the first two years of the zone-fare system. According to the San Diego Union for March 19, 1922, the number of permits for new residences in 1920-21 was 285, against 242 in 1918-19, an increase of 43 per cent. The value of these new residences was placed at \$3,232,000, against a value of \$724,500 in 1919, a gain of 346 per cent. In January and February of 1922 activity

has become even greater, January showing 131 permits for \$322,900 of buildings and February 130 permits for \$337,025 worth.

These are large figures for a city of 80,000 population. But what will interest the electric railway man most is that about 90 per cent of the building activity in 1920 and 1921 occurred within the outer or 7½-cent-10-cent zone, a fact which is all the more significant because San Diego is a most diffused city with more than one vacant lot at its very core. It may well be that our real estate brethren have had to sell these outer zone lots for a bit less than if they were reachable by a 5-cent fare, but the record to date surely shows that the congestion argument, so far as San Diego is concerned, is all moonshine.

## The Railway Vocabulary Is Enriched

WHEN a great need develops in the industrial field, some inventor usually rises to the occasion and produces the device or machine required. It is the same with the English speech. If there is a real demand for a word or phrase to express an idea, it will be coined by some one and become a recognized part of the language. A notable instance was the word "inter-urban" as applied to an electric railway joining two cities.

Last week another expression was first used to describe an electric railway condition, and it promises to be so useful that it also will probably become a part of the electric railway vocabulary. The occasion was a hearing on car loading and service conditions before the New York Transit Commission, the particular point being to determine the number of passengers who had seats during certain hours and those who were obliged to stand.

In most cases of this kind, the presumption to which such testimony leads is that those who stand because they cannot find seats undergo a hardship. The management of the railway company, however, pointed out that, during a large part of the day at least, such passengers suffer no real inconvenience, because they do not have to stand for any considerable length of time. The reason for this is that so many people leave the car at each station that during the non-rush hours most passengers can secure seats after riding a few blocks.

To this class of passenger the representative of the company applied the term "rotary standees." A "rotary standee" may then be defined as a passenger who cannot find a seat the moment that he enters the car, but who within a short time will be able to seat himself in the place made vacant by a departing passenger.

Standees, in railway parlance, can therefore be classified in three ways. First, there is the standee who might be termed the compulsory standee or long distance straphanger. Next comes the rotary standee, whose status has just been defined. Finally, comes the pas-

senger who stands by preference, either because he prefers an open rear platform to a seat in the middle of a car which he may have to occupy with some disagreeable companion, or because he has baggage which he does not care to take into the car, or because he boards the "car ahead" when there is a vacant seat for him in the car behind, or for some other reason.

It is, of course, generally admitted that railways in large cities cannot supply a seat to every passenger during rush hours, and often not at other times. Even if they could afford to do so, in most cases it would be impracticable because of the impossibility of operating so many cars on the street. Where it is possible it would cost so much that it would greatly increase the average cost of a ride.

Nevertheless, the public should realize that every standee is not what might be described for the purpose of this discussion as a standee by compulsion.

### Why the Increasing Interest in the Rail Car?

THERE is something about the rail car, or automotive bus with flanged steel wheels, that appeals to the imagination of the steam railroad and electric railway man. A self-reliant, self-propelling vehicle that can be set on rails anywhere and is immediately ready for business is a transportation tool not to be despised.

Of course the principal field for the rail bus is on light-traffic steam railroad lines or for supplementary local passenger service on steam lines which are primarily devoted to through freight and passenger business. Under such conditions it is necessary to operate steam-locomotive-drawn trains at very low load factor, or to stop through trains at frequent intervals to furnish necessary local service. The flexibility of the rail car adapts it well to such use. Operated in single units it insures a quality of service which will not only care for existing business cheaply but will develop new business.

Obviously the opportunity for this vehicle on steam roads is sufficient to stimulate, through competition, the perfection of its design and construction. The electric railways will profit by this, for while they, even in the aggregate, cannot use many rail cars, they can use some. In the evolution of a new interurban project rail cars might well be employed during a certain period, while traffic is building up. The same is true on roads whose traffic has lightened to an uneconomical point, or whose expected traffic has never materialized.

Granting all of this, one naturally inquires why the rail car has only recently aroused widespread interest. Steam "dummies" were of course used with some success many years ago, but were discarded in the progress of the transportation art. Why take a step apparently backward? This query ignores the fact that the automobile and the automotive bus have in the meantime taken the country by storm. More important yet is the fact that the robust and foolproof truck motor has been made available for the rail car through hard service in a closely allied field. In addition, the hard times in the transportation industry have driven home the fact that its facilities must be co-ordinated in order to move people and goods with facility and economy.

Transportation men are waking to the fact that old equipment and old methods will not pay dividends under modern conditions. Hence, once assured that the rail car is reliable and durable they will use it.

### Augusta Learns a Costly Lesson

AUGUSTA has seen the error of her way. After the city had struggled along for a month without electric railway service the city officials met the company's representatives in a spirit of give and take and conceded the attitude of the company to be right, that two systems of transportation cannot exist in active competition on the same street. The lesson was available to Augusta of the dire consequences of unregulated jitney competition in Des Moines and Saginaw, but Augusta, it seems, had to learn at first hand.

From the standpoint of the city, the whole proceeding was a disgrace. The Council had been warned sufficiently in advance of the direction in which events were heading. So far as the members of that body are concerned, the charitable thing, of course, would be to conclude that the Councilmen must have been cognizant of the ultimate result of their attitude, but that they felt called upon to make a demonstration against the railway so as to placate the jitney interests. If this is so, then the city has paid a frightful price in the name of political expediency.

For the company there was nothing else left for it to do but to shut down. In resuming service it has done so apparently against its best judgment and without securing the full measure of protection against the jitneys that would appear to be warranted under the circumstances, but it has returned the cars to service in a spirit of helpfulness, hopeful that the public will respond with a measure of patronage that will permit it to continue operation uninterrupted. The company is not against the jitney, or jitney service. Its contention all along has been against unfair competition, unfair as manifested most strikingly by the operation of two lines of transportation service on the same street. It ought not to take long to demonstrate whether the measure of regulation under which the cars have been returned in Augusta is sufficient to afford the company the degree of protection necessary for it to operate successfully in the future.

### What Do You Do with a Complaint?

ONE electric railway executive who has made a conspicuous success of his interurban railroad never lets a complaint go by as inconsequential. To him every complaint is a matter of important concern. Every complaint represents evidence that the service is not as good as it could be and he takes steps to determine how the cause of that complaint can be removed. His constant endeavor is to do everything possible to cater to the comfort of the passengers. No effort or expense is spared in seeking improvements. Perhaps the worth of this way of treating complaints can be judged by the fact that in the last four years the passenger traffic on this line has increased 40 per cent, the passenger revenue 150 per cent and the freight revenue 1,000 per cent, despite the direct competition of one of the best steam railroads in the country. Of course this policy and effort in connection with complaints is only one phase of a very broad and intelligent program of developing the line and building public esteem, all of which has a bearing on the growth of the business handled. But it bespeaks the general attitude of the whole organization toward the public and the result speaks volumes as to the wisdom of the policy.

# Electric Locomotives for Chile Freight Service

Details of Road and Switching Locomotives Soon to Be Delivered to Chilean State Railways Are Given  
—Designs Provide for Incorporation Into Present Railway System While Not Preventing Further Standardization

BY F. E. WYNNE

Manager Railway Equipment Engineering, Westinghouse Electric & Manufacturing Company

THE initial electrification program of the Chilean State Railways includes fifteen freight locomotives for road service and seven for switching service. These are in addition to the passenger locomotives, of two types, described in an article in the issue of the ELECTRIC RAILWAY JOURNAL for Feb. 25, 1922. The first ten cabs for the road freight locomotives have now been delivered by the Baldwin Locomotive Works to the Westinghouse company for the installation of the electrical and air-brake equipments. On account of the progress

which is being made in the production of these machines some details regarding them will be of interest.

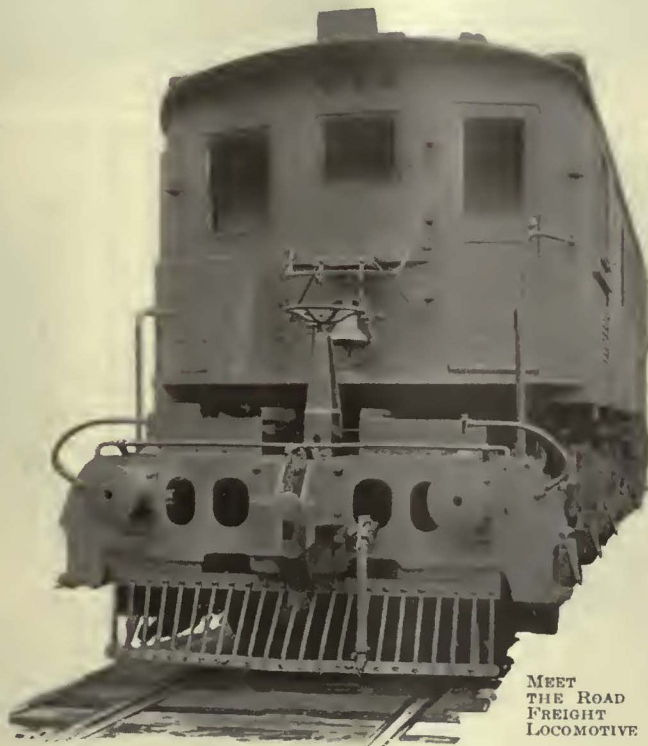
The service conditions under which the locomotives will operate were covered in articles in the issues of this paper for Dec. 3, 1921, and Jan. 28, 1922. They will be put into service on the main line between Santiago and Valparaiso, 116 miles, and on the branch line between Las Vegas and Los Andes, 28 miles. The heaviest grade is 2.25 per cent, 12 miles long against southbound traffic on the main line from Llai Llai to La Cumbre. In emergency or on holidays these locomotives may be used to operate express passenger trains.

## ROAD LOCOMOTIVE SIMILAR TO THAT USED ON PAULISTA

In general design the road locomotive is similar to the freight locomotives furnished to the Paulista Railway of Brazil. The box-type cab is carried on two trucks, articulated, each having three driving axles with direct-gear motors. The estimated weight is 226,000 lb.

A low voltage will be generated on the locomotive for the control circuits, and the system of control is arranged for operation of the locomotive from either end and for multiple operation of two locomotives from any one controller. Regenerative braking also is provided.

The nominal rating of the locomotive is 1,680 hp. at 3,000 volts and the equipment is capable of developing a maximum of 3,200 hp. for short periods. With natural ventilation the locomotive will deliver a tractive effort of 27,950 lb. at a speed of 22.6 m.p.h. at 3,000 volts for one hour with a temperature of 75 deg. C. by thermom-



MEET THE ROAD FREIGHT LOCOMOTIVE

eter on the main motors. The continuous capacity at 3,000 volts and with forced ventilation is 20,580 lb. tractive effort at 24.8 m.p.h. with a temperature rise of 65 deg. C. by thermometer on the main motors. With 25 per cent nominal adhesion the starting tractive effort is 56,500 lb. The maximum speed is 40 m.p.h. At loads corresponding to the short field continuous current ratings of the motors, running speeds of approximately 6.1, 8.1, 12.8, 16.6, 19.5 and 25 m.p.h. are available.

With any one pair of motors cut out, half of the locomotive capacity is available for starting and two-thirds for running.

The general dimensions and estimated weights of the locomotive are given in Table I.

The salient features of the cab and trucks and many of the details are clearly shown in the accompanying illustrations. The

Chilean freight cars now use drawhooks as in European practice. However, it is planned eventually to use M.C.B. standard drawbar equipment on the entire system. Consequently, these locomotives will be equipped with Continental spring buffers and M.C.B. couplers. The couplers are arranged to take attachments for chain couplers during the transition period.

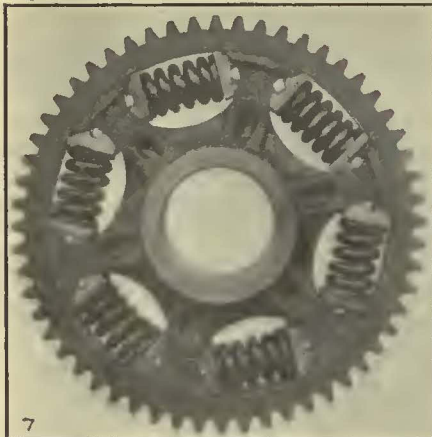
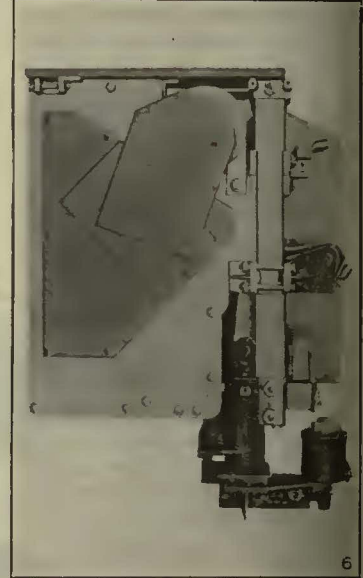
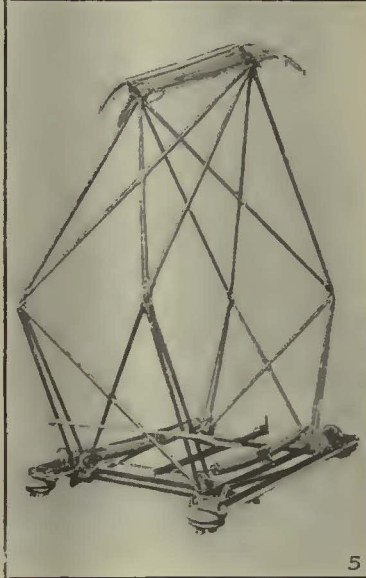
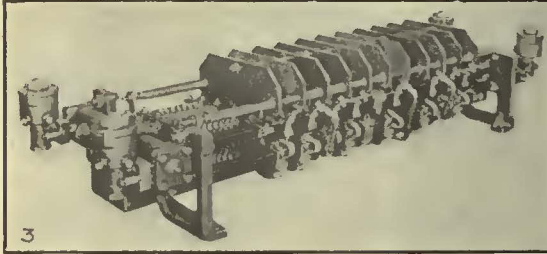
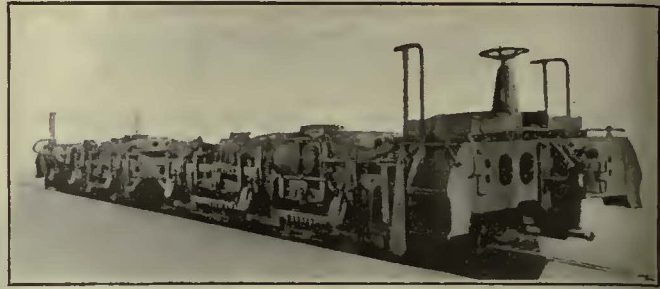
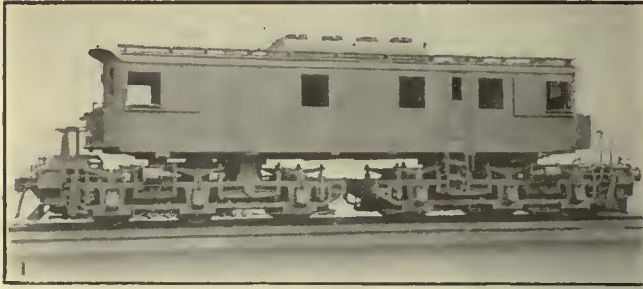
The articulation of the two six-wheel trucks at the inner ends is effected by means of a Mallet hinge. The bar-type cast-steel side frames are located outside of the wheels and are connected by cast-steel bumpers and cross-ties. The oil-tempered steel semi-elliptic driving springs over the journal boxes on each side are connected to one another by equalizing beams. The ends of each set of three driving springs connected thus are attached to the side frames through coil springs.

Rolled steel shapes extending the entire length of the cab and joined by cast-steel and rolled-steel cross members constitute the cab underframe. The cab is of the

TABLE I—DIMENSIONS AND WEIGHTS OF ROAD FREIGHT LOCOMOTIVES

Track gage.....	5 ft. 6 in.
Length over buffers.....	49 ft. 10 in.
Length over cab.....	38 ft. 0 in.
Total wheelbase.....	37 ft. 0 in.
Rigid wheelbase.....	13 ft. 9 in.
Height, top of rail to cab roof.....	12 ft. 7 in.
Height, top of rail to clerestory.....	13 ft. 10 in.
Width over cab sheets.....	10 ft. 0 in.
Height of coupler.....	41 in.
Wheel diameter.....	42 in.
Weight of complete locomotive.....	226,000 lb.
Weight of mechanical parts.....	140,000 lb.
Weight of electrical equipment.....	86,000 lb.
Weight per driving axle.....	37,670 lb.

## Assembly View of Chilean State Railways Road Freight Locomotive and Some Details of This and the Switcher



### Key to the Illustrations

No. 1—One of the Chilean road freight locomotives.

No. 2—The road freight locomotive trucks are articulated at the inner ends by a Mallet hinge and are equipped with M.C.B. couplers and spring buffers.

No. 3—Cam-operated switches are mounted on a single shaft connected through rack and pinion to a double-acting air piston.

No. 4—The motors are 280-hp. wound for 1,500 volts and insulated to operate two in series on 3,000 volts.

No. 5—Pantographs are spring-raised, air-lowered and mechanically locked in the lowered position.

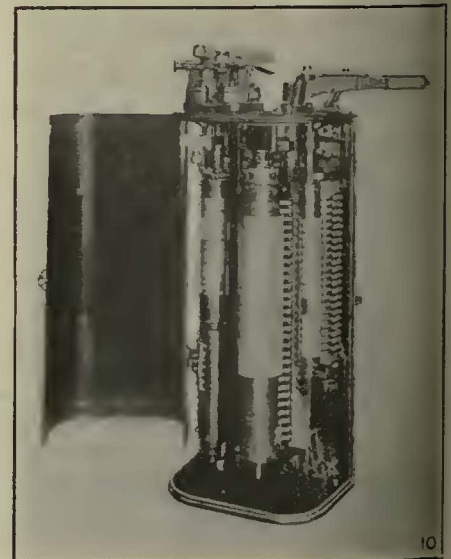
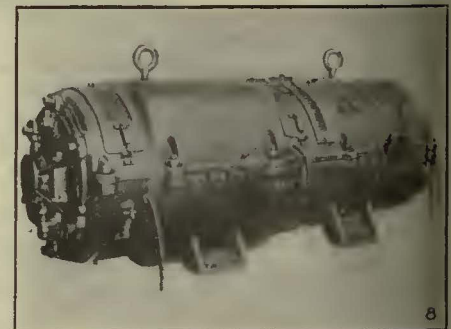
No. 6—One of the 3,000-volt unit switches.

No. 7—Type of flexible gear with which freight locomotives will be equipped.

No. 8—The 35-kw. motor-generator set which furnishes low-voltage power supply on the road freight locomotives.

No. 9—The master controller for the switching locomotives has two levers.

No. 10—The master controller for the road freight locomotives has four levers.



box type, 38 ft. long, and comprises an engineman's compartment in each end and a central equipment compartment. These compartments are separated by bulkheads, in which are doors at each end of each side aisle. The equipment compartment houses the blowers, motor-generator set, air compressors and most of the control equipment. The end doors are in front of the fireman's stations and there is a side door from each aisle. The usual windows, louvers and roof ventilators are provided.

The cab is carried on center pins located approximately over the midpoint of each rigid wheelbase. One center pin is restrained both longitudinally and laterally and the other in the lateral direction only. This permits longitudinal movement of the cab relative to one truck.

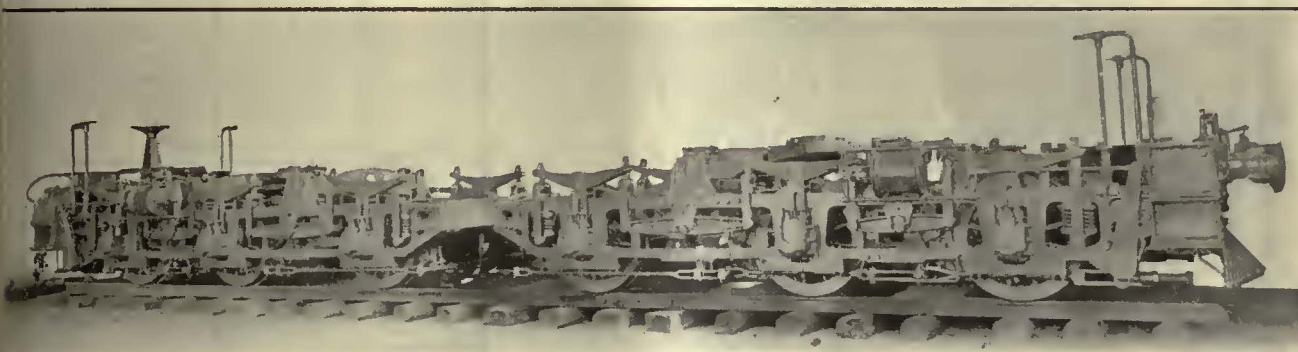
The locomotives are equipped with Westinghouse air brakes, which are already standard with the Chilean railways. The air brake is of the 14-E.L. type, which provides straight air for the locomotive alone and the automatic feature for both locomotive and train. This is of advantage in that the locomotive brakes may be applied either independently of, or in conjunction with, the train brakes.

The air brake is interlocked with the regenerative brake so that the latter may be supplemented by service application of the train brakes, if desired, without ap-

connected through a rack and pinion to a double-acting air piston. The application of air to this piston through the electro-magnetic valves rotates the camshaft, closing and opening the switches in the correct sequence. Each switch is closed by the pressure of a cam on a hardened roller and is opened by spring action. Each cam switch can be removed from its group without disturbing the other switches. These switches are without blowouts, except where they are required to open power current.

Each of the six axles of the locomotive is driven by a Westinghouse No. 350-D 1,500-volt series motor and insulated to operate two in series on 3,000 volts. The nominal rating of this motor on short field is 280 hp., at 155 amp. and 1,500 volts. Field control is secured by the use of two separate field windings on the main poles. During acceleration high starting tractive effort at low speeds is obtained with a current below normal by connecting these two main field windings in series. The full-field connection also provides an additional operating speed for each of the three motor combinations. For the higher operating speed in each combination, only one of the main field windings is effective. High continuous capacity is assured by the forced ventilation provided by two motor-driven blowers.

The motors are geared directly to the axles with a



TRUCKS FOR ONE LOCOMOTIVE ASSEMBLED AT LOCOMOTIVE WORKS

plying the air brake to the locomotive drivers. In case sudden stop is required during regeneration, movement of the brake valve to the emergency position cuts off the regenerative brake and gives an emergency application of the air brakes on both locomotive and train.

The pantograph trolleys provided for collecting the current from the overhead are of the spring-raised, air-actuated type, arranged to be mechanically locked in the lowered position. Each has two flexibly mounted shoes with hard-drawn copper wearing strips which can be readily replaced. One trolley is sufficient for regular operation. For safety and to facilitate cutting out a defective pantograph, a double-throw disconnecting switch is mounted adjacent to each trolley. This switch is arranged so that in one position it connects the trolley to the main switch and in the other position it locks the trolley down and connects it to ground.

The main circuit connections are established by a number of individual air-operated switches mounted in several banks, each switch a complete and removable unit in itself. The 3,000-volt unit switch is of the same general design as that which is standard for low voltage.

For certain combination switching where no current is broken and for low-voltage circuits cam-operated switches are used. These also operate by compressed air controlled by electro-magnetic valves. The cam group comprises a number of switches mounted on a single shaft

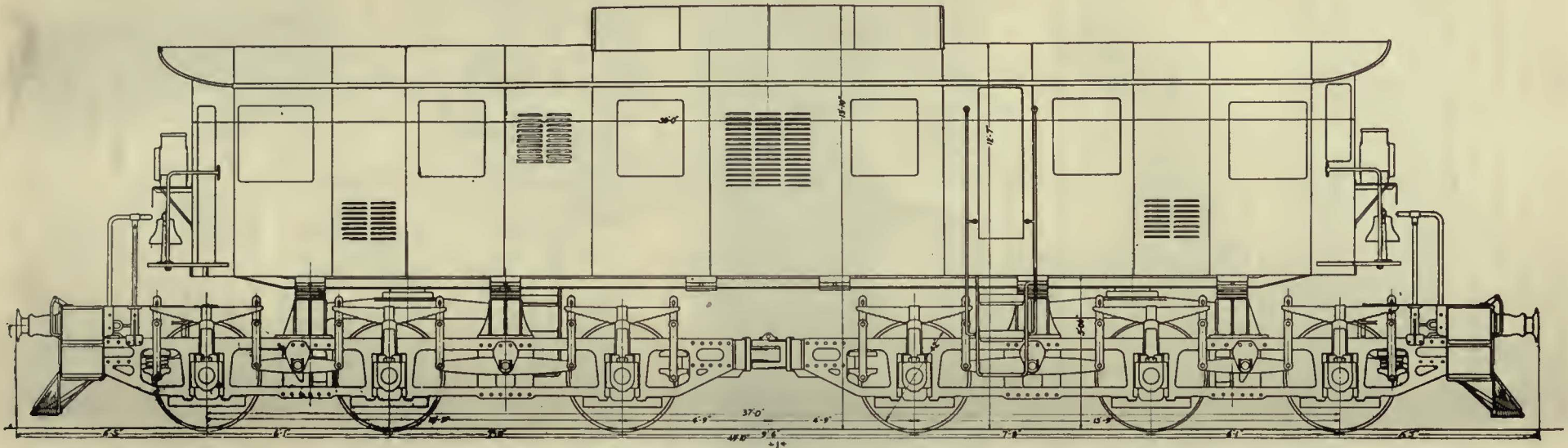
ratio of 3.94 to 1. The sixteen-tooth solid pinion of 2 diametral pitch is cut from a forged steel blank and treated. The sixty-three-tooth gear is of the flexible type, similar in general design to those which have been in successful operation on the Pennsylvania Railroad's Philadelphia terminal electrification for seven years.

For low-voltage supply to compressors, blowers, control equipment and lights a motor-generator set is installed in the locomotive. This has a single frame and the two armatures are carried by a common shaft running in two bearings. The 3,000-volt motor is a bi-polar double-commutator machine. The continuous rating of the generator is 35 kw. at 92 volts.

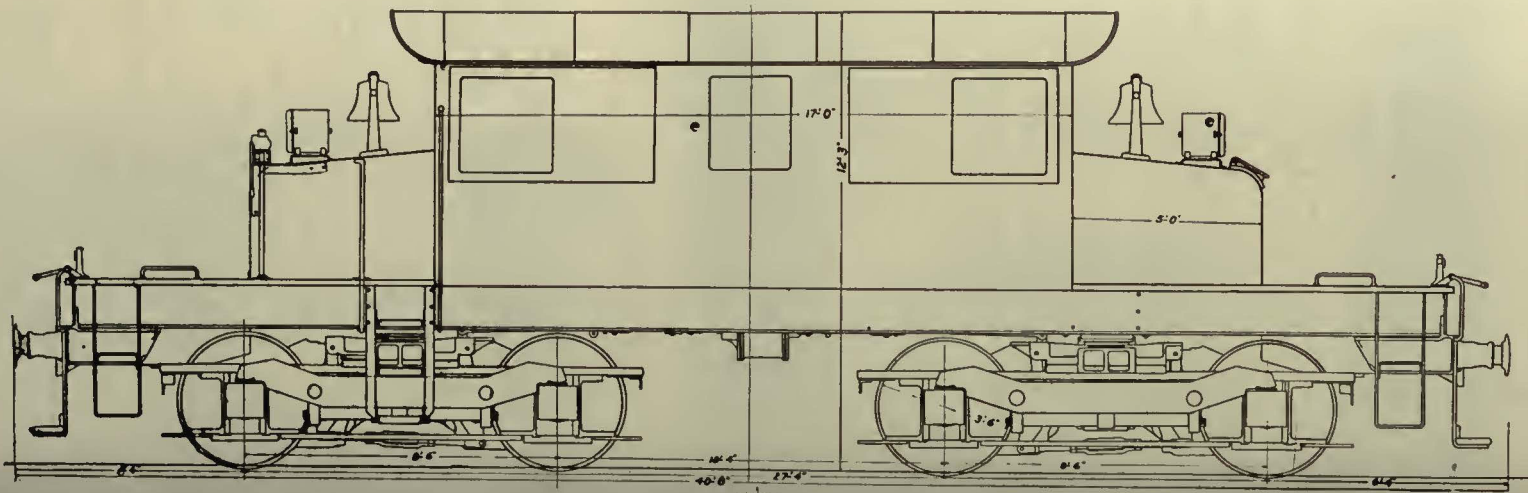
To provide for double-end operation of the locomotive a master controller is located in each engineman's compartment, the same one being used for both motoring and regenerative braking. This controller has four levers: a reverse lever with forward and reverse positions; a regenerative lever with thirteen notches; a motor combination lever with three positions; a speed lever with sixteen resistance notches, one full-field notch, and one short-field notch. Altogether, fifty control notches are available in acceleration so that tractive effort variations are small, thereby permitting exceedingly smooth handling of trains. All levers of the master controller are thoroughly interlocked.

By means of the Westinghouse HLFRC control three

Fifteen of These Road Freight and Seven of These Switching Locomotives  
Are Under Construction for the Chilean State Railways



Outline Drawing of the Road Freight Locomotive



Outline Drawing of the 560-Hp. Switching Locomotive



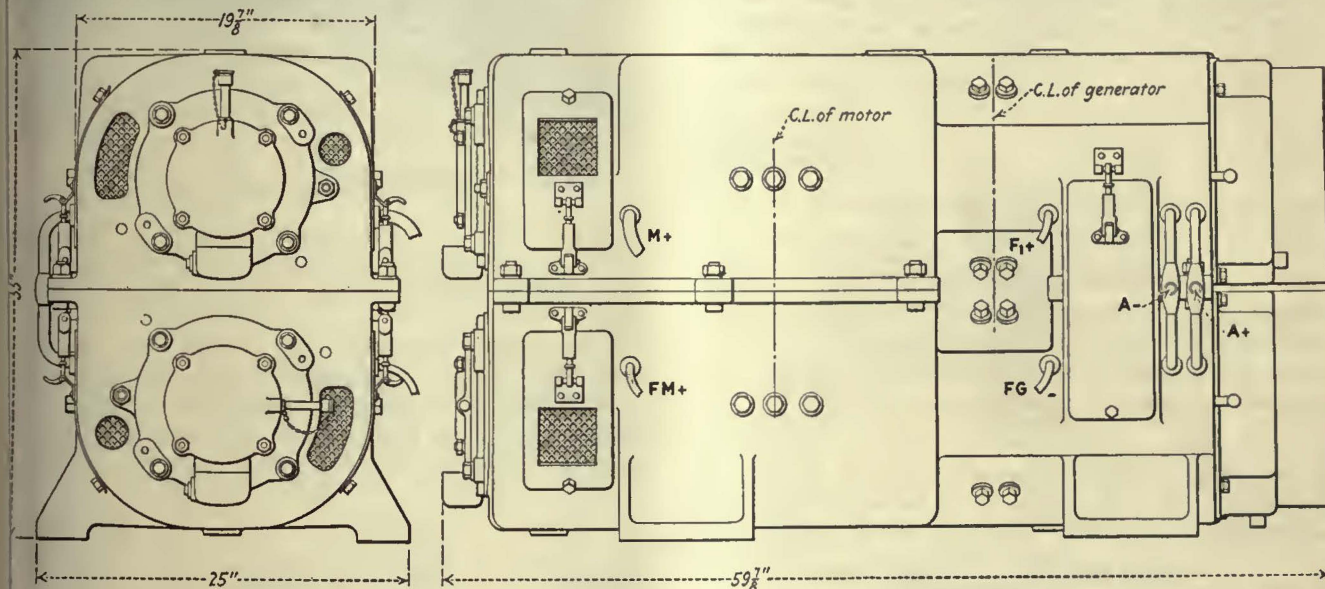
speed combinations will be obtained by varying the grouping of the motors. With all six motors in series one-third speed will result. Two parallel groups, each comprising three motors in series, give two-thirds speed. On full speed three groups, each of two motors in series, are in parallel. All motor main fields are connected next to ground, the voltage stresses on the field windings being reduced thereby. The double-field winding on the motors, giving a full-field and a short-field position for each motor combination, provides a total of six running speeds. Transition from one motor combination to another is by the shunting method.

For regenerative braking, the main motor armatures are arranged for the same combinations as when motoring, and the motor fields are separately excited by the motor-generator set. The arrangement is such that the same voltage is impressed on all field circuits. This tends to produce the same generated voltage in each series group of armatures and assures equal distribution of the load among the motors. Stabilizing resistors are

TABLE II—DIMENSIONS AND WEIGHTS OF SWITCHING LOCOMOTIVES

Track gage.....	5 ft. 6 in.
Length over buffers.....	40 ft. 0 in.
Length over central cab.....	17 ft. 0 in.
Length over hoods.....	27 ft. 4 in.
Total wheelbase.....	27 ft. 4 in.
Rigid wheelbase.....	8 ft. 6 in.
Height, top of rail to cab roof.....	12 ft. 3 in.
Width over cab sheets.....	10 ft. 0 in.
Height of couplers.....	38 1/2 in.
Wheel diameter.....	42 in.
Weight of complete locomotive.....	136,000 lb.
Weight of mechanical parts.....	86,000 lb.
Weight of electrical equipment.....	50,000 lb.
Weight per driving axle.....	34,000 lb.

3,000 volts at the locomotive and natural ventilation of the motors the tractive effort for one hour is 19,600 lb. at 10.6 m.p.h., and the continuous capacity is 11,400 lb. at 12.7 m.p.h. With 25 per cent nominal adhesion the starting tractive effort is 34,000 lb. The maximum speed is 35 m.p.h. For short periods the equipment is capable of developing 1,000 hp. At loads corresponding to the continuous current rating of the motors, the speed will be 5.9 m.p.h. in series and 12.7 m.p.h. in series-



THE 22.5-KW. MOTOR-GENERATOR SET WHICH FURNISHES LOW-VOLTAGE POWER SUPPLY ON THE SWITCHING LOCOMOTIVES

used to equalize the resistances of the parallel field circuits. Both the exciting current and the generated current flow through these resistors. Any tendency of one group of armatures to generate more than its proportion of the current decreases the field current of that group and correct division of load is automatically restored. The range of speed in regenerative braking will be from 8 to 30 m.p.h.

Adequate provision for effective opening of the high-voltage circuits is secured by inserting the main resistance in the circuit prior to the final break at the line switches. This is done whenever the main motor circuit is opened, whether through manipulation of the master controller or under action of the overload relay.

SWITCHING LOCOMOTIVES ARE LARGELY STANDARD

The switching locomotive is similar in general design to Baldwin-Westinghouse standard Class D locomotives. The cab is of the steeple type and is carried on two swivel trucks. On each two-axle truck are mounted two motors driving direct through standard helical gears. The estimated weight is 136,000 lb. The control is arranged for double-end operation.

The nominal rating of the locomotive is 560 hp. With

parallel. With one pair of motors cut out, 50 per cent of the locomotive capacity will be available for starting and for running.

Table II gives the general dimensions and estimated weights of the locomotive.

This locomotive will be capable of handling, in yards with level tracks, trains of 1,200 short tons. This capacity, though in excess of that required for serving the initial trains of 770 short tons, is desirable to provide for the expected increase in traffic.

The trucks are of the rigid-bolster equalized type with rolled steel frames located outside of the wheels. A center pin is located at approximately mid-length of each rigid wheelbase. The central cab has an engineman's stand in each end and control apparatus centrally located and suitably protected. Buffers, couplers and air-brake equipment are duplicates of those on the road locomotive.

The control equipment comprises apparatus similar to that already described for the road locomotives.

The four Westinghouse No. 350-D-2 motors are of the series type, wound for 1,500 volts. This motor has an hour rating of 140 hp., at 79 amp. and 1,500 volts. The pinions have sixteen teeth, 2 D.P., and the solid helical gears have sixty-three teeth.

The motor-generator set has a two-part frame, each part containing two bearings in which runs a common shaft carrying two armatures, one a 1,500-volt motor (insulated for operation two in series at 3,000 volts) and the other a low-voltage generator.

The motors are connected in series for 3,000-volt operation and the generators are in parallel. With 3,000 volts applied to the motors, the generators will deliver 22.5 kw. at 92 volts. The set supplies power for the compressor motor, lights and control circuits.

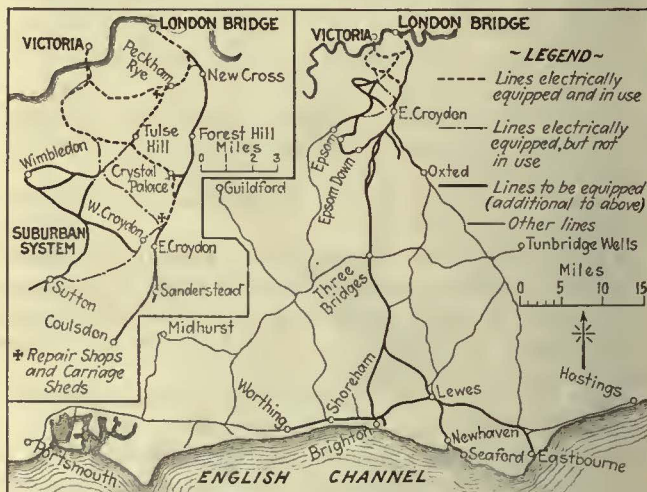
A master controller is mounted in each end of the central cab, each with a reverse lever with forward and reverse positions, and a speed lever for accelerating. A total of nineteen notches are available in operation. Shunting transition is used.

### Further Electrification Promises Congestion Relief

SIR PHILIP DAWSON and the officials of the London, Brighton & South Coast Railway, England, have recently made an investigation as to the possibilities of extending electrical operation on its lines. This study,

Location	Service		Percentage Increase in London Trains	Percentage Increase in All Trains, Loaded and Empty
Victoria.....	Main Line.	Electric over steam .....	220	152
London Bridge..	Main Line.	Electric over mixed steam and electric. ....	143	58
Victoria.....	Suburban..	Mixed steam and electric over pre-electric all steam .....	94	100
Victoria.....	Suburban..	Electric over pre-electric all steam.....	225	206
Victoria.....	Suburban..	Electric over mixed steam and electric. ....	68	53
London Bridge..	Suburban..	Mixed steam and electric over pre-electric all steam .....	38	21
London Bridge..	Suburban..	Electric over pre-electric all steam.....	206	86
London Bridge..	Suburban..	Electric over mixed steam and electric.....	121	53

as reported in the *Electrician*, London, showed the desirability of such extension to include not only the outer London suburban area but would reach as far



PRESENT AND PROSPECTIVE ELECTRIFICATION ON LONDON, BRIGHTON & SOUTH COAST RAILWAY

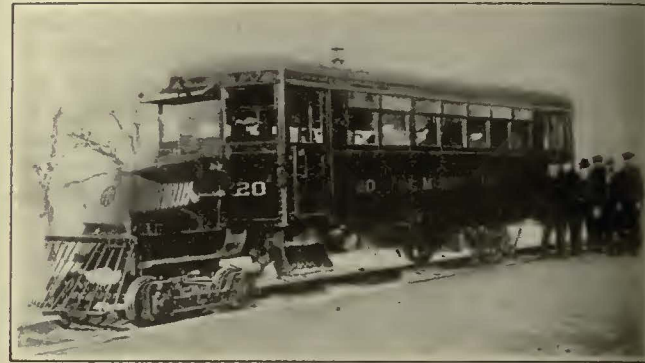
as Brighton, Eastbourne and Worthing. The plan involves the equivalent of 141 single-track miles on the single-phase system in addition to the 70 miles now in successful operation.

The accompanying table shows the estimated benefit from the electrification with respect to train-handling capacity on the congested terminal sections.

## Gasoline Rail Car Operated at 40 Cents a Mile

Another Example of the Increasing Popularity of the Single Self-Propelled Unit on Steam Railroad Sections Where Traffic Is Light and Frequent Service Is Appreciated

ON JAN. 1 of this year the Lewisburg, Milton & Watsontown Passenger Railway put into operation a gasoline rail car, which is used in regular service over the tracks of the Pennsylvania Railroad between Montandon and Mifflinburg, Pa. The distance between



THIS CAR OPERATES OVER THE P. R.R. LINE BETWEEN MONTANDON AND MIFFLINBURG, PA.

these two points is 10.9 miles. The car was delivered on its own wheels over the Pennsylvania Railroad lines from Philadelphia to Milton, Pa., a distance of 167 miles.

For February and March the car-mile cost averaged 40.23 cents, but it is expected this figure will be lowered as the operating personnel becomes more familiar with maintenance of the gasoline car. The railway company gives the following cost figures, in cents per car-mile:

	Cents per Mile			Cents per Mile	
	Feb.	March		Feb.	March
Wages.....	17.79	17.43	Maintenance (labor).....	0.59	0.58
Gasoline.....	5.93	5.38	Interest.....	4.39	3.88
Lubricants.....	0.64	0.72	Depreciation.....	9.14	8.08
Miscellaneous.....	3.19	2.30	Insurance.....	0.11	0.10
Maintenance (material).....	0.14	0.07	Total.....	41.92	38.54

The depreciation is figured on an eight-year basis, a first cost of \$16,564.03 and an approximate life of 200,000 miles. The company operates storage-battery cars over the Montandon-Mifflinburg route, and the same force has been used to operate the rail car. Two men form the rail-car crew. The motorman runs the car and assists the conductor in handling mail, baggage and express. Overhauling and repairs are handled in the shops of the company, which employs one barn man for both gasoline and storage-battery cars.

The present schedule allows thirty-eight minutes for the run of 10.9 miles, the stops averaging about 1½ to the mile. The run is divided up into four fare zones, the fare in each being 7 cents. Railroad tickets are honored when presented, and the Pennsylvania Railroad reimburses the company for them at regular zone rates.

The car seats forty passengers, thirty-five in the passenger compartment and five in the baggage compartment. The body was built by the J. G. Brill Company, Philadelphia, and is mounted on a Mack A.C. chassis with a 22-ft. wheelbase. The car is 9 ft. 8½ in. wide and 27 ft. 11½ in. long, both over-all dimensions.

## Zone Passes for Beaver Valley

The Fare per Zone on a Cash Basis Is 5 Cents, but Unlimited-Ride Service on Transferable Passes Has Been Made Available for Rides Covering One, Two or More Zones

THE Beaver Valley Traction Company, as described in the *ELECTRIC RAILWAY JOURNAL* for April 9, 1921, is a cross-country electric railway with a main line 9.5 miles long between College Hill and Leetsdale and several other routes. With the Pittsburgh & Beaver Railway, there are 26 miles of route. The population of the entire district is about 64,000 and of the largest community, Beaver Falls, 13,000.

In pre-war days this railway was on a 5-cent zone basis with zones up to 6 miles. The first fare changes were to 6 and 7 cents respectively with no change in the lengths of zones. As these higher fares did not produce the necessary increases in revenue and also cut down the number of customers, the company returned to a basic fare of 5 cents per zone, but the length of zone was cut to an average of 2 miles. This kept the fare within the limits of the towns served to 5 cents.

The 5-cent, short-zone plan proved the best plan tried up to that time, but unluckily soon thereafter came the depression, which hit the Beaver Valley so hard that traffic for eleven months ended Nov. 30 compared with eleven months of 1920 showed a loss of 18 per cent despite 10 per cent more service and no increase in fare. In these circumstances, W. H. Boyce, general manager of the railway companies, decided to sound the public before making any further changes in fares or service.

To this end, he sent out copies of the accompanying questionnaire to the larger employers of labor in the district for distribution among their people. The answers to these questionnaires showed where a large proportion of the employees lived, where they were employed, where they boarded the car, whether they owned or made use of fellow workers' automobiles, what they thought of the trolley service and whether they would be likely to buy a transferable, unlimited-ride weekly pass.

Disregarding, for the present article, the questions and answers relating to cars and service, the poll on the fare queries brought out the fact that (a) some people rode to work but not from work; (b) few rode home to lunch but would do so if the fares were lower; (c) some had stopped using the cars although comparatively few had automobiles or used the machines of their friends; (d) people who happened to live rather close to a zone boundary protested against the 10 or 15-cent fares which they had to pay for comparatively short rides each day.

Of course, the fact that the answers showed the writer's place of employment and of residence made it possible to judge whether he really was a good prospect for unlimited rides a day at more advantageous rates of fare.

After the information from this questionnaire had been compiled, the company printed a little folder of acknowledgment and explanation which it distributed to passengers through boxes in the cars. It took up the principal points of which complaint had been made and offered a few words of explanation about them. Thus, to the criticism that fares were high, the circular pointed out that it is impossible at this time to reduce

the charge per ride except when rides are purchased by the wholesale, as by a weekly pass. Complaints that the safety car was not desirable were answered by the statement that it was a modern car, more than 5,000 of them being in operation in the United States and that it was a means of keeping the railway service going in a great many communities or of giving a more frequent service. Reasons beyond the control of the company for car delays were given, and passengers were urged to investigate the advantages of the pass.

### ZONE-FARE TICKET MACHINE HELPS GREATLY IN TRAFFIC ANALYSIS

As explained, when the zone system of fare collection was begun the plan followed was to collect a new fare at each zone boundary. Upon the introduction of one-man safety cars on the Beaver Valley main line—which has seven active zones throughout the year and eight in summer—the company installed the Shanklin machine



A TWO-ZONE WEEKLY PASS

for issuing zone-fare receipts, as described in the *ELECTRIC RAILWAY JOURNAL* for Nov. 26, 1921. The records from this machine were of the greatest value in working out fare alterations because they show for any desired run, day or week, the origin and destination of every passenger.

For example, the analysis of Route 2001, the main line, for Friday, Dec. 16, 1921, showed:

- 3,933 passengers rode within one zone
- 1,348 passengers rode within two zones
- 217 passengers rode within three zones
- 78 passengers rode within four zones
- 96 passengers rode within five zones
- 102 passengers rode within six zones
- 4 passengers rode within seven zones

These figures alone indicated that it was hardly worth while to get out a special form of transportation ticket for any ride exceeding three zones, even if that class of traffic would be doubled thereby. In addition, the Shanklin records also permitted the separate classification of each set of zone passengers, the one-zone riders on Route 2001 varying from 1,519 to 86 in number, according to the location of the zone. This gave a clue to the further elimination of special transportation.

An analysis was also made of the steam railroad

**PLEASE FILL THIS OUT**

If you want a lower street car fare please fill out this blank, answering each question, as it is material to us in making a survey of the conditions. Your filling out this blank may result in our adopting a ticket method by which you will feel justified in using the street cars more frequently

By what plant/are you employed? \_\_\_\_\_  
(Give name and location by street and No.)

What is your name? \_\_\_\_\_

What is your house number? \_\_\_\_\_ On what street do you live? \_\_\_\_\_  
In what town? \_\_\_\_\_

Do you ride the cars to your work? \_\_\_\_\_

Where do you board the car going to work? \_\_\_\_\_

At what time of day? \_\_\_\_\_

Do you ride home from work? \_\_\_\_\_

Where do you board the car? \_\_\_\_\_

At what time of day? \_\_\_\_\_

Do you now ride home to lunch? \_\_\_\_\_

Would you ride home to lunch if the fare is reduced? \_\_\_\_\_

About how much do you spend for all of your street car fares, per week? \_\_\_\_\_

Do you own an automobile? \_\_\_\_\_

Do you use it to go to and from your work? \_\_\_\_\_

Do you carry other workmen with you? \_\_\_\_\_

What is there about our service that is not satisfactory to you? \_\_\_\_\_

If we sold a pass for a certain amount that would permit you or any member of your family to ride as frequently as you might wish, would you be likely to buy such a pass each week? \_\_\_\_\_

With the question of a reduced fare for the worker to be considered, won't you help us reach a decision by filling out this card?

We thank you.  
 THE BEAVER VALLEY TRACTION COMPANY  
 and  
 THE MANAGEMENT OF THIS PLANT

SETS OF THIS QUESTIONNAIRE WERE SENT OUT TO EMPLOYERS FOR DISTRIBUTION AMONG THEIR EMPLOYEES

commutation service and rates in this territory with a view to seeing if any of it could be transferred to the electric railway. It was found, however, that the bulk of this business is done during the rush hours and is handled at such low rates that they could not be met by the electric railway. For the runs exceeding three electric railway zones, also, the steam railroads offer a big advantage in speed to all who live reasonably near the stations.

**A VARIETY OF ZONE PASSES ADOPTED**

As the result of these several studies, the company decided to install an adaptation by Walter Jackson of the unlimited ride pass first suggested by him for Racine, Wis., and since installed at Kenosha, Youngstown and Fort Wayne (Feb. 28, 1922). Actually, the Beaver Valley passes as inaugurated on Feb. 13, 1922, strongly resembled the station-to-station season ticket of the London Underground Railways, since instead of being universally valid over all parts of the railway they could be used only between the points shown on the pass. This naturally made the pass less attractive because it may not meet the social or amusement direction of travel desired by the same person who finds it handy for his home-job riding. To meet this condition, the \$2 three-zone pass is now good for unlimited riding in either direction.

The number of passes originally installed was twenty, made up of:

- 1 school pass .....\$0.75 per week
- 11 one-zone passes .....\$0.85 per week
- 6 two-zone passes .....\$1.60 per week
- 2 three-zone passes .....\$2.00 per week

The experience of the first four weeks showed that in some cases the number of passes sold of a given kind did not make it worth while to print so many varieties. The company is prepared, however, to sell

from its office any combination on demand. For these rarer styles, a rubber stamp for zone identifications will answer. The revenue from the sale of passes has increased from week to week. The whole plan is simply an effort to promote good will, and give the public every possible opportunity to make more use of the company's facilities.

The pass procedure is very simple. On boarding or leaving either a one-man or two-man car, the passholder shows his pass, which bears the zone designations in either numerical or letter form, according to the route. On leaving, he shows it again. The figure "7," in the cut on page 673, is simply for the seventh week of the year. In addition to the zone designations (single or combination), the card carries the names of the boundaries. It will be understood that a passholder can ride beyond the boundaries shown on his pass merely by paying for the excess zones in cash via the locked farebox.

Of course, the ideal scheme would be to sell passes good for one, two or more zones on any part of the line, but this would involve so much checking that it would be impracticable on a one-man car. With the present plan, there is absolutely no addition to the work of the operator. In fact, his work is reduced because every pass ride means one fare transaction and receipt issuance less.

Because of the double visé of the pass, it is not necessary to change the colors frequently or to use different colors for different zones. The small number of each kind required also demands simplicity from

the standpoint of the printer's bill. Mr. Boyce has solved the problem of pass cost neatly enough by selling the space on the back to the local lighting company at a figure that eliminates this factor. A word or two is in order on the principle used in fixing the prices of the passes. That of the one-zone pass is 85 cents, which is equivalent to seventeen rides a week or practically three rides a day. In such small communities as are served by this company, a pass-holder can readily average four rides a day by making it his business to go home to lunch or ride instead of walk in the evening or on holidays. Thus, he gets his two off-peak rides at half price.

The price of the two-zone pass was set at \$1.60, which is equal to sixteen 10-cent rides a week. The concession is slightly greater because of the greater revenue paid per trip and because a two-zone rider will be likely to average fewer extra rides outside of the "home-job" trips. The cost of the universal pass is \$2 or the cost of thirteen and one-third rides, since this class is likely

RUN HOME AND SPRUCE UP  
**GOT A DATE Use That Weekly Pass**  
 BEAVER VALLEY TRACTION COMPANY W. H. BOYCE, General Manager

**GOING To the Basket Ball Game?**  
**USE THAT WEEKLY PASS.**  
 Beaver Valley Traction Company  
W. H. BOYCE, General Manager

**RUN DOWN TOWN GET ICE CREAM FOR SUNDAY DINNER**  
**USE THAT WEEKLY PASS**  
 Beaver Valley Traction Company  
W. H. BOYCE, General Manager

THE PASS WAS WELL ADVERTISED BY THESE AND OTHER NOTICES IN THE DAILY PAPERS

**Street Car Fares Way Down Now**

**Ride on a Weekly Pass**

All the Riding You Want for a Solid Week at About What You Spend Now

- 1 Zone \$0.85.....for a Weekly Pass
- 2 Zones \$1.60.....for a Weekly Pass
- 3 Zones \$2.00.....for a Weekly Pass

A Hundred Rides for Two Dollars

They Now Cost You Fifteen Dollars

We can make this enormous reduction when we are assured of so many rides each week. A certain volume of Pass sales will remove the uncertainty from our business. You are to profit by this.

**If You Want This Reduced Fare Buy Your Weekly Pass Now and Buy One Each Week**

The pass is probably the only way by which we will be able to reduce the present fare within a period of several years.

**We Believe You Should Have Some Reduction in Fare**

We want to bring down the cost of living. We believe the wholesale purchaser of rides should have some reduction in fare. After months of study, in which we were assisted by many local manufacturers and their employees, and the most prominent fare expert in this country, Mr. Walter Jackson, of New York, we have decided on the adoption of the Weekly Pass. Our receipts are running 22% behind last year's, but still we can't close down and wait for business to pick up. We are going out after business even with this enormous reduction in rate.

**We Want You to Know that We Want Your Business**

It is essential to your own prosperity that the transportation lines of your community prosper. Suppose we shut down two weeks or three to six months every year? What kind of a community would this be?

**Do You Appreciate that We Never Shut Down?**

That always, day and night, the loyal street cars are at your service? Good times and slack times, rain, snow, fog, in cold or hot weather, always ready to take you anywhere on our lines. If you appreciate it

Buy Your Pass On Sale Now by all Conductors

**Buy a Weekly Pass**

**Ride as Often as You Can**

BEAVER VALLEY TRACTION COMPANY

W. H. BOYCE, GENERAL MANAGER.

Buy Your Pass On Sale Now by all Conductors.

**WHY REGULAR RIDERS SHOULD BUY THE PASS**

to take still fewer excess rides; nor will many steam railroad commuters be likely to change over.

Although the number of passes in use was twenty, the number of applications was greater, inasmuch as some of the passes are good between specified points on either the main line or the Riverview line (Route 2005). This arrangement also gives the passholder a more liberal use of his transportation than otherwise. No attempt has been made to record the number of rides taken on each kind of pass, but each kind could be recorded in turn purely as a matter of curiosity, if desired.

**NO MEANS OF PUBLICITY LEFT UNTRIED**

Mr. Boyce is known as one of the country's strongest believers in, and practitioners of, publicity. An inspection of the window cards, dasher placards and newspaper advertising would reveal that he revealed in the opportunity for good will offered by the unlimited-ride pass. The newspaper advertisements, in particular, display his direct, candid way with present and prospective customers. Among the varieties of copy used was the curiosity type, as in the one headed "Coming .....WE---- PA-- ....What Is It?"; the personal

style, as in the one reading "Got a Date? Run Home and Spruce Up. Use that Weekly Pass"; the timely variety, as "Going to the Basket Ball Game?" and a "Go" advertisement urging some of the many uses as: To work, to bowl, to see "honey-bunch," to church, to school, to visit the well, to visit the sick, to the lodge, to the club, etc.

Both the problem of selling the pass and of advertising its uses are complicated by the fact that the shoestring layout of the Beaver Valley system demands a variety of passes. For this reason, one cannot expect at any time the same high range of percentages of sales and use possible with a universal city pass. The fact that the base fare is the convenient nickel also tends to restrict pass sales in comparison with systems with higher and more cumbersome rates of fare.

**Wages Lag in Living Cost and Price Declines**

**A**NALYSIS of changes in wages and commodity prices and in living costs throughout the United States from 1914 to 1921, made by the J. L. Jacobs Company, engineers, Chicago, shows that wage increases ran ahead of living costs in 1918, and that at the peak early in 1920 average wages had increased approximately 134 per cent over 1913, while the cost of living increase for the same period was about 116 per cent. Since then both living costs and commodity prices have declined much more rapidly than the wages of employed industrial workers. Digests of wage changes during 1921, made by this organization, cover reports from 1,026 establishments and industrial groups in practically every key industry in the country and show average wage reductions during the year 1921 of 16.1 per cent for over 5,000,000 workers.

Data from the 1026 establishments and industries show that approximately 4.7 per cent report reduced wages 30 per cent or over, 8.6 per cent reduced wages between 25 per cent and 30 per cent, 24.2 per cent reduced wages between 20 per cent and 24 per cent, 18.2 per cent reduced wages between 15 per cent and 19 per cent, 34.1 per cent reduced wages between 10 per cent and 14 per cent, and the balance of 10.2 per cent made wage reductions of less than 10 per cent.

Classified according to industries, the data show the largest reduction in the meat packing industry. There the average reduction has been 25.5 per cent for the 200,000 workers in that industry. The reductions then taper off to 14.8 per cent for approximately 140,000 street railway and other utility employees in 161 cities, approximately 12½ per cent reductions for railroad and express employees and an average 16.4 per cent reduction for over 866,000 employees in miscellaneous establishments and industries.

Among the public utilities, wage reductions reported show that of the 161 organizations thirty-five reduced wages 5 per cent to 9 per cent, fifty-seven reported reductions of from 10 per cent to 14 per cent, thirty-one from 15 per cent to 19 per cent, twenty-six from 20 per cent to 24 per cent and twelve reduced wages over 25 per cent. Some of the larger street railways reporting reductions were in the cities of New York, Philadelphia, Brooklyn, Boston, San Francisco, Detroit, Cleveland, Pittsburgh, Denver, Los Angeles, Seattle, Albany, Indianapolis, Buffalo, Milwaukee, Omaha, Topeka, Council Bluffs, Salt Lake City, Mobile, Ala.; Fort Wayne, Syracuse, N. Y., and Newark, N. J.

# Control Equipments for the Frankford Elevated

## Electro-pneumatic, Battery Operated Unit Switch Control with Many Special Features Was Chosen —Interchangeability with Existing Equipments of Market Street Lines Can Be Had with Few Changes

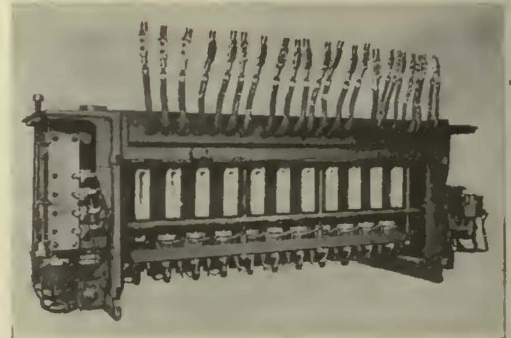
THE control equipments for the cars for the Frankford Elevated line in Philadelphia will include all features necessary for extending subway as well as elevated service. The use of storage batteries insures an uninterrupted supply of energy for the motor control, the emergency lights, door engines, signals and other devices necessary for efficient and safe operation in underground service. With the motor control fed by a storage battery, the train may be stopped in an emergency by reversing the motors regardless of the availability of line voltage. Also the source of control energy not being dependent on the power available on the head car of a train makes it unnecessary for the motorman to operate the train from the second or third car when the main power fuses are blown on the head car, thus eliminating one source of delay encountered in elevated service where battery control is not used.

Another consideration in which battery control has apparent advantages is in regard to reliability of regular operation. This is insured, since the comparative low voltage of the storage battery practically eliminates control failures due to insulation breakdowns, and the low voltage is not dangerous to life.

The unit-switch control equipment includes twelve Westinghouse electro-pneumatic unit switches of the HL type for effecting the principal changes in the main motor circuits, and also for overload protection. Eleven of the switches are grouped together into a main switch group, on the ends of which are mounted the drum-type motor reverser and the control sequence drum. In addition to the main switch group, another similar unit switch is mounted in a separate frame, with the arc chute venting to atmosphere. This unit serves as a line switch, opening on overload as well as interrupting the circuit under normal conditions. On

the ends of the line switch are mounted the overload trip relay, line switch operating relay and the notching relay.

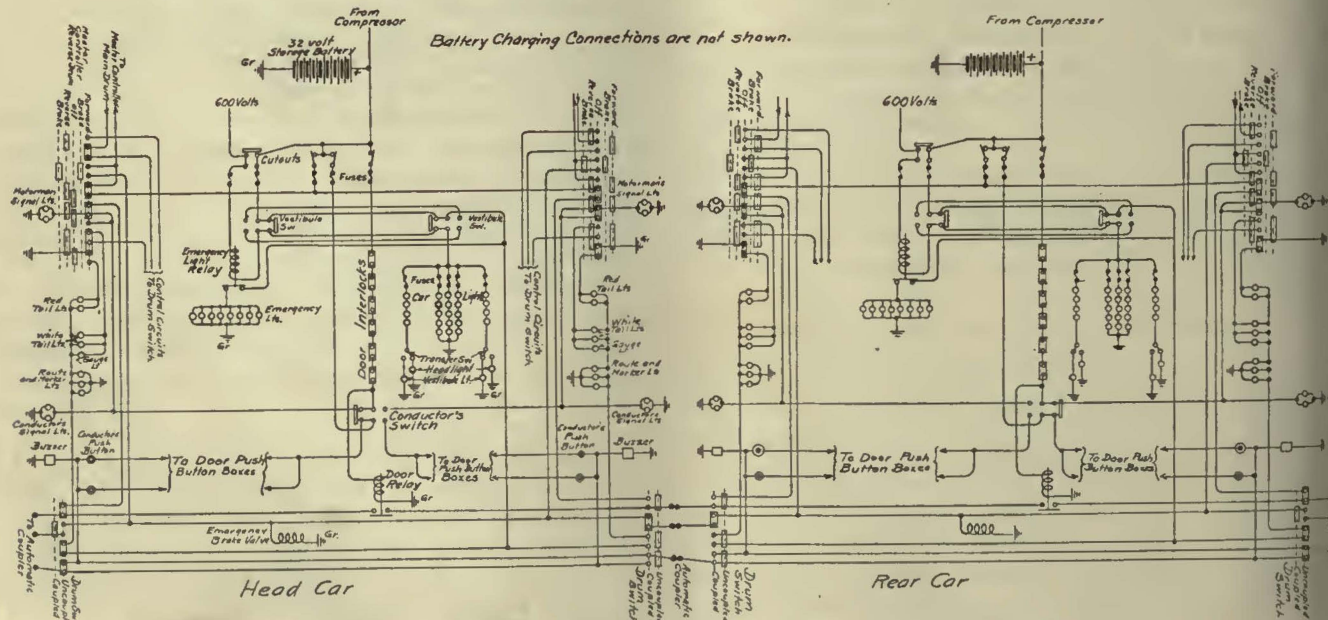
Automatic acceleration is accomplished by a current limit relay governing the movement of the sequence drum and thus energizing the unit switch magnet valve coils in a certain definite sequence. For the specific manipulation of the main circuits during acceleration, six steps are provided with the motors connected in



SWITCH GROUP—REVERSER AT END

series, four steps with the motors connected in parallel, and the closed circuit or bridging transition between the series and parallel connections. The normal or tapped field connection of the motors is effective on the last full parallel running step.

The grouping of the unit switches, with their supplementary control apparatus, into two boxes gives an assembly which is compact, yet fully accessible for maintenance or inspection purposes. The use of separate electro-pneumatic unit switches for all main circuit switching provides accurate means for control of the acceleration in trains. The compressed air required



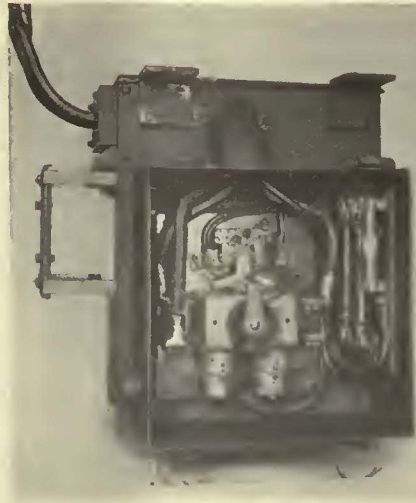
SCHEMATIC DIAGRAM OF LIGHT AND SIGNAL CIRCUITS FOR A TWO-CAR TRAIN

for operating the switches is taken from the common air brake supply through a reducing valve to give a normal pressure of 70 lb. per square inch.

Control power for operating the electro-pneumatic apparatus is taken from the 32-volt storage battery that is charged in series with the compressor motor. A train line circuit connects in parallel the positive poles of all batteries of a train and the control power is led from this common train line connection to a master controller at each end of the car. The master controller is provided with two handles, a main accelerating handle permanently attached to the controller and a removable reverse handle for controlling the direction of car movement. The two handles are mutually interlocked so that the main handle cannot be moved unless the reverse handle is in one or the other operating position. The movement of the reverse handle energizes the master controller drum from the control circuit supply and establishes circuits for the "Dead-man's" operation of the brakes and for the signal and marker light circuits. The emergency or "dead man's" application of the brakes from the master controller is secured both electrically and pneumatically. The main handle of the master controller has an upward movement whenever the motorman's hand is removed. This releases the fingers on the upper positions of the reverse drum and closes the circuit to the emergency wire of the air brake system. The same upward movement of the handle releases a small air valve in the top of the controller which operates a secondary relay valve that exhausts air from the brake pipe of the train.

From the master controller, the control power is led to a train line from which the circuits are taken to the various unit switches and allied operating devices. Provision is made for cutting out of service any defective car in a train by means of a small drum type control cutout switch mounted on the panel board at one end of the car and connected in the circuits to the control apparatus. The train line runs to automatic electric couplers attached to the drawbars of the car. The train line contacts on the face of the coupler are energized through a separate drum switch which is operated when the cars are coupled in train to connect both air and electric train lines. Ten of the eighteen train line circuits in the coupler are utilized for motor control purposes, five for the electro-pneumatic air brake circuits, two for signals and one as an extra for any future extensions to the auxiliary circuits.

Protection for the control equipment is provided by the main and third rail fuses in conjunction with the overload trip relay and the high speed-line switch. The line switch opens at an extremely high speed in response to the overload relay, or due to a sudden drop in line voltage, which usually accom-



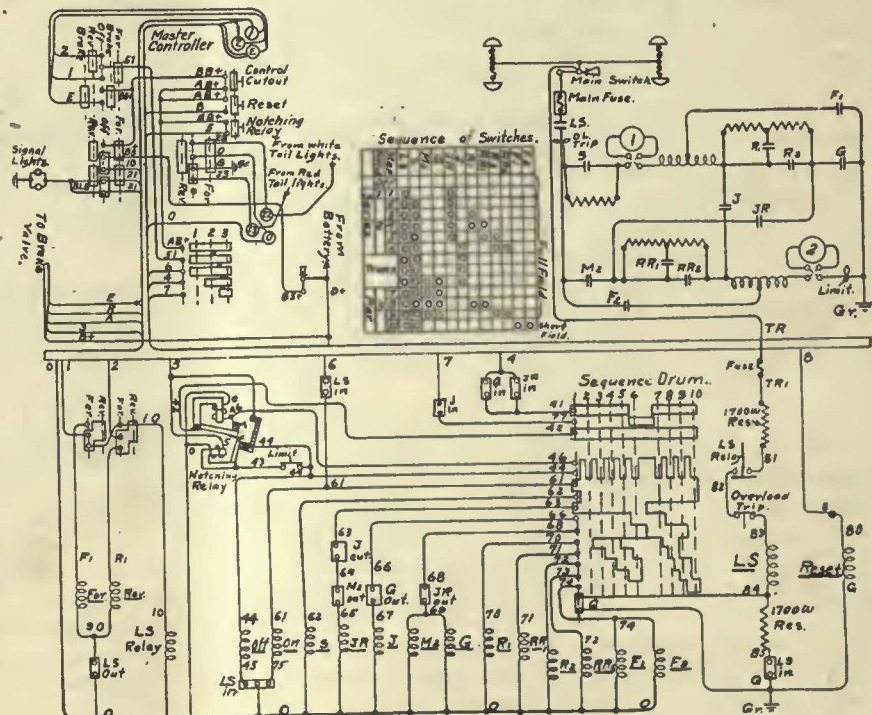
OVERLOAD TRIP RELAY OF LINE SWITCH



NOTCHING AND OPERATING RELAYS OF LINE SWITCH

panies the sudden and very severe momentary loads that occur on third rail systems. A high-voltage surge usually follows immediately after the sudden voltage drop and the high speed of the line switch enables it to open quickly so as to protect the motors against the voltage peak. Operating the high-speed line switch by trolley voltage insures positive opening on the momentary interruptions of power when the train is passing at high speed over gaps in the third rail. In this way, the power circuits are opened locally on each car after passing each gap and the control operates automatically just as when starting the car, thus preventing flashing of the motors and surging of the cars in the train.

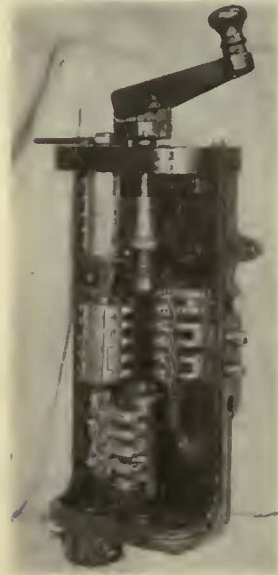
The overload trip relay has two operating coils, each connected in the circuit to one of the motors. The relay operates at the same overhead current value per motor with the motors in either the series or the parallel combination, thus allowing closer adjustment and better overload protection than would be obtained if a relay



SCHEMATIC CONTROL DIAGRAM OF FRANKFORD ELEVATED CARS

with a single operating coil were used and connected in the main power circuit to the third-rail shoes.

The sequence drum is essentially a secondary master controller that operates on the balanced-air principle, having the usual on and off magnets for regulating the admission and release of compressed air to the double-end piston which is geared to the contact drum. The drum is advanced automatically, notch by notch, by the "off" cylinder, being intermittently charged and discharged by the limit relay energizing or de-energizing the "off" magnet circuit. In addition, the sequence



MASTER CONTROLLER

drum, in combination with the notching relay, provides means for securing non-automatic notching of the control independent of the limit relay. This operation becomes necessary only under exceptional circumstances, such as accelerating a train after it has stopped on the grade when coming from the subway to the elevated structure, or in a two-car train when one car has been cut out of service.

The notching relay is mounted on the line switch. It comprises essentially two relays mounted at right angles with the contacts interconnected so that notch-by-notch operation can be obtained when desired by intermittently energizing one of the relay coils from a push button located at the side of the master controller. The other relay coil is connected to the limit and sequence drum circuits so as to be energized each time the sequence drum advances a notch, which insures that the drum will pause momentarily on each notch during automatic acceleration.

There are eight tail lights per car, located in groups of two beneath the window rails at each end of the car. One of the 20-watt lamps of each pair is provided with a white lens, the other with a red lens. The interlocking in the master controller and drum switches is such that when the cars are coupled, the lights are automatically disconnected at the coupled ends, but the white lights show at the head end of the train where the master controller reverse drum has been operated, and the red lights show at the rear end of the train. The marker and route indicator lights on the ends of the car are also arranged to be lighted only at the head and rear of the train. This arrangement reduces the drain on the battery to a minimum, and also insures that the proper lamps are always lighted without special attention on the part of the train crew.

The motorman's and conductor's signal lamps are located at each end of the car in plain view of the motorman inside the car and the conductor outside between the cars. The lamps at the conductors' station between cars burn when the doors of the adjacent cars are closed, and at the motorman's station when all the doors are closed throughout the train. This selection of circuits is made by means of a conductor's switch and a relay on each car connected in series with the door interlocks on the car. The relay contacts throughout the train are connected in series by a train line circuit, which receives its energy through the

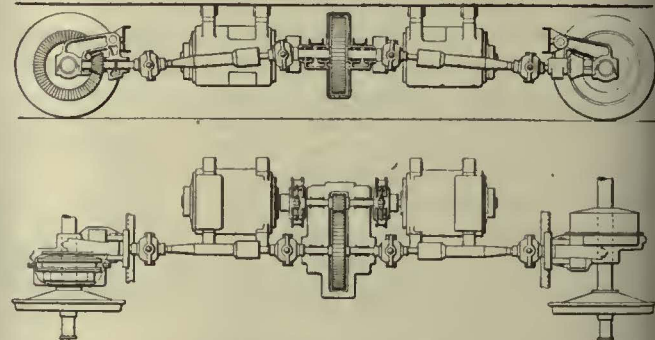
master controller reverse drum and coupler drum switch at the rear of the train. This scheme places comparatively few interlock contacts in series throughout a long train, thus reducing to a minimum the chances of signal failure from open circuit or excessive voltage drop. In case a door cannot be closed completely, thus preventing light signal indications, the buzzer system insures that the motorman receives the starting signal. The buzzers are used at all times, being relayed from conductor to conductor, beginning at the rear of the train. The motorman starts the train upon receiving either the light signal or the buzzer signal.

### Differential Drive Radial Truck in Germany

THE Dortmund Street Railway Company has recently put in operation an experimental single-truck car with differential drive. The truck is of the radial type, and the drive somewhat similar to that on an automobile except that both axles are driven through separate differential shafts from twin motors in the center of the truck. The mechanical portions of the truck and driving mechanism were supplied by F. Krupp & Company of Essen, and the rest of the equipment by Brown, Boveri & Company. The car was put in operation in June, 1921, and according to *Verkehrstechnik* has run nearly 4,000 miles without failure.

The accompanying drawing shows plan and elevation of the system of motor suspension and motor drive. The truck has a wheelbase slightly over 13 ft. Owing to the nature of the drive, the axles can take a radial position when the car is passing around a curve, and no difficulty has been experienced in driving this car at a speed of 22 m.p.h. around a curve of 70-ft. radius.

The motors are attached to the car underframe, the



PLAN AND ELEVATION OF NOVEL MOTOR DRIVE FOR SINGLE-TRUCK CAR

flexibility between the motors and the axles being secured by two universal joints in the driving shaft. The gage is only 1 m. (3.2808 ft.). The radial arrangement would permit the car to pass easily around a curve with a radius of 50 ft. and still keep the wheelbase at 13 ft. Usually with a single-truck car and a gage of 1 m. it is not practicable to have the wheelbase more than 10 ft., and even this is productive of much grinding at the curves.

United States Commerce Reports have been rearranged and are now classified by commodities and geographically with special sections devoted to transportation, tariff, commercial law and similar subjects. The information is received direct from over 600 representatives of the United States Government in the world's industrial and commercial centers.



# Letters to the Editors

## An Appeal for a Square Deal for Electric Railways in New York

NEW YORK, N. Y., April 10, 1922

To the Editors:

Civilization is something the world has fought countless centuries to achieve. Men relish it today and struggle for its maintenance because they have come to realize that it not only is the cheapest but also the easiest way to live. Next to peace of mind what they most long for is physical comfort.

To obtain physical comfort a man pays three times the rent that he needs to pay in order to domicile himself in an apartment with elevator service. For the same reason he hires a taxicab to take him a distance that he could easily walk or, if he is a man of means, he rides to his office mornings in his limousine when the subway, the elevated lines or a bus would take him there more expeditiously.

It is because of the physical comfort that it gives, with its rule that every passenger shall have a seat and there shall be no crowding, that the service of the Fifth Avenue Coach Company has become so popular. It is, in fact, the Pullman service of city transportation, and the waiting crowds along its various routes demonstrate the willingness of the people of New York to pay a reasonable price for a service which is distinctive and which assures physical convenience and comfort.

Americans are the hardest workers in the world. That is why America leads all countries in the conveniences, comforts and luxuries that it offers its people. It is bred in the bone of Americans to pay unhesitatingly for service well rendered. Briefly, such service means the efficient, proficient supplying of the conveniences of life at a cost economically sound and just.

Among all modern conveniences what is more essential today than transportation? America was the first great nation of the world firmly to weld itself together by land transportation. And for the comforts and conveniences that its great transportation systems offer its people have always been willing to pay a fair price. No American seeks something for nothing. Few Americans are blind to the fact that great aggregations of capital which have been made to render public service are entitled to a fair earning power.

We have heard much, through the press and otherwise, of what has been termed the "disgraceful overcrowding and congestion of present transit facilities." Yet here in New York, a city which enjoys the most wonderful and safest transportation system the world has ever known, there is continued insistence that a service shall be rendered at a price which represents an actual loss to those furnishing it. No other service, public or private, is demanded on such terms by our people. Fair and square in everything else, they obstinately insist on what has come to be known as "the 5-cent fare." Their attitude is so untrue to the real American spirit of square dealing that it is difficult to understand.

For the first time in our history we find our people demanding something for which they are unwilling to pay a fair price. Not only are they forcing the trans-

portation companies to economies which necessarily reflect themselves in the service given, but they are choking off the development of our subway systems, and frightening capital away from traction investments which must be made by private citizens if our rapidly growing transportation needs are to be met.

It is time for New Yorkers to think these things over, to close their ears to the wailings of the agitators and demagogues who have made our transportation system a football for their private political ambitions, and to approach the matter in the true American spirit, as other cities have done.

This, in a word, calls for the square deal; a fair price for an honest service rendered, no more, no less.

What has become of the hard common sense, as well as the sense of fair play, of the New Yorker of bygone days?

M. A. SCREEBER.

## Standardized Methods of Employment\*

BUREAU OF PERSONNEL RESEARCH  
CARNEGIE INSTITUTE OF TECHNOLOGY

PITTSBURGH, PA., April 3, 1922.

To the Editors:

I have been interested to note that electric railway men are showing increasing interest in the scientific selection of men for their services. The interest in vocational selection methods generally is rapidly increasing. Evidence of careful study of means of improving the quality of employees comes from every direction. The question of getting the best men and women available is not limited to employees, as that term is usually understood, but extends to the need for better minor and major executives. All of us have realized the importance of the problems connected with obtaining satisfactory employees, but until the last few years we have been helpless in the face of the complexities involved. That electric railways are also interested in better selection is only evidence that they too wish to be in the forefront of this new movement.

My own belief is that the increasing importance attached to selection is being brought about by the rapidly developing appreciation of the business value of good will and satisfaction. "The public be damned" policy, or caustic criticism of the individual employee or of the transportation system in general, is giving way before constructive suggestions from public-spirited men, before the selection of "boosters" as employees and before carefully planned instructions on how the public can make the transportation system more efficient. One passenger crosswise in a car either in temper or actual position; one tired, cross platform man, can do more to destroy efficient service and satisfied patrons than a whole fleet of trucks stalled on the tracks. The adjustment of the human element is of utmost importance.

For these reasons I wish to commend the *ELECTRIC RAILWAY JOURNAL* for opening its pages to a discussion of the problems of selection as applied to platform men. I have read with interest the discussion of the report of a committee of the American Electric Railway Transportation & Traffic Association on this subject, and I have also enjoyed reading Dr. Gradenwitz's interesting

\*The author of this letter was one of the compilers of the "Army Mental Tests" referred to in the discussion on personnel and training of transportation department employees at the 1921 Atlantic City convention of the T. & T. Association. As major in the army, he had much to do with personnel work during the war.—EDITORS.

article in the Jan. 28 issue and Dr. John Leeming's article in the March 11 issue of the JOURNAL. Both writers have done an important and suggestive service; one in calling attention to the great need for carefully planned testing procedures, the other in emphasizing the inadequacy of the usual medical, neurological and physical examinations.

#### WHAT RECORDS SHOULD BE KEPT

There are certain points that, to my mind, should be more fully emphasized in the discussion of a selection program. An extremely important consideration is the matter of records. It should be impressed upon every official of every company that no question and no test applied to a prospective applicant is so unimportant that it can go unrecorded. In the first place the application of such a principle will eliminate much that is useless or disregarded in the interview and in the routine of the employment office. The only exception to the principle that occurs to me now is the introductory conversation that aims to set the applicant at ease before the beginning of the formal interview or test series. Even this should be carefully standardized. But a more important reason for careful observance of this point lies in the need for detailed records of the medical, physical, mental, emotional and social characteristics of the applicant. Unless the routine of record keeping is regularly maintained we shall never satisfactorily establish the value of any preliminary examination. Dr. Leeming has successfully shown the importance of the medical records in several specific instances. A like importance will finally attach to the other records if properly kept.

All of us have seen personnel men, employment managers, welfare workers and even plant physicians dismissed in the last few years. One reason, among others, has been the failure of these employees to demonstrate the importance of their work. They have relied too much on the performance of routine duties and too little on the accumulation of facts. If the facts demonstrate the value of tests and of routine examinations, no official is going to risk the loss of that information. Much of this work is new and therefore experimental. Certain psychological tests and records will doubtless prove to be of no value to a particular concern. It is therefore important that careful records be available so that a distinction can quickly be made between those that are proving of distinct importance and those that are not.

#### MENTAL ALERTNESS AND EFFICIENT EMPLOYEES

One of the striking discoveries dependent on the development of mental alertness tests is that men become dissatisfied and do not perform their work efficiently if their mental capacity is either above or below that required by the nature of their tasks. All sorts of reasons may be found to explain why the employee is inefficient or resigns or must be discharged. But the evidence now available shows that the majority of these are false, and that dissatisfaction and inefficiency can more often be traced to a lack of adjustment between the capacities of the employee and the requirements of the task given him. To determine the requirements of the task is the function of the job analysis. To determine the capacities of the applicants is the function of the physical and mental measurements.

The special ability tests as described in the Jan. 28

article illustrate one important series of measurements needed. They do not, except indirectly, indicate the mental level of the applicants. An applicant could conceivably perform these acts successfully and fail to pass the course of instruction that follows; or, passing both, become an employee and there quickly find the routine of his job unbearable. Space will not permit specific illustration of just such actual results. The Bureau of Personnel Research has determined the mental level of several thousand employees of different types in the last five or six years. It has been found very difficult to estimate mental alertness without tests so that employees can be properly placed. Groups that are commonly described as of average intelligence have been shown to be, in some occupations, above, and in others below, the estimated intelligence. Physical and emotional stability factors as determined by the physician, being equal, careful determination of the mental alertness differences in groups enable us to predict progress, efficiency and satisfaction more readily and accurately.

#### RECORDING THE INTERESTS OF EMPLOYEES

Other questionnaire forms of yet more recent development enable the employment manager to determine the major lines of interest and likes of the applicant. Where there are no distinguishable physical emotional or intellectual differences between two groups, it has been shown by appropriate questions that there is a wide difference in the things in which these two groups are interested; in the things they enjoy doing over and over, and in their ways of working with others. Of course, we all recognize that platform men should not be selected merely because they are needed nor because men want jobs. But in these days of many applicants, and good ones by every measure we have so far been able to apply, it is important to forecast as far as possible the probable length of service of the men selected. Employment managers tell me that this is one of their most pressing problems now. It is therefore important now, as it always will be, to select those men who by nature and training are willing to enter the particular occupation as a life work.

#### PERFORMANCE RECORDS

It is perhaps unnecessary to point out the need for performance records and for tests in the improvement of performance with practice. So many public service corporations and private corporations as well find these necessary for promotional, disciplinary and legal purposes. Two points may be emphasized. The difficulty of getting satisfactory records of efficiency, and the need for such standards in evaluating the various records of personal history, medical examinations, psychological tests, training courses and later tests for promotion. Many tests have been discarded both by the physician and the psychologist, or by the impatient executive when no one had sufficient data to evaluate the tests. Promotions have been based on factors that bore no relation to continuous efficiency of performance on the part of the individual.

In my very brief comments, I have endeavored to emphasize certain points that, I believe, will keep these new and important aids to proper selection and placement from suffering serious setbacks at the hands of their many friends. I have mentioned two or three forms of examinations that in my opinion should be included in any comprehensive employment procedure.

they would require at most thirty minutes additional time of the applicant. But most important of all, the nature of psychological examinations ought to be determined on the basis of adequate records and sound statistical procedure.

C. S. YOAKUM,  
Director.

*The Trolley Shoe or "Slide" at Low Speed*

NEW YORK CITY, April 17, 1922.

Dear the Editors:

I happened to notice C. L. Greer's letter on the above subject, in your issue of April 15, page 641.

Mr. Greer appears to have proved by tests that the wear on the trolley wire is very much greater at low speed with the slide than with the trolley wheel, and that the extra wear is due almost entirely to increased friction at low speed.

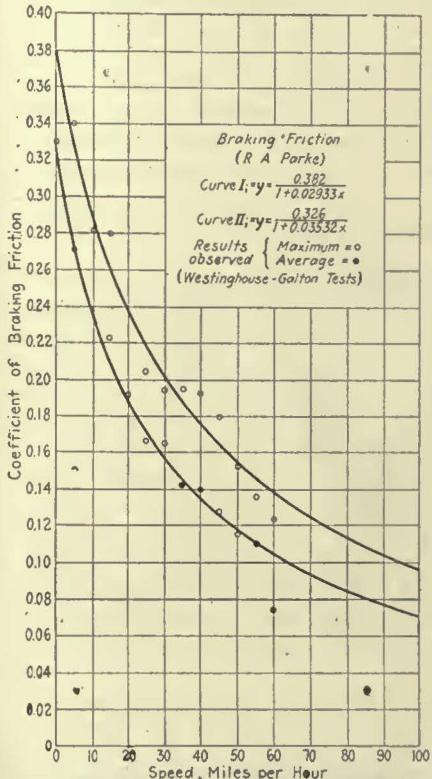
He is entirely right on both points. It may have seemed strange to him, as it usually does to most people, that the friction and wear should be greater at low speed than at high speed; but it is all right, because it is all in perfect accordance with the physics of friction between unlubricated surfaces. As a matter of fact, everybody connected with the operation of a railroad already knows something, in a practical way, about unlubricated friction, because concrete examples of it are brought to his notice repeatedly by the wear of brakeshoes and of carwheels. It is well known that the grip of a brakeshoe on the tread of a carwheel, and the wear which is caused in both the shoe and the wheel, are much greater at low speed than at high speed, with the same contact pressure. Indeed, it is precisely this fact that complicates the action of a brake involving a variation of the brakeshoe pressure as a function of the speed of the train, because a constant shoe pressure means the danger of slipping, above a certain speed, and of skidding, below a certain other speed. Now the friction between a trolley wire and a non-lubricated trolley shoe or slide is exactly of the same physical character as the friction between a brakeshoe and a wheel tread. The explanation is the same and is very simple in both cases, being the physical fact that the coefficient of friction is very high at low speeds and falls off rapidly as the speed increases.

The relation between the coefficient of friction and the "velocity of rubbing," in the case of brakeshoes, was studied exhaustively by Galton and Westinghouse more than forty years ago. The accompanying diagram, taken from the printed notes given to the students attending my lectures on electric railways, about twenty years ago, gives the principal results of the tests made by Galton and Westinghouse, as reported and collated by the late R. A. Parke, a world authority on this subject. In this diagram the abscissas represent the speed of the train or car, in miles per hour, this speed being the same as the "velocity of rubbing" between the brakeshoe and the tread of the car wheel; and the ordinates represent the coefficient of friction corresponding to different rubbing velocities. Now the sliding speed of the trolley shoe or slide is the same as the train speed and the same as the velocity of rubbing of the brakeshoe. Hence, this diagram would also represent correctly the conditions in the case of the friction between the sliding shoe and the trolley wire, if the metals which are in frictional contact in this case were the same. As a matter of fact, however, the difference in dry sliding friction obtained with different metals is not very great,

so that these curves approximate closely to the results that would be obtained from actual tests of the friction between metal surfaces of the same kind as the trolley wire and the trolley shoe. The curves will, in any case, be accurate enough to give an idea of the rapid increase in the coefficient of friction as the speed decreases.

By reference to the lower curve it is seen that the coefficient of friction is about 0.12 at 50 m.p.h. and double that value at 10 m.p.h. As the speed is further reduced the coefficient increases rapidly, being 0.28 at 5 m.p.h. and 0.32 at 0.5 m.p.h. The wear should, therefore, be the greatest at the points where the cars run most slowly, or where the greatest number of stops is made.

Comparing the points of highest speed and fewest stops on an interurban line with the points of lowest speed and of most frequent stops in cities and towns, we would be warranted, from the curves shown in the diagram, in expecting the wear of the trolley wire to be two and one-half times greater at the stopping points. It would be interesting to know whether Mr. Greer has found as great differences as this. With a lubricated trolley shoe the case is quite different, because the coefficient is then equal, as I



FRICITION BETWEEN UNLUBRICATED METAL SURFACES AT DIFFERENT SPEEDS

have shown in my lectures, to the algebraical sum of two values, one of which is on a descending curve similar to the curves shown in the diagram, while the other is on an ascending curve starting from 0 at zero speed. This means that the friction, when a lubricant is used, is made up of two kinds of friction, namely, solid or unlubricated friction, as before, but to a much lower degree, and liquid or viscous friction. The former decreases, and the latter increases, with the velocity of rubbing. The graph representing the solid friction component is of hyperbolic character, same as in the diagram, but with scales of ordinates which depend upon the condition of the rubbing surfaces, in respect to smoothness and finish, or polish, etc. The graph representing the liquid friction component is of parabolic character, the scale of ordinates depending upon the quality and condition of the lubricant. The resultant curve, representing the composite result, is a two-branch curve, having its highest point at or near "zero" speed, and which falls down to its lowest value at a very low speed and then rises as the speed increases. The scale of ordinates, in this case, depends upon both the condition of the rubbing surfaces and upon the quality and condition of the lubricant, as might be expected.

C. O. MAILLOUX.

# Electric Railway Publicity

*Devoted to How to Tell the Story*

## Illinois Travels De Luxe

THE Illinois Traction System, Peoria, Ill., is now advertising its four-car electric train which operates nightly between Peoria, Springfield and St. Louis. So inviting is the service offered, in addition to the smokeless and cinderless feature of the trip by trolley, that no doubt the ticket agent will soon acquire the haughty air heretofore known only to the box office manager of a New York theatrical success. The folder, well illustrated, talks variously of the observation compartment of this marvelous train, the club compartment, with tables for writing of cards, and the smoking compartment.

The Pullman accommodations on the train beget wonder, and in themselves could win all traffic, for each of the twenty berths is nearly 6 in. longer than in Pullman cars on steam trains. Windows are provided in upper berths, and both upper and lower berths have safety deposit vaults for valuables. The train, which was on exhibition at the midwinter meeting of the American Electric Railway Association, is 216 ft. in length, weighs 360,000 lb., and cost \$107,000. While the train was on exhibition near the Claypool Hotel where the Indianapolis meeting was held more than 10,000 persons inspected it. It received much publicity both at Indianapolis and in towns en route, where large crowds, informed in advance of the arrival of the special, collected to inspect it.

A heavy-duty sixty-ton electric locomotive is used to transport the passenger coach, sleeping car and parlor



GROUP OF DELEGATES INSPECTING TRAIN

car. Engineers of the Illinois Traction System designed the equipment and part of it was built in the company's shops. Officials of the company feel that the train demonstrates the comfort and safety of electric railway transportation and the possibilities which lie in the interchange of equipment between electric and steam lines.

Officials of electric railways in Illinois were carried to the Indianapolis meeting in the car. Throughout Illinois the train was operated over lines of the Illinois



VIEW OF THREE-CAR TRAIN AND LOCOMOTIVE EN ROUTE TO INDIANAPOLIS CONVENTION

raction System. From Danville, Ill., to Crawfordsville, Ind., the tracks of the Big Four Railway were used. At Crawfordsville the train switched to the tracks of the Terre Haute, Indianapolis & Eastern Railway.

### Sousa Concert Widely Advertised

THE Shreveport Railway utilized the local concert engagement of John Philip Sousa to advertise the convenience of the railway service. Practically the entire quarter-page advertisement was devoted to the announcement that Sousa and his famous band would play at the Fair Grounds. His program was announced in full, and a short biographical note of the conductor was contained in the advertisement.

The concert and the railway were coupled finally with the following:

The weather being inclement, you will be glad if you leave your automobile at home while attending the concerts and use the street cars. No Skid—No Danger—and much cheaper. The street cars take you to the Fair Grounds gate. You have a smooth concrete walk up to the Coliseum. Cars go to the Coliseum every seven and one-half minutes. There will be plenty of extra cars for the rush after concerts are over. Ride the street cars.

### Utility Problems Discussed Direct with Public

A SERIES of fifteen meetings with stockholders of the Public Service Corporation of New Jersey was started on April 3 when Thomas N. McCarter, president, discussed the problems of public service enterprises on the Proctor Theater roof, Newark. With Mr. McCarter were Percy S. Young, vice-president in charge of finance; Edmund W. Wakelee, vice-president and general solicitor, and Harlow C. Clark of the publicity department, who also spoke. Mr. McCarter described the meeting as the first of a series of "one night stands" throughout the State.

In the audience were 1,500 men and women. It was estimated by company officials that a quarter of these were employees and the others stockholders. Mr. McCarter made an appeal for co-operation of stockholders, and asked that the company's past mistakes be forgotten. On his part he promised to forget the sharp criticisms directed at himself, and expressed hope that eventually every customer of Public Service would be a stockholder in the concern, paying monthly bills with dividends received.

Mr. McCarter said the idea of meeting the stockholders was advanced first by the head of the Pacific Gas & Electric Company in California and that he intended to "go about the State presenting the gospel of public service in one night stands" with his associates, making friends as best they could. Telling of 58,000 holders of company securities, he spoke of their remarkable power to create public sentiment that "would stand by us if we are right and see that we get a fair deal."

"The man at the head of a public utility company who does not crave the help and co-operation of the stockholders does not deserve the authority to run a corporation," Mr. McCarter said. He declared the two campaigns his company had made to have the general public become stockholders in the company had "just touched the fringe" and he hoped to see the company's 300,000 gas and electric patrons, as well as others, take stock in the concern eventually.

He announced himself as an optimist and said now that the war's problems are practically over the corporation is emerging from its handicaps better than ever. He referred to newspaper reports to show the stock is appreciating in value, and said the great activity of Public Service securities on the New York Stock Exchange augured well for the future of the company.

The problem ahead of Public Service is to get \$5,000,000 or \$6,000,000 of new capital each year, to keep pace with the growth of business and the public demand for improved service, he said. The bond market was exhausted for company securities and investments in common and preferred stock must provide this additional capital, Mr. McCarter added.

He said handicap results when the demagogue, the politician or any one else steps in to put a stop to this flow of financial support from the public. "He only cuts off his own nose as, deprived of this aid, the company is unable to supply the needs of the public," said Mr. McCarter.

### Railway Wants to Know Sentiment of Patrons

A CAMPAIGN to determine the sentiment of residents of northern Kentucky regarding Green Line service is under way by the South Covington & Cincinnati Street Railway, Covington, Ky. Questionnaires are being placed in every home in northern Kentucky, ostensibly for the purpose of aiding the traction company with suggestions as to how to improve its service for the benefit of the public. The questionnaires also are distributed in the Dixie Terminal and boxes have been provided in the cars for the receipt of the questionnaires when filled out.

The Federated Improvement Association of Covington has issued a statement warning the citizens not to sign any papers asking for an increase in fares until they heard the people's side of the question.

The South Covington & Cincinnati Street Railway is operating under a perpetual franchise in northern Kentucky cities which fixes the fare at 5 cents. Several years ago the traction company offered to surrender its perpetual franchise and accept in lieu a twenty-year franchise with the right to increase fares. The offer was rejected by the City Commissioners of Covington and Newport.

Polk Laffoon, president of the traction company, said that the company is merely trying to ascertain the sentiment of its patrons relative to its service by the distribution of the questionnaires and is not endeavoring to get as many signatures as possible and then present a petition to the city commissions of northern Kentucky municipalities with the request that the company be given the right to increase its rates of fare.

A copy of the questionnaire is as follows:

*To Green Line Patrons:*

The development and progress of northern Kentucky depends on adequate transportation. We are trying to do our part to provide as much service and as well distributed accommodations as have been possible considering the revenue we have been receiving.

Our public relations department was organized to acquaint you with the operation of the Green Line and its relations to the development of Campbell and Kenton Counties. Through the "Topics" our problems have been explained; the difficulties which have beset us in trying to make our income meet the demands made upon it, and the uncertainties regarding future developments, have been brought out.

Requests have been made for changes, bettered and additional service, and service impossible under our present

franchises. In keeping with our endeavors to give Green Line patrons what they want and need, we desire to obtain expressions from the car riding public showing what service is wanted in each locality.

Your reply is earnestly solicited in order that we may best serve your requirements. Kindly fill in this sheet carefully, and then hand it to the conductor on your next trip or drop it in the "question boxes" provided at the Dixie Terminal and waiting stations.

1. What car lines do you ride?.....
2. How many members of your family use the cars?....
3. Is time between cars satisfactory?..... (Yes or No). If not, what would you suggest?.....
4. Are more cars needed on the lines you use?..... (Yes or No). If so, should additions be to the regular or "rush" service?.....
5. What betterments or additions would you suggest? .....
6. How far will you go to aid us in bettering service, considering facts we have shown regarding the Green Line Nickel? .....

### If It's Good for a National Advertiser It's Good for You

FOR years the Tri-City Railway, Davenport, Iowa, sold the advertising rights in its cars, but used none of this space itself. The space was always at a premium and the best known nationally advertised brands of foodstuffs and other goods were displayed there. The company also sold the right to place banners on its cars, but never used this space itself.

The year 1922 has marked a decided change. The company, in addition to selling space, has reserved some itself and every car now operating carries either an advertisement urging the public to buy United Light & Railway's prior preferred stock or educational copy.

For instance, a signboard swung in the top of the car carries these statements:

"This company has been required to invest over two-thirds of a million dollars in paving."

"In 1921 the fare of every twelfth passenger went to pay interest and depreciation on this investment and did nothing to improve the cars or rails on which you ride."

"Passengers on street cars don't ride on pavement. Seems as if the paving should be paid for by those who use it."

"Gentlemen: Fairness and consideration for the women and children require that there be NO SMOKING on this car."

On the reverse of the card is a placard like this:

"YOU WILL BE INTERESTED TO KNOW

"That last year, a year of hard times—the Tri-City Railway Company alone paid out to your community—\$461,260 in wages, or \$1,260 each day; \$134,670 in supplies, or \$370 each day; \$66,400 in direct taxes, or \$182 each day.

"That's trading in your home town, isn't it? Two-thirds of a million dollars in the year, \$75 worth every hour."

President B. J. Denman is planning to continue the advertising campaign and a series of strong arguments has been prepared which are designed to win more consideration for the utilities by the public. Thus there is presented for study the strange case of a utility company finally realizing that right at hand on its own property there is presented, perhaps, the very best medium of communication with the public. In other words, Tri-City Railway has been "sold" on its own advertising space, space which the biggest national advertisers in the country were "sold" on long ago.

### Comfort Plus!

BY PROVIDING luxury, plus service, the Kansas City, Clay County & St. Joseph Railway is keeping itself favorably before the public. Its latest appeal to the luxury complex, as Freud would term it, takes the form of a parlor and observation compartment made part of a regular car. Parties attending meetings take to this club car as through the ages the proverbial duck has



LUXURIOUS OBSERVATION END OF CONVERTED CAR

taken to the omnipresent water. The special compartment, with its soft carpet, upholstered chairs and soft draperies, provides a convenient and secluded place where conferences can be held en route from or to Kansas City, St. Joseph, Excelsior Springs, Liberty and other way points.

To charter the car a minimum of fifty round-trip tickets must be purchased at regular fare.

It takes less than an hour to convert one of the regular standard steel cars, 60 ft. in length, into the special. The six regular car seats of the rear twelve-foot compartment are unscrewed and five mahogany office chairs and three leathered folding chairs substituted. A heavy wilton carpet is used to cover the floor and is fastened with grommets and knobs. The entire equipment cost \$284.

It is a wonderful territory through which the Kansas



EXTERIOR OF TYPICAL CLAY COUNTY CAR

City, Clay County & St. Joseph road operates, a country in which there is something new to be seen on every trip. The way to see it best, of course, is from the luxurious observation end of one of the Clay County cars.

## Rail Cars Must Combine Automotive and Railroad Practice\*

BY CHARLES GUERNSEY

General Manager Railroad Division, Service Motor Truck Company

PREVIOUS to 1905, efforts had been made to build a single-unit car, team-propelled, for use on railroads. These cars were unsuccessful, owing primarily to boiler limitations. The light-fire engine type of boiler was too expensive to maintain and the locomotive type was too heavy. They had no particular advantage over the ordinary type of steam locomotives. They did not eliminate roundhouse supervision, etc. About 1910 the General Electric Company developed a car propelled by electric motors, current for which was supplied by a 200-hp. gasoline engine connected to an electric generator. A number of these cars were built, and some of them are still in service. They were not successful, however, because of the great weight, complication and maintenance expense made their operating cost almost as high as that of a steam train.

Mr. McKeen of the Union Pacific developed the McKeen car, of which probably more have gone in service than any car yet developed. Here again, however, the great weight necessitated an engine considerably larger than was commercially accepted, so that the total operating cost of the car was only slightly less than the operating cost of the steam train. Cars of the McKeen type were not popular, because the builders attempted to provide in a gasoline car the same capacity and speed supplied by the ordinary steam train, consisting of a locomotive and two cars. Wherever such capacity is required, the steam train can ordinarily be operated at a profit. The real field for the gasoline car is in service where the steam train has more capacity than is required.

About ten years ago a car was built by the J. G. Brill Company, Philadelphia, on contract for the inventor. The engine was mounted amidships, driving by silent chain to a countershaft from which the drive was by propeller shaft to two bevel gear axles, one on either truck. Cars have been built by Hall-Scott, Sargent and others.

It is generally conceded that for continuous heavy duty work engines having cylinders larger than a 5-in. bore are not commercially successful. Warp-ge, lubrication difficulties and heating of valves, piston heads, etc., become too difficult to handle. If this is correct, then the failure of the heavy cars can be traced directly to a failure to appreciate the limitations of the gasoline engine.

So much for the development by the railroads and railroad men. On the other hand, manufacturers of motor trucks have for several years equipped chassis ranging from 3-ton to 5-ton

capacity with flanged driving wheels, to adapt them for operations on rails. These cars have in general been successful. Owing to the light weight, low rolling resistance and the small engines required and in some installations to the fact that they can be handled by one man, the operating cost has been low. These converted motor trucks, however, were unduly limited in capacity and speed. There still remains a decided middle ground between the rail bus or rail car, as we have known it in the past, and the field of the steam train. It is in this middle ground that the gasoline rail car can make a place for itself, provided it is designed specifically for operating on rails. It is in no sense a converted motor truck. It represents a combination of automotive and railroad practice.

In the past the designs have been

safety, steadiness, comfort and convenience of the steam coach. This means that it should include such features of design as four-wheel pivoted trucks front and rear, full speed either direction, air brakes and safety appliances. The rail car shown here has an over-all length of about 44 ft., a seating capacity of thirty-eight, drop seats for eight in the baggage room, making a total capacity of forty-six passengers. The baggage space is 70 sq.ft. The car is provided with standard vestibule doors, saloon, comfortable seats and electric lights. Yet the total weight of this car is only 13 tons. This is less than one-third of the weight of the old-time motor cars of the same capacity, and a 60-hp. engine can be used, as against the 200-hp. engine required by the other types. At the same time a speed of 48 m.p.h. has been obtained, and a speed of 35 m.p.h. can be maintained indefinitely without damage to the mechanism. The fuel consumption is small, the car running between 5 and 7 miles to a gallon of gasoline. Because of the light weight, the car has a good acceleration, a speed of 25



GASOLINE CAR FOR RAIL SERVICE. IT WEIGHS 13 TONS AND CARRIES THIRTY-EIGHT PASSENGERS, WITH DROP SEATS FOR EIGHT IN BAGGAGE COMPARTMENT

based almost entirely on one practice, to the exclusion of the other. To illustrate the point, some of the earlier cars developed by the railroad men weighed more than 50 tons and required a 300-hp. engine, although they had seats for only from fifty to sixty passengers. They did not give due consideration to the automotive side of the design. They attempted to use a gasoline engine in a car of steam railroad design.

By careful design and the use of alloy steels, anti-friction bearings and other features proved in automotive use the weight can be materially reduced. Weight must be a minimum in order to keep the rail car requirements within the capacity of proved gasoline engines.

It is just as undesirable to forget the railroad point of view entirely. Many of the features of railroad designs are the result of almost a century of development. The designer must weigh his problem carefully, choosing from railroad practice those features which fit in with this new type of equipment.

The rail car should combine the light weight of the motor truck with the

m.p.h. being reached from a standstill in thirty seconds.

This car is arranged with two four-wheel pivotal trucks. The drive is from the power plant located forward, through an auxiliary transmission contained in the bolster of the front truck, to the two axles of the front truck. The auxiliary transmission is so arranged that either one of two pairs of gears can be used to transmit the drive, thus giving in effect two high gears. One of these gears is proportioned for the ruling grade on the particular railroad where it is to be used, while the other gear is proportioned to give a maximum speed in straight-away operation.

The success of the rail car, after all, hinges primarily on the engine. The car must be designed with this thought always uppermost. The engine must stand up under the severest service. It must be capable of operating continuously at high speed and under wide-open throttle. It must operate with the minimum of vibration. Everything must be accessible and so arranged that repairs can be made quickly.

The gasoline rail car will enable many branch lines and short lines, which are

\*Abstract of paper given March 29 at Indianapolis before Indiana Section, Society of Automotive Engineers.

now operated at an enormous loss, to be converted to a money-making basis. A 13-ton car has low first cost and can be operated for 20 to 30 cents per car-mile, as against a cost of \$1 to \$2 per mile for steam operation.

The gasoline rail car as a unit possesses many advantages over steam and electrified service—speed, frequent service, low cost of operation, crew of one or two men, elimination of the usual terminal facilities and great reduction in initial cost and fixed investment. Frequent service can be given, which may not be justified by a steam train. A freight-carrying unit can be installed in conjunction with a passenger unit, at an initial cost much below that of a passenger unit.

### Utilities Division Purchasing Agents' Association Proposed

**A** MOVEMENT is under way in the National Association of Purchasing Agents, which has a membership of approximately 4,500, to form a division for public utility purchasing agents including the electric railways, light and power, telephone, water and gas companies, many of whom are already members of the various state purchasing agents' associations. Harry H. Lloyd, purchasing agent, Indianapolis Street Railway and the Terre Haute, Indianapolis & Eastern Traction Company, is chairman of the public utilities committee and public relations committee of the Indiana Association, and was appointed chairman of the tentative national committee at the Indianapolis convention of the National Association of Purchasing Agents.

Mr. Lloyd reports that a great many public utility buyers throughout the country are interested in a division of the national association which will be devoted to the common interests of the utilities and still maintain the advantage of affiliation with the purchasing agents of the big manufacturing industries of the country. Mr. Lloyd had suggested the formation of utility committees in various states which will be co-ordinated in a non-geographical national committee and will also develop an interest of the railway membership in the purchase and stores committee of the A.E.R.A.

It has been suggested that as the National Association of Purchasing Agents holds its convention at Rochester, N. Y., May 15 to 20, 1922, as many utility purchasing agents as possible attend this convention whether already members of the various state purchasing associations or not. If sufficient interest is manifested in the movement by the public utility buyers, it will be possible to have a national committee definitely organized at that time. Mr. Lloyd says this should be of great advantage to the various utilities throughout the country.

A dinner for utility purchasing agents will be held on Tuesday, May 16, at the Rochester convention, and also a joint conference with the national fuel committee.

### Improvement in Unemployment Situation Among Engineers

**A**CCORDING to reports from the Employment Service Bureau of the Federated American Engineering Societies the records of the first quarter of 1922 indicate a distinct improvement in the unemployment situation in the engineering profession. There was a 41 per cent increase in the number of men placed by the bureau and more than 100 per cent increase in the number of available positions listed with the bureau in this quarter compared with the same quarter.

The bureau reports that there is a noted increase in the higher grade openings which are sent in, indicating that many companies are actively preparing for a return to more normal business conditions, in the mind of the bureau.

### Public Conference on Business Training of Engineers Called

**T**HE United States Commissioner of Education is calling a second public conference on commercial engineering to investigate business training of engineers and engineering training for students of business.

The conference will be held May 1 and 2 at the Carnegie Institute of Technology in Pittsburgh. Outstanding topics at the conference will deal with the new problems that have recently arisen in modern industries, the solution of which demands a more scientific approach to include job analyses and personnel specifications and a translation of these into a new and teachable content for use in our engineering and commerce schools, with the training of the engineer for a better understanding of problems relating to community development and with the training of the engineer for management of overseas engineering projects.

### Southwestern Electrical & Gas Association

**A** JOINT meeting of the Southwestern Geographic Division, N. E. L. A., and the Southwestern Electrical & Gas Association will be held in San Antonio May 3 to 6. A summary of the program follows:

Wednesday, May 3. Morning, opening joint session. Afternoon, separate meetings of the following sections or committees: accounting, commercial, public relations, technical, railway.

Thursday, May 4. Morning, joint session. Afternoon, separate meetings of the same sections mentioned above. Evening, banquet.

Friday, May 5. Morning, joint session. Afternoon, joint session followed by executive session, N. E. L. A. division; separate meetings of power and railway sections.

Saturday, May 6. Morning, executive session of S. E. & G. A.; separate meetings of accounting technical and public relations sections, southwestern division, N. E. L. A.

A list of the papers scheduled for

presentation at the railway sessions follows:

"Merchandising Transportation," by G. I. Plummer, superintendent of traffic, Dallas Railway.

"Economics of Car Maintenance Through Modern Shop Practice," by Walter Silvus, master mechanic, Texas Electric Railway.

"Methods for Relief from Traffic Congestion," by W. H. Holden, superintendent of transportation, San Antonio Public Service Company.

"Standard Transfer for Different Companies." Round-table discussion lead by A. B. Paterson, acting general superintendent of railways, New Orleans Railway & Light Company.

"Accident Prevention Methods," by Alves Dixon, superintendent of railways, El Paso Electric Railway.

"Vocational Training," by C. J. Crampton, superintendent of safety and efficiency, Dallas Railway.

"Adjustment of Track Construction and Maintenance to Modern Light Weight Cars," by R. G. Taber, engineer, Stone & Webster, Fort Worth.

"Operation of Double Truck Cars with One Man," by G. S. Brush, superintendent of transportation, Houston Electric Company.

"Possibilities of Motor Bus or Trolley Bus for Suburban and Feeder Service." Round-table discussion led by J. P. Griffin, general passenger agent, Texas Electric Railway.

"Overhead and Car Current Collecting Devices," by L. E. Delf, electrical engineer, Northern Texas Traction Company.

"Training Platform Men," by W. E. Robertson, superintendent of transportation, Eastern Texas Electric Railway.

"Accounting for Passenger Receipts," by W. R. Burns, assistant treasurer, Dallas Railway.

## American Association News

### Heavy Electric Traction

**T**HE committee on heavy electric traction of the Engineering Association held its organization meeting in New York City on April 20. The result of the conference was a plan for compiling data and for digesting the discussion on this subject at the Rome International Railway Congress, which, by a coincidence, was in session at the same time. The New York meeting was attended by these members: Sidney Withington, New Haven Railroad, chairman; A. H. Armstrong, General Electric Company; H. W. Cope, Westinghouse Electric & Manufacturing Company; J. C. Davidson, Norfolk & Western Railway; J. H. Davis, Baltimore & Ohio Railroad, and L. S. Wells, Long Island Railroad. J. V. B. Duer (who was attending the Rome congress) was represented by Mr. Viele.



# News of the Electric Railways

FINANCIAL AND CORPORATE :: TRAFFIC AND TRANSPORTATION  
PERSONAL MENTION

## Favors Purchase Plan

### 55,669 Votes in Favor of Municipal Ownership—Mayor Hopeful for Future Operation

Detroit electors voted with a majority of nearly 82 per cent indorsing the Detroit United Railway purchase plan, thus ending the thirty-year traction war and again approving municipal ownership. The Detroit United Railway's city system will be taken over on May 15 as provided in Mayor Couzens' proposal and replaced by a municipally-owned system, which according to the plans of the municipal street railway officials is to be made the largest municipal ownership system in the world as well as one of the best in the world. Because of bad weather conditions and the lack of interest on the part of some of the qualified voters, only a small vote was cast. Of the 67,912 votes polled, 55,669 were in favor of the purchase plan, giving a considerable larger percentage than the 60 per cent favorable vote required.

### \$2,770,000 DOWN PAYMENT

In connection with the purchase plan approved, a bond issue of \$4,000,000 was voted, of which \$2,770,000 will be paid as a down payment on the D. U. R. when the system is turned over to the city. The remainder of the bond money will be used to purchase material and supplies which the company has on hand and which the city has agreed to purchase, and to provide working capital. Semi-annual payments of \$100,000 will be made by the city until 1933 at which date the balance of the \$2,850,000 will come due. Interest at the rate of 6 per cent will be paid on all of the unpaid balance. The money will go to a trust company to the credit of mortgage and bondholders of the company.

Mayor James Couzens, who has consistently maintained that the lines can be made to pay under city ownership, believes the city will be able to make the payments out of the earnings from the system and that in addition enough will be earned to rehabilitate the property. The city will not be liable in event the system fails to make enough money to meet the payments. The company interests could collect only by going into the courts and attaching the street car property. The property could be taken back in event of default on the part of the city but no collections could be made from taxes, or tax money.

On the morning of the day of transfer of the property to the city, it is planned to have every car manned by a city employee as it pulls out of the carhouse. The change is to be made with as little interruption of service

as possible. Present Detroit United Railway employees will be retained except where it is necessary to cut down the force. The Mayor favors retaining all platform employees who show that they have the municipal ownership idea of giving the public the best service.

In a statement given out by E. J. Burdick, vice-president and general manager of the Detroit United Railway, he is quoted as saying that it is only fair to all concerned to state that the taking over of the property at the price paid is fully \$10,000,000 below its actual present day worth. The property as it stands, he said, with a reasonable expenditure of money, can be made one of the best going-concern railroads in the country, and with this great undercapitalization and with the fact that it is a good going concern with an excellent organization, there is no reason why the city should not succeed in the venture.

He further stated that had the company in the past been given definite rights, whereby its officials could have gone to the money markets of the world and secured cash to make the reasonable extensions and betterments to the service, many of the arguments that have arisen from time to time could have been avoided. The company officials stand ready to do anything they can to facilitate the undertaking, Mr. Burdick stated.

It is cited that when the systems are combined, Detroit will have the largest municipally owned street railway in the world including 263 miles of track with 1,457 cars and all the necessary equipment.

## Funds Provided for Electrification by Stock Authorization

Stockholders of the Illinois Central Railroad at their annual meeting on April 19 approved the issue of \$50,000,000 of preferred stock to finance the Chicago Terminal improvement and electrification work. While no decision has been reached as yet as to the system of electrification that will be adopted, work will begin soon on the lowering of the grade from Forty-third Street to Thirty-first Street and raising the grade from Forty-third Street to Fifty-first. This work is a necessary preliminary to the electrification of the road and will require nearly two years to complete. No decision on the system of electrification will be reached until after A. S. Baldwin, vice-president in charge of the electrification work, has returned from Europe, where he has been studying recent developments in connection with trunk line electrification there. Mr. Baldwin is expected to return the latter part of May.

## Check for \$2,934,112 Refused by City

Maintaining its position that the companies have broken the contract ordinances, the city of Chicago on April 10 refused to accept from the Chicago Surface Lines a check for \$2,934,112, representing 55 per cent of the net receipts for the year ended Jan. 31, 1922. This added to the amounts due for the two previous years makes a total of \$6,526,091 which is being held until it is seen whether some compromise can be reached.

It is expected that a fight will be made on the companies' refusal to pay interest on this amount even if the principal is finally accepted. The courts have indicated that the Surface Lines have not broken the contract, and several Aldermen have insisted that the city change its attitude. This money, which now totals about \$36,000,000, can be used only for transportation purposes and it is expected to be a nucleus of a subway fund.

## Houston Improvements Started

The Houston (Tex.) Electric Company has started work on its program of improvements and betterments promised under its agreement with the city in return for a sixteen-year extension to its franchise. The traction company is pledged to spend \$1,250,000 within the next two years. The company's first improvements will be the double tracking of the line on Lorraine Street from Gano to Maury, and work has begun on this project. Double tracking of portions of other lines will follow shortly.

The traction company will give "jobless" men who have been working for the city at \$1.25 a day on Hermann Park improvements the first chance when recruiting its construction gangs. Officials of the company made this promise to Mayor Holcombe.

In addition to extensions and improvements already listed, and which have been announced in previous issues of the ELECTRIC RAILWAY JOURNAL, the street car company announced that it intends to purchase thirty-five new cars at once, to put into service as soon as delivered. These will cost \$270,000. Besides this the company will repair and repaint thirty-six of its old cars, which have been stored in the carhouses, and put them to work.

The new car fare system also has gone into effect. Metal tokens are on sale in thirty-eight drug stores and other convenient places. Sixteen are sold for \$1 or four for 25 cents. Half fare tokens are also sold thirty-two for \$1. It is contemplated that tokens will be sold in other places to be added from time to time.

### Brooks-Coleman Act Held Constitutional

The Brooks-Coleman act passed by the 1921-1922 Minnesota Legislature providing for regulation of electric railway rates based on true valuations of properties was held constitutional by Judge H. D. Dickinson of the Hennepin County District Court on April 12, in denying the motion of an intervenor in a suit brought by the city of Minneapolis against the Minneapolis Street Railway. The intervenor, George H. Friend, attacked the constitutionality of the law. The judge held that neither fundamental principles of the home rule government of the city nor the constitution of either the state or the United States had been infringed upon by the law. The decision is similar to those handed down previously in Ramsey and St. Louis Counties, at St. Paul and Duluth. John M. Rees, counsel for Mr. Friend, indicated that the case would be taken to the Supreme Court.

In his opinion the judge said that it is to be noted, contrary to popular misconception, that the act does relieve the city of a general control and supervision of the operation of the railway lines. Full plenary powers are reserved to the City Council. The subjects upon which the State assumes control are limited to rate making, supervision of stock and bond issues and the determination of property valuations for certain purposes.

The State Supreme Court has sustained the validity of a similar act by which all local franchises to telephone companies are surrendered and brought under state control through the Railroad & Warehouse Commission. The whole subject is one wherein the Legislature is supreme. The question of state control of public utilities is one of public policy entirely.

### Supplementary Report in Paving Case

A supplementary report was issued by the Public Service Commission of Pennsylvania on Nov. 22, 1921, in the paving case of the borough of Swarthmore against the Philadelphia Rapid Transit Company, referred to in the *ELECTRIC RAILWAY JOURNAL* for April 1, page 573. Subsequent to the presentation of the original report in this case, the time during which the order should be held in abeyance was extended, on the petition of the borough, in order that a full opportunity might be afforded the parties to consider and act on the recommendations therein made. In November the commission was advised by the municipality, through its solicitor, that it had decided it would be unwise for it to accept such recommendations, and also that the borough had not adopted any program of highway improvement with respect to Yale Avenue. In consequence of these developments the commission is of the opinion that further consideration of any change in the character of the pavement was a matter that should await the action of

the municipality with regard to the portion of the highway not occupied by the respondent.

The supplementary order of the commission follows:

It is further ordered, That the respondent, Philadelphia Rapid Transit Company, generally maintain and keep in repair that portion of Yale Avenue in the Borough of Swarthmore which lies between its rails and to the end of its ties, so as to be at all times safe to the public and to the employees and patrons of the utility, and so as to make a smooth riding surface over the same for vehicles.

It is further ordered, That the Philadelphia Rapid Transit Company shall not pave or maintain that part of Yale Avenue in the Borough of Swarthmore outside of the railway strip, nor do any other thing specified to be done by it in the ordinances referred to in the commission's original report, nor shall said company pay for the doing of such things by advancement, reimbursement or otherwise unless this commission shall first find and determine that such work or payment shall not prevent or unduly interfere with the ability of the said Philadelphia Rapid Transit Company adequately to perform and properly to meet the duties and liabilities imposed on it by the public service company law.

### Terms of Bill Reviewed Authorizing Service-at-Cost

Governor Miller of New York, as noted in the *ELECTRIC RAILWAY JOURNAL* for April 15, has signed the act to amend the public service commission law to define service-at-cost contracts. Under the law as changed municipal corporations having a population of less than 1,000,000 inhabitants and street surface railways are authorized to enter into service-at-cost contracts and the Public Service Commission is authorized to approve and validate such contracts. The provisions of the measure follow:

Section 1. Section forty-nine of chapter four hundred and eighty of the laws of nineteen hundred and ten, entitled "An act in relation to the public service commission and the transit commission, constituting chapter forty-eight of the consolidated laws," as added by chapter one hundred and thirty-four of the laws of nineteen hundred and twenty-one, is hereby amended by adding thereto subdivisions nine, ten and eleven, as follows:

9. Service-at-cost contract defined. A service-at-cost contract is an agreement between a municipal corporation and a street surface railroad corporation, providing generally for operation of a street surface railroad wholly or partly within the limits of such municipal corporation, with a rate of fare directly or indirectly dependent upon the excess of revenues after deductions for operating expenses, maintenance, taxes, allowances for renewal and depreciation and a return on the value of the property used and useful in the service rendered.

10. Authority to enter into service-at-cost contracts. All municipal corporations and street surface railroad corporations now existing or which may hereafter exist have and shall have power to enter into service-at-cost contracts as herein defined.

11. Approval of service-at-cost contracts by public service commission. Any party to a service-at-cost contract, as herein defined, upon ten days' written notice, served in the manner provided by the civil practice act for the service of a summons, to the other party or parties to such contract, may present such contract to the public service commission for its approval. The public service commission shall have the power to approve such contract and any agreement purporting to be such a contract, if entered into between the proper parties subsequent to the first day of July, nineteen hundred and twenty, so presented to it upon filing proof of service of notice of presentation as hereinbefore provided. Upon approval by the public service commission, every such contract is and shall be valid and binding as between the parties thereto as of, from and on the day of the date of the execution thereof, in all respects and for all purposes therein expressed, and no provision of any law, gen-

eral or special, unless the contrary effect shall be specifically stated in any general or special law which shall hereafter take effect, shall or be deemed to interfere with or affect such service-at-cost contract or any provision thereof, or the performance and carrying out of such contract and each and every provision thereof. The execution of any such existing service-at-cost contract and all acts thereunder are, upon the approval of such contract by the public service commission, validated.

Sec. 2. Application of act. This act shall apply only to municipal corporations having a population of less than one million inhabitants according to the last preceding federal census, anything to the contrary herein notwithstanding.

Sec. 3. This act shall take effect immediately.

### Philadelphia Dividends to Employees to Go Into Common Dividend Fund

On April 6 the employees of the Philadelphia (Pa.) Rapid Transit Company, speaking through their elected representatives, enthusiastically endorsed President Mitten's suggestion that the entire 1922 co-operative wage dividend be deposited in a common investment fund, each depositor sharing its earnings in proportion to the amount of his savings so invested.

Following the convention of co-opera-  
mitteemen opportunity was immediately afforded all employees to express their approval of the action of their representatives by signing authorization empowering the trustees of the co-operative wage dividend fund to proceed forthwith along the lines proposed by the president.

Within forty-eight hours more than 99½ per cent of the full personnel of the system had gone on record in approval of the new idea.

In urging the men to the action they have now taken Mr. Mitten said:

Just as I formerly counseled you to deposit your extra wage with the saving fund, so I now urge upon you to turn over the co-operative wage dividend, when paid, to a committee of your own selection, consisting of four trustees who, with the co-operative council, should be empowered to act for you.

The co-operative wage dividend in the hands of your committee should, of course, be subject to withdrawal by any employee who leaves the service, the same as in the saving fund, and in case of death should be paid to the family. Similarly, income derived from investment made with the fund should be distributed to you in case of your death.

We are preparing ourselves to act as principals, so that we may participate in profits. To do this, we must keep our co-operative wage fund together, so as to be able to speak with the authority of capital. We must be prepared to take the risk that capital takes in making investment, excepting that our risk will be less for capital, in making its investment, never knows how far it may safely depend upon labor.

Capital has always spoken authoritatively because of its money power. Men and money, with capital added, are stronger than is capital standing alone. We have been keeping our co-operative wage dividend undivided, can together, as time passes, more and more effectively function as principal in the hiring of capital, as against the heretofore universal practice of capital hiring labor.

More Turnstiles Ordered. — The New York Transit Commission has given permission to the Interborough Rapid Transit Company to install 43 additional turnstiles in its subway stations. The Brooklyn Rapid Transit Company has also received permission to install twenty-nine turnstiles of different type.

### Hearing on the Bacharach Bill Next Week

The House judiciary committee will hold a hearing on April 25 on the Bacharach bill, limiting the jurisdiction of federal courts over the orders of the public service commissions. From indications the hearing will be well attended, many mayors, governors, public service commissioners and other state and city officials having signified their intention of being present.

In addition, representatives of numerous bar associations and public utility corporations are expected to testify against the measure. If enacted into law, public utility companies will lose the right of appeal to the federal courts and must look to state courts for relief from oppressive orders of public service commissions. The prospects for the passage of such a law are regarded as rather dubious by official Washington. The terms of the measure were referred to in the *ELECTRIC RAILWAY JOURNAL* for April 8, page 607.

### Railway Employees Must Be Their Own Representatives

C. A. Smith, general manager of the Steubenville, East Liverpool & Beaver Valley Traction Company, East Liverpool, Ohio, recently sent formal notice to the employees that when the existing wage contract expired on May 1 the company would not deal with outsiders in the discussion of a new contract. The letter follows:

You are hereby notified by the Steubenville, East Liverpool & Beaver Valley Traction Company as follows:

1. That on May 1, 1922, at midnight the existing contract under which you are now employed by this company will terminate.
2. That this company refuses to be further bound by any of the provisions of the agreement under which you are now employed by it.
3. That with respect to the further employment of yourself, this company will make up and discuss such further employment with you, or with you and other employees representing yourself or yourself and others constituting the whole number of employees of this company or any part or group thereof at any satisfactory time which discussion may be had with C. A. Smith, but no discussion will be had with any officer or representative of any so-called labor union as the representative of such a labor union.

You are invited at your earliest convenience to take up the matter of further employment with this company as it is the belief of this company that a satisfactory basis for your further employment can be agreed upon.

### 1,850 Old Cars Scrapped and Burned at Boston

Until recently it had been a frequent comment of visitors to Boston that more old style street cars were in evidence there than in any other city of the country. But the last two years of trustee management, with a fare unit adequate to write off obsolete equipment, has changed all that. From July 1, 1919, to Dec. 31, 1921, 1,850 old cars of the Boston Elevated Railway have been scrapped and consigned to the

they have had to keep them. It is only within the last two years that the Boston Elevated has been able to rid itself of the burden of depreciated and inefficient rolling stock.

Most of these old cars had seen twenty-five years of service, and not a few of them three decades. Some were originally horse cars, which were spliced together and equipped with motors when electricity displaced the straining steeds of the '80s. Among the cars destroyed were fifty of the first wooden rapid transit cars used on the elevated lines.

The surface cars destroyed were single and double-truck box cars, 25 and 30 ft. types respectively, also a number of single and double-truck open



CLOSE-UP OF "L" CAR IN FLAMES

flames of a gigantic funeral pyre at the Forest Hills yard. Rolling stock of modern type has replaced these old cars.

Under the strict regulations of the Massachusetts laws and the supervision of the commission, a street railway may not scrap any physical property without writing it off out of earnings. This necessarily involves the use of an actual cash depreciation charge against earnings and few of the companies have been financially able to charge off the value of obsolete cars. Consequently

cars. In their stead, center-entrance multiple-unit cars operated singly and in trains of two and three units are now in service. The company also has put a number of standard one-man safety cars in use in the suburbs.

Before being sent to the Forest Hills yard, the cars to be destroyed are stripped of everything of any possible value, all copper and brass trimmings being removed. After the conflagration, the ashes are raked for iron and metal scrap, which is stored until a favorable opportunity for sale occurs.



CARS BEING BURNED IN BATCHES IN BOSTON

# Financial and Corporate

## Surplus in Cleveland

### Continuous Decrease in Riding with the Maximum Rate of Fare—Increase of Stockholders

According to the annual report of John J. Stanley, president of the Cleveland (Ohio) Railway, the company during 1921 earned expenses, taxes and interest. The number of passengers decreased greatly, but the city lessened the service and the company was able to give the service demanded without suffering a loss. Finishing the year 1921 with an actual profit was due in great part to the fact that the company was collecting the maximum rate of fare under the Cleveland ordinance, to adjustments made in the rates of fare collected in other municipalities, wage reductions in all departments, a lowering of the cost of materials and the slight improvement in general business conditions. The report was referred to in the ELECTRIC RAILWAY JOURNAL in the issue of Feb. 11, page 252.

At the close of the year there were 5,808 stockholders, an increase of 277 over 1920. Of this number 5,219 were residents of the state and 3,935 of the county. The report says that the range of prices of the company's stock on the Cleveland Stock Exchange for the past three years, while not indicative of the value of the stock, does emphasize the duty of the city to take some action that will place the market value of the stock above par and maintain it there. In 1919 the range was from 97 to 102; in 1920 from 87 to 100½, and in 1921 from 84½ to 93¼. The last sale during 1921 was 86.

The betterments during 1921 were so small that they could be paid for with the money realized from the retirement of obsolete property or, in two instances, paid for by private individuals interested in having them made. In the matter of track renewals the company made a record, completing 28½ miles of track, the largest amount in any year on this system.

On Jan. 1, 1921, the wages of em-

ployees in the maintenance of way department were reduced approximately 20 per cent and employees in the maintenance of equipment department were reduced 10 per cent. On Feb. 1 the wages of all employees except those in the train service and in the above-mentioned departments were reduced 10 per cent. At the same time a bulletin was addressed to the trainmen announcing a reduction of 15 cents per hour and the elimination of all spread and overtime rates. This was followed in March by counter demands of the men and by a series of conferences with their committee during April, but an agreement was reached without recourse to arbitration or without any serious controversy. A new wage scale with the conductors and motormen was made effective on May 1 last which is substantially a 20 per cent decrease over the previous wage scale.

Mr. Stanley quoted at length from a report of City Street Railroad Commissioner Fielder Sanders made to the City Council on Dec. 14, which is a historical review of the past six years of operation and "should be of especial interest to every stockholder for its analysis of the financial and service conditions of the company."

In conclusion Mr. Stanley referred to the death of Henry J. Davies and gave a brief sketch of the man who he said was an authority on the accounting for street railways and on insurance in connection with street railways.

## Cities Service Utility Properties Do Well

The annual report of the Cities Service Company, New York, N. Y., for 1921, shows net earnings of \$10,846,585. This was 2.23 times the preferred dividend and after deduction of the preferred dividend was equal to \$13.04 earned on the average common stock outstanding, as compared with \$43.09 in 1920. Gross earnings last year were \$13,461,770, as compared with \$24,698,039 in the preceding year. Current liabilities were reduced \$13,375,000.

The earnings of the public utility properties increased 50.8 per cent, or from \$4,609,912 to \$6,918,741. This was sufficient to pay not only all of Cities Service Company interest charges but came within a few thousand dollars of covering preferred stock dividend requirements. With earnings from oil properties a comfortable showing for the common stock was made.

Total current assets as shown in the balance sheet in the report were \$42,438,113, as compared with total current liabilities of \$18,532,347, leaving an ample working capital of \$23,905,766. Accumulated earnings which have not been declared as dividends are shown as \$47,013,011. During the year 11,565,993 barrels of oil were produced, and the company sold 86,133,082,000 cu. ft. of natural gas, 5,849,050.310 cu. ft. of artificial gas, 647,751,497 kw.-hr. of electrical energy and 95,274,280 passengers were carried on its electric railways.

### INCOME ACCOUNT THE CLEVELAND RAILWAY BASED ON ACTUAL EXPENDITURES

	1921	1920	Per Cent Change
Passenger revenue*	\$17,336,685	\$17,072,999	1.5
Other transportation revenue	81,536	130,668	-37.7
Other railway operations	189,497	178,691	-6.1
<b>Total operating revenue</b>	<b>\$17,607,718</b>	<b>\$17,382,358</b>	<b>1.3</b>
Way and structures	2,013,810	2,109,294	-4.5
Maintenance car equipment	1,723,407	1,949,887	-11.6
Maintenance power plant	75,630	59,021	28.1
Power operation	1,399,515	1,652,874	-15.3
Conducting transportation	6,037,904	7,042,945	-14.3
General and miscellaneous	2,171,286	2,252,030	-3.6
Obsolete property	494,361	498,000	-0.7
<b>Total operating expenses</b>	<b>\$13,915,913</b>	<b>\$15,564,051</b>	<b>-10.6</b>
Net operating income	3,691,805	1,818,307	103.1
Taxes	1,181,144	1,082,185	9.1
<b>Operating income</b>	<b>\$2,510,661</b>	<b>\$736,122</b>	<b>241.0</b>
Non-operating income	190,229	174,196	9.2
<b>Gross income</b>	<b>\$2,700,890</b>	<b>\$910,318</b>	<b>196.9</b>
Interest and dividends	2,100,732	2,101,239	-0.02
<b>Surplus</b>	<b>\$600,158</b>	<b>\$1,190,921 (d)</b>	<b>150.5</b>

(d) Deficit.

\* Includes employees' passes.

### STATISTICAL INFORMATION THE CLEVELAND RAILWAY

	1921	1920	Per Cent Change
Miles of track operated	411.41	412.71	-0.3
Revenue car-miles—			
Motor cars	31,010,697	33,634,735	-7.8
Trail cars	4,585,813	5,791,397	-20.4
Interurban cars	1,338,195	1,462,086	-8.5
Express and freight, mail, newspaper and chartered cars	183,522	203,022	-9.6
<b>Total</b>	<b>37,118,227</b>	<b>41,091,240</b>	<b>-9.6</b>
Revenue passengers carried	286,844,527	327,840,438	-12.5
Transfers collected	109,110,258	120,156,602	-9.2
<b>Total revenue rides</b>	<b>395,954,785</b>	<b>447,997,040</b>	<b>-11.6</b>
Employees fares	948,717	817,409	16.1
Deadheads	2,526,164	2,111,228	19.7
<b>Total rides</b>	<b>399,429,666</b>	<b>450,925,677</b>	<b>-11.4</b>
Rides per car-mile	10.761	10.974	-1.9
Passenger revenue			
From cash fare passengers	\$16,340,105	\$15,970,086	2.3
From transfers	937,161	1,057,437	-11.4
<b>Total</b>	<b>\$17,277,266</b>	<b>\$17,027,523</b>	<b>1.5</b>
Average fare in cents per revenue passenger*	6.02	5.19	16.0
Average fare in cents per ride	4.34	3.78	14.8
Operating revenue per mile of track	\$42,894	\$42,117	1.8
Operating ratio	79.1	89.2	-10.1
Taxes, per cent of operating revenue	6.72	6.24	0.48

\* Including employees' fares.

## Reorganization Terms Made Public

First Mortgage Bondholders Must Furnish New Cash to Participate in New Company

The Northampton (N. J.) Traction Company as the owner of the stock of the Northampton, Easton & Washington Traction Company, Easton, Pa., is apparently eliminated from participation in the reorganization of the company under the tentative plan which has been drawn by the committee representing the first mortgage bondholders. According to the members of that committee the operation of the Northampton, Easton & Washington Traction Company has shown that it cannot as now constituted earn money sufficient to pay fixed charges on the amount of bonds now outstanding and that it would be unwise again to place upon the company operating the property a burden of fixed charges in excess of any amount which can surely be earned. In consequence the committee has proposed to allot to the present first mortgage bondholders that portion of the earnings only which remains after payment of operating expenses and taxes and necessary prior fixed charges and after setting aside proper amount for maintenance and depreciation. In order to accomplish this, an income bond has been decided upon as providing perhaps the best means to the end which the members of the committee have in mind.

It is the intention of the committee that the property shall be bid in in its entirety at the foreclosure sale. A new company will then be organized to which the entire property will be conveyed. In reorganizing it will be necessary to raise new money to pay for improvements, refunds, receivers' certificates, and to pay expenses of the committee. As the committee considers it impossible to raise such money from outside sources, the present bondholders will be called upon to subscribe to an issue of \$100,000 of 7 per cent first mortgage bonds. Each bondholder will subscribe to an amount of these bonds equal to 20 per cent of his present holdings. In other words, each

depositor of a \$1,000 bond will subscribe for \$200 of new 7 per cent bonds, for which he will pay \$180.

The proposed authorized capitalization of the new company will consist of \$1,000,000 of first mortgage 7 per cent bonds, \$536,000 of 4 per cent sinking fund income bonds and 2,000 shares of stock of no par value. The amount of securities to be issued at this time will consist of \$100,000 of first mortgage 7 per cent bonds, \$444,000 of 4 per cent sinking fund income bonds and 2,000 shares of no par value stock.

The 2,000 shares of no par value stock will be held by the committee representing the bondholders. Each assenting depositor will receive for each \$1,000 bond and \$180 in cash, \$1,000 of sinking fund 4 per cent income bonds and \$200 of first mortgage 7 per cent bonds. No rights to the income bonds will accrue to any bondholder who does not subscribe for the new first mortgage 7 per cent bonds.

## Control of Stark Electric Changes Hands

Purchase of a majority of the stock of the Stark Electric Railroad, Alliance, Ohio, has been made by a syndicate from Alliance and vicinity. The deal, which has been under consideration for several months, was concluded during the week ended April 8. The following Alliance men are interested: W. H. Purcell, F. E. Dussell, A. A. Reeves, S. L. Sturgeon, F. A. Graves, F. A. Hoiles, M. S. Melbourne, A. L. Atkinson, W. E. Davis, E. B. Webb, O. F. Transue, W. H. Ramsey, B. F. Weybrecht, G. R. Floyd and J. F. Heacock. The control of the road has been held by Cleveland capitalists since the organization, twenty years ago.

The Stark Electric Company was organized in 1903. It took over the Alliance Street Railway, the oldest electric road in the country. It first operated a line between Alliance and Canton, and shortly afterward extended the line to Salm. The company at present operates 34 miles of roadway. It owns its own right-of-way except in Alliance and the loop at Canton. The power plant of the company is located at Lake Park east of Alliance.

## Renaming and Refinancing

In arranging the refinancing of the Hagerstown & Frederick Railway, Frederick, Md., to meet obligations maturing this year, the name will be changed to the Potomac Public Service Company. Because of its operations extending now into Virginia and West Virginia it is desired to have a corporate name more in keeping with the company's activities and to bring about a closer combination of all its various subsidiaries into one big corporation.

In its new refinancing Hambleton & Company, Baltimore, and E. H. Rollins & Sons, New York, N. Y., will offer \$2,155,000 of the company's first and refunding mortgage 7 per cent sinking fund gold bonds, dated April 1, 1914, and due April 1, 1944. The bonds are offered at 100 and interest yielding 7 per cent.

The bonds are part of an authorized issue of \$10,000,000 and there will be outstanding after this issue \$4,855,000. The bonds are redeemable on any interest date at 107½ up to 1935 and at 2½ less in each succeeding five-year period. The Potomac Public Service Company will have a capitalization of \$1,512,950 in common stock and \$1,625,000 in preferred, which will be used to take over the stocks of its predecessor corporation.

## New Directors for Quebec Company

The board of the Quebec Railway, Light & Power Company, Quebec, Que., was largely changed at the annual meeting following the election of E. A. Robert, president of Montreal Tramways, to the presidency. Lorne C. Webster, retiring president, took the vice-presidency and other directors are George E. Amyot, Quebec; Adalard Turgeon, Quebec; D. O. Lesperence, Quebec; J. N. Greenshields, Montreal; H. G. Valiquette, Montreal; Col. J. E. Hutcheson, Montreal; K. B. Thornton, Montreal, and A. C. Barker, New York, and C. G. Greenshields, Montreal. Shareholders approved a by-law making the \$100 par value common stock no par value.

	Latest	Month Ago	Year Ago	Peak	1913
Street Railway Fares*	April 1922 7.14	March 1922 7.14	April 1921 7.22	May 1920 7.24	4.84
Street Railway Materials*	March 1922 156	Feb. 1922 156	March 1921 181	Sept. 1920 247	100
Street Railway Wages*	April 1922 213	March 1922 214	April 1921 231	Sept. 1920 232	100
Steel Unfilled orders (Million tons)	Mar. 31 1922 4.49	Feb. 28 1922 4.14	Mar. 31 1921 6.28	Apr. 30 1917 12.18	5.91
U.S. Bank Clearings Outside N. Y. City (Billions)	March 1922 12.26	Feb. 1922 10.16	March 1921 12.37	March 1920 18.54	Av. Mo. 1913 6.12
Business Failures Number	March 1922 2,317	Feb. 1922 2,072	March 1921 1,500	Jan. 1922 2,722	Av. Mo. 1913 1,213
Liabilities (millions)	March 1922 57.51	Feb. 1922 66.92	March 1921 68.70	Jan. 1922 105.7	Av. Mo. 1913 24.64

**Conspectus of Indexes for April, 1922**  
Compiled for Publication in this Paper by  
**Albert S. Richey**  
Electric Railway Engineer  
Worcester, Mass.

	Latest	Month Ago	Year Ago	Peak	1913
U.S. Bur. Lab. Stat. Wholesale Commodities	March 1922 152	Feb. 1922 151	March 1921 162	May 1920 272	100
Bradstreet's Wholesale Commodities	Apr. 1 1922 11.53	March 1 1922 11.60	Apr. 1 1921 11.37	Feb. 1 1920 20.87	9.21
Dun's Wholesale Commodities	Apr. 1 1922 166.3	March 1 1922 169.7	Apr. 1 1921 174.4	May 1 1920 263.3	120.9
Annalatt Wholesale food	Apr. 15 1922 182.7	Mar. 18 1922 182.6	Apr. 16 1921 181.9	June 12 1920 329.2	140
U.S. Bur. Lab. Stat. Retail food	March 1922 139	Feb. 1922 142	March 1921 156	June 1920 219	100
Nat. Ind. Conf. Bd. Cost of living	March 1922 154.7	Feb. 1922 157.7	March 1921 168.7	July 1920 204.5	(1914) 100

\*The three index numbers marked with an asterisk are compiled by Mr. Richey, as follows: Fares index is average street railway fare in all United States cities with a population of 50,000 or over, except New York City, and weighted according to population. Street Railway Materials Index is relative average price

of materials (including fuel) used in street railway operation and maintenance, weighted according to average use of such materials. Wages index is relative average maximum hourly wage of motor-men and conductors on street and interurban railways in the United States.

## Chicago Surface Lines Has Biggest Year

Earnings Largest in History of Companies—Decrease in Riders Small Compared with Other Cities

The report of the Chicago Surface Lines for the fiscal year ended Jan. 31, 1922, discloses gross and net receipts greater than any earned heretofore in the history of the company. The figures are shown in the accompanying table. One of the notable things about the business of the Chicago Surface Lines has been that during the year 1921, when the traffic on many electric railway systems fell off very materially, riding in Chicago decreased only 2.4 per cent as compared to the total number of riders in the previous year. Another interesting item, brought out in regard to traffic is that since 1910 the increase in the number of revenue passengers on all of Chicago's urban transportation systems has been 56.4 per cent, and of this increase 91.52 per cent has been on the surface lines.

In addition to the financial statement of the companies, the report touches very briefly on many operating matters. On the subject of employing trainmen it is pointed out that during the year 10,810 men applied for train service. Of these 4,808, or 45 per cent, were allowed to file applications; of these, 1,114 were tentatively accepted as students, and of these, ninety-eight were rejected by medical examination. A tabulation is included which shows that 101 employees have been in continuous service with the company for forty years or over, 198 for thirty-five years or over, 447 for thirty years or over, and 481 for twenty-five years or over, making a total of 1,227 employees who have been with the company more than twenty-five years.

On July 28, 1921, the department of schedules and time tables was organized as a unit independent of the transportation department and reporting directly to the general manager. The work of this department is to make and revise the time-tables for the ninety-three different lines, nearly all of which require separate time-tables for week days, Saturdays, Sundays and holidays. During the year this department re-

wrote and revised 200 schedules for various purposes.

On the effect of the skip stop on power consumption, the report states that from studies made by the electrical department, it appears that the power saving due to the skip stop is from 15 to 18 per cent, and that if the skip-stop plan were eliminated, the company would not be able to operate the cars without additional power generating, transforming and transmitting equipment.

The power purchased from the Com-

### CHICAGO SURFACE LINES — EARNINGS, EXPENSES AND DIVISION OF RESIDUE RECEIPTS FOR TWELVE MONTHS ENDED JAN. 31, 1921 AND 1922

	1920-1921	1921-1922
<b>Earnings</b>		
Passenger cars.....	\$54,726,740	\$59,706,413
Chartered cars.....	11,591	12,121
Newspaper cars.....	15,745	16,161
Freight earnings.....	3,234	2,319
Hospital car service.....	2,734	4,194
Advertising.....	240,957	247,184
Rents of buildings, etc.....	93,642	106,479
Sale of power.....	98,104	92,371
Interest on deposits.....	112,530	137,939
Miscellaneous.....	22,108	18,553
	<b>\$55,327,385</b>	<b>\$60,343,734</b>
<b>Expenses</b>		
Way and structures.....	\$2,859,901	\$3,040,940
Equipment.....	4,015,806	4,348,373
Renewals.....	4,167,327	4,827,499
Power—maintenance.....	337,093	320,376
Power—operation.....	3,105,975	3,128,792
Conducting transportation—trainmen.....	20,475,132	21,574,699
Conducting transportation—other.....	3,023,872	3,208,603
Traffic.....	9,577	34,547
General and miscellaneous—damages.....	1,930,000	2,271,224
General and miscellaneous—other.....	1,645,711	1,568,098
Taxes.....	1,730,000	2,193,000
Total expenses.....	<b>\$43,300,393</b>	<b>\$46,516,151</b>
<b>Residue receipts</b> .....	<b>*\$12,026,992</b>	<b>*\$13,827,583</b>
Divided		
Chicago Railways.....	*\$7,216,195	*\$8,296,550
South Side Lines.....	*\$4,810,797	*\$5,531,033

\* Includes city's 55 per cent of net divisible receipts, as defined by ordinances.

monwealth Edison Company during the year amounted to 540,446,679 kw.-hr. The cost of this purchase power was \$4,046,272. The total direct-current output at substations and power houses was 496,246,165 kw.-hr., the cost of which, including maintenance, fixed charges and purchased power, amounted to \$4,459,102. The highest direct-current peak encountered was for 461,100 amp. on the morning of Jan. 24, 1922.

Another interesting item in the year's review is the mention that Marsh & McLennan were appointed general

insurance brokers for the company and a \$50,000,000 blanket insurance arranged on a new general form covering all buildings and their contents active used in the operation of the road and rolling stock, except the Seventy-seventh Street shops. A \$3,000,000 Mutu Insurance Company policy was continued in force on these shops and their contents and rolling stock. A special insurance policy of \$2,579,613 was placed on buildings and their contents not used in the operation of the road.

The legal expense of the company during the year amounted to 2.87 per cent of the gross earnings, as compared to 3.28 per cent during the previous year.

### More Passengers in Boston—General Results Better

The Boston (Mass.) Elevated Railway carried 1,193,657 more revenue passengers last month than during March last year, and revenues exceed cost of service by \$204,332.

During March the total revenue was \$2,868,518, while in the same month last year it was \$2,991,780, a decrease of \$123,262.

The total cost of service last month was \$2,664,186, as compared with \$2,790,932 in March, 1921.

On April 1 the balance in the reserve fund created under the public contract was \$919,863. The Elevated trustees expect that by May 1 this reserve fund will be restored to its original total of \$1,000,000, and after that receipts over cost of service must be paid over to the State to be distributed to the cities and towns that contribute to the loan assessment in 1919.

The number of 10-cent passengers carried last month was 24,765,577 compared with 28,548,059 in March year ago, but this loss was more than made up by the gain in 5-cent passengers, which were 6,130,322 last month and 1,147,316 in March, 1921. The grand total of revenue passengers last month was 30,895,899 and in March last year it was 29,695,375.

It is stated that the receipts for fares per revenue passenger last month were 9.005 cents and the total cost service was 8.623 cents. Last year March these figures were 9.804 cent and 9.399 cents, respectively.

### CHICAGO SURFACE LINES For the Fiscal Year Ended Jan. 31

Rate of Fare	1915	1918	1919	1920	1921	1922
	5 Cents	5 Cents	5 Cents	5 Cents	6 Cents	8 Cents
Revenue passengers.....	627,731,550	692,815,889	685,300,718	743,746,584	769,025,413	750,515,600
Passenger receipts.....	\$31,324,038	\$34,566,601	\$34,186,578	\$43,417,639	\$54,726,740	\$59,706,413
Total earnings.....	31,966,046	35,114,633	34,710,098	43,963,438	55,327,385	60,343,734
Operating wages.....	10,560,039	12,854,406	14,768,089	19,854,174	28,204,342	29,676.9
Other operating expenses and taxes.....	9,329,236	10,247,289	10,963,848	13,399,841	15,096,051	16,839.1
Residue receipts.....	12,076,773	12,012,937	8,978,161	10,709,423	12,026,992	13,827.5
Less: Joint account expenses.....	311,894	648,206	478,831	181,862	164,733	449.0
	<b>\$11,764,879</b>	<b>\$11,364,732</b>	<b>\$8,499,329</b>	<b>\$10,527,561</b>	<b>\$11,862,259</b>	<b>\$13,378.5</b>
5 <sup>1</sup> / <sub>2</sub> Per cent on purchase price.....	7,113,273	7,661,543	7,802,574	7,893,292	7,974,289	8,024.1
55 Per cent to city.....	2,558,384	2,036,754	383,215	1,448,847	2,138,383	2,944.5
45 Per cent to companies.....	2,093,223	1,666,435	313,540	1,185,421	1,749,586	2,409.5

## Tennessee Plan Announced

Bankers Outline the Conditions Under Which Chattanooga and Nashville Properties Will Be Consolidated

Steps are being taken toward the formation of the Tennessee Electric Power Company to effect a consolidation of the companies controlled by the Tennessee Railway, Light & Power Company with the Chattanooga & Tennessee River Power Company. The properties of these companies have been operated as one system, and it is now proposed to bring them together as early as possible into one ownership.

The bankers concerned in the financing state that a sound basis will thus be provided for the funding of the present floating debt and for the permanent financing of necessary improvements and extensions to the several properties as required to take care of their growing business. They explain that the first problem presented in making the necessary financial arrangement is to care for the large bonded indebtedness of the present operating companies.

Holders of the Tennessee Power Company's 5 per cent bonds, Nashville Railway & Light Company refunding and extension 5 per cent bonds and Chattanooga Railway & Light Company 7 per cent bonds are being offered their choice of several options in exchange for their bonds. When it is known to what extent such exchanges can be accomplished a supplementary plan will be submitted to the preferred and common stock holders of the Tennessee Railway Light & Power Company, stating the terms on which they may acquire the available securities of the new company in exchange for their preferred and common stock.

Tentative arrangements have been made, conditioned on the plan being declared operative, for the sale of first and refunding bonds of the new company for cash to investment bankers heretofore identified with any of the properties.

It is explained that the Tennessee Railway, Light & Power Company controls the Tennessee Power Company, the Chattanooga Railway & Light Company and Nashville Railway & Light Company. Each of these companies has a floating debt, in some cases large, incurred for necessary betterments and improvements, for which it has been impossible to provide through sale of long-term securities. Because of the inability of these companies to finance their requirements, the Tennessee Railway, Light & Power Company has made large advances to them, borrowing the money for the purpose and pledging as collateral the bonds and stocks of the subsidiary companies held in its treasury, and these obligations have been renewed from time to time.

On or before June 1 next there will mature obligations of this company amounting to \$3,561,000, and as collateral practically all of its assets are pledged. In addition the subsidiary

companies have unfunded obligations amounting to \$2,515,907 as of March 1, 1922, nearly all of which mature on or before June 1 next. It is further explained that under the circumstances it is imperative that steps be taken not only to provide for the present obligations of all of the companies, but also to remove the dangers of temporary financing by making provision for permanent financing of the necessary improvements and extensions to the several properties as required to take care of their growing business.

As a result of the careful study of all the conditions the best solution, so the bankers state, is a thorough readjustment of the securities of the company and its subsidiaries and the consolidation of them as outlined in the proposed plan. The details of the basis of exchange of the various securities are, of course, of interest primarily to the holders of the various securities of these companies. The capitalization of the proposed new Tennessee Electric Power Company would be divided as follows: Bonds, \$32,947,500; preferred stock, \$7,914,700; second preferred non-cumulative stock of no par value, 50,000 shares; no par value stock, 150,000 shares.

## Taxes Being Paid Up in Muskegon

Forty-three thousand dollars in back taxes will be paid on the installment plan by the Muskegon Traction & Lighting Company, Muskegon, Mich. The company has already paid \$2,000 on account and its installments will be based on the revenue, it is announced by George Steinwedel, president and general manager. He hopes at least to continue the \$2,000 monthly payments as the revenue is increasing.

Owing to bus competition the company lost money in the operation of its cars for two years. It then asked the Michigan Utilities Commission for permission to quit. The state commission made the order but suggested that Muskegon and Muskegon Heights, the two cities served, first vote whether they wanted railway or jitney service. Following a spirited campaign the cities voted four to one for street cars.

The company had been unable to pay its personal property taxes for two years and as soon as the revenue started to increase it decided on the installment plan. Figures submitted showed the buses on competing lines had taken \$80,000 revenue from the railway.

The company is charging a 10-cent cash fare with four tickets for 30 cents.

Last February was the first month in more than three years that the company was able to meet both operating charges and interest. For two years the company is said to have failed by \$50,000 to earn operating expenses.

There had been a marked feeling against the corporation in the two cities, but this sentiment quickly underwent a change when the company asked permission to discontinue service.

# Financial News Notes

**Opposes Abandonment.**—The Bridgeton City Council has adopted a resolution opposing the expressed determination of the Bridgeton & Millville Traction Company, Bridgeton, N. J., to abandon its lines at Bridgeton on July 1 because of the heavy losses sustained.

**Receiver Named.**—Joseph A. Yager has been named receiver of the Toledo & Western Railroad, Toledo, Ohio. The matter was decided by Federal Judge Killits, acting on the petition of attorneys representing the company's stockholders. He will work with the other receivers, J. Frank Johnson and Harry A. Dunn.

**Another Step Taken Toward Reorganization.**—The Chicago, Aurora & Elgin Railroad, Aurora, Ill., has applied to the Illinois Commerce Commission for permission to issue \$11,000,000 of common stock for the purpose of acquiring the properties of the Aurora, Elgin & Chicago Railroad under the reorganization plan.

**Foreclosure Step Confirmed.**—Grayson M. P. Murphy, chairman of the committee representing the holders of the 4½ per cent bonds of the Interborough-Metropolitan Company, has confirmed the report that these bondholders are about to take steps for acquiring by foreclosure the \$33,912,000 of Interborough Rapid Transit Company stock which since 1918 has been held as security for the bonds.

**Passenger Decrease Noted.**—For the three months ended March 31, 1922, the Philadelphia (Pa) Rapid Transit Company, after deducting charges, realized a net income amounting to \$614,831, against \$364,547 for the same period in 1921. There was a decrease in the traffic from 207,961,020 total passengers for the first three months of 1921 to 202,286,650 for the first three months of the present year. The decrease in passenger revenue was \$386,398.

**Prospects for Reorganization Better.**—Receiver George Whysall said recently that he had been advised by Judge Merle Walker, Indianapolis, and Guy L. Emerson, Chicago, who represent the bondholders, that they are meeting with thorough co-operation in working out plans for refinancing and reorganization of the Springfield, Troy & Piqua Traction Company, Springfield, Ohio. They expect to be in a position to make a complete report within the next few weeks. At present the line is only in partial operation. Residents along the line have expressed themselves as willing to help in the refinancing move. The Erie Railroad in the past has been used by the road to transfer passengers and freight to and from Springfield and its nearest connection, 2 miles distant.

## Traffic and Transportation

### Petition for Fare Rehearing Denied

The Illinois Commerce Commission on April 14 denied the petition for a rehearing filed two days before by the Chicago Surface Lines in the 6-cent fare case. The companies have until April 30 to make their next move. It was expected they would seek protection in the courts against enforcement of a rate which they consider confiscatory.

The petition of the companies for a rehearing attacked every conclusion reached by the commission. They contended that the 5 per cent return allowed by the commission would be insufficient to meet even the interest on the outstanding bonds and notes and would prevent them from financing necessary capital improvements. They denied the charge that their operating costs are excessive because the only evidence in the case shows the costs per car-hour and per car-mile were lower than the average for twelve large companies.

The companies insisted that the commission has no authority to set aside the provisions of ordinances as to maintenance and renewal charges and that it would be a grave mistake to reduce these expenditures at a time when the property, built since 1907, is beginning to need more repair and replacement. Also they attacked the section of the order which would prevent further payments into the injuries and damage reserve fund, and they stated the commission has no power to deduct from operating expenses the cost of sweeping, sprinkling and cleaning streets.

The Chicago Surface Lines filed a petition in the United States District Court on April 18 for a permanent injunction against the 6-cent fare order. The plea was made on the ground that the proposed rate is confiscatory. Judge Page set a hearing for next Monday afternoon, at which time he will decide whether he will grant a temporary restraining order to serve until the court can hear the case completely.

### Plans Made to Develop Waterway Traffic and Shipment by Electric Railway

The Louisville (Ky.) Railway and the Interstate Public Service Company, the latter operating the interurban lines north through Indiana from Louisville, are destined to play an important part in the revival of Ohio River transportation. President James P. Barnes, of the Louisville Railway, is chairman of the executive committee and director of the new Inland Waterways Company, and Harry Reid of the Interstate is a director. The new corporation is chartered with a capital of \$1,000,000. Plans

call for bringing freight to Louisville from upper river points as far off as Pittsburgh and reshipping or distributing from Louisville by steam and electric railway.

The drawback to river shipping in the past has been found in the fact that so many large plants are located inland. This means that to move the river shipments to these plants after the

materials reach city destination resort must be made to very expensive drayage. However, if plans now being made are worked out to completion it is probable that the Louisville Railway will not only transfer freight from river barges and boats to freight cars for delivery to its interurban lines, but will also transfer to plants located on city car lines.

Through proper co-operation the interurbans will be able to secure materially increased tonnage and will be in position to aid the waterway companies in forcing the steam line to play the game.

### Service Restored in Augusta on April 15

Appeal for Relief from Unfair Jitney Competition Heeded, but Company Reserves Right to Withdraw Cars Again if Experiment at Regulation Fails

Electric railway service was resumed on April 15 in Augusta, Ga., by the Augusta Railway & Electric Corporation, after a suspension of just a month. The City Council and Charles S. Banghart, general manager of the company came to terms on April 12 at a special meeting of the Council. The action under which the jitneys will now be regulated was concluded behind closed doors. The agreement was reached after less than an hour's deliberation.

UNDER the agreement Council will also regulate the jitneys that they shall not be permitted to take on or discharge passengers nearer than one block of the street car lines. It will also prevent the jitneys from crossing Broad Street except at the intersection of Broad and Fourth Streets and Broad and Fifteenth Streets. The railway agrees to a 7-cent token fare to be sold in multiples of five, will charge the casual riders 10 cents and sell school children and teachers tickets at 5 cents, as heretofore.

The agreement was reached when Mr. Banghart, representing the corporation, accepted the terms presented in a resolution coming from the finance and special traffic committee of Council. This resolution was amended at the session of Council on April 12 by a substitute presented by Councilman C. Vernon Elliott and was adopted.

The original resolution from the committee and the Elliott substitute follow:

#### ORIGINAL RESOLUTION

Whereas, in the opinion of the City Council of Augusta it is necessary to further regulate jitneys in the city of Augusta, as a traffic regulation in the exercise of the police power of said city; now, therefore, be it

Resolved, That the police committee of the City Council of Augusta be, and it is hereby authorized and directed to so regulate the jitneys now licensed by the City Council of Augusta as that they shall not be permitted to take on or discharge any passengers nearer than one block of any street car line of the Augusta-Aiken Railway & Electric Corporation, and further to so regulate said jitneys as to prevent their crossing Broad Street, except and alone at the intersection of Broad and Fourth Streets, Broad and Twelfth Streets and Broad and Fifteenth Streets.

(Amended)

#### SUBSTITUTE RESOLUTION

Whereas, in the opinion of the City Council of Augusta it is necessary to further regulate jitneys in the city of Augusta as a traffic regulation in the exercise of the police power of said city; now, therefore, be it

Resolved, That the police committee of the City Council of Augusta be, and it is hereby authorized and directed to so regulate the jitneys now licensed by the City

Council of Augusta as that they shall not be permitted to take on or discharge any passengers nearer than one block of any street car line of the Augusta-Aiken Railway & Electric Corporation, and further to so regulate said jitneys as to prevent their crossing Broad Street, except and alone at the intersection of Broad and Fourth Streets and Broad and Fifteenth.

2. Resolved further, That in restarting its cars the status quo ante existing between the city and the Augusta-Aiken Railway & Electric Corporation, with respect to the rights, privileges, duties and obligations belonging to or imposed upon either the city or the company, shall be and remain the same as they were prior to March 15, 1922, provided nothing herein contained shall be construed as in any way enlarging the franchises granted to said railway company prior to March 14, 1922.

Adopted in open Council, this the 12th day of April, 1922.

In a letter to the Council dated April 12, Mr. Banghart agreed that if the Council passed the resolution presented to him the company "will assure the public that it will resume service in the city, charging 10 cents for the casual rider and will sell tokens at 7 cent in multiples of five, and sell school children and teachers tickets at 5 cent as heretofore."

Furthermore, the company agreed to resume and maintain not more than fifteen-minute schedule or headway on all city lines. The company also agreed to maintain a seven-and-one-half-minute service on the Summerville line as far as Baker Avenue during the morning and afternoon rush hours.

Mr. Banghart indicated that the company was willing to try to operate under the conditions just outlined, but that it was obvious that it could do so successfully only with the full co-operation of the riding public. The company has pledged itself to do its best to make operation a success under the new conditions, but that it must remain free to exercise its legal right and to stop cars again if after a reasonable trial the jitney competition is regulated under the new order still cut into the railway company's legitimate revenue as reflected in the operating receipts and expenses.



### New Loop Plan Suggested

The Board of Control of Steubenville, Ohio, in co-operation with various committees of the City Council has submitted a new loop plan to the City Council for all rail traffic within the city. The new loop plan eliminates five "dead-end" terminals in the city business district, provides for continuous operation of cars on all lines with elimination of loss of time for passengers and congestion on busy thoroughfares, makes Market and Adams Streets "one-way" streets for electric lines and in the opinion of officials, as near as is humanly possible, remedies inconvenience to the traveling public and congested traffic. Under the new plan, which is said to meet with the approval of the operating companies, universal transfers on all lines will be issued.

### City Fathers Allow One-Man Cars

One-man cars, of the Birney type, similar to those which have been so successful in Tampa, will be permitted on the lines of the Jacksonville (Fla.) Traction Company, following the decision of the city fathers there to accept the recommendations of the laws and rules committee of the Council. The decision amends Section 5 of the existing ordinance which says that there shall be a conductor and motorman on each car.

The Jacksonville Traction Company, a Stone & Webster subsidiary, and now in receivership, had requested the city to eliminate that section of the ordinance regulating electric railway traffic that requires that a car crew shall consist of a conductor and a motorman.

According to E. J. Triay, receiver for the Jacksonville Traction Company, the installing of one-man cars in Jacksonville will not mean that the number of carmen now employed by the traction company will be reduced. The men will merely be assigned to different cars, thereby increasing the car service.

### Hopeful That Traffic Will Increase

The maximum decline in the number of passengers transported by the Cincinnati (Ohio) Traction Company has passed, according to William Jerome Kuertz, Director of Street Railways, who has just completed compilation of figures for the first three months of 1922. Director Kuertz said that while the number of passengers was less for the first three months this year as compared with last year, the bottom of the depression has been reached and the trend is upward.

In January this year there were 8,932,704 revenue passengers as compared with 9,093,024 in January, 1921. In February, 1922, there were 8,071,061 and in February, 1921, 8,208,261. March showed an increase to 9,098,342. In March, 1921, the number was 9,238,402. Director Kuertz said that the percentage of difference is being overcome

from month to month and at the present rate the traction company will exceed last year's figures and will be on a fair way to equalizing the record of 1920.

### Hearing on Lower Fare— Decision Reserved

James T. Manee was the only signer of the petition to the Public Utilities Commission for a reduction of fares at Hartford, Conn., to 5 cents who appeared at the hearing on April 18 in the Capitol in support of the petition. The Connecticut Company was represented by President Storrs and Attorney Joseph Berry. Commissioner Elwell conducted the hearing alone. The commission reserved its decision.

Mr. Manee declared the people of Hartford did not consider the three-tokens system a satisfactory substitute for a flat rate of 5 cents. He knew that the commission had given consideration to the 5-cent proposition and he did not come to the hearing with figures in support of the petition. He would not favor the petition if the granting of it would have a tendency to reduce the wages of the trolley company's employees. The people traveling on the cars felt that a 10-cent fare was burdensome.

President Storrs said that before the war the payrolls of the company amounted to \$4,000,000 annually. At the present time the payrolls amount to \$7,000,000. Coal and materials have doubled in price. A 5-cent fare was beyond a possibility. By the reduction of fares in Hartford 16 per cent the company contributed \$50,000 in the month of March to the cost of living in Hartford. About 90 per cent of the people of Hartford took advantage of the reduction by buying tokens.

### Emergency Ordinance Passed

The City Council of Akron, Ohio, on April 18 passed an emergency ordinance granting the Northern Ohio Traction & Light Company a 5-cent fare until the expiration of the present 4-cent fare franchise Feb. 1, 1924. The new franchise provides that the company must lay tracks on North Main Street over the North Hill Viaduct, on a portion of West Market Street, and install eight new buses as feeders to present traction lines. The ordinance provides the work must be completed with ninety days after the company is notified.

The company has been receiving a 5-cent fare under ordinances passed from time to time for the last year and a half. The passage of the present ordinance clears the situation for an agreement. It is expected that a permanent contract will be agreed upon during the next few months. While the franchise passed is subject to a referendum within the next sixty days, it does not appear at this time that a referendum will be called for the reason that the public attitude toward the company is such that a referendum would merely ratify the action of the Council.

### New Service to Start

Arrangements have been completed for a two-hour through limited inter-urban service between Akron and Warren, Ohio, to begin May 1 over the Northern Ohio Traction & Light Company and the Cleveland, Alliance & Mahoning Valley Railway lines with connections at Ravenna for Alliance. Tickets will be sold through from Akron to Youngstown, using the Pennsylvania-Ohio Electric line beyond Warren, where transfer will be necessary for the present.

The first train leaves Akron Terminal, eastbound, at 6:50 a.m. and every two hours until 4:50 p.m. The first train leaves Warren, westbound, at 6:45 a.m. and every two hours until 4:45 p.m. The schedule running time is one hour and fifty minutes each way. New steel cars will be used.

Trains will stop at Chalkers Landing, Cuyahoga Falls, Silver Lake, Kent, Brady Lake, Ravenna, Wayland, Newton Falls, and Leavittsburg. Eastbound trains stop only at Wayland and Leavittsburg to discharge passengers, while westbound trains stop at these two points only to pick up passengers.

### Will Report Traffic Violations

A number of traffic changes are in the making at the present time in Louisville, Ky. One act which will probably be passed will prohibit autos passing street cars on the left side when both auto and vehicle are moving in the same direction. Just recently there was a bad smash when an auto was caught between two cars moving in opposite directions and three people have been in the hospitals for some time as a result. An ordinance prohibiting parking for more than fifteen minutes in the downtown district is now before the board.

Through the efforts of the Louisville Safety Council and the Automobile Club several hundred prominent men, including many motorists, have been appointed members of the Citizens' Police Auxiliary Committee, these members reporting all traffic violations which they see, especially cases where automobile owners pass standing street cars. Members of the auxiliary committee have received fresh identification cards.

**Hearings Started.**—High percentages of overloading during the rush hours on the Myrtle and Marcy Avenues stations and on the Canarsie line were disclosed on April 17 when the Transit Commission began its investigation of service on the subway and elevated lines of the Brooklyn Rapid Transit Company. Statistics were presented by W. K. Edgerton, the commission's assistant supervising inspector. Clarence J. Shearn, chief counsel to the commission, said that conditions would be different if the city had put the Fourteenth Street Eastern District subway in operation. The investigation was adjourned until April 24.

### "Weekly Pass" in Meadville, Pa.

You can now ride whenever you like and as often as you like in Meadville, Pa., for \$1 a week. The new arrangement, which is the "weekly pass" plan, is the result of a conference between a committee appointed by the Chamber of Commerce and Charles M. Hatch, vice-president and general manager of the Crawford County Railways, operated under lease by the Northwestern Pennsylvania Railway. Mr. Hatch recently wrote to the Chamber of Commerce stating that owing to the decrease in riding the company was considering some way of readjusting the rates or increasing the traffic in the city. A committee was then appointed and at a conference held on March 30 it was brought out that the business of the company had decreased 20 per cent below the same months of 1921 and that the company proposed to put on sale a reduced ticket rate.

The 10-cent cash fare or ticket plan will still be in effect. It is said that the tickets are transferable but are not good on interurban cars. This "weekly pass" plan is the same as in effect in Youngstown, Fort Wayne and other cities of moderate size.

### Extension of Freight Service Announced

A new avenue for the shipment of freight to and from Cleveland, Akron, Massillon, Canton and other points has been opened by the Northern Ohio Traction & Light Company, Akron, Ohio. Through the establishment of this service there will be an early morning distribution of freight from Cleveland to all points on the Northern Ohio Traction & Light, Mahoning Valley, Pennsylvania-Ohio Electric, Stark Electric and other roads with which negotiations are now in progress. Arrangements have also been practically completed for the handling of freight from every point on the Northern Ohio Traction & Light to other cities and states via several steam lines. Rates will be the same as on steam roads.

A freight house has been established at 725 Eagle avenue, near Ninth street and Euclid Avenue, which is in the center of the city's business district. Northern Ohio Traction & Light cars will be switched to this freight house and loaded. The extension of freight service has necessitated the establishment of new freight depots, outside of Cleveland, in Ravenna, Barberton, Massillon, Dover and New Philadelphia.

### Petition for Lower Rates

J. P. Jones has filed a petition with the Georgia Railroad Commission asking for a reduction of the fares to 5 cents on the Rome Railway & Light Company's lines. Various charges are made against the railway in the petition, which states that after the reductions are sought in railway fares and in light and power rates it would still be possible for the company to

earn fair returns on the capital invested. The petition was filed in Atlanta and May 26 has been set for the hearing by the commission.

## Transportation News Notes

**Will Determine Fares.**—The City Commission of Fort Smith, Ark., has promised a thorough investigation of the earnings of the Fort Smith Light & Traction Company for the purpose of determining whether the company is to return to a 5-cent fare.

**New Plan to Become Effective.**—The skip-stop system will shortly be started on electric railway lines in Oklahoma City, Okla. Announcement to this effect was recently made by J. W. Shartel, vice-president of the Oklahoma Railway. The skip-stop plan is already in use on one of the Oklahoma City lines.

**Will Appeal Rate Decision.**—The Nashville Interurban Railway, operating between Nashville and Franklin, Tenn., has announced through its officials its intention of appealing the decision of the Public Utilities Commission in regard to its rates. The order of the commission reduced the passenger rate from 10 cents to 4 cents.

**Five-Cent Fare Orders Issued.**—Officials of the Steubenville, East Liverpool & Beaver Valley Traction Company, East Liverpool, Ohio, recently announced the return of the 5-cent fare on local lines. The lower rate instead of the three-fare zone system is the result of a decision of the Federal District Court.

**Merchants Oppose Rates.**—Merchants of Wheeling, W. Va., working with a committee of the Chamber of Commerce, are planning to take action soon to force a reduction in rates of the Wheeling Traction Company and the Wheeling Public Service Company. Retail merchants claim that the alleged high rates keep out business from the Ohio district.

**Interurban Adopts Daylight Saving.**—Despite the fact that the city of Springfield, Ohio, rejected a proposal to establish daylight saving in the city at a referendum, last fall, the Indiana, Columbus & Eastern Traction Company will operate trains on the advanced time effective April 30 to Oct. 1. Springfield is one of the few cities on the traction line that does not operate on advanced time during the summer months. Moreover, connecting lines operate on Daylight Saving time during the summer.

**Use of One-Man Cars Being Extended.**—One-man cars have been introduced by the International Railway, Buffalo, N. Y., on several local lines in the city of Niagara Falls and there has

been an extension of the one-man car service in Buffalo. The company has been operating one-man cars in Lockport for several years. In Niagara Falls, where the company had been operating cars on certain lines on a forty-minute schedule, one-man cars are being operated under a twenty-minute headway.

**New Rules for Car Operation.**—Under a new ordinance adopted by the City Commission of Trenton, N. J., electric railway companies operating within a radius of three-quarters of a mile from the center of the city of Trenton are prohibited from allowing cars to stand for a longer period of time than is reasonably necessary for receiving and discharging passengers. Trolley companies are also prohibited from allowing two cars to stand side by side at any terminus for any period of time whatsoever.

**Zone Ticket Machine to Be Installed.**—Shanklin Equipment Company, Springfield, Mass., has contracted with London Tramways, Ltd., to supply a machine for issuing zone tickets and adding fares automatically, and the first lot of machines was shipped to England, April 14. The use of the machine is said to be an experiment and the outcome will have a bearing in determining if it is feasible to install one-man tram cars to replace the buses so extensively in use in that city. Alfred L. Chase, chief of the Shanklin Company's mechanical organization, is going to London to install the machines.

**Contract with Public Trustees Must Stand.**—Attorney-General J. Weston Allen of Massachusetts has rendered an opinion in which he declares unconstitutional some fourteen bills submitted to the Legislature by residents of Boston having for their object the restoration of the 5-cent fare on all lines of the Boston Elevated Railway and the Eastern Massachusetts Street Railway. According to Mr. Allen the contracts must stand which were made in 1918 providing for the operation of these roads under a board of public trustees. The bills were introduced as a result of the pre-election promises of Mayor Curley.

**City Will Take No Action.**—Announcement has been made that no action will be taken by the city of Erie, Pa., in the matter of the recent ruling of the Public Service Commission in refusing to make mandatory recommendations for a reduction in fares in the city until official notice of the ruling has been received by the city. The Public Service Commission over a year ago recommended that fares on the Buffalo & Lake Erie Traction Company be reduced in the city. Such recommendations have been ignored by the company and the council petitioned the commission to make the recommendations mandatory. The Public Service Commission has declined to do this, on the ground that the operating expenses of the company are such as not to permit a reduction in fares.

## Personal Mention

### Oscar Terry Crosby

**Germans Listen Attentively to Outspoken American Who Advises Them to Clean House Financially**

Oscar Terry Crosby, publicist, economist, explorer, engineer and electric railway executive, has been indulging in his favorite pastime again. He has been on another investigation. Mr. Crosby is always investigating somebody or something. The difference between Mr. Crosby and your ordinary investigator is that when Mr. Crosby investigates anything he goes to the bottom of it, with permanence in view as the outcome of such recommendations as he may make.

Just now Mr. Crosby happens to be in Germany, but he would be equally at home most anywhere else in the wide world. According to newspaper accounts, the former Assistant Secretary of the United States Treasury—for this is one of the many posts Mr. Crosby has held—has startled the German optimists by the candid manner in which he set forth the conditions which any conservative leader would obviously impose before diverting his capital to the field of government or large private loans in Germany. But that isn't all. Among other things he has proposed to the Germans a determination of the theoretical value of the paper mark, based on the average index figures and exchange rates during the era of inflation.

The Germans are not the only ones Mr. Crosby has shocked. He does not think that others have been very much nearer to being correct or less free from economic sins than have the Germans. He is of the opinion that the Reparations Commission has been negligent in making demands without requiring the one step which would permanently put its debtor in a position to make orderly payments in the future. This step, he explains, is the establishment of sound currency. His plan is one of the fruits of his direct study on the ground, but has its real basis on knowledge gained previously.

It will probably be recalled that Mr. Crosby was formerly resident manager in Belgium of the work of the American Commission for Relief in Belgium and Northern France and that late in December, 1917, he represented the United States at a meeting of representatives of all the Allies held in London to discuss the industrial and economic situations. And thus it goes.

Money has been a means to the end with Oscar Crosby, never the end. Long before Edward Bok and others began to preach the doctrine of letting younger men take over the active reigns of business, Mr. Crosby had put aside all thought of active participation in

business affairs in order that he might devote himself to his avocations and to the public service. The safe guess would be that Mr. Crosby has worked harder since 1914, when he entered the public service, than he ever did before. That, indeed, is saying a great deal when proper weight is given to the many business interests of the man in the pioneer days of the electric railway industry. Mr. Crosby is in many respects a marvel. That sounds big and imposing. Well, it is meant to sound that way. And what is more, it is a fact.

### Enter Safety Director Koehler

A. W. Koehler has been appointed director of safety of the New York State Railways. He is a newcomer in



A. W. KOEHLER

the electric railway field, but he has had an extended and successful experience in safety work. For two years previous to joining the staff of the State Railways Mr. Koehler was executive secretary of the Rochester Safety Council, which is affiliated with the National Safety Council. During the previous five years, with the exception of a period of war service in the engineering department of the Navy, he was engaged in safety work with the Commonwealth Steel Company, Granite City, Ill., and the Atlantic Steel Company, Atlanta, Ga.

Mr. Koehler graduated in mechanical engineering from Purdue University in 1915. His experience since graduation has convinced him that the field of industrial accident reduction is a promising one for young engineers. He visualizes a great opportunity on the New York State Railways, in spite of the fact that that company has been one of the pioneers in this field.

P. L. Hatch is now general manager of the Glendale & Montrose Railway, Glendale, Cal. He was formerly superintendent and purchasing agent.

F. W. Gerlach has been appointed general agent of the newly created freight department of the Northern Ohio Traction & Light Company, with headquarters in Cleveland. C. J. Laney, traffic manager, will have complete supervision over the new department.

Harry Reid, president of the Interstate Public Service Company, which owns and operates the Indianapolis, Columbus & Southern Indiana Traction Company and other public utilities in Indiana, has been elected president and also a member of the executive committee of the Great Lakes division of the National Electric Association. The Great Lakes division is made up of Illinois, Wisconsin, Michigan and Indiana. The division will hold its annual convention at French Lick in September.

C. D. Cass, general manager of the Waterloo, Cedar Falls & Northern Railway, Waterloo, Iowa, some weeks ago addressed the annual convention of the Iowa Engineering Society at Sioux City on the steam railway situation. Mr. Cass was one of the managers under federal operation during the war and knows the difficulty now faced by the railroads. He said the roads are so hedged about by restrictive regulations and regulatory bodies that they do not and cannot respond promptly enough to economic changes and conditions. He pointed out that the railroads are subject to a host of masters—the United States Congress, the Interstate Commerce Commission, forty-eight state legislatures, forty-eight state railroad commissions, hundreds of county governments, thousands of city governments, untold numbers of health officers, township trustees, highway commissions, road supervisors, and what not—because each of these governmental agencies has the absolute power to compel a railroad to make expenditure of money under authority of law. The address was well received.

## Obituary

William J. Armstrong, assistant treasurer of the Gould Coupler Company, New York, died suddenly at his home in Brooklyn some time ago. Mr. Armstrong had been connected with the company for the past twenty-five years.

John H. Campbell, treasurer of the Interborough Rapid Transit Company, the Interborough Consolidated Corporation and the New York Railways, New York, N. Y., died April 5 at Garden City, Long Island. Mr. Campbell gained political importance during the régime of Richard Croker, and served as his private secretary when Mr. Croker was Tammany leader. For some years before he became secretary of the traction companies, Mr. Campbell was deputy city chamberlain, leaving that work in 1908 to take up his duties with the Interborough.

# Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE  
MANUFACTURER, SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES

BUSINESS ANNOUNCEMENTS

## Railway Business Is Increasing

We find it necessary this week to devote more space than usual to information on business and market conditions. Reports of track reconstruction and extension have been increasing daily and purchases for power and rolling stock equipment indicate a steady increase. Reports from the Department of Commerce on foreign conditions show an increased demand for American products, and in other closely allied lines there is indication of a continued though slow resumption of business.

## Some Figures on Coal Production

Complete returns of coal loaded into cars at the mines indicate that production during the first week of the strike was 3,784,000 net tons of bituminous coal and a few cars of anthracite dredged from the rivers. The total production of all coal was 3,793,000 net tons. In the first week of the great strike of 1919 only 3,582,000 tons of bituminous coal were produced, but at that time the anthracite mines were working to capacity and produced 2,008,000 tons. The total production of all coal in the first week of the 1919 strike was therefore 5,590,000 tons. Preliminary telegraphic returns for the present week indicate no change in anthracite, but a slight decrease in the output of bituminous coal.

The current production is less than the districts now at work are able to produce when the demand for coal is active. It is true that a number of important non-union mines in the Connellsville coke region and in central Pennsylvania have been closed by the strike, but the existing demand is not sufficient to call out full production in those districts remaining at work. From mines in many non-union fields reports of "no market," "dull demand" and "unbilled coal" continue to be received. The number of loaded cars unassigned at the mines was very large when the strike began, but the latest reports from the railroads show that it is increasing rather than decreasing.

## New Director of Industrial Relations for Schenectady Plant

G. H. Pfeif, has been appointed director of industrial relations at the Schenectady plant of the General Electric Company, succeeding E. B. Merriam, who recently became executive engineer of the Switchboard Department. As director of industrial relations he will have supervision over the employment, education and training, compensation, hospital and safety work of the Schenectady plant.

Mr. Pfeif has been with the General Electric Company since 1905 and for the past several years, as secretary of the committee on student affairs, has been in charge of the selection and placement of technical graduates in the student engineering courses of the Company.

## Railway Electrification in Switzerland

The general management of the Swiss Federal Railways has requested the Administrative Council to approve of the plan for electrification of the Lucerne-Olten-Bale line (92 km.) and to provide it with a credit of 28,300,000 francs to purchase the necessary installations, materials and tools. The management also requests that it be permitted to alter the present construction plans at its own discretion whenever the present credits might be greatly surpassed.

## German Rails and Steel Poles for Edinburgh

The Edinburgh Tramways Committee, by a majority, has recommended the acceptance of the quotation of a German manufacturer in Cologne for 130 tons of tramway rails and 5 tons of fish-plates. The German firm quoted, through its British agent, £1,365, and the nearest British offer was £1,495. The German figure, on a basis of \$4.40 to the pound sterling, would be equivalent to \$33.37 a ton.

The Edinburgh committee also unanimously agreed to accept the tender of another German firm for steel poles. The British quotation was £7,977, as against £5,436 by a Düsseldorf firm.

## More Electric Railway Extensions Planned for London

Late developments of the project for certain extensions and improvements of the London Underground Railways show that the trade facilities committee of the government has reported favorably on the plans which have been proposed and has recommended that the government guarantee the principal and interest upon a sum not exceeding £5,000,000 for this work. Press comments state that there is every reason to believe that the recommendation of this committee will be accepted and that the guarantee will be given. A survey of the situation is being made for the U. S. Department of Commerce by a representative at London of the Bureau of Foreign and Domestic Commerce, and further details relative to the commencement of this work are expected soon.

## Western Electric Reports Earnings of \$10,166,337

The net earnings of the Western Electric Company in 1921 were \$10,166,337, compared with \$8,277,414 in 1920. This increase in the face of drop in gross sales from \$206,112,000 in 1920 to \$189,765,000 is attributed to a thorough readjustment and reduction of expenses. The balance carried to the common stock after payment of interest and dividends was \$823,990. The unfilled orders of the company Dec. 31, 1921, aggregated \$75,525,000 as compared with \$82,655,000 at the end of the year 1920 and \$47,442,000 at the end of the year 1919.

C. G. Du Bois, president, says:

A survey of the prospects for 1922 indicates that the business in the company products will be about the same in quantity as 1921, but somewhat less in value, due to the lower price level which the product will be sold.

## Rapid Transit Proposals Made in Los Angeles

The Pacific Electric Railway, Los Angeles, Cal., has just made application to the City Council for a franchise to operate trains through a tunnel which it is proposed to bore between Hill Street Station and Glendale Boulevard. According to reports, work on the project can be started immediately after the granting of a franchise. It is expected that two years would be necessary to complete the work.

The proposed tunnel will cost approximately \$1,850,000 and will be approximately 1 mile in length. Such a tunnel will remove a car a minute from the North Hill Street line, where conditions are very congested. At the same time the scheduled speed could be increased considerably and at least fifty grade crossings would be removed.

## Railway Electrification in Java

The estimates made in the Netherlands Indian budget for the electrification of the railways of Java have been accepted, but no time has been set for the beginning of the work. A German concern has recently sent a special representative to Java for the purpose of studying the plans and making competitive bids on machinery and the necessary supplies.

## Metal, Coal and Material Prices

Metals—New York		April 18, 1922
Copper, electrolytic, cents per lb.	.....	12.87
Copper wire base, cents per lb.	.....	14.12
Lead, cents per lb.	.....	5.12
Zinc, cents per lb.	.....	5.25
Tin, Straits, cents per lb.	.....	31.12
Bituminous Coal, f.o.b. Mines		
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	.....	\$4.75
Somerset mine run, Boston, net tons	.....	2.25
Pittsburgh, mine run, Pittsburgh, net tons	.....	2.75
Franklin, Ill., screenings, Chicago, net tons	.....	2.75
Central, Ill., screenings, Chicago, net tons	.....	2.50
Kansas screenings, Kansas City, net tons	.....	2.50
Materials		
Rubber-covered wire, N. Y., cents per lb.	.....	5.90
Weatherproof wire base, N. Y., cents per lb.	.....	15.50
Cement, Chicago net prices, without bags	.....	\$1.97
Linseed oil, (5-bbl. lots), N. Y., cents per gal.	.....	88.00
White lead, (100-lb. keg), N. Y., cents per lb.	.....	12.25
Turpentine (bbl. lots), N. Y., cents per gal.	.....	86.00

## Rolling Stock

West Penn Traction & Water Power Company, Pittsburgh, Pa., during 1921 added nine cars of double-truck type to the Coke Region Division rolling stock and ten cars of the double end double-truck type to the McKeesport Division.

Western Ohio Railway, Lima, Ohio, has purchased ten new passenger cars lighter than cars now used. The new equipment will cost \$250,000. General Manager Carpenter stated that later on, to meet competition of the motor bus, the Western Ohio will place in service passenger buses on the highways.

Pittsburg County Railway, McAlester, Okla., which owns and operates the electric railway lines in McAlester and also the electric railway from McAlester to nearby towns, has purchased and put in operation a new type of electric locomotive, built especially for its line at a cost of \$25,000.

Chicago, North Shore & Milwaukee Railroad has requested bids on twelve new single-truck safety cars, ten merchandise dispatch cars and ten steel passenger coaches, all of which will be motor cars. There is a possibility that a larger number of cars may be ordered and that the specifications as to types of cars to be purchased may be changed. Types of equipment, and passenger car design, are under study and investigation at the present time.

## Power Houses, Shops and Buildings

Toledo & Indiana Railroad, Toledo, Ohio, has purchased a site at Washington and Ontario Streets, Toledo, and will soon build there an interurban freight station. President L. P. Schenk has announced that the move was made necessary because of the indefiniteness of the present leases for the interurban union freight station in the downtown district. The Ohio Electric will use its own interurban station. Two or three other lines are negotiating for the right to use the Toledo, Bowling Green & Southern freight station, and some lines may also want to enter the Toledo & Indiana station for their freight business.

Holyoke (Mass.) Street Railway may have a joint waiting station with the Boston & Maine Railroad. At a hearing before the Holyoke Board of Public Works on March 11 on a petition to abolish the Boston & Maine passenger and freight stations at Smith's Ferry, the feasibility of this plan was considered. A plan to establish physical connection between the tracks of the two companies at this point is also under discussion. This would enable cars to be run from a nearby quarry onto the Boston & Maine without transferring the loads. Several plans to reduce the dangers arising from the grade crossing were considered.

Brooklyn, N. Y.—The \$342,000 bid of F. L. Cranford for the construction of the Lawrence Street subway station on the Whitehall Street line of the Brooklyn Rapid Transit Company was found to be the lowest when the bids were opened before Leroy T. Harkness, a member of the Transit Commission. The terms of the contract provide that the station must be ready for operation in eighteen months from the time work is begun and must be entirely completed in twenty-four months. Work is to begin within thirty days of the date of the delivery of the contract. The bid next lowest was that of the Joslin Construction Company, \$355,000. The highest was that of Pat McGovern, \$502,000. There is already a platform at Lawrence Street, but it has never been used.

## Track and Roadway

Montreal, Que.—At a recent meeting of representatives of the City Council and the Tramways Commission it was definitely decided to build a car line to the top of Mount Royal.

San Francisco - Oakland Terminal Railways, Oakland, Cal., has protested the extension of its Rockridge line on the ground that this improvement would necessitate a new switch at a cost of \$5,000.

The Poughkeepsie & Wappingers Falls Railway, Poughkeepsie, N. Y., is planning a program of improvement work on its lines in the city. Double tracks will be laid on some streets.

Georgia Railway & Power Company, Atlanta, Ga., will spend \$220,000 on improvement work. On Marietta Street 122-lb. rail will be put in and 103-lb. rail on Decatur Street. These rails will be laid in a concrete roadbed.

Cincinnati (Ohio) Traction Company will start the work of putting in new rails on Hamilton and Eastern Avenues on May 1. These thoroughfares are equipped with double tracks and the new rails will be laid for a distance of 1 mile on each street.

Eastern Pennsylvania Railways, Pottsville, Pa., replaced much new track during 1921 and built a new siding at Port Carbon. Some of the overhead trolley wire was also replaced. During the year \$399,719 was expended for improvements and extensions to the property.

Winona Interurban Railway, Warsaw, Ind., operating from Goshen, Ind., to Peru via Warsaw, is building a track connection with the Michigan division of the Big Four railroad at New Paris, 6 miles south of Goshen. The arrangement will also afford connection with the Wabash Railroad at that place.

Steubenville, Ohio.—Plans for a loop system for all traction lines in Steubenville have been mapped out by the city board of control and safety and street committees of Council. The idea is to route all city lines on a loop embracing Sixth, Adams, Third and Market Streets.

Inter-City Terminal Railway Company, North Little Rock, Ark., will formulate plans for laying tracks on the new Main Street bridge, which is being constructed to facilitate traffic between Little Rock and North Little Rock. The proposed improvements will cost about \$150,000.

New York, N. Y.—The Transit Commission is planning to build a subway from Long Island City to Borough Hall and to extend the Fourth Avenue subway to Staten Island. George McAneny, chairman of the commission, recently made this announcement before the Brooklyn Chamber of Commerce.

Shenango Valley Traction Company, Youngstown, Ohio, will begin work on the double tracking of its line on Broadway, Farrell and South Dock Streets, Sharon. Where necessary, the present double-track section will be rebuilt so that there will be a continuous double-track system. The rail used will be grooved girder. It will be laid on International twin steel ties.

Public Service Railway, Newark, N. J., is preparing plans for extending its lines to the proposed bridge plaza at Camden, where a structure will be erected across the Delaware River. The railway is waiting to hear from the bridge engineers before deciding on a loop or otherwise at the bridge approach.

Little Rock Railway & Electric Company, Little Rock, Ark., may be required to place its wires underground at the foot of Broadway Street, so that the work of constructing the new bridge across the river at this point may not be interfered with, according to a recent City Council resolution. The work will cost about \$7,000.

Altoona & Logan Valley Electric Railway, Altoona, Pa., will soon start work on double-tracking the Eighteenth Street line between Eleventh Avenue and a point between the culvert and Nineteenth Street. The officials have under consideration the matter of extending the Fairview line beyond Fourth Street on Twenty-Second Avenue.

Savannah Electric & Power Company, Savannah, Ga., has started the work of repaving West Broad Street. The track improvements recently referred to in the ELECTRIC RAILWAY JOURNAL include heavier rail on the Thunderbolt line from Nelson's switch to the Casino, heavier rail on Forty-sixth Street and increased capacity of the Daffin Park line.

Interstate Public Service Company, Indianapolis, Ind., is working out plans for an extension of the electric transmission line from Salem to Campbellsburg, 12 miles west. A small plant is in operation in Campbellsburg at the present time, affording only fourteen-hour service, and business men are making every effort to obtain twenty-four hour service.

Marshall (Tex.) Traction Company may extend its line to serve a new industrial district established near that

city and schools. The city wants the line extended west to the Darco plant, then south around Wiley University, east to the Southside High School then north to join with the present terminus of the line on Fannin Street. The extension will make a belt around the city south of the Texas & Pacific Railway and will be more than a mile in length.

Portland Railway, Light & Power Company, Portland, Ore., will make extensive repairs to its tracks in various parts of the city during the coming summer. Definite plans have not been made but the tracks on Hawthorne Avenue will probably be reconstructed from East Water to East Twelfth Streets. In addition to its repair and reconstruction program, the railway company must participate in the costs of the improvement of Foster Road, East Twenty-eighth and Sixty-second Avenue Southeast.

Houston, Tex., John Henry Kirby of Houston, Tex., and other financiers are promoting a proposition to build an interurban line from Houston to Seabrook and other resort towns on the coast near Houston. The matter has been placed before Mayor Holcombe and the City Commissioners of Houston and application has been made for a franchise over the streets of the city of Houston. The proposed line will be about 25 miles in length and will reach all the resort places along the shores of Trinity Bay between Houston and the gulf.

Indiana Service Corporation, Fort Wayne, Ind., will co-operate with the Wabash, Ind., officials in repairing that portion of their car lines on the streets of Wabash. This includes the city car line and the interurban lines on West Market Street. General Manager Greenland was in Wabash recently to inspect with City Engineer Latchem the condition of the car lines. Mr. Greenland stated that the company would give its co-operation and send an engineer soon to make tentative plans for improvements needed.

Des Moines (Iowa) City Railway will make track extensions and improvements on two more lines this spring, according to F. C. Chambers, manager. On the Clark Street line a double track is to be put in from the point where the north line of Keosauqua Way intersects Twelfth Street, run north to School and west to Thirteenth Street. On the same line passing tracks are to be put in from Twenty-ninth Street to Thirty-second Street on Clark. This will make a total of six blocks of new track improvements on Clark. Passing tracks which now extend from Guthrie to Arthur Avenues on the East Sixth and Ninth line will be extended on two blocks further to Morton Avenue.

Springfield (Mass.) Street Railway through President Clark V. Wood reports an agreement with the Hampden County (Mass.) commissioners to pay an annual rental fee of \$10,125 for the privilege of laying its tracks across the new Connecticut River bridge. A hear-

ing has already been given by the City Council of Springfield on the company's petition for location of tracks approaching the new bridge. The company was very desirous of establishing a physical connection between its west and east side lines, so as to admit of running cars across the bridge and thence to principal urban and interurban routes, as deemed advisable, and it is said that this condition has been fulfilled. Cars, by this plan, would be looped around Court Square Extension by way of Water Street. The cost of building the approaches to the bridge is estimated by the company at \$300,000.

---

### Recent Incorporations

---

Lafayette (Ind.) Street Railway has filed articles of incorporation with Ed Jackson, Secretary of State for Indiana. The concern has taken over the local lines at Lafayette after sale under foreclosure.

South Florida Traction Company, Miami, Fla., has been incorporated. The officers are G. E. Merrick, president; F. King, vice-president, and I. M. Carr, secretary-treasurer. The line will operate south of Miami as far as Coconut Grove and will include Homestead and West Palm Beach.

---

### Professional Notes

---

Edwin F. Wendt, consulting engineer is now established in the practice of engineering in connection with valuation, financing, consolidation, etc. His office is in the Union Trust Building, 740 Fifteenth Street, N. W., Washington, D. C.

Waddell & Son, Inc., New York City, consulting engineers for the Connecticut State Highway Commission on the Washington Bridge over the Housatonic River, designed the special track and overhead construction on the bascule span described in the issue of April 8. The article simply says "that the bridge was built under the direction of engineers of the State of Connecticut."

---

### Trade Notes

---

The Economy Electric Devices Company, Chicago, has recently received orders from the Wheeling Traction Company for fifteen watt-hour meters; from the Poughkeepsie & Wappinger Falls Railway, for twenty-one meters; the Southern New York Power & Railway Corporation for eleven meters, and from the Haagsche Tramweg Maatschappij, Holland, for twenty 1,200-volt watt-hour meters.

The United Alloy Steel Corporation, Canton, Ohio, announces that John McConnell has again affiliated himself with the company in the capacity of vice-president, in charge of operation. Mr.

McConnell gained a reputation in the early days with the United Steel Company in producing the first vanadium steel in commercial quantities made in America. His experience comprises ten years with the Carnegie Steel Company, three years with the Bethlehem Steel Company, eleven years with the United Steel Company (now the United Alloy Steel Corporation), one year with the Central Steel Company, as consulting metallurgist, and three years as vice-president, in charge of alloy steel production, with the Interstate Iron & Steel Company.

J. R. L. Glover, who has been connected with the Bridgeport Brass Company for the past six years, has been appointed sales engineer on brass and copper pipe and piping. He has firsthand knowledge of the processes involved in the making of sheet, tube, pipe and rod. He resigned his position with the Bridgeport Brass Company to enter the U. S. Air Service in France. After his return from the war he was given a position in the sales department of the company. He was soon given the title phono-electric engineer, a position which he created due to his effective promotion of the sale of phono-electric trolley wire, one of the best known products of the Bridgeport Brass Company, which is used extensively for trolley construction at points of dense traffic or severe wear. This position Mr. Glover held up to the time of his present advancement.

---

### New Advertising Literature

---

The Federal Porcelain Company, Carey, Ohio, has recently issued its new Catalog No. 2, covering its line of standard electrical porcelains.

Dwight P. Robinson & Company, Inc., New York, N. Y., has begun the publication of a house organ entitled the *News*. Vol. 1, No. 1 is dated March, 1922, and gives several items relating to the work being done by this company in various parts of the world.

The Griscom-Russell Company, New York, N. Y., has just issued a new bulletin, No. 360, in reference to the application of evaporators for the purification of boiler feed water by distillation. The booklet describes the use of Reilly evaporators in the power plant for the elimination of scale, blow down, priming, etc.

The Galena Signal Oil Company, Franklin, Pa., has issued a booklet giving an alphabetical list of equipment parts for rolling stock, power plants, shops, etc., together with the particular lubricant recommended for each part. This gives in compact form the company's complete line of oils and greases for shop machinery and other railway equipment and will be of service as a convenient guide to the selection of the particular oil or grease that the experience of the company has proved the best and most economical for the purpose.

# PEACOCK PROPOSES

*“trial by jury”*



## Let the Motormen Test Them

Isn't this the fairest, the surest, the most satisfactory way to find out what hand brakes you need for your cars. It will cost you little or nothing to install a set of each type of brakes on cars of similar type and weight and make some actual tests. A jury of a dozen of your experienced motormen will return a verdict on which you can rely.

# PEACOCK BRAKES

## The Choice by Theory and by Test

There is a certain eastern company which made some tests of hand brakes along these lines. Their technical men approved the theories of Peacock Brake design, but their hard-headed operating men had to be shown. They tried them on big cars and little cars, on light and on loaded ones, on dry rail and on slippery track. And Peacock Brakes *did the showing*.

Today this Company specifies *Peacock Brakes* for all its cars and it has every kind from safeties to seventy-tonners.

In fairness to us, in fairness to the public safety, in fairness to yourself, make the tests.

*We will gladly furnish set of Peacock Brakes for test purposes, will help you install them, and assist at the trials if desired—Write us today.*

### NATIONAL BRAKE COMPANY

890 Ellicott Square, Buffalo, N. Y.

# Bankers and Engineers

## Ford, Bacon & Davis Incorporated

Business Established 1894  
 PHILADELPHIA NEW YORK SAN FRANCISCO  
 DETAILED EXAMINATIONS BY EXPERTS  
 Reports for Financing covering Valuation, Turnover, Costs, Reserves, Rates,  
 UTILITIES INDUSTRIALS SHIPPING

## THE J. G. WHITE ENGINEERING CORPORATION

*Engineers—Constructors*  
 Industrial Plants, Buildings, Steam Power Plants, Water  
 Powers, Gas Plants, Steam and Electric Railroads,  
 Transmission Systems  
 43 Exchange Place, New York

## STONE & WEBSTER

*Incorporated*  
 EXAMINATIONS REPORTS APPRAISALS  
 ON  
 INDUSTRIAL AND PUBLIC SERVICE PROPERTIES  
 NEW YORK BOSTON CHICAGO

## JOHN A. BEELER

OPERATING, TRAFFIC AND RATE INVESTIGATIONS  
 SCHEDULES—CONSTRUCTION—VALUATIONS  
 OPERATION—MANAGEMENT  
 52 VANDERBILT AVE., NEW YORK

## SANDERSON & PORTER ENGINEERS

REPORTS, DESIGNS, CONSTRUCTION, MANAGEMENT  
 HYDRO-ELECTRIC DEVELOPMENTS  
 RAILWAY, LIGHT and POWER PROPERTIES  
 CHICAGO NEW YORK SAN FRANCISCO

## ENGELHARDT W. HOLST

*Consulting Engineer*  
 Appraisals, Reports, Rates, Service Investigation,  
 Studies on Financial and Physical Rehabilitation  
 Reorganization, Operation, Management  
 683 Atlantic Ave., Boston, Mass.

## THE ARNOLD COMPANY

ENGINEERS—CONSTRUCTORS  
 ELECTRICAL—CIVIL—MECHANICAL  
 105 South La Salle Street  
 CHICAGO

## ROBERT M. FEUSTEL

CONSULTING ENGINEER  
 Rate, Traffic and Reorganization  
 Investigations  
 Fort Wayne, Indiana

ALBERT S. RICHEY  
 ELECTRIC RAILWAY ENGINEER  
 WORCESTER POLYTECHNIC INSTITUTE  
 WORCESTER, MASSACHUSETTS

## KELLY, COOKE & COMPANY

Engineers

149 BROADWAY  
 NEW YORK

424 CHESTNUT STREET  
 PHILADELPHIA

## WALTER JACKSON

*Consultant*  
 FARES, BUSES, MOTOR TRUCKS  
 More revenue from more riders  
 143 Crary Ave., Mt. Vernon, N. Y.

## Parsons, Klapp, Brinckerhoff & Douglas

WM. BARCLAY PARSONS H. M. BRINCKERHOFF  
 EUGENE KLAPP W. J. DOUGLAS  
*Engineers—Constructors—Managers*  
 Hydro-electric Railway Light and Industrial Plants  
 Appraisals and Reports  
 CLEVELAND NEW YORK  
 743 Hanna Bldg. 84 Pine St.

## C. E. SMITH & CO.

*Consulting Engineers*  
 2065-75 Railway Exchange Bldg., St. Louis, Mo.  
 Chicago Kansas City  
 Investigations, Appraisals, Expert Testimony, Bridge  
 and Structural Work, Electrification, Grade Crossing  
 Elimination, Foundations, Power Plants

## DAY & ZIMMERMANN, INC. ENGINEERS

*Design, Construction  
 Reports, Valuations, Management*  
 NEW YORK PHILADELPHIA CHICAGO

## HEMPHILL & WELLS

CONSULTING ENGINEERS  
 Gardner F. Wells John F. Layng Albert W. Hemphill  
 APPRAISALS  
 INVESTIGATIONS COVERING  
 Reorganization Management Operation Construction  
 43 Cedar Street, New York City

## JAMES E. ALLISON & CO.

*Consulting Engineers*  
 Specializing in Utility Rate Cases and  
 Reports to Bankers and Investors  
 1017 Olive St., St. Louis, Mo.



# AMERICAN BRIDGE COMPANY

HUDSON TERMINAL, 30 CHURCH STREET, NEW YORK

*Manufacturers of Steel Structures of all classes, particularly*  
**BRIDGES AND BUILDINGS**

*Sales Offices:*

NEW YORK, N. Y. . . . . 30 Church Street  
Philadelphia, Pa. . . . . Widener Building  
Boston, Mass. . . . . 120 Franklin Street  
Baltimore, Md. . . . . Continental Building  
PITTSBURGH, PA. . . . . Frick Building  
Buffalo, N. Y. . . . . Marine National Bank  
Cincinnati, Ohio. . . . . Union Trust Building  
Atlanta, Ga. . . . . Candler Building  
Cleveland, Ohio. . . . . Guardian Building  
Detroit, Mich. . . . . Beecher Ave. & M. C. R. R.  
CHICAGO, ILL. . . . . 208 South La Salle Street

St. Louis, Mo. . . . . Liberty Central Trust Bldg.  
Denver, Colo. . . . . First National Bank Bldg.  
Salt Lake City, Utah. . . . . Walker Bank Building  
Duluth, Minn. . . . . Walvin Building  
Minneapolis, Minn. . . . . 7th Ave. & 2d St., S.E.

*Pacific Coast Representative:*

U. S. Steel Products Co., Pacific Coast Dept.  
San Francisco, Cal. . . . . Rialto Building  
Portland, Ore. . . . . Selling Building  
Seattle, Wash. . . . . 4th Ave. So., Cor. Conn. St.

*Export Representative: United States Steel Products Co., 30 Church St., N. Y.*

## Byllesby Engineering & Management Corporation

208 S. La Salle Street, Chicago

New York

Tacoma

## SANGSTER & MATTHEWS

### Consulting Accountants

Valuation and Rate Specialists

Depreciation

Consolidations

Rate Schedules

Reports to Bankers

25 Broadway, NEW YORK

134 South LaSalle Street, CHICAGO

## ENGEL & HEVENOR

Incorporated

### TRACK

Engineers—Constructors—Maintenance

Appraisals—Valuation—Rehabilitation

Steam and Electric Railroads

Estimates

220 BROADWAY, NEW YORK

## THE P. EDWARD WISH SERVICE

50 Church St.  
NEW YORK

Street Railway Inspection  
DETECTIVES

131 State St.  
BOSTON

B. A. Hegeman, Jr., President  
Charles C. Castle, First Vice President  
Harold A. Hegeman, Vice-Pres. and Treas.

W. C. Lincoln, Mgr. Sales & Engineering  
Fred C. J. Dell, Secretary

## National Railway Appliance Co.

50 East 42nd St., New York City

Hegeman-Castle Corporation  
343 So. Dearborn St., Chicago, Ill.

National Railway Appliance Co.  
Munsey Bldg., Washington, D. C.

National Railway Appliance Co.  
100 Boylston Street, Boston, Mass.

## RAILWAY SUPPLIES

Tool Steel Gears and Pinions

Anderson Slack Adjusters

Genesco Paint Oils

Dunham Hopper Door Device

Feasible Drop Brake Staffs

Flaxlinum Insulation

Anglo-American Vanishes,  
Palots, Enamels, Surfacer,

Shop Cleaner.

Johnson Fare Boxes

Perry Slide Bearings

Drew Line Material and Railway

Specialties

Hartman Centering Center Plates

Economy Power Saving Meters

H & W Electric Heaters

Garland Ventilators

Pitt Sanders

National Safety Car Equipment

Co.'s One-Man Safety Cars

Central Equipment Company's

Hand Holds

## PETER WITT

UTILITY CONSULTANT

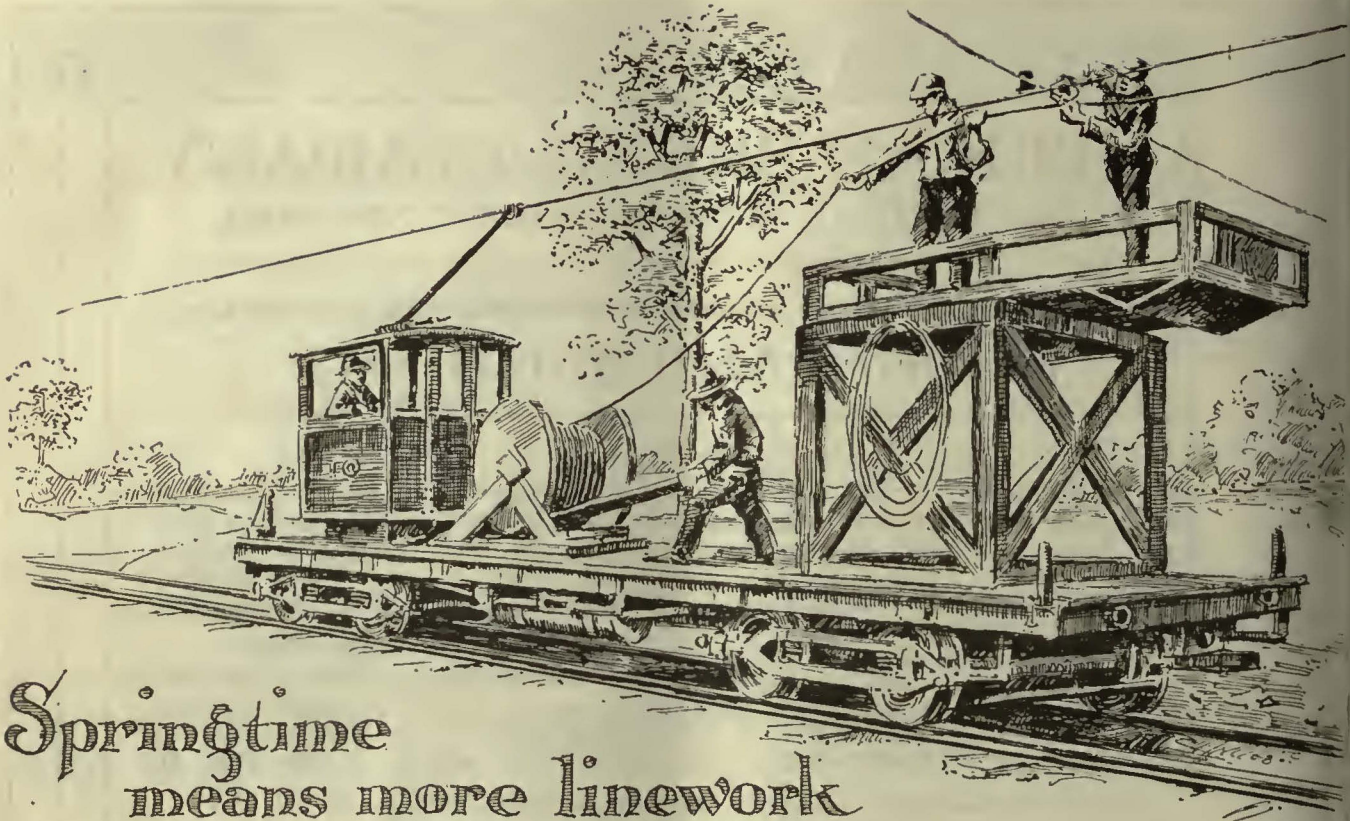
456 Leader-News Bldg., Cleveland, O.

The Most Successful Men in the Electric Railway Industry read the

**ELECTRIC RAILWAY JOURNAL**

Every Week

When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.



Springtime  
means more linework

Figure your line renewals now and start getting quotations on materials.

Columbia Ears are made according to well-tested designs. Only fresh metals, correctly alloyed for maximum durability, are used.

Our prices are in line and deliveries prompt.

# COLUMBIA

## Trolley—Splicing—Feeder

# EARS



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

A. A. GREEN, Sales Mgr., Brooklyn, N. Y.

ERNEST KELLER, Brooklyn, N. Y.

E. ALLISON THORNWELL, 1026-7 Atlanta Trust  
Bldg., Atlanta, Ga.

J. L. WHITTAKER, 141 Milk St., Boston, Mass.

F. F. BODLER, 903 Monadnock Bldg., San  
Francisco, Calif.

W. McK. WHITE, 343 South Dearborn St.,  
Chicago, Ill.





One Hundred New One-Man Double-Truck Milwaukee Cars

*In Milwaukee—*

where they build fine new cars and reconstruct old ones in their own well-equipped shops they use

**AGASOTE**  
(TRADE MARK)

Headlinings  
and

**PANTASOTE**  
(TRADE MARK)

Curtains

**THE PANTASOTE COMPANY**

11 Broadway,  
New York

Peoples Gas Bldg.,  
Chicago, Ill.

751 Monadnock Bldg.,  
San Francisco

# "Broadcasting" to Industry

McGRAW-HILL publications provide a service to industry which is similar in several respects to radio broadcasting—the newest scientific development to attract widespread popular attention.

EACH PUBLICATION is, in effect, a broadcasting station with its "wave length" adjusted to serve, not the entertainment-loving public, but a selected industrial group with common problems and interests.

EACH GROUP is "attuned", by reason of its demand for authoritative information, to receive the "program" which is provided to meet its specialized needs.

THOUSANDS of industrial executives are depending upon these publications to guide them in this period of business recuperation.

IF YOU do not already have a "receiving set" for the McGraw-Hill service to *your* industry, fill out the coupon at once.

## McGraw-Hill Publications:

### American Machinist

Serves the men responsible for results wherever any kind of machinery is made or used. The recognized clearing house of the better ways of doing things in the machine shop, of the new ideas in machinery and of the most approved methods in shop management. \$5.00 per year.

### Bus Transportation

A transportation engineering and business paper of the passenger bus industry—including automotive buses, trackless trolleys and any other self-propelled buses. It covers managerial, organization, operating and maintenance problems, complete news of the industry and details of equipment. \$2.00 per year.

### Chemical and Metallurgical Engineering

Exponent of the fundamental engineering principles on which the chemical, metallurgical and allied industries are based. The scope of its editorials and articles may be summarized as the engineering, technology and economics of those industries. \$5.00 per year.

### Coal Age

Devoted to the mining and marketing of coal. Presents new methods, new equipment, new construction, current news, production statistics and market data. \$3.00 per year.

### Electrical Merchandising

The monthly magazine of the electrical trade. It gathers from the field new selling ideas and effective commercial and financial methods and disseminates these facts among those who sell, manage and finance electrical appliances, equipment, supplies or service. \$2.00 per year.

### Electric Railway Journal

The engineering and business newspaper of the electric railway industry. It thoroughly covers corporate policies, construction, managerial, operating and maintenance methods, legal and financial news, equipment and supplies and all phases of public relations. \$4.00 per year.

### Electrical World

Presents the latest authoritative information on the activities of the central station, the industrial electrical engineer and on the scientific, manu-

facturing and commercial fields of electricity. \$5.00 per year.

### Electrical Review and Industrial Engineer

Devoted to the problems of electric operation and maintenance in mills and factories, particularly from the standpoint of the man responsible for the proper inspection, operation and maintenance of electrical equipment. \$2.00 per year.

### Engineering and Mining Journal-Press

Recognized as the standard authority on metal mining, milling, refining and on the mineral industries. Reports on methods, processes and improved equipment used in the leading mines, mills and smelters. Gives authoritative summaries of market conditions and prices. \$4.00 per year.

### Engineering News-Record

Records the intimate technical details concerning notable operations, keeps its readers abreast of current engineering and construction practice, and reports promptly and accurately the civil engineering and construction news of the day. \$5.00 per year.

### Ingenieria Internacional

Presents the latest information on the current achievements, practices, equipment and apparatus of the five major branches of engineering in all parts of the world, with special reference to their application and use in the Spanish-reading countries. \$5.00 per year. (Printed in Spanish.)

### Journal of Electricity and Western Industry

Reports Western events, advocating economy, efficiency and convenience of electric power for all industries of the West, manufacturing, agricultural, mining, merchandising and home-building. \$2.50 per year.

### Power

It reports every phase of the progress in the generation and transmission within the power plant—including steam, oil, gas and water-power prime movers, and electrical refrigerating ventilating, pump and elevator auxiliary equipment. \$3.00 per year.

Promotion Dept., McGraw-Hill Co., Inc.  
Tenth Ave. at 36th St., New York City

Please send me a sample copy of \_\_\_\_\_  
I am particularly interested in articles on \_\_\_\_\_

Name \_\_\_\_\_  
Position \_\_\_\_\_  
Company \_\_\_\_\_  
Address \_\_\_\_\_



**Griffin Wheel  
Company**  
McCormick Building  
Chicago, Ill.



# GRIFFIN F. C. S. WHEELS

**For Street and Interurban Railways**

All of our plants have adequate facilities for fitting wheels to axles

**FOUNDRIES:**

Chicago

Detroit  
Denver

Boston  
Kansas City  
Council Bluffs

St. Paul  
Los Angeles

Tacoma

## **RATTAN SEATS** *for cars or buses*

Whether for new work or for rehabilitating old, St. Louis Quality Rattan will make a more attractive appearance and a more durable job.

All imported stock, inspected to eliminate imperfections. Will be cut to your own specifications before shipment.

*Look at this illustration—then send for sample*

**St. Louis Car Company**  
St. Louis, Mo.



## Ngapi

The Burmese is very fond of *ngapi*, which, according to Kipling, is "fish pickled long after it should have been buried."

But he wouldn't touch limburger on a bet.

That's the way with some humans.

They get so accustomed to a bad thing they think it is good.

The station operator, for instance.

—who buys motor brushes by the lot, hit or miss, without regard for the individual requirements of the machine, or the work it has to do!

—who blames the motor bearings, or the commutator, when sparks begin to sputter!

But there's no reason for him to *keep on* doing it wrong when the Morganite method of brush application is openly offered for trial.

Not a bit.

# Morganite Brush Co., Inc.

Main Office and Factory:  
519 West 38th Street, New York

DISTRICT ENGINEERS AND AGENTS:

Electric Power Equipment Corp.,  
13th and Wood Sts., Philadelphia.

Electrical Engineering & Mfg. Co.,  
808 Penn Ave., Pittsburgh.

R. W. Little Corporation,  
176 Federal Street, Boston, Mass.

W. R. Hendey Co., Hoge Bldg.,  
Seattle.



Herzog Electric & Engineering Co.,  
150 Stewart St., San Francisco.

Charles Farnham, L. W. Hellman Bldg.,  
Los Angeles.

Railway & Power Engineering Corporation, Ltd.,  
131 Eastern Ave., Toronto, Ontario, Canada.



## the new, improved Croft Handbook

The new, improved CROFT HANDBOOK gives you the latest information on practical electricity. It is brimful of those facts which every man engaged in electrical work needs to know.

Think how much help you would be able to get from a convenient pocket-size handbook that gives you in one book:

Practical suggestions for locating and correcting both motor and generator troubles—

Clear directions for proper installation and operation of motors and generators—

Explanations of fundamentals of practical electricity—Helpful data on transformers—

All the details the practical man needs on wiring for light and power.

All these topics and many more are covered in the new revised

Second Edition

## American Electricians' Handbook

By Terrell Croft

823 pages, flexible, pocket size  
600 illustrations, \$4.00 net, postpaid

This book has become world famous. 47,000 practical electrical workers know and respect this great electrical guide.

Now there is a new edition—a careful, thorough revision. One hundred pages of new material have been added. Several entire divisions have been completely rewritten and reset. All the data have been brought into accordance with the 1920 National Electrical Code requirements.

You can examine this great pocket book on practical electricity for ten days free. See coupon below.

## FREE EXAMINATION COUPON

McGraw-Hill Book Co., Inc., 370 Seventh Ave., New York.

You may send me on 10 days' approval Croft's American Electricians' Handbook new Second Edition, \$4.00 net, postpaid. I agree to remit for the book or return it postpaid within 10 days of receipt.

... I am a regular subscriber to Electrical Merchandising.

Signed \_\_\_\_\_  
(Please print)

Address \_\_\_\_\_

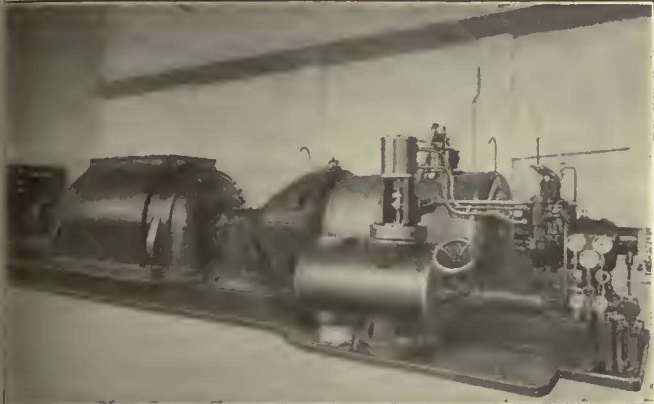
Official Position \_\_\_\_\_

Name of Company \_\_\_\_\_

(Book sent on approval to retail purchasers in the U. S. and Canada only.) F.E.M.

# Allis-Chalmers Steam Turbines

## For Fuel Economy



4000 Kw. max. 80% P. F. 3600 r.p.m. Allis-Chalmers Steam Turbine and Alternator Unit with direct connected Exciter installed in a western power plant.

In the design of **Allis-Chalmers** Steam Turbines efficiency and reliability are the principal features receiving attention.

High efficiency under test conditions is an achievement to be proud of, but real economy can be measured only by sustained efficiency over long periods of operation.

**Allis-Chalmers** Turbines are known above all others for **sustained efficiency** throughout years of constant operation.

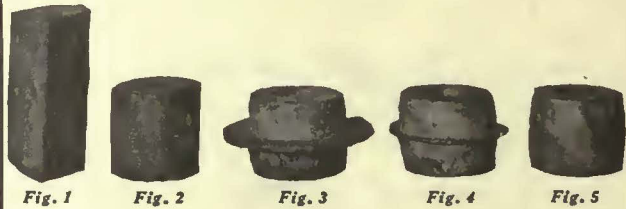
### A.-C. PRODUCTS

- |                      |  |
|----------------------|--|
| Air Brakes           | Metallurgical Machinery                  |
| Air Compressors      | Mining Machinery                         |
| Cement Machinery     | Oil Engines                              |
| Condensers           | Perforated Metals                        |
| Crushing Machinery   | Pumping Machinery                        |
| Electrical Machinery | Reciprocating Pumps                      |
| Electric Hoists      | Saw Mill Machinery                       |
| Farm Tractors        | Steam Engines                            |
| Flour Mill Machinery | Steam Hoists                             |
| Forgings             | Steam Turbines                           |
| Gas Engines          | Timber Treating and Preserving Machinery |
| Hydraulic Turbines   |  |

# ALLIS-CHALMERS

## Manufacturing Company

Milwaukee, Wis., U. S. A.  
District Offices in All Leading Cities.



## Nuttall's New Process of Drop Forging Motor Pinion Blanks

The illustrations above show the various steps in forging Nuttall special drop-forged motor pinion blanks.

Figure 1—Section cut from square rolled billet.

Figure 2—Billet upset and rounded.

Figure 3—Blank rough forged—first forming operation in retaining die.

Figure 4—Blank finish forged—second forming operation in retaining die.

Figure 5—Blank sized and trimmed—ready for machining.

### Result—Improved Basic Material.

This process produces a basic material with close-grained interwoven fibres—free from the type of forging flow lines common in rolled bars.

This basic material, when subjected to the Nuttall BP heat treatment, has toughness and ductility to withstand shocks and strains, and hardness to resist wear—an ideal combination for railway motor service.

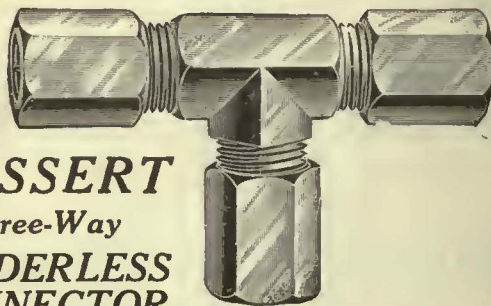
**R.D. NUTTALL COMPANY**  
PITTSBURGH  PENNSYLVANIA

All Westinghouse Electric & Mfg. Co. District Offices are Sales Representatives in the United States for the Nuttall Electric Railway and Mine Hoisting Products. In Canada: Lyman Tube & Supply Co., Ltd., Montreal and Toronto.

# Nuttall

To make a three-way splice

USE THE

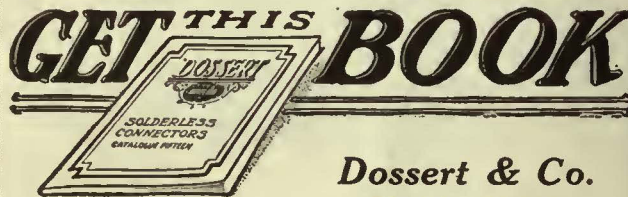


**DOSSERT**  
Three-Way  
**SOLDERLESS**  
**CONNECTOR**

Better conductivity at the joint than in the wire itself, is a condition you always have with any of the Dossert connectors.

—all due to the Dossert principle—the tapered sleeve.

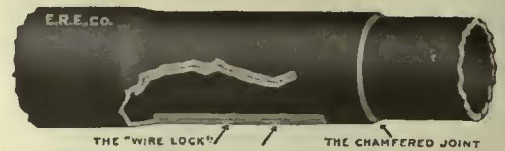
The Dossert 15th Year Book shows you the economy these connectors give you.



FREE

**Dossert & Co.**  
242 West 41st St.  
New York, N. Y.

**ELRECO TUBULAR POLES**

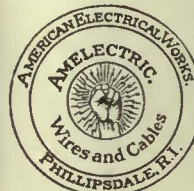


COMBINE

Lowest Cost      Lightest Weight  
Least Maintenance      Greatest Adaptability

Catalog complete with engineering data sent on request

**ELECTRIC RAILWAY EQUIPMENT CO.**  
CINCINNATI, OHIO  
New York City, 30 Church Street



**AMELECTRIC PRODUCTS**

**BARE COPPER WIRE AND CABLE**

**TROLLEY WIRE**

**WEATHERPROOF WIRE AND CABLE**

**PAPER INSULATED UNDERGROUND CABLE**

**MAGNET WIRE**

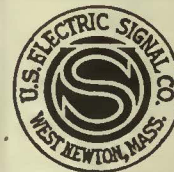
Reg. U. S. Pat. Office  
Galvanized Iron and Steel  
Wire and Strand

Incandescent Lamp Cord

**AMERICAN ELECTRICAL WORKS**  
PHILLIPSDALE, R. I.

Boston, 176 Federal; Chicago, 112 W. Adams; Cincinnati, Traction Bldg.; New York, 233 B'way; San Francisco, 612 Howard; Seattle, 100 1st Ave. So.

**ANACONDA**  
Copper Wire  
111 W. Washington St., Chicago



**U. S. Electric Contact Signals**

for

Single-track block-signal protection  
Double-track spacing and clearance signals  
Protection at intersections with wyes  
Proceed signals in street reconstruction work

**United States Electric Signal Co.**  
West Newton, Mass.

**FLOOD CITY**

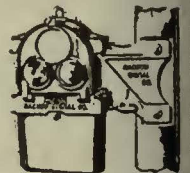
Rail Bonds and Trolley Line Specialties

**Flood City Mfg. Co., Johnstown, Pa.**

**AUTOMATIC SIGNALS**

Highway Crossing Bells  
Headway Recorders

**NACHOD SIGNAL COMPANY, INC.**  
LOUISVILLE, KY.



Electrical  
Wires  
and  
Cables

**JOHN A. ROEBLING'S SONS CO., Trenton, N. J.**

**Chapman**  
**Automatic Signals**

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



**Peirce Forged Steel Pins**  
**with Drawn Separable Thimbles**

Your best insurance against insulator breakage

**Hubbard & Company**  
PITTSBURGH, PA.

**AETNA INSULATION LINE MATERIAL**

Third Rail Insulators, Trolley Bases, Harps and Wheels, Bronze and Malleable Iron Frogs, Crossings, Section Insulators, Section Switches.

**Alber & J. M. Anderson Mfg. Co.**

289-93 A Street, Boston, Mass.

Established 1877

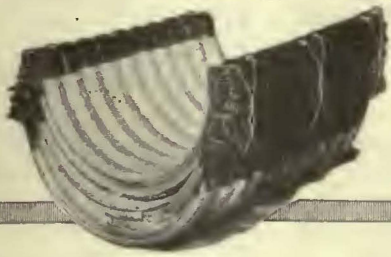
Branches—New York, 135 B'way.

Philadelphia, 429 Real Estate Trust Bldg. Chicago, 105 So. Dearborn St.

London, E. C. 4, 38-39 Upper Thames St.







24 feet of  
**"ACME" (NESTABLE)**  
**TONCAN**  
**CORRUGATED METAL CULVERTS**

A full circle corrugated culvert 24 feet long requires several men to handle it.

A 24-foot "ACME" (Nestable) Corrugated Culvert as shown above can be handled by one man. Which do you think would decrease your maintenance costs the most?

Write for Booklet M-21.



# American Rail Bonds

CROWN  
 UNITED STATES  
 TWIN TERMINAL  
 SOLDERED  
 TRIPLEX

Arc Weld and Flame Weld

*Send for new  
 Rail Bond book*

**American Steel & Wire  
 Company**  
 CHICAGO  
 NEW YORK

## SPECIAL TRACKWORK

Of the well-known **WHARTON** Superior Designs and Constructions

STEEL CASTINGS	FORGINGS	GAS CYLINDERS
CONVERTER AND ELECTRIC	DROP, HAMMER AND PRESS	SEAMLESS STEEL

**WM. WHARTON JR. & CO., Inc., Easton, Pa.**  
 (Subsidiary of Taylor-Wharton Iron & Steel Co., High Bridge, N. J.)

ORIGINATORS OF  
**MANGANESE STEEL IN TRACKWORK**

# ERICO CONOMICAL EFFICIENT RAIL BONDS

THE ELECTRIC RAILWAY IMPROVEMENT CO.  
 CLEVELAND, OHIO

## Transmission Line and Special Crossing Structures, Catenary Bridges

WRITE FOR OUR NEW DESCRIPTIVE CATALOG

**ARCHBOLD-BRADY CO.**

Engineers and Contractors SYRACUSE, N. Y.

## NASHVILLE TIE COMPANY

Cross Ties: White Oak, Chestnut, and Treated Ties. Oak Switch Ties.

*Prompt shipment from our own stocks.*

**Headquarters—Nashville, Tenn.**

A. D. Andrews, Terre Haute, Ind., Representative.



# RAMAPO

Automatic Return Switch Stands for Passing Sidings  
 Automatic Safety Switch Stands  
 Manganese Construction • Tee Rail Special Work

**RAMAPO IRON WORKS**  
 HILLBURN - NEW YORK  
 Branches: 111 Duane St. - New York, 111 Duane St. - New York, 111 Duane St. - New York

# STANDARD

Wires, Cables, Cable Accessories  
 Superior quality, economical prices  
 Standard Underground Cable Co.  
 Boston Philadelphia Pittsburgh Detroit  
 New York Washington Chicago St. Louis  
 San Francisco



## THE INDIANAPOLIS SWITCH & FROG CO., SPRINGFIELD, OHIO

### Indianapolis Economy Products That Make Dollars "Grow"

#### Indianapolis Solid Manganese:

Frogs, Crossings, Mates and Tongue-switches. Super-quality material, Par-excellent design. Gives many lives to one, of ordinary construction, and when worn down, CAN BE RE-STORED by INDIANAPOLIS WELDING.

#### Indianapolis Electric Welder:

Efficient, Rapid, ECONOMICAL, Durable. Price, \$2.00 (per day for three hundred days) thoroughly dependable every day in the year, upkeep about 75 cents per month. LAST A LIFE TIME.

#### Indianapolis Welding Steel:

Fluxated heat treated Metal Electrodes, insure Uniform Dependable Welds that are from 75 per cent to 100 per cent more efficient, than the "MELT," from the same High Grade basic stock, untreated.

#### Indianapolis Welding Plates:

Eliminate "Joints" and "Bonds" in Street Track. Higher in Strength and Conductivity than the unbroken Rail. Installed according to instructions, have proven THOROUGHLY DEPENDABLE, during 10 YEARS, of "Time and Usage" TEST. Extensively used in 48 STATES and COUNTRIES. Recognized as paramount MAINTENANCE ELIMINATORS.

#### Indianapolis Welding Supplies:

CABLES, HELMETS, LENSES, CARBONS.

#### Turntables:

Ball-bearing, for ash-pits, storage yards, etc.

#### Indianapolis "Economy" Products

are Pre-eminently "Money Savers." YES—"Money Makers" for Electric Railways.

## THE BABCOCK & WILCOX COMPANY

85 LIBERTY STREET, NEW YORK

Builders since 1868 of  
Water Tube Boilers  
of continuing reliability

#### BRANCH OFFICES

BOSTON, 49 Federal Street  
PHILADELPHIA, North American Building  
PITTSBURGH, Farmers Deposit Bank Building  
CLEVELAND, Guardian Building  
CHICAGO, Marquette Building  
CINCINNATI, Traction Building  
ATLANTA, Candler Building  
TUCSON, ARIZ., 21 So. Stone Avenue  
FORT WORTH, TEX., Flatiron Building  
HONOLULU, H. T., Castle & Cooke Building



#### WORKS

Bayonne, N. J.  
Barberton, Ohio

Makers of Steam Superheaters  
since 1898 and of Chain Grate  
Stokers since 1893

#### BRANCH OFFICES

DETROIT, Ford Building  
NEW ORLEANS, 521-5 Baronne Street  
HOUSTON, TEXAS, Southern Pacific Building  
DENVER, 435 Seventeenth Street  
SALT LAKE CITY, 705-6 Kearns Building  
SAN FRANCISCO, Sheldon Building  
LOS ANGELES, 404-6 Central Building  
SEATTLE, L. C. Smith Building  
HAVANA, CUBA, Calle de Aguilar 104  
SAN JUAN, PORTO RICO, Royal Bank Building

### BARBOUR-STOCKWELL CO.

205 Broadway, Cambridgeport, Mass.  
Established 1858

Manufacturers of  
Special Work for Street Railways

Frogs, Crossings, Switches and Mates  
Turnouts and Cross Connections  
Kerwin Portable Crossovers  
Balkwill Articulated Cast Manganese Crossings

ESTIMATES PROMPTLY FURNISHED

### SPECIALISTS

in the

Design and Manufacture  
of

Standard—Insulated—and  
Compromise Rail Joints

The Rail Joint Company  
61 Broadway, New York City

## High-Grade Track Work

SWITCHES—MATES—FROGS—CROSSINGS  
COMPLETE LAYOUTS  
IMPROVED ANTI-KICK BIG-HEEL SWITCHES  
HARD CENTER AND MANGANESE  
CONSTRUCTION

New York Switch & Crossing Co.  
Hoboken, N. J.

## BUCKEYE JACKS

high-grade R. R. Track and Car Jacks.

The Buckeye Jack Mfg. Co.  
Alliance, Ohio

## RWB DYNAMOTORS

FOR

CARBON ARC RAIL JOINT WELDING  
CARBON ARC RAIL BONDING  
CARBON and METALLIC ARC GENERAL WELDING  
Rail Welding and Bonding Co., Cleveland, O.



**W & B  
"Railroad Special"  
Wrenches**

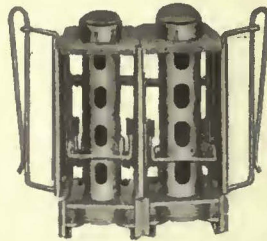
Unexcelled for Heavy Duty  
Practically indestructible  
7 sizes, 6 to 21 inches.

*Screw Wrench Book?*

**J. H. WILLIAMS & CO.**  
"The Wrench People"

BROOKLYN BUFFALO CHICAGO  
143 Richards St. 143 Vulcan St. 1143 W. 120 St.

**JOHNSON Universal Changer**



**Adjustable**

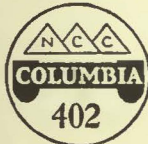
The best changer on the market. Can be adjusted by the conductor to throw out a varying number of coins, necessary to meet changes in rates of fares.

**Flexible**

Each barrel a separate unit, permitting the conductor to interchange the barrels, to suit his personal requirements and to facilitate the addition of extra barrels.

**JOHNSON FARE BOX COMPANY**  
Ravenswood, Chicago, Ill.

**RAILWAY MOTOR BRUSHES**



Grade 402 has been proved by test the most economical and satisfactory brush for standard slotted commutator railway motors in both city and interurban service. One of a series of standard railway motor brushes.

**COLUMBIA BRUSHES**

**COST NO MORE — LAST LONGER**  
NATIONAL CARBON COMPANY, INC.

CLEVELAND, OHIO SAN FRANCISCO, CAL.

**A Single Segment or a Complete Commutator**

is turned out with equal care in our shops. The orders we fill differ only in magnitude; small orders command our utmost care and skill just as do large orders. CAMERON quality applies to every coil or segment that we can make, as well as to every commutator we build. That's why so many electric railway men rely absolutely on our name.

Cameron Electrical Mfg. Co., Ansonia, Connecticut

**HACKSAW HIGH SPEED GLADIUM BLADES**  
ECONOMY EFFICIENCY  
GLADIUM CO. Inc. 34 Cliff St. New York

**FORD TRIBLOC**

A Chain Hoist that excels in every feature. It has Planetary Gears, Steel Parts,  $3\frac{1}{2}$  to 1 factor of Safety. It's the only Block that carries a five-year guarantee.

FORD CHAIN BLOCK CO.  
Second and Diamond Sts., Philadelphia

SPECIFY

**THE TERRY TURBINE**

For Driving Your Auxiliaries  
TERRY STEAM TURBINE CO.  
Hartford, Conn.



Type R-10

**International Registers**

Made in various types and sizes to meet the requirements of service on street and city system.

Complete line of registers, counters and car fittings.

Exclusive selling agents for HEEREN ENAMEL BADGES.

**The International Register Co.**

15 South Throop Street, Chicago, Illinois



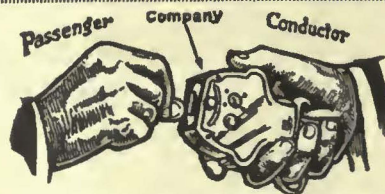
**Cleveland Fare Boxes**

have no bolts, nuts or screws, that can be removed from the outside. Let us tell you of other good features.

Let us explain.

**The Cleveland Fare Box Co.**

Cleveland, Ohio  
Canadian Cleveland Fare Box Co., Ltd.  
Preston, Ontario



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



**I. T. E. Circuit Breakers**

for heavy street railway work are the best obtainable. Write for New Complete Catalogue.

*They are Uniform in Quality!*



**LE CARBONE CARBON BRUSHES**

*"They Talk for Themselves"*

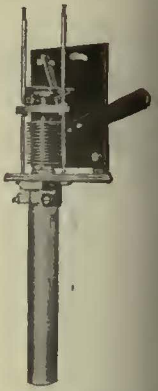
**W. J. Jeandron**  
345 Madison Avenue  
New York City

Pittsburgh Office:  
636 Wabash Building  
San Francisco Office:  
525 Market Street

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



Type BT-3  
Bearing Thermostat Relay With Cover in Place



Type BT-3  
Bearing Thermostat Relay With Cover Removed

**Hot Bearings Are Liable to Develop On Any Rotating Machine**

The Type "BT-3" Bearing Thermostat Relay serves as a watchman on constant duty ready to give warning the instant excessive bearing temperature begins to develop, and so possibly prevent a shut-down; or automatically shut down the machine before the bearing is injured and the machine wrecked.

If the continuous operation of your machinery is important and your equipment is worthy of protection, the Type "BT-3" Bearing Thermostat Relay constitutes a most reliable, effective and economical form of insurance.

**BULLETIN 400-C GIVES THE DETAILS**

**THE AUTOMATIC RECLOSING CIRCUIT BREAKER CO.**

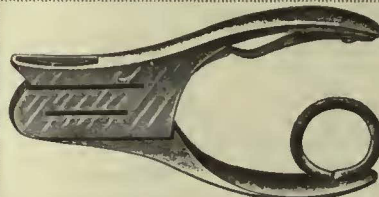
**COLUMBUS, OHIO, U. S. A.**

DISTRICT SALES OFFICES:  
Pittsburgh—223 Oliver Bldg.      Birmingham—302 American Trust Bldg.  
Philadelphia—1613 Chestnut St.      St. Louis—401 National Bank of Commerce Bldg.  
Charleston, W. Va., 110 Hale St.

**STEEL AND STEEL PRODUCTS**

MIDVALE STEEL AND ORDNANCE COMPANY  
CAMBRIA STEEL COMPANY

General Sales Office: WIDENER BUILDING, PHILADELPHIA, PA.  
DISTRICT SALES OFFICES:  
Atlanta, Boston, Chicago, Cincinnati, Cleveland, Detroit, New York, Philadelphia, Pittsburgh, San Francisco, Salt Lake City, Seattle, St. Louis, Washington, D. C.  
Consolidated Steel Corporation, 25 Broadway, New York, is the sole exporter of our commercial products.



**Economical in the Long Run**

Send for Catalog  
**BONNEY-VEHSLAGE TOOL CO.**  
Newark, N. J.

**Car Seating, Broom and Snow Sweeper Rattan, Mouldings, etc.**

**AMERICAN RATTAN & REED MFG. CO.**  
Brooklyn, N. Y.

**AMERICAN means QUALITY**  
RATTAN SUPPLIES OF EVERY DESCRIPTION

**STERLING VARNISH**

**What Is In A Gallon?**

Consider what you actually pay for in insulating varnish. What per cent is basic material, what is benzine, spirit or other solvent?  
*See our page in the March 18th Issue!*

**The Sterling Varnish Co., Pittsburgh, Pa.**

**SUPER-SEASONED FIBRE**

Peerless Insulation Paper has 25 to 50 per cent higher electrical resistance.



Hornflex Insulation Paper has no grain. Folds without cracking.

**NATIONAL FIBRE & INSULATION CO.**  
Box 420 Yorklyn, Delaware.

**BAKELITE-DILECTO**

The fields of usefulness for Bakelite-Dilecto are many and varied because of its superior merit over materials heretofore available in sheets, tubes or rods. The exceptional qualities of Bakelite-Dilecto are satisfying electric railways all over the country. Investigate.

**The Continental Fibre Co., Newark, Delaware**  
Branch Offices:

CHICAGO, 332 S. Michigan Ave.      NEW YORK, 233 Broadway  
Pittsburgh Office, 301 Fifth Ave.      San Francisco Office, 75 Fremont St.  
Los Angeles Office, 411 S. Main St.  
CANADIAN OFFICE, 89 Wellington St., W., Toronto, Ont.

- a manufacturer in Newark, N. J.
- saved \$200 buying from an Indiana dealer in
- second-hand machinery through his advertising in the
- searchlight section



*It pays to read the Searchlight.*

*It pays to advertise in the Searchlight.*



ELECTRIC RAILWAY JOURNAL

Think "SEARCHLIGHT" First

ADVERTISING RATES

**POSITIONS VACANT**—Business Opportunities and other undisplayed ads, 8 cents a word, minimum \$2.00 an insertion.

**POSITIONS WANTED**—Evening work wanted, tutoring and other undisplayed ads of individuals looking for employment, 4 cents a word, minimum 75 cents, payable in advance.

**ADD 5 WORDS** for box number in undisplayed ads if replies are to any of our offices. There is no extra charge for forwarding replies.

**DISCOUNT OF 10%** if one payment is made in advance for 4 consecutive insertions of undisplayed ad.

**ADS IN DISPLAY TYPE**—Space is sold by the inch (30 in. to a page), the price depending upon total space used within a year, some space to be used each issue.

**RATE PER INCH** for ads in display space:  
1 to 3 in., \$4.50 an in. 15 to 30 in., \$3.00 an in.  
4 to 7 in., \$4.30 an in. 30 to 45 in., \$2.00 an in.  
8 to 14 in., \$4.10 an in. 60 to 99 in., \$3.70 an in.

**POSITIONS VACANT**

**ENGINEER** of maintenance of way wanted by city property in Middle West; young graduate civil engineer with some practical experience preferred. P-412, Elec. Ry. Jour., Leader-News Bldg., Cleveland.

**RAILWAY** overhead line foreman wanted. Location, eastern Pennsylvania. Must be capable and able to handle entire overhead railway line work. Application will not be considered unless fully qualified. State salary and send references. P-411, Elec. Ry. Jour., Real Estate Trust Bldg., Phila.

**POSITIONS WANTED**

**AUDITOR** or assistant; 16 years' experience electric railway, light and power; references. PW-409, Elec. Railway Jour.

**TWENTY** years' experience all branches city and interurban railways, wish connection as master mechanic, large property, or manager small company; also had charge maintenance work, 225 motor trucks, 3 years. PW-414, Elec. Ry. Jour., Old Colony Bldg., Chicago.

**MASTER MECHANIC** or general foreman; 22 years' experience on all types of railway motors, also one-man cars and line work; A-1 reference. PW-407, Elec. Ry. Journal.

**AGENTS AND SALESMEN**

**Salesman Wanted**

Calling on street railways to sell our products as a side line. AS-413, Elec. Ry. Jour., Leader-News Bldg., Cleveland.

**FOR SALE**

**Two 400 H.P. Edge Moor Boilers** Complete for 175 lb. pressure equipped with Foster superheaters for 100° superheat, Diamond soot blowers and Green chain grate stokers with 102 sq.ft. of grate area. In use six years. Excellent condition. Now in service. Must be moved to make way for larger boilers. Address Room 653, Union Building, Union Traction Company of Indiana, Anderson, Ind.

**ROTARY CONVERTERS**

- 1—500 kw. Westinghouse, 3 phase, 60 cycle, 360 volts A.C.; 600 volts D.C.; 400 r.p.m., with 3—340 kw. Westinghouse 2400/350 volt transformers, also switchboard.
- 2—300 kw. Stanley, 3 phase, 25 cycle, 360 volts A.C.; 600 volt D.C.; speed, 600 r.p.m.; complete, with suitable transformers, also panels.
- 1—300 kw. Westinghouse, 3 phase, 60 cycle, 370 volts A.C.; 615 volts D.C.; 600 r.p.m.

**MOTOR GENERATOR SETS**

- 3—1000 kw. General Electric Synchronous Motor Generator Sets, each consisting of 1—1000 kw., 600-volt type MPC, 514 r.p.m., D.C. generator, and 1—1400 kva., 3 phase, 60 cycle, 2300/4000 volt, 514 r.p.m. synch. motor.

**DIRECT CONNECTED ENGINE UNIT**

- 1—650 kw. Gen. Elec. 615-volt Compound Wound 100 r.p.m. Generator, direct connected to 28 and 64 x 48 Greene Wheelock cross compound heavy duty 4-valve engine, complete with surface condensing equipment and panel; price, f.o.b. cars, \$7,500.

**ARCHER & BALDWIN, Inc., 114 Liberty St., New York City**  
Telephone 4337-4338 Rector

**FOR SALE AT A SACRIFICE**

A Large Brass Band  
**WELTE ORCHESTRION**  
*Replaces a Band of about 15 pieces*  
**THE BEST MUSIC FOR PARKS**  
**IT IS POSSIBLE TO GET**  
Cost \$6500 Can be shipped at once  
*For particulars address*  
**TAYLOR, 634 W. 138th St., N. Y. C.**

*"The House of Dependable Service"*

**NEW and RELAYING RAILS**

of all Sections

**HYMAN-MICHAELS CO.**  
Peoples Gas Building, Chicago, Ill.

*Branch Offices:*

- 1324 Woolworth Bldg., New York
- 3115 Railway Exchange Bldg., St. Louis
- 1813 First Nat'l Bank Bldg., Pittsburgh

*Write or wire when in the market to BUY or SELL*  
Please Mention this Publication

**"Opportunity" Advertising:**

Think  
**"SEARCHLIGHT"**  
First!

0099

**FOR SALE**  
12—Brill 77-E-1  
**TRUCKS**

with 24 in. steel wheels  
**TRANSIT EQUIPMENT COMPANY**  
501 Fifth Avenue, New York

**FOR SALE**

**SECOND HAND CARS**  
trucks and motors  
**ELECTRIC EQUIPMENT CO.**  
Commonwealth Bldg., Phila., Pa.

Buyers  
Everywhere  
know

**"Searchlight"**

Try an ad for what you wish to sell.

0232

**SOME ONE WANTS TO BUY**

the equipment or machinery that you are not using. This may be occupying valuable space, collecting dust, rust and hard knocks in your shops and yards.

**SELL IT BEFORE DEPRECIATION SCRAPS IT**

THE SEARCHLIGHT SECTION IS HELPING OTHERS  
—LET IT HELP YOU ALSO

0079

# WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with  
Names of Manufacturers and Distributors Advertising in this Issue

- Advertising, Street Car**  
Collier, Inc., Barron G.
- Anchors, Guy**  
Electric Service Sup. Co.  
Ohio Brass Co.  
Westinghouse E. & M. Co.
- Armature Shop Tools**  
Elec. Service Supplies Co.
- Axles**  
Bemis Car Truck Co.  
Cambria Steel Co.  
Midvale Steel & Ordnance Co.  
St. Louis Car Co.
- Axles, Car Wheel**  
Bemis Car Truck Co.  
Brill Co., The J. G.  
Carnegie Steel Co.  
Standard Steel Works Co.  
Westinghouse E. & M. Co.
- Axle Straighteners**  
Columbia M. W. & M. I. Co.
- Babbitt Metal**  
More-Jones Br. & Metal Co.
- Babbling Devices**  
Columbia M. W. & M. I. Co.
- Badges and Buttons**  
Electric Service Sup. Co.  
Internat'l Register Co., The
- Batteries, Dry**  
National Carbon Co.
- Bearings and Bearing Metals**  
Bemis Car Truck Co.  
Columbia M. W. & M. I. Co.  
General Electric Co.  
More-Jones Br. & Metal Co.  
St. Louis Car Co.  
Westinghouse E. & M. Co.
- Bearings, Center and Roller**  
Slide  
Stucki Co., A.
- Bells and Gongs**  
Brill Co., The J. G.  
Columbia M. W. & M. I. Co.  
Consolidated Car-Heating Co.  
Electric Service Sup. Co.  
St. Louis Car Co.
- Benders, Rail**  
Railway Track-work Co.
- Bollers**  
Babcock & Wilcox Co.
- Boiler Tubes**  
Cambria Steel Co.  
Midvale Steel & Ordnance Co.
- Bond Testers**  
American Steel & Wire Co.  
Rail Welding & Bonding Co.
- Booding Apparatus**  
American Steel & Wire Co.  
Electric Railway Improvement Co.  
Electric Service Sup. Co.  
Indianapolis Switch & Frog Co.  
Ohio Brass Co.  
Rail Welding & Bonding Co.  
Railway Truck-work Co.
- Bonds, Rail**  
American Steel & Wire Co.  
Electric Railway Improvement Co.  
Electric Service Sup. Co.  
General Electric Co.  
Indianapolis Switch & Frog Co.  
Ohio Brass Co.  
Rail Welding & Bonding Co.  
Westinghouse E. & M. Co.
- Brackets and Cross Arms**  
(See also Poles, Ties, Posts, etc.)  
American Bridge Co.  
Bates Exp. Steel & Tr. Co.  
Electric Ry. Equip. Co.  
Electric Service Sup. Co.  
Hubbard & Co.  
Ohio Brass Co.
- Brake Adjusters**  
National Ry. Appliance Co.  
Westinghouse Tr. Br. Co.
- Brake Shoes**  
Amer. Br. Shoe & Fdry. Co.  
Barbour-Stockwell Co.  
Bemis Car Truck Co.  
Brill Co., The J. G.  
Columbia M. W. & M. I. Co.  
St. Louis Car Co.
- Brakes, Brake Systems and Brake Parts**  
Allis-Chalmers Mfg. Co.  
Bemis Car Truck Co.  
Brill Co., The J. G.  
Columbia M. W. & M. I. Co.  
General Electric Co.  
National Brake Co.  
St. Louis Car Co.  
Westinghouse Tr. Br. Co.
- Bridges and Buildings**  
American Bridge Co.
- Brooms, Track, Steel or Rattan**  
Amer. Rattan & Reed Mfg. Co.
- Brushes, Carbon**  
General Electric Co.  
Jeandron, W. J.  
Le Carbone Co.  
Morganite Brush Co., Inc.  
National Carbon Co.  
Westinghouse E. & M. Co.
- Brushes, Graphite**  
National Carbon Co.
- Brush Holders**  
Anderson Mfg. Co., A. & J. M.  
Columbia M. W. & M. I. Co.
- Bankers, Coal**  
American Bridge Co.
- Buses, Motor**  
Brill Co., The J. G.  
Republic Truck Sales Corp.
- Bushings**  
Nat'l Fibre & Insulation Co.
- Bushings, Case Hardened and Manganese**  
Bemis Car Truck Co.  
Brill Co., The J. G.
- Cables (See Wires and Cables)**
- Carbon Brushes (See Brushes, Carbon)**
- Car Lighting Fixtures**  
Elec. Service Supplies
- Car Panel Safety Switches**  
Consolidated Car Heating Co.  
Westinghouse E. & M. Co.
- Cars, Dump**  
Differential Steel Car Co.
- Cars, Passenger, Freight, Express, etc.**  
American Car Co.  
Brill Co., The J. G.  
Cambria Steel Co.  
Kuhlman Car Co., G. C.  
Midvale Steel & Ordnance Co.  
National Ry. Appliance Co.  
St. Louis Car Co.  
Watson Mfg. Co.
- Cars, Second Hand**  
Electric Equipment Co.  
Transit Equipment Co.
- Cars, Self-Propelled**  
General Electric Co.
- Castings, Brass, Composition or Copper**  
Anderson Mfg. Co., A. & J. M.  
Columbia M. W. & M. I. Co.  
More-Jones Br. & Metal Co.
- Castings, Gray Iron and Steel**  
American Bridge Co.  
American Steel Foundries  
Bemis Car Truck Co.  
Columbia M. W. & M. I. Co.  
St. Louis Car Co.
- Castings, Malleable and Brass**  
Amer. Brake Shoe & Fdry. Co.  
Bemis Car Truck Co.  
Columbia M. W. & M. I. Co.  
St. Louis Car Co.
- Catchers and Retrievers, Trolley**  
Electric Service Sup. Co.  
Ohio Brass Co.  
Wood Co., Chas. N.
- Catenary Construction**  
Archbold-Brady Co.
- Ceiling Car**  
Pantasote Co.
- Circuit Breakers**  
Automatic Reclosing Circuit Breaker Co.  
Cutter Co.  
General Electric Co.  
Westinghouse E. & M. Co.
- Clamps and Connectors for Wires and Cables**  
Anderson Mfg. Co., A. & J. M.  
Dossert & Co.  
Electric Ry. Equip. Co.  
Electric Service Sup. Co.  
General Electric Co.  
Hubbard & Co.  
Ohio Brass Co.  
Westinghouse E. & M. Co.
- Cleaners and Scrapers—Track (See also Snow-Plows, Sweepers and Brooms)**  
Brill Co., The J. G.  
Ohio Brass Co.
- Clusters and Sockets**  
General Electric Co.
- Coal and Ash Handling (See Conveying and Hoisting Machinery)**
- Coll Banding and Winding Machines**  
Columbia M. W. & M. I. Co.  
Electric Service Sup. Co.
- Colls, Armature and Field**  
Columbia M. W. & M. I. Co.  
General Electric Co.  
Westinghouse E. & M. Co.
- Colls, Choke and Kicking**  
General Electric Co.  
Westinghouse E. & M. Co.
- Coin-Counting Machines**  
Electric Service Sup. Co.  
Internat'l Register Co.  
Johnson Fare Box Co.
- Commutator Slotters**  
Electric Service Sup. Co.  
General Electric Co.  
Westinghouse E. & M. Co.
- Commutator Truing Devices**  
General Electric Co.
- Commutators or Parts**  
Cameron Elec'l. Mfg. Co.  
Columbia M. W. & M. I. Co.  
General Electric Co.  
Westinghouse E. & M. Co.
- Compressors, Air**  
Allis-Chalmers Mfg. Co.  
General Electric Co.  
Westinghouse Tr. Br. Co.
- Concrete Reinforcing Bars**  
Cambria Steel Co.  
Midvale Steel & Ordnance Co.
- Condensers**  
Allis-Chalmers Mfg. Co.  
General Electric Co.  
Westinghouse E. & M. Co.
- Connectors, Solderless**  
Dossert & Co.  
Westinghouse E. & M. Co.
- Connectors, Trailer Car**  
Consolidated Car Heating Co.  
Electric Service Sup. Co.
- Controllers or Parts**  
Allis-Chalmers Mfg. Co.  
Automatic Reclosing Circuit Breaker Co.  
Columbia M. W. & M. I. Co.  
General Electric Co.  
Westinghouse E. & M. Co.
- Controller Regulators**  
Electric Service Sup. Co.
- Controlling Systems**  
General Electric Co.  
Westinghouse E. & M. Co.
- Converters, Rotary**  
Allis-Chalmers Mfg. Co.  
General Electric Co.  
Westinghouse E. & M. Co.
- Conveying and Hoisting Machinery**  
American Bridge Co.  
Columbia M. W. & M. I. Co.
- Copper Wire**  
Anaconda Copper Min. Co.
- Cord Adjusters**  
Nat'l Fibre & Insulation Co.
- Cord, Bell, Trolley, Register, etc.**  
Brill Co., The J. G.  
Electric Service Sup. Co.  
Internat'l Register Co., The  
Roebbling's Sons Co., J. A.  
Samson Cordage Works  
Silver Lake Co.
- Cord Connectors and Connectors**  
Electric Service Sup. Co.  
Samson Cordage Works  
Wood Co., Chas. N.
- Conplers, Car**  
Amer. Steel Foundries  
Brill Co., The J. G.  
Ohio Brass Co.  
Westinghouse Tr. Br. Co.
- Cranes**  
Allis-Chalmers Mfg. Co.  
Cross Arms (See Brackets)
- Crossing Foundations**  
International Steel Tia Co. Co.
- Crossing Manganese**  
Indianapolis Switch & Frog Co.
- Crossing Signals (See Signals, Crossing)**
- Crossings, Frog and Switch**  
Wharton, Jr., & Co., Wm.
- Crossings, Track (See Track, Special Work)**
- Crushers Rock**  
Allis-Chalmers Mfg. Co.
- Culverts**  
Canton Culvert & Silo Co.
- Curtains and Curtain Fixtures**  
Brill Co., The J. G.  
Electric Service Sup. Co.
- Morton Mfg. Co.**  
Pantasote Co.  
St. Louis Car Co.
- Dealers' Machinery**  
Archer & Baldwin  
Electric Equipment Co.
- Derailing Devices (See also Track Work)**  
Wharton, Jr., & Co., Wm.
- Destination Signs**  
Columbia M. W. & M. I. Co.  
Electric Service Sup. Co.
- Detective Service**  
Wish Service, P. Edward
- Dogs, Lath**  
Williams & Co., J. H.
- Door Operating Devices**  
Con. Car Heating Co.  
Nat'l Pneumatic Co., Inc.
- Doors and Door Fixtures**  
Brill Co., The J. G.  
General Electric Co.
- Doors, Folding Vestibule**  
Nat'l Pneumatic Co., Inc.
- Draft Rigging (See Conplers)**
- Drills, Track**  
American Steel & Wire Co.  
Electric Service Sup. Co.  
Ohio Brass Co.
- Dryers, Sand**  
Electric Service Sup. Co.
- Electric Grinders**  
Seymour Rail Grinder Co., E. P.
- Electrical Wires and Cables**  
Amer. Electrical Works  
American Steel & Wire Co.  
Roebbling's Sons Co., J. A.
- Electrodes, Carbon**  
Indianapolis Switch & Frog Co.
- Electrodes, Steel**  
Indianapolis Switch & Frog Co.
- Engineers, Consulting, Contracting and Operating**  
Allison & Co., J. R.  
Archbold-Brady Co.  
Arnold Co., The  
Beeler, John  
Bylleaby & Co., H. M.  
Day & Zimmermann  
Engel & Hevener, Inc.  
Fenel, Robert M.  
Ford, Bacon & Davis  
Gould, L. E.  
Hemphill & Welle  
Holst, Englehardt W.  
Jackson, Walter  
Kelley, Cooke & Co.  
Parsons, Klapp, Brinkerhoff & Douglas  
Richey, Albert S.  
Sanderson & Porter  
Sangster & Matthews  
Smith & Co., C. E.  
Stans & Webster  
White Engineering Corp., The J. G.  
Witt, Peter
- Engines, Gas, Oil or Steam**  
Allis-Chalmers Mfg. Co.  
Westinghouse E. & M. Co.
- Fare Boxes**  
Cleveland Fare Box Co.  
Economy Electric Devices Co.  
Johnson Fare Box Co.  
National Ry. Appliance Co.
- Fence**  
Cambria Steel Co.  
Midvale Steel & Ordnance Co.
- Fences, Woven Wire and Fence Posts**  
American Steel & Wire Co.
- Fenders and Wheel Guards**  
Brill Co., The J. G.  
Cleveland Fare Box Co.  
Electric Service Sup. Co.
- Fibre and Fibre Tubing**  
Continental Fibre Co.  
Nat'l Fibre & Insulation Co.  
Westinghouse E. & M. Co.
- Field Colls (See Colls)**
- Floodlights**  
Electric Service Sup. Co.
- Flooring Composition**  
Amer. Mason Safety Tread Co.  
Western Electric Co.
- Floor Plates**  
Amer. Abrasive Metals Co.
- Forgings**  
Cambria Steel Co.  
Carnegie Steel Co.  
Columbia M. W. & M. I. Co.  
Midvale Steel & Ordnance Co.  
Williams & Co., J. H.
- Frogs, Track (See Track Work)**
- Funnel Castings**  
Wharton, Jr., & Co., Wm.
- Fuses and Fuse Boxes**  
Columbia M. W. & M. I. Co.  
Consolidated Car Heating Co.  
General Electric Co.  
Westinghouse E. & M. Co.  
Williams & Co., J. H.
- Fuses, Refillable**  
Columbia M. W. & M. I. Co.  
General Electric Co.
- Gages, Oil and Water**  
Ohio Brass Co.
- Gaskets**  
Westinghouse Tr. Br. Co.
- Gas-Electric Cars**  
General Electric Co.
- Gas Producers**  
Westinghouse E. & M. Co.
- Gasolene Torches**  
Economy Electric Devices Co.
- Gates, Car**  
Brill Co., The J. G.
- Gear Blanks**  
Cambria Steel Co.  
Carnegie Steel Co.  
Midvale Steel & Ordnance Co.
- Gear Cases**  
Columbia M. W. & M. I. Co.  
Electric Service Sup. Co.  
Westinghouse E. & M. Co.
- Gears and Pinions**  
Bemis Car Truck Co.  
Columbia M. W. & M. I. Co.  
Electric Service Sup. Co.  
General Electric Co.  
National Ry. Appliance Co.  
Nuttall Co., R. D.  
Tool Steel Gear & Pinion Co.
- Generating Sets, Gas-Electric**  
General Electric Co.
- Generators**  
Allis-Chalmers Mfg. Co.  
General Electric Co.  
Westinghouse E. & M. Co.
- Goggles, Eyes**  
Indianapolis Switch & Frog Co.
- Gongs (See Bells and Gongs)**
- Graphite**  
Morganite Brush Co., Inc.
- Greases (See Lubricants)**
- Grinders and Grinding Supplies**  
Indianapolis Switch & Frog Co.  
Metal & Thermit Corp.  
Railway Track-work Co.
- Grinders, Portable Electric**  
Seymour Rail Grinder Co., E. P.
- Grinding Blocks and Wheels**  
Railway Track-work Co.
- Guards Cattle**  
American Bridge Co.
- Guards, Trolley**  
Electric Service Sup. Co.  
Ohio Brass Co.
- Hackaws**  
Gladium Co.
- Harps, Trolley**  
Anderson Mfg. Co., A. & J. M.  
Electric Service Sup. Co.  
More-Jones Br. & Metal Co.  
Nuttall Co., R. D.  
Star Brass Works
- Headlights**  
Electric Service Sup. Co.  
General Electric Co.  
Ohio Brass Co.  
St. Louis Car Co.
- Headlining**  
Pantasote Co.
- Heaters, Car (Electric)**  
Consolidated Car Heating Co.  
Economy Electric Devices Co.  
Gold Car Heating & Lighting Co.  
National Ry. Appliance Co.  
Smith Heater Co., Peter
- Heaters, Car, Hot Air and Water**  
Smith Heater Co., Peter
- Heaters, Car (Stove)**  
Electric Service Sup. Co.  
Smith Heater Co., Peter
- Helmets, Welding**  
Indianapolis Switch & Frog Co.



*Don't talk about your deeds—  
they speak for themselves*

## CARNEGIE Wrought Steel WHEELS

Speak for themselves  
in Performance

(The best talking point after all)

### Carnegie Steel Company

General Offices: Carnegie Building, Pittsburgh, Pa.

1528

### Kass Safety Treads

present an unusual combination in that  
they give better results at less cost.

*Manufactured and sold by*

**MORTON MANUFACTURING CO., Chicago**

### Nelsonville Filler and Stretcher Brick for T Rails

Makes permanent, light, level pavement  
with a minimum of paving repairs.

**The Nelsonville Brick Co.**  
Columbus, Ohio

### "Boyerized" Products Reduce Maintenance

Bemis Trucks	Manganese Brake Heads
Case Hardened Brake Pins	Manganese Transom Plates
Case Hardened Bushings	Manganese Body Bushings
Case Hardened Nuts and Bolts	Bronze Axle Bearings

Bemis Pins are absolutely smooth and true in diameter. We carry  
40 different sizes of case hardened pins in stock. Samples furnished.  
Write for full data.

**BEMIS CAR TRUCK CO., Springfield, Mass.**

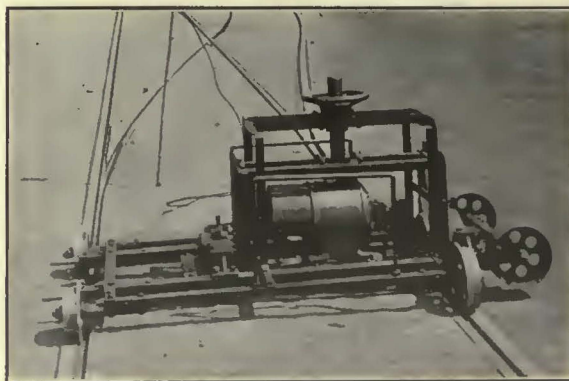
### SAMSON SPOT WATERPROOFED TROLLEY CORD



Trade Mark Reg. U. S. Pat. Off.

Made of extra quality stock firmly braided and smoothly finished.  
Carefully inspected and guaranteed free from flaws.  
Samples and information gladly sent.

**SAMSON CORDAGE WORKS, BOSTON, MASS.**



### Seymour **MIDGET** Grinder

#### A One-Man Equipment

Fast and efficient  
Smooths corrugations  
Grinds grooves  
Trues gauge lines  
Repairs special work  
Simple and cheap to operate

*Send for free booklet*

**E. P. Seymour Rail Grinder Co.**  
Waltham, Mass.

- Holts and Lifts**  
Columbia M. W. & M. I. Co.  
Ford-Chain Block Co.
- Hose, Bridges**  
Ohio Brass Co.
- Hydraulic Machinery**  
Allis-Chalmers Mfg. Co.
- Instruments, Measuring, Testing and Recording**  
Economy Electric Devices Co.  
Electric Service Supplies Co.  
General Electric Co.  
Westinghouse E. & M. Co.
- Insulating Cloth, Paper and Tape**  
General Electric Co.  
Nat'l Fibre & Insulation Co.  
Standard Underground Cable Co.  
Westinghouse E. & M. Co.
- Insulating Varnishes**  
Sterling Varnish Co.
- Insulation (See also Paints)**  
Anderson Mfg. Co., A. & J. M.  
Electric Ry. Equip. Co.  
Electric Service Sup. Co.  
General Electric Co.  
Sterling Varnish Co.  
Westinghouse E. & M. Co.
- Insulators**  
(See also Line Material)  
Anderson Mfg. Co., A. & J. M.  
Electric Ry. Equip. Co.  
Electric Service Sup. Co.  
Flood City Mfg. Co.  
General Electric Co.  
Ohio Brass Co.  
Westinghouse E. & M. Co.
- Insulator Pins**  
Electric Service Sup. Co.  
Hubbard & Co.
- Insurance, Fire**  
Marsh & McLennan
- Jacks (See also Cranes, Holts and Lifts)**  
Buckeye Jack Mfg. Co.  
Columbia M. W. & M. I. Co.  
Elec. Service Supplies Co.
- Joints, Rail**  
(See Rail Joints)
- Journal Boxes**  
Bemis Car Truck Co.  
Brill Co., The J. G.
- Junction Boxes**  
Standard Underground Cable Co.
- Lamp Guards and Fixtures**  
Anderson Mfg. Co., A. & J. M.  
Electric Service Sup. Co.  
General Electric Co.  
Westinghouse E. & M. Co.
- Lamps, Arc and Incandescent (See also Headlights)**  
Anderson Mfg. Co., A. & J. M.  
General Electric Co.  
Westinghouse E. & M. Co.
- Lamps, Signal and Marker**  
Nichols-Lintern Co.  
Ohio Brass Co.
- Lanterns, Classification**  
Nichols-Lintern Co.
- Lathe Attachments**  
Williams & Co., J. H.
- Lightning Protection**  
Anderson Mfg. Co., A. & J. M.  
Electric Service Sup. Co.  
General Electric Co.  
Ohio Brass Co.  
Westinghouse E. & M. Co.
- Line Material (See also Brackets, Insulators, Wires, etc.)**  
Anderson Mfg. Co., A. & J. M.  
Archbold-Brady Co.  
Columbia M. W. & M. I. Co.  
Dossert & Co.  
Electric Ry. Equip. Co.  
Electric Service Sup. Co.  
General Electric Co.  
Hubbard & Co.  
More-Jones Br. & Metal Co.  
Ohio Brass Co.  
Westinghouse E. & M. Co.
- Locking Spring Boxes**  
Wharton, Jr. & Co., Wm.
- Locomotives, Electric**  
General Electric Co.  
Westinghouse E. & M. Co.
- Lubricating Engineers**  
Galena-Signal Oil Co.  
Texas Company, The
- Lubricants, Oil and Grease**  
Galena-Signal Oil Co.  
Texas Company, The
- Machine Tools**  
Columbia M. W. & M. I. Co.
- Machine Work**  
Columbia M. W. & M. I. Co.
- Manganese Steel Castings**  
Wharton, Jr. & Co., Wm.
- Manganese Steel Special Track Work**  
Indianapolis Switch & Frog Co.  
Wharton, Jr. & Co., Wm.
- Meters (See Instruments)**  
Meters, Car Watt Hour  
Economy Electric Devices Co.
- Motor Buses (See Buses, Motor)**
- Motor Leads**  
Dossert & Co.
- Motorists' Seats**  
Brill Co., The J. G.  
Electric Service Sup. Co.  
Wood Co., Chas. N.
- Motor Electric**  
Allis-Chalmers Mfg. Co.  
Westinghouse E. & M. Co.
- Motors and Generators, Sets**  
General Electric Co.  
Nails  
Cambria Steel Co.  
Midvale Steel & Ordnance Co.
- Nuts and Bolts**  
Allis-Chalmers Mfg. Co.  
Barbour-Stockwell Co.  
Bemis Car Truck Co.  
Columbia M. W. & M. I. Co.  
Hubbard & Co.
- Oil (See Lubricants)**
- Omnibuses (See Buses, Motor)**
- Packing**  
Elec. Service Supplies Co.  
Westinghouse E. & M. Co.
- Paints & Varnishes, Insulating**  
Sterling Varnish Co.
- Paints and Varnishes for Woodwork**  
National Ry. Appliances Co.
- Paving Bricks, Filler and Stretcher**  
Nelsonville Brick Co.
- Paving Material**  
Amer. Br. Shoe & Fdry. Co.  
Nelsonville Brick Co.
- Pickups, Trolley Wire**  
Electric Service Sup. Co.  
Ohio Brass Co.
- Pinion Pulleys**  
Columbia M. W. & M. I. Co.  
Electric Service Sup. Co.  
General Electric Co.  
Wood Co., Chas. N.
- Pins (See Gears)**
- Pine, Case Hardened, Wood and Iron**  
Bemis Car Truck Co.  
Electric Service Sup. Co.  
Ohio Brass Co.  
Westinghouse Tr. Br. Co.
- Pipe Fittings**  
Westinghouse Tr. Br. Co.
- Planers (See Machine Tools)**
- Pliers, Insulated**  
Electric Service Sup. Co.
- Pneumatic Tools**  
Ingersoll-Rand Co.
- Pole Reinforcing**  
Hubbard & Co.
- Poles, Metal Street**  
Bates Exp. Steel Truss Co.  
Electric Ry. Equip. Co.  
Hubbard & Co.
- Poles, Trolley**  
Anderson Mfg. Co., A. & J. M.  
Columbia M. W. & M. I. Co.  
Electric Service Sup. Co.  
Nuttall Co., R. D.
- Poles, Tubular Steel**  
Electric Ry. Equip. Co.  
Elec. Service Supplies Co.
- Poles and Ties Treated**  
International Creosoting and Construction Co.
- Poles, Ties, Post, Piling and Lumber**  
International Creosoting and Construction Co.  
Nashville Tie Co.
- Power Saving Devices**  
Economy Electric Devices Co.
- National Ry. Appliances Co.**
- Pressure Regulators**  
General Electric Co.  
Ohio Brass Co.  
Westinghouse E. & M. Co.
- Pumps**  
Allis-Chalmers Mfg. Co.
- Punches, Ticket**  
Bonney-Vehslage Tool Co.
- Internat'l Reg. Co., The**
- Wood Co., Chas. N.**
- Rail Grinders (See Grinders)**
- Rail Joints, Bolted**  
Carnegie Steel Co.
- Rail Joint Co.**
- Rail Joints-Welded**  
Indianapolis Switch & Frog Co.
- Rails, Steel**  
Cambria Steel Co.  
Carnegie Steel Co.  
Midvale Steel & Ordnance Co.
- Railway Safety Switches**  
Consolidated Car Heating Co.  
Westinghouse E. & M. Co.
- Rail Welding**  
Rail Welding & Bonding Co.  
Ry Track-work Co.
- Rattan**  
Amer. Rat. & Reed Mfg. Co.  
Brill Co., The J. G.  
Electric Service Sup. Co.  
St. Louis Car Co.
- Registers and Fittings**  
Brill Co., The J. G.  
Electric Service Sup. Co.  
Internat'l Reg. Co., The  
Rooks Automatic Reg. Co.
- Reinforcement, Concrete**  
American Steel & Wire Co.  
Carnegie Steel Co.
- Repair Shop Appliances (See also Coil Handling and Winding Machines)**  
Columbia M. W. & M. I. Co.  
Electric Service Sup. Co.
- Repair Work (See also Coils)**  
Columbia M. W. & M. I. Co.  
General Electric Co.  
Westinghouse E. & M. Co.
- Replacers, Car**  
Columbia M. W. & M. I. Co.  
Electric Service Sup. Co.
- Resistance, Grid**  
Columbia M. W. & M. I. Co.
- Resistance, Wire and Tube**  
General Electric Co.  
Westinghouse E. & M. Co.
- Resistances**  
Consolidated Car Heating Co.
- Retrievers, Trolley (See Catchers and Retrievers, Trolley)**
- Rheostats**  
General Electric Co.  
Westinghouse E. & M. Co.
- Roofing Car**  
Pantasote Co.
- Sanders, Track**  
Brill Co., The J. G.  
Columbia M. W. & M. I. Co.  
Electric Service Sup. Co.  
Nichols-Lintern Co.  
Ohio Brass Co.  
St. Louis Car Co.
- Sash Fixtures, Car**  
Brill Co., The J. G.
- Scrapers, Track (See Cleaners and Scrapers, Track)**
- Seating Materials**  
Brill Co., The J. G.  
Pantasote Co.
- Seats, Car (See also Rattan)**  
Amer. Rattan & Reed Mfg. Co.  
Brill Co., The J. G.  
St. Louis Car Co.
- Second-Hand Equipment**  
Archer & Baldwin  
Electric Equipment Co.
- Shades, Vestibule**  
Brill Co., The J. G.  
Pantasote Co.
- Shovels**  
Allis-Chalmers Mfg. Co.  
Brill Co., The J. G.  
Hubbard & Co.
- Side Bearings (See Bearings, Center and Slide)**
- Signals, Car Starting**  
Con. Car Heating Co.  
Electric Service Sup. Co.  
Nat'l Pneumatic Co., Inc.
- Signals, Indicating**  
Nichols-Lintern Co.
- Signal Systems, Block**  
Electric Service Sup. Co.  
Nachod Signal Co., Inc.  
U. S. Electric Signal Co.  
Wood Co., Chas. N.
- Signal Systems, Highway Crossing**  
Nachod Signal Co., Inc.  
U. S. Electric Signal Co.
- Slack Adjusters (See Brake Adjusters)**
- Slag**  
Carnegie Steel Co.
- Slat**  
Carnegie Steel Co.
- Slat Wheels and Cutters**  
Anderson Mfg. Co., A. & J. M.  
Columbia M. W. & M. I. Co.  
Electric Ry. Equip. Co.  
Elec. Service Supplies Co.  
More-Jones Br. & Metal Co.  
Nuttall Co., R. D.  
Smokestacks, Car  
Nichols-Lintern Co.
- Snow-Plows, Sweepers and Brooms**  
Amer. Rat. & Reed Mfg. Co.  
Brill Co., The J. G.  
Columbia M. W. & M. I. Co.
- Spikes**  
Amer. Steel & Wire Co.
- Splicing Compounds**  
Westinghouse E. & M. Co.
- Splicing Sleeves (See Clamps and Connectors)**
- Springs, Car and Truck**  
Amer. Steel Foundries  
Amer. Steel & Wire Co.  
Bemis Car Truck Co.  
Brill Co., The J. G.
- Sprinklers, Track and Road**  
Brill Co., The J. G.  
St. Louis Car Co.
- Steel Castings**  
Wharton, Jr. & Co., Wm.
- Steels and Steel Products**  
Cambria Steel Co.  
Midvale Steel & Ord. Co.  
Morton Mfg. Co.
- Steps, Car**  
Amer. Abrasive Metals Co.  
Amer. Mason Saf. Tread Co.  
Morton Mfg. Co.
- Stokers, Mechanical**  
Babcock & Wilcox Co.  
Westinghouse E. & M. Co.
- Storage Batteries (See Batteries, Storage)**
- Strand**  
Roebling's Sons Co., J. A.
- Structural Steel**  
Cambria Steel Co.  
Midvale Steel & Ordnance Co.
- Superheaters**  
Babcock & Wilcox Co.
- Sweepers, Snow (See Snow Plows, Sweepers and Brooms)**
- Switch Stands**  
Indianapolis Switch & Frog Co.
- Ramapo Iron Works**
- Switches, Selector**  
Nichols-Lintern Co.
- Switches, Track (See Track Special Work)**
- Switches and Switchboards**  
Allis-Chalmers Mfg. Co.  
Anderson Mfg. Co., A. & J. M.  
Automatic Reclosing Circuit Breaker Co.  
Electric Service Sup. Co.  
General Electric Co.  
Westinghouse E. & M. Co.
- Tapes and Cloths (See Insulating Cloth, Paper and Tape)**
- Telephones and Parts**  
Electric Service Sup. Co.
- Terminals Cable**  
Standard Underground Cable Co.
- Testing, Commercial and Electrical**  
Elec'l Testing Laboratories
- Testing Instruments (See Instruments, Electrical Measuring, Testing, etc.)**
- Thermostats**  
Automatic Reclosing Circuit Breaker Co.  
Con. Car Heating Co.  
Gen. Car Heating & Lighting Co.  
Railway Utility Co.  
Smith Heater Co., Peter
- Ticket Choppers and Destroyers**  
Electric Service Sup. Co.
- Tickets Transfers**  
Carnegie Steel Co.
- Tie Plates**  
Cambria Steel Co.  
Midvale Steel & Ordnance Co.  
Ties and Tie Rods, Steel  
American Bridge Co.  
Barbour-Stockwell Co.  
Carnegie Steel Co.  
International Steel Tie Co.
- Ties, Wood Cross (See Poles, Ties, etc.)**
- Tongue Switches**  
Wharton, Jr. & Co., Wm.
- Tool Holders**  
Williams & Co., J. H.
- Tool Steel**  
Cambria Steel Co.  
Carnegie Steel Co.  
Midvale Steel & Ordnance Co.
- Tools, Thread Cutting**  
Williams & Co., J. H.
- Tools, Track and Miscellaneous**  
Amer. Steel & Wire Co.  
Columbia M. W. & M. I. Co.  
Electric Service Sup. Co.  
Hubbard & Co.  
Railway Track-work Co.
- Towers and Transmission Structures**  
American Bridge Co.  
Bates Exp. Steel Truss Co.  
Westinghouse E. & M. Co.
- Track Expansion Joints**  
Wharton, Jr. & Co., Wm.
- Track Grinders**  
Seymour Rail Grinder Co.  
E. P.
- Track, Special Work**  
Barbour-Stockwell Co.  
Indianapolis Switch & Frog Co.  
N. Y. Switch & Crossing Co.
- Rampno Iron Works**
- Wharton, Jr. & Co., Wm., Inc.**
- Transfer Tables**  
American Bridge Co.
- Transformers**  
Allis-Chalmers Mfg. Co.  
General Electric Co.  
Westinghouse E. & M. Co.
- Treads, Safety, Stair Car Step**  
Amer. Abrasive Metals Co.  
Amer. Mason Saf. Tread Co.  
Morton Mfg. Co.
- Trolley Bases**  
Anderson Mfg. Co., A. & J. M.  
Electric Service Sup. Co.  
General Electric Co.  
Nuttall Co., R. D.  
Ohio Brass Co.
- Trolley Bases, Retrieving**  
Anderson Mfg. Co., A. & J. M.  
Electric Service Sup. Co.  
General Electric Co.  
Nuttall Co., R. D.  
Ohio Brass Co.
- Trolley Buses**  
Brill Co., The J. G.  
General Electric Co.  
Westinghouse E. & M. Co.
- Trolley Materials, Overhead**  
Flood City Mfg. Co.  
Ohio Brass Co.
- Trolley Shoe**  
Miller Trolley Shoe Co.
- Trolley and Trolley Systems**  
Ford Chain Block Co.
- Trolley Wheels (See Wheels, Trolley Wheel Bushings)**  
Flood City Mfg. Co.
- Trolley Wheel and Harps**  
Flood City Mfg. Co.
- Trolley Wire**  
Amer. Electrical Work  
Amer. Steel & Wire Co.  
Anaconda Copper Mining Co.  
Roebling's Sons Co., John A.
- Tracks, Car**  
Bemis Car Truck Co.  
Brill Co., The J. G.  
St. Louis Car Co.
- Turbines, Steam**  
Allis-Chalmers Mfg. Co.  
General Electric Co.  
Terry Steam Turbine Co.  
Westinghouse E. & M. Co.
- Turbine, Water**  
Allis-Chalmers Mfg. Co.
- Turntables**  
Indianapolis Switch & Frog Co.
- Turnstiles**  
Elec. Service Supplies Co.  
Ohio Brass Co.  
Perey Mfg. Co.
- Upholstery Material**  
Amer. Rattan & Reed Mfg. Co.
- Valves**  
Westinghouse Tr. Br. Co.
- Vacuum Impregnation**  
Allis-Chalmers Mfg. Co.
- Ventilators, Car**  
Brill Co., The J. G.
- National Ry. Appliance Co.**
- Nichols-Lintern Co.**
- Railway Utility Co.**
- St. Louis Car Co.**
- Vises, Pipe**  
Williams & Co., J. H.
- Welders, Portable Electric**  
Electric Railway Improvement Co.  
Indianapolis Switch & Frog Co.  
Ohio Brass Co.  
Railway Track-work Co.  
Rail Welding & Bonding Co.
- Welding Processes and Apparatus**  
Electric Railway Improvement Co.  
General Electric Co.  
Indianapolis Switch & Frog Co.
- Metal & Thermit Corp.**
- Ohio Brass Co.**
- Railway Track-work Co.**
- Rail Welding & Bonding Co.**
- Westinghouse E. & M. Co.**
- Welders, Roll Joint**  
Indianapolis Switch & Frog Co.  
Ohio Brass Co.  
Railway Track-work Co.  
Rail Welding & Bonding Co.
- Welders, Steel**  
Indianapolis Switch & Frog Co.
- Wheel Guards (See Fenders and Wheel Guards)**
- Wheel Presses (See Machine Tools)**
- Wheels, Car, Cast Iron**  
Bemis Car Truck Co.  
Griffin Wheel Co.
- Wheels, Car, Steel and Steel Tire**  
American Steel Foundries  
Bemis Car Truck Co.  
Carnegie Steel Co.
- Wheels, Bolted Steel**  
Cambria Steel Co.  
Midvale Steel & Ordnance Co.
- Wheels, Trolley**  
Anderson Mfg. Co., A. & J. M.  
Columbia M. W. & M. I. Co.  
Electric Ry. Equip. Co.  
Electric Service Sup. Co.  
General Electric Co.  
More-Jones Br. & M. Co.  
Nuttall Co., R. D.  
Star Brass Works
- Whistles, Air**  
General Electric Co.  
Ohio Brass Co.  
Westinghouse Tr. Br. Co.
- Wire Rope**  
Amer. Steel & Wire Co.  
Roebling's Sons Co., John A.
- Wires and Cables**  
Amer. Elec'l Works  
Amer. Steel & Wire Co.  
Anaconda Copper Mining Co.  
Cambria Steel Co.  
General Electric Co.  
Indianapolis Switch & Frog Co.
- Midvale Steel & Ordnance Co.**
- Roebling's Sons Co., John A.**
- Standard Underground Cable Co.**
- Westinghouse E. & M. Co.**
- Woodworking Machines**  
Allis-Chalmers Mfg. Co.
- Wrenches**  
Williams & Co., J. H.



### Waterproofed Trolley Cord



Is the finest cord that science and skill can produce. Its wearing qualities are unsurpassed.

**FOR POSITIVE SATISFACTION ORDER SILVER LAKE**

If you are not familiar with the quality you will be surprised at its **ENDURANCE** and **ECONOMY**

*Sold by Net Weights and Full Lengths*

**SILVER LAKE COMPANY**

*Manufacturers of bell, signal and other cords. Newtonville, Massachusetts*

## Brake Shoes A. E. R. A. Standards

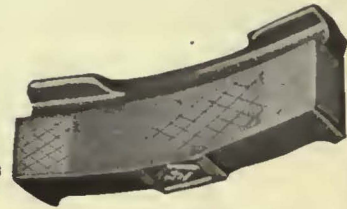
Diamond "S" Steel Back is the Best Type



### Standard Patterns

for

### SAFETY CAR



D-67 for Narrow Treads  
D-87 for Wide Treads

**American Brake Shoe and Foundry Co.**

**30 Church Street, New York**

**332 So. Michigan Ave., Chicago    Chattanooga, Tenn.**



### MORE-JONES "TIGER-BRONZE" AXLE AND ARMATURE BEARINGS

*Not always the cheapest, but ever  
lowest in ultimate cost*

**MORE-JONES BRASS & METAL CO.**  
St. Louis, Missouri

#### ELECTRIC HEATER EQUIPMENTS

**GOLD CAR HEATING &  
LIGHTING CO.**  
NEW YORK CITY  
PATENTED

Address All  
Communications  
to

**BUSH  
TERMINAL**  
(220 36th St.)  
Brooklyn, N. Y.

*Literature on  
Request*

#### THERMOSTAT CONTROL EQUIPMENTS

# N-L

**Indicating Signals  
Mechanical Sanders  
Ventilators, Smokestacks  
Pneumatic Sanders  
Selector Switches, Lanterns, etc.**

**THE NICHOLS-LINTERN CO.**  
8404 Lorain Ave., Cleveland, Ohio

### The Kalamazoo Trolley Wheels

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



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

### Car Heating and Ventilation

Is one of the winter problems that you must settle without delay. We can show you how to take care of both, with one equipment. Now is the time to get your cars ready for next winter. Write for details.

**The Peter Smith Heater Company**  
1725 Mt. Elliott Ave., Detroit, Mich.



**ELECTRIC CAR HEATERS**  
**THERMOSTATIC CONTROL**

**ELECTRO-PNEUMATIC  
DOOR OPERATING DEVICES**

### The Rex-L Turnstile Model 50

Positive, tamper-proof, registering device. Individual release for each person. Conforms to U. S. Internal Revenue Department Rules. Used by Boston Elevated Railway Co.

*Write us for consultation*

**DAMON-CHAPMAN COMPANY**  
Rochester, N. Y.

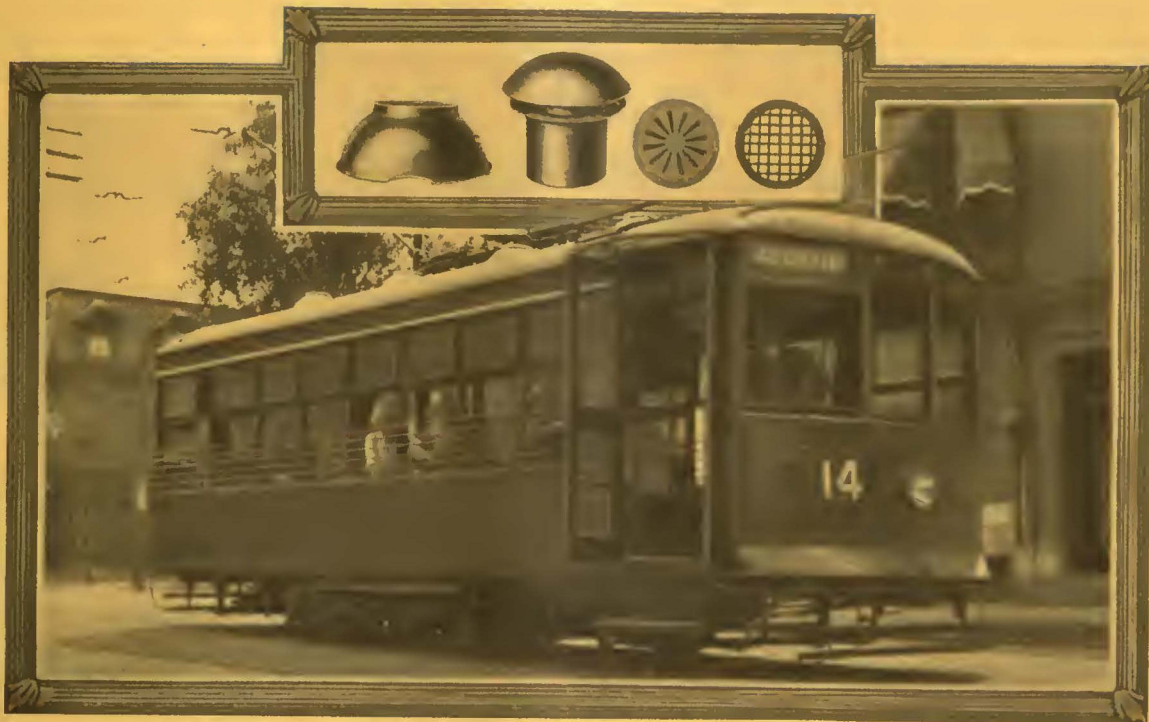


Use them in your terminals—  
**PEREY TURNSTILES**  
or **PASSIMETERS**

*Faster than the ticket seller*

**Perey Manufacturing Co., Inc.**  
30 Church Street, New York City






## Brill "Exhaust" Ventilator *and* Birney Safety Cars

In the development of the Birney Safety Car it was important that every part of its equipment should measure up to the high standard of service which was apparently essential for this type car.

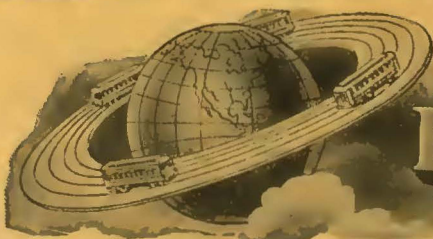
The Brill "Exhaust" Ventilator was included, because in its many years of service it had been found to have a capacity in excess of all boards of health requirements. Its neat and symmetrical appearance and simple construction with the absence of any moving parts were important factors in its selection as the type best suited to modern city service with Birney Safety Cars.


**THE J. G. BRILL COMPANY**
  
 PHILADELPHIA, PA.  
 AMERICAN CAR CO. — G.C. KUHLMAN CAR CO. — WASON MAN'G CO.  
 ST. LOUIS MO. CLEVELAND, OHIO. SPRINGFIELD, MASS.  
 CANADIAN BRILL COMPANY, LTD., PRESTON, ONT.

**C**OLLIER SERVICE sustains car card space value by maintaining a nation-wide organization of car advertising experts.



CANDLER BUILDING, THE HOME OF COLLIER SERVICE



**Barron G. Collier**

INCORPORATED  
Candler Bldg., New York