

ELECTRIC RAILWAY JOURNAL

McGraw-Hill Publishing Company, Inc.

MARCH, 1930

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*"Ye gods, 'tis a dizzy pace
for we old managers."*

Twin Coach
BY F. B. ZAGBY, PRESIDENT

Designed by *Charles F. Russell*

The march of Progress



FURTHERING their program of car replacement and expansion, the West Penn System has placed twelve new modern light-weight interurban cars in service on its Allegheny Valley lines.

These cars will replace all the present rolling stock operating in the Allegheny

Valley between Aspinwall, New Kensington and Natrona, Pa.

The use of four Westinghouse high-speed 35-hp. motors and W-N drive, along with a reduction in wheel size and floor level, all tend to decrease the stop time, and permit a substantial increase in schedule speed.

Service, prompt and efficient, by a coast-to-coast chain of well-equipped shops

Westinghouse



Electric Railway Journal

Consolidation of
Street Railway Journal and Electric Railway Review

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Vol. 74, No. 3.

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Washington
ALEX. MCCALLUM
London, England

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Next Month

Trends in Electric Railway Purchasing

A survey of present practices as compared with those which were in use five years ago. Information of vital importance to every company

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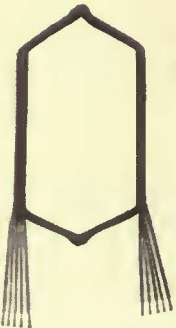
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BUILDING MILEAGE *into your armatures*



A Westinghouse
Railway Arma-
ture Coil.

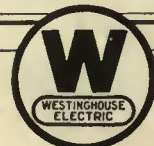
THE life of a set of armature coils is determined by such factors as, *Condition of Core, Workmanship and Type of Service . . .* but the most important factor of all is the *Coils* themselves.

One of the largest interurban

operating companies has built up a record during the past few years of rewinding only seven per cent of its armatures a year. It is worthy of note that this traction company uses Westinghouse coils for its Westinghouse motors.

Service, prompt and efficient, by a coast-to-coast chain of well-equipped shops

Westinghouse



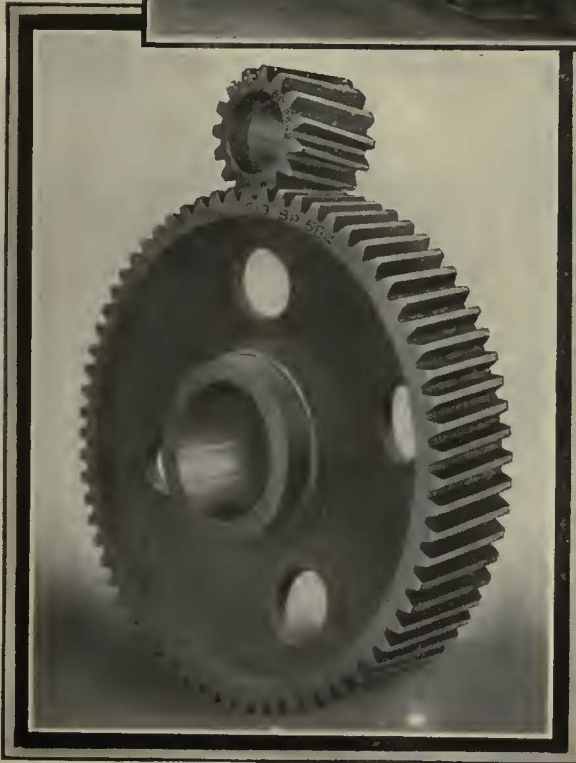
NIAGARA JUNCTION

Changes

to

BP HELICAL

gears



Two of the seven Baldwin-Westinghouse electric locomotives in service on the Niagara Junction line and the BP helical gears with which they are equipped.

SEVERAL years ago, it became necessary to replace the original spur gears on some of the electric switching locomotives of the Niagara Junction Railway, because they were causing excessive noise and vibration which resulted in heavy maintenance costs. With a view to preventing a recurrence of these conditions, the railway company installed Westinghouse-Nuttall BP helical gears.

That all expectations were fulfilled is convincingly evident from the fact that since then the other locomotives on this property also have been equipped with BP helical gears.

Assurance of longer gear life, too, is indicated by the results to date, in spite of the fact that some of the BP spur gears ran from 12 to 24 hours daily, 6 days a week, for sixteen years.

Also, it is this superior performance that has established the preference for BP helical gears on passenger equipment.

Service, prompt and efficient, by a coast-to-coast chain of well-equipped shops



1930

Westinghouse

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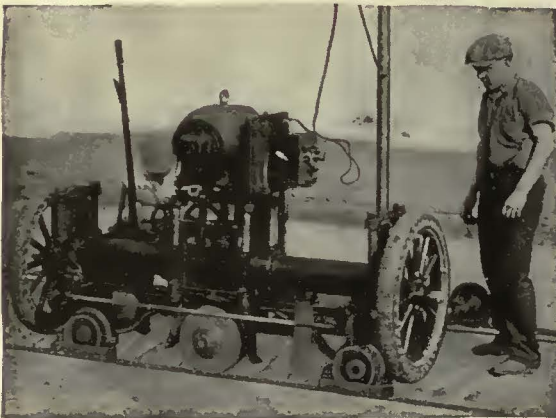




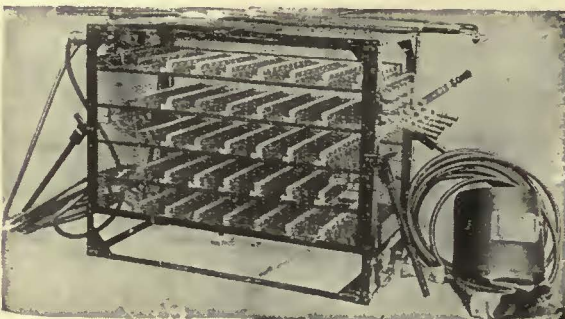
Improved Atlas Rail Grinder



Eureka Radial Rail Grinder



Imperial Track Grinder



Ajax Electric Arc Welder

Popular
 pastime:
 Gum-
 shoeing
 for
 nerve-
 rackers

Let the editor say it again. We quote from last month's Journal:

One thought missing is reference to track-grinding. That's the thought that makes all the difference in the world. Grind and weld, weld and grind—that's the answer to the cry for peace and applause.

“Noise is receiving ever-increasing attention as an unfavorable factor in American life, particularly in metropolitan centers. Means of eliminating or reducing it are under consideration nearly everywhere.”

* * *

“With all this campaign against unnecessary noise it is inevitable that unfavorable attention should be directed to noisy street cars.”

* * *

“The committee on noise reduction of the A.E.R.E.A. has shown conclusively that most of the noise usually associated with car operation is unnecessary.”

* * *

“As to the track, of itself it is one of the quietest things on earth. But when a car passes it begins to act up and emit many and various noises. Here again the wrench and the welder can make a lot of difference. By tightening loose joints, truing up worn surfaces and securing correct alignment even poor track can be so improved that cars can run on it without emitting sounds of pain that arouse the neighborhood.”

* * *

“Money spent on noise reduction will return directly in lower maintenance costs. Equally important, however, is the effect on the public. This cannot be measured in dollars and cents but it is hardly an exaggeration to say that it may mean the difference between success and failure.”

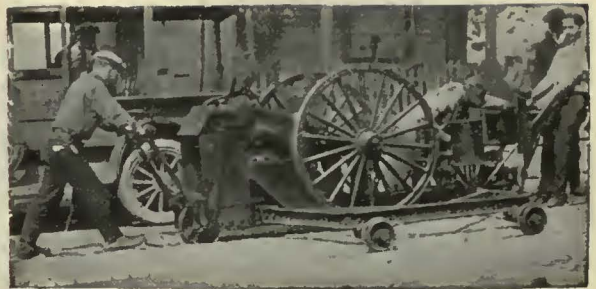
Railway Trackwork Co.

3132-48 East Thompson Street, Philadelphia

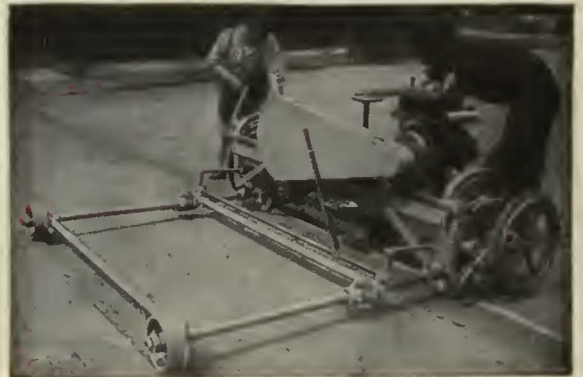
AGENTS

Chester F. Gallor, 50 Church St., New York
 Chas. N. Wood Co., Boston
 H. F. McDermott, 208 S. LaSalle St., Chicago
 F. F. Bodler, San Francisco, Cal.
 H. E. Burns Co., Pittsburgh, Pa.
 Equipment & Engineering Co., London

Ⓢ 3467



Reciprocating Track Grinder



Vulcan Rail Grinder



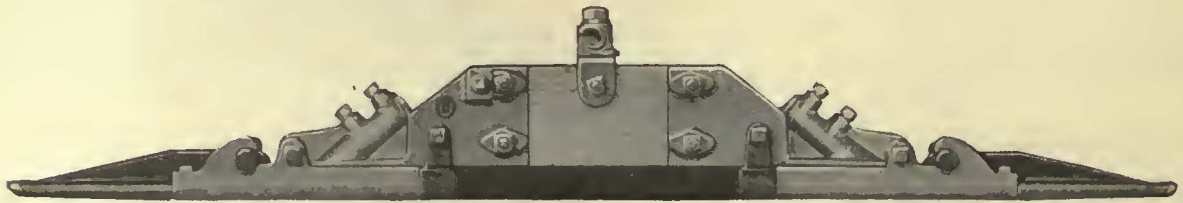
Midget Rail Grinder



KTW Curve Oiler



QUICKLY AND COMPLETELY RENEWABLE WHERE WEAR OCCURS



ABOUT eighteen months ago O-B introduced a new section insulator—an insulator in which the entire underrun was renewable. This design was highly important, for it presented features of convenience, economy and service life which far exceeded those of any previous design. These features include:

1. Quick and easy replacement of any worn part, or the entire underrun as required.
2. Complete replacement of entire underrun without disturbing or removing either trolley or span wires. No block and tackle required.
3. Remarkable savings, in some cases as high as 50%, in replacement labor cost and in material cost.
4. No delay in schedules—no interruptions to service.

In communities throughout the country, alert overhead superintendents have tested, then standardized on the O-B Renewable Underrun Section Insulator. Their experience can be duplicated on any property. Inquire of your O-B representative.

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 Niagara Falls, Canada
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NEW YORK PITTSBURGH PHILADELPHIA BOSTON

CHICAGO CLEVELAND ST. LOUIS ATLANTA SAN FRANCISCO LOS ANGELES DALLAS

PORCELAIN INSULATORS
 LINE MATERIALS
 RAIL BONDS
 CAR EQUIPMENT
 MINING MATERIALS
 VALVES



The NEW O-B Interurban Type Dash-Illuminating Headlight

TO meet a demand brought about by the O-B Dash-Illuminating Headlight for city service, O-B now offers a new and distinctly different headlight—a *dash-illuminating* headlight for *interurban* service—a headlight designed to completely overcome the major disadvantages of older designs. This new O-B Interurban Type Dash-Illuminating Headlight provides:

1. Ample track illumination and pick-up for the highest speed service.
2. Adequate illumination through cities and towns without glare, or without dimming through resistance.
3. Full illumination of the dash through prismatic lens in the sides and bottom of headlight.
4. 100% safe illumination at all times.

For information and demonstration inquire of your O-B representative or address

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 Canadian Ohio Brass Co., Limited
 Niagara Falls, Canada
 1207C

Ohio Brass Co.

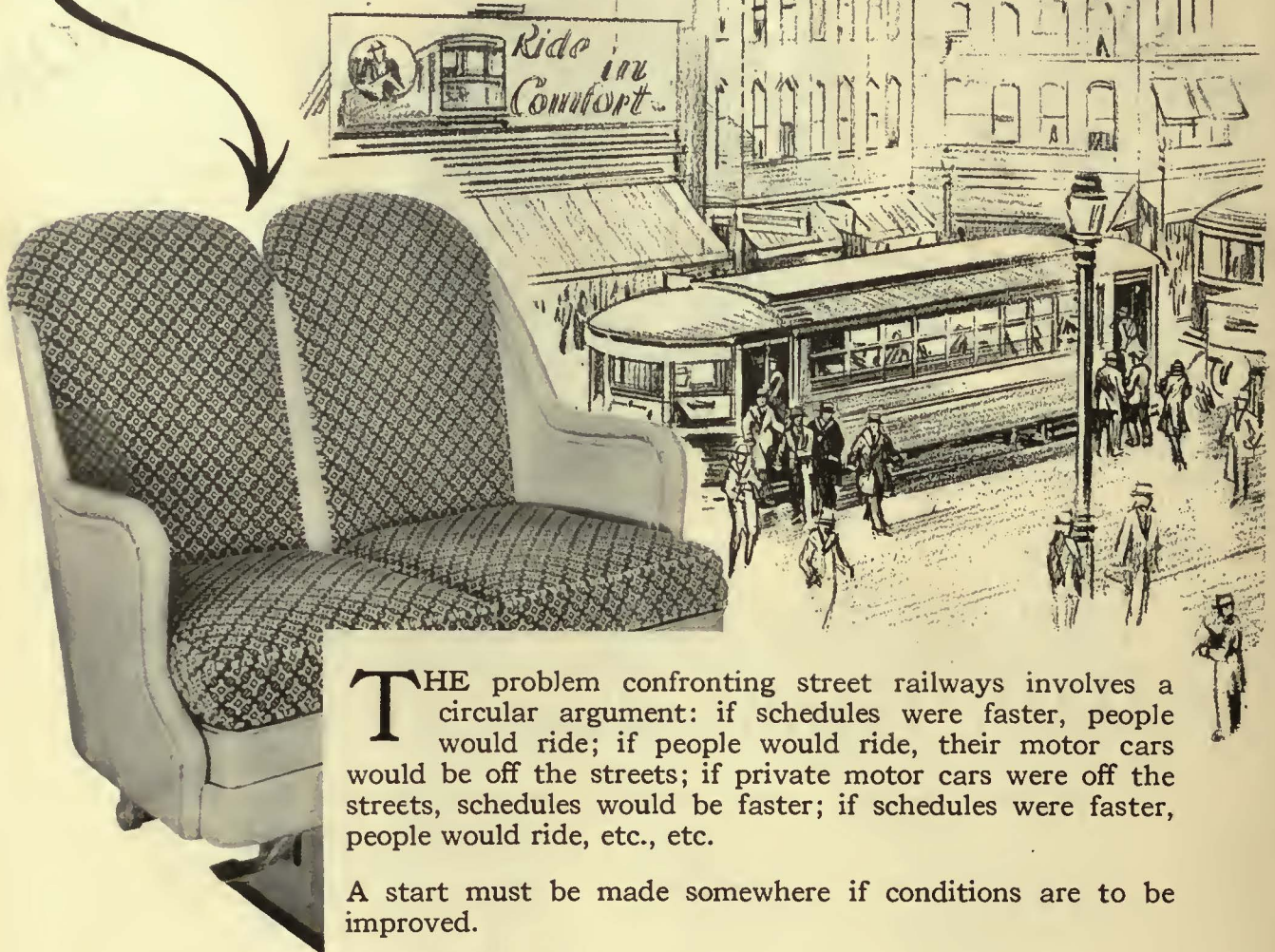
NEW YORK PITTSBURGH PHILADELPHIA BOSTON

CHICAGO CLEVELAND ST. LOUIS ATLANTA SAN FRANCISCO LOS ANGELES DALLAS

PORCELAIN INSULATORS LINE MATERIALS RAIL BONDS CAR EQUIPMENT MINING MATERIALS VALVES

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This is the place to start



THE problem confronting street railways involves a circular argument: if schedules were faster, people would ride; if people would ride, their motor cars would be off the streets; if private motor cars were off the streets, schedules would be faster; if schedules were faster, people would ride, etc., etc.

A start must be made somewhere if conditions are to be improved.

It has been demonstrated over and over again on many properties that clean, comfortable cars with comfortable seats attract heavily increased passenger traffic. Riders in your cars mean automobiles off the streets. Get the riders into your cars by making them comfortable and advertising the fact. It won't be long before you can accelerate schedules.

The logical place to start is with comfortable seats. HALE & KILBURN seats are the acme of comfort.

HALE & KILBURN SEATS

"A Better Seat for Every Type of Modern Transportation Service"

HALE & KILBURN CO.

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The Customer Has Been Right for 1930 years

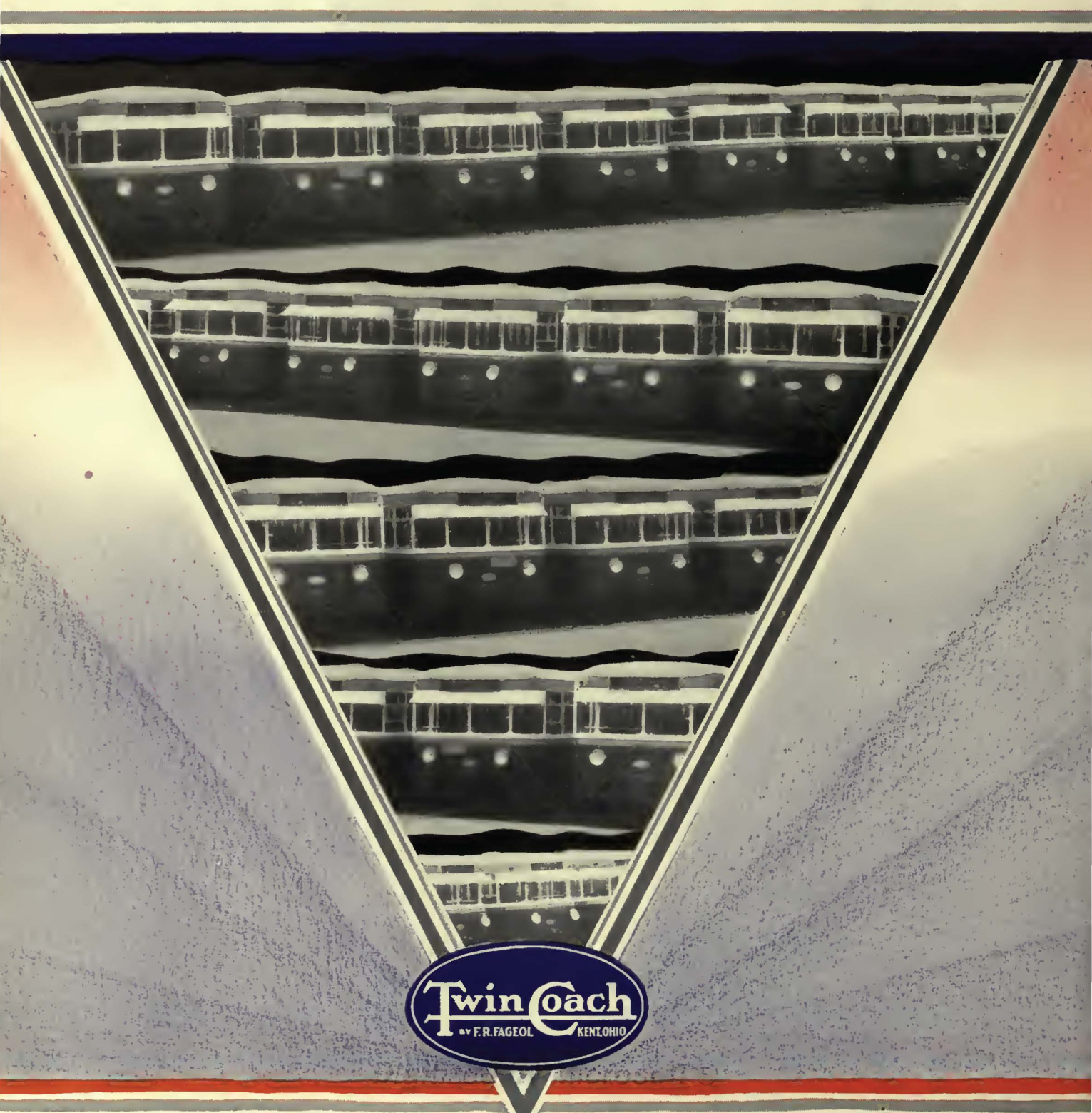
Company Name	Month	Revenue	Operating Expenses	Operating Income	Net Income
Key Bank, Treasury Co.	November 1929	47,756	86,305	868,677	623,846
Market Street Railway, San Francisco, Cal.	November 1929	83,481	31,982	837,513	677,550
Denver Tramway, Denver, Col.	November 1929	4,420	804,420	35,137	456,960
Jacksonville Railway, Fla.	November 1929	377	261	4	213
Chicago & North Western, Chicago, Ill.	November 1929	4,074	151,14	9,370	4,073
Long Island Railroad, New York	November 1929	3,082	2,195	2,195	1,984
New York, Westchester & Albany, New York, N. Y.	November 1929	73	2,480	64	4
Staten Island Ferry, New York, N. Y.	November 1929	4	1,641	58,477	47,171
Tulsa Avenue, Tulsa, Okla.	November 1929	29,711	1,720	5,741	21,737
Philadelphia & Reading, Philadelphia, Pa.	November 1929	43,480	41,800	120,128	17,147
Providence & Worcester, Worcester, Mass.	November 1929	47	46	2,44	3
Union Pacific, Omaha, Neb.	November 1929	4,414	4,414	4,414	4,414
Chicago & North Western, Chicago, Ill.	November 1929	4,074	151,14	9,370	4,073
Brooklyn Manhattan Transit, New York, N. Y.	November 1929	9,14	7,857	1,283	1,179
Edison Gas & Electric, Edison, N. J.	November 1929	7,647	4,542	4,542	4,542
Edmonton & Northern Alberta, Edmonton, Alta.	November 1929	321,75	321,75	321,75	321,75
Edison Gas & Electric, Edison, N. J.	November 1929	7,647	4,542	4,542	4,542
Edmonton & Northern Alberta, Edmonton, Alta.	November 1929	321,75	321,75	321,75	321,75
Edison Gas & Electric, Edison, N. J.	November 1929	7,647	4,542	4,542	4,542
Edmonton & Northern Alberta, Edmonton, Alta.	November 1929	321,75	321,75	321,75	321,75

Why not try

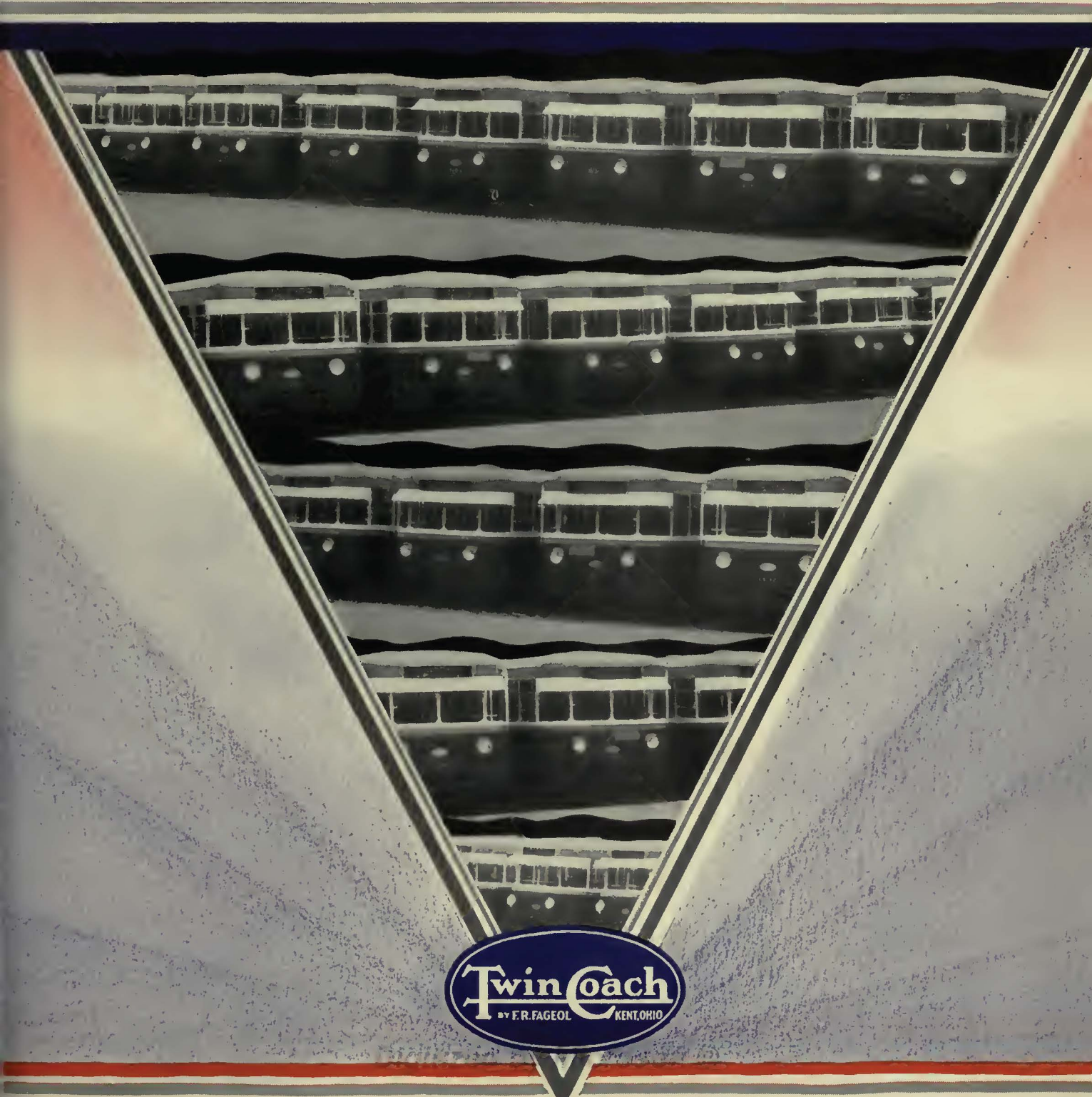
TWIN S

You Want Riders
and you know the Riders Say
"Twins Ride Best"

**More Twin Coaches have been
sold to Electric Railways than
of all other makes of 37-40
Passengers Types Combined**



**The Practice of Building
Separate Motor Coach Bodies
and then attaching them to a
chassis is **The Hard Way****



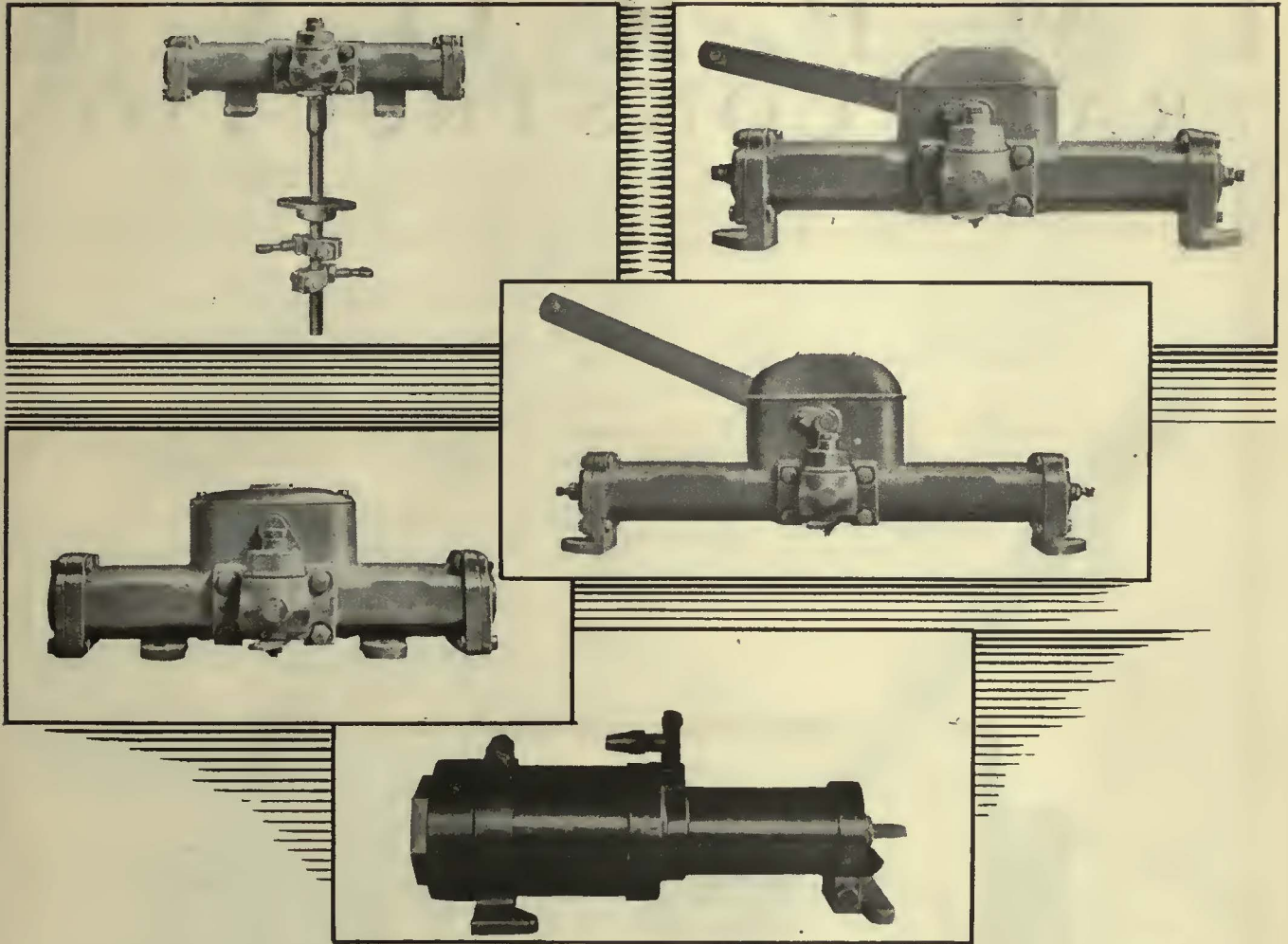


**"Electric Coaches are no dream
They are real live Transportation"**

W. S. Rainville, Jr.—Equipment Engineer—
at Birmingham meeting
Southern Equipment Association.
January 27, 1930



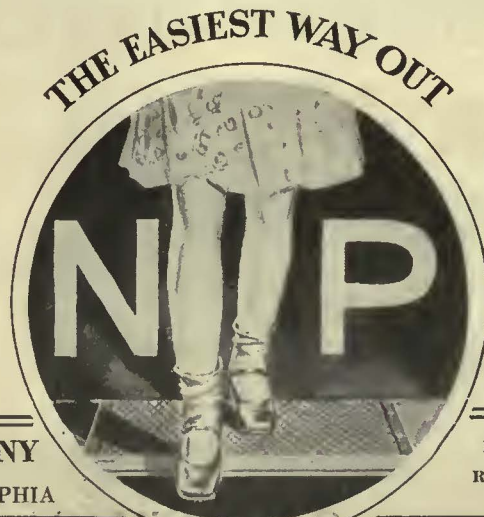
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The Basis of Correct Door Control

National Pneumatic Door Engines, controlled mechanically, pneumatically or electrically, are the logical solution for your door control problems.

For one man cars, the N. P. Automatic Treadle Exit Door Provides



NATIONAL PNEUMATIC COMPANY

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Railway & Power Engineer.
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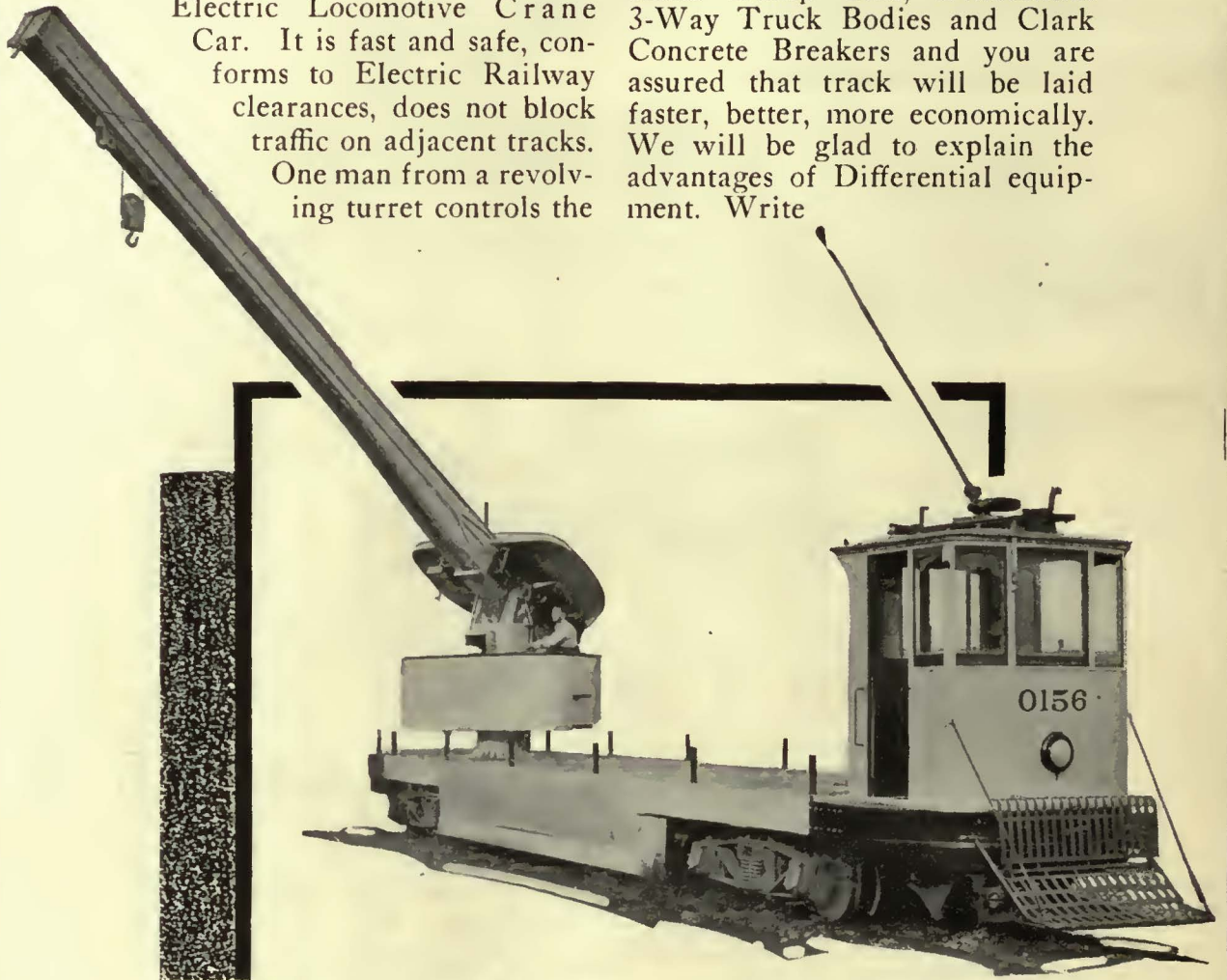
IMPROVE TRACK CONSTRUCTION

To build modern track requires modern equipment—and no equipment is more modern than Differential.

Outstanding is the Differential Electric Locomotive Crane Car. It is fast and safe, conforms to Electric Railway clearances, does not block traffic on adjacent tracks. One man from a revolving turret controls the

crane for any loading or unloading operation, for handling bridge timbers and rails or any special track work.

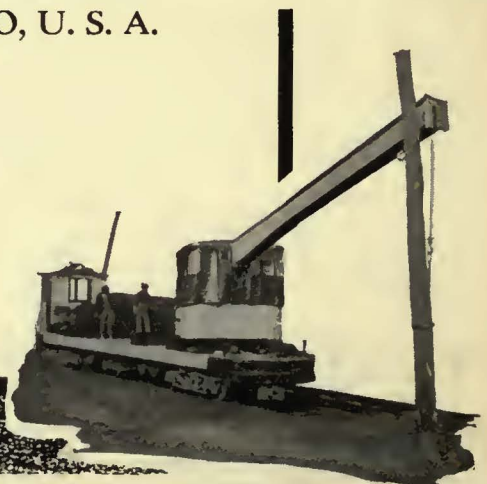
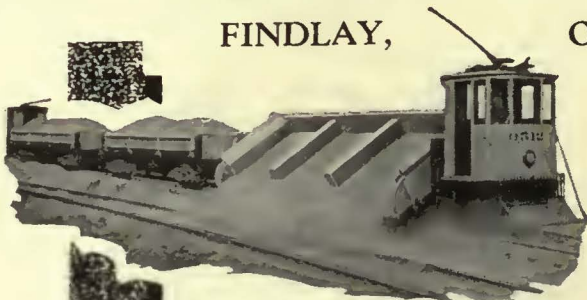
Combine this crane with Differential Dump Cars, Differential 3-Way Truck Bodies and Clark Concrete Breakers and you are assured that track will be laid faster, better, more economically. We will be glad to explain the advantages of Differential equipment. Write



THE DIFFERENTIAL STEEL CAR CO.

FINDLAY,

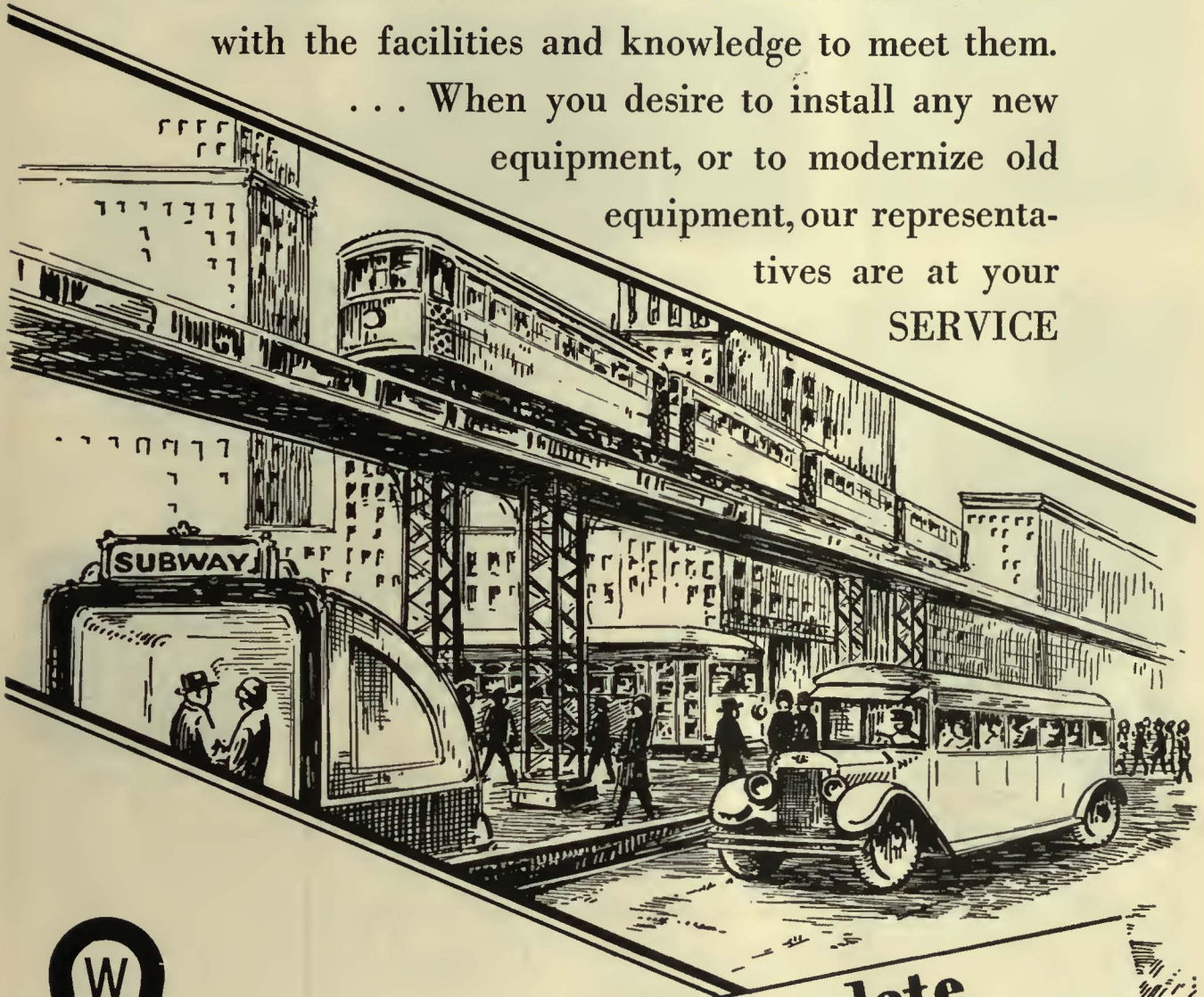
OHIO, U. S. A.



SERVING *the* SERVICE

WE appreciate the responsibility imposed by years of service in the traction field. Thorough research in solving many problems has given us full understanding of the diversified needs of the field and endowed us with the facilities and knowledge to meet them.

... When you desire to install any new equipment, or to modernize old equipment, our representatives are at your SERVICE



**Complete
Air Brake Equipment
for every class of service**

WESTINGHOUSE TRACTION BRAKE CO.
General Office and Works — Wilmerding, Pa.



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Faraday Resistance Panel

THE Faraday Passenger Signal System provides pushes within easy reach of every passenger for signalling the operator to stop. It is a practical, inexpensive and reliable method of building good will among your patrons.

This complete line of pushes, bells, buzzers and resistances will meet the needs of the simplest and most complicated systems. Every device is highly engineered and made to provide long, reliable, unflinching operation.

This equipment is completely listed in our Car Equipment Catalog No. 7 and Bus Equipment Catalog No. 9.



Type CB
Push Button



High Voltage
Buzzer



High Voltage
Vibrating Bell

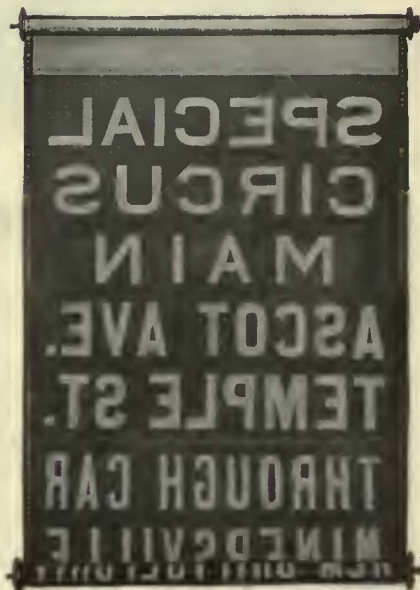
ELECTRIC SERVICE

Home office and manufacturing plant located at
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District offices are located at 111 North Canal
Street, Chicago, Ill. and 50 Church Street,
New York City.

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Front of Curtain



Rear of Curtain

The curtains used in Keystone-Hunter signs under usual service conditions will last for many years. Should they become dirty and soiled with misuse it will pay to renew them. They are continually selling your service—keep them right.

HUNTER-KEYSTONE illuminated destination signs "tell the public where you're going." They advertise your service and your different routes. They make easy the re-routing of cars and give a business-like appearance to your cars.

When remodeling or building new cars Hunter-Keystone signs should be given first consideration in order to assure successful operation of those cars.

Hunter signs are listed in catalog No. 7 for railway cars and in catalog No. 9 for buses.

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Eliminates a Lot of Guesswork from Motor Repairs



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Paints

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Compounds

Varnished Cloths and
Tapes

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Cords and Twines

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Skilled varnish makers and highest grade ingredients *make them right*—a great research laboratory keeps them *right*.

You can get G-E Insulating Varnishes from General Electric Merchandise Distributors everywhere. For full information, write Section M-813, Merchandise Department, General Electric Co., Bridgeport, Conn.

MERCHANDISE DEPARTMENT

GENERAL ELECTRIC COMPANY

BRIDGEPORT, CONN.

GENERAL ELECTRIC INSULATING VARNISH





TYPE L G-E WELDING ELECTRODE

Puts **STRENGTH** into steel joints

Shattering loads...braking strain...impact — they have least effect on truck frame welds made with G-E Type L Electrode. Its tensile strength is *high*...its penetration *deep*.

Type L is a wire specially processed for strength...It also possesses all the good qualities of fluxed rods. *In addition*, it flows uniformly, spatters little and yields a smooth bead.

Wherever a steel welding job is to be done by hand, choose one of the G-E Electrodes with confidence.

You can get welding electrodes for every kind of welding from G-E Merchandise Distributors — or write Section M-813, Merchandise Department, General Electric Company, Bridgeport, Connecticut.

G-E ELECTRODES FOR EVERY WELDING JOB

- Type A — For Cast Iron only.
- Type B — For Automatic Welding.
- Type F — For General Welding of Steel.
- Type L — For General Welding of Steel — High Tensile Strength.
- Type H — For Automatic Welding.
- Type M — For General Welding of Steel — Sound and Ductile welds.

ACCESSORIES, TOO:

General Electric has developed accessories that are right:

- Helmets and Hand Shields
- Electrode Holders
- Weld Gauges
- Welding Cables
- Scratch Brushes, etc.

GENERAL  **ELECTRIC** 

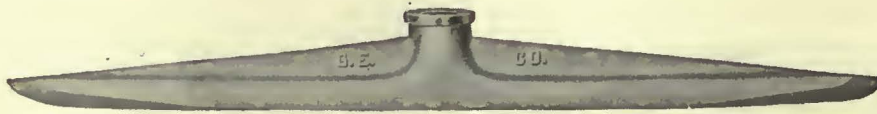
WELDING ELECTRODES

MERCHANDISE DEPARTMENT

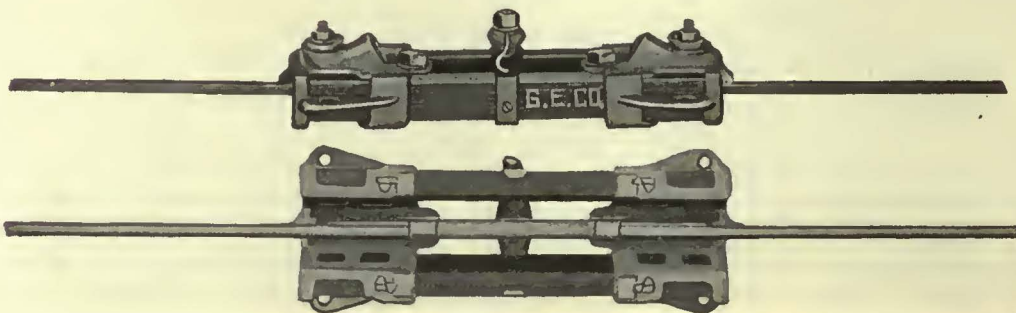
GENERAL ELECTRIC COMPANY

BRIDGEPORT, CONN.

G-E line material



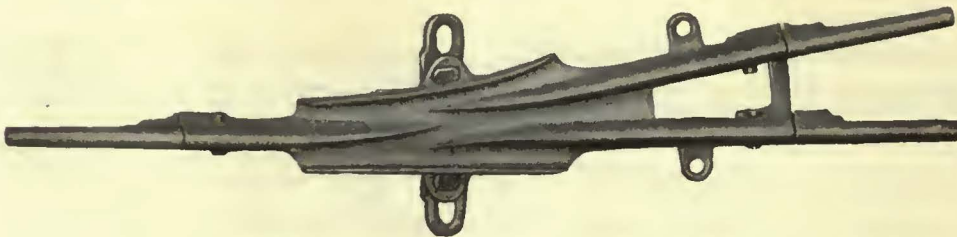
*Form C2
Ear*



*Form L4
Section
Insulator*



*Form T
Frog*

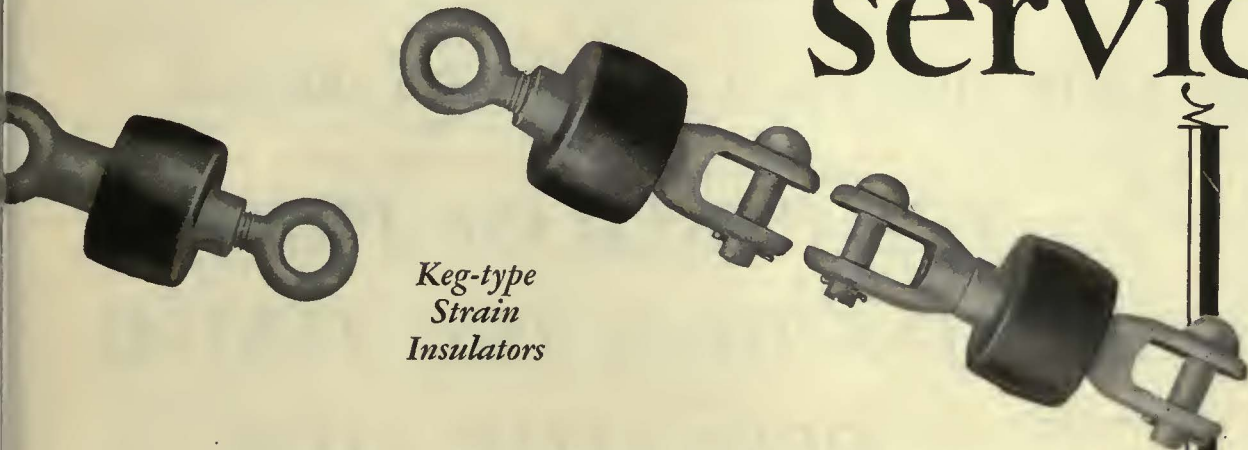


*Form Q2
Splicing
Sleeve*



GENERAL

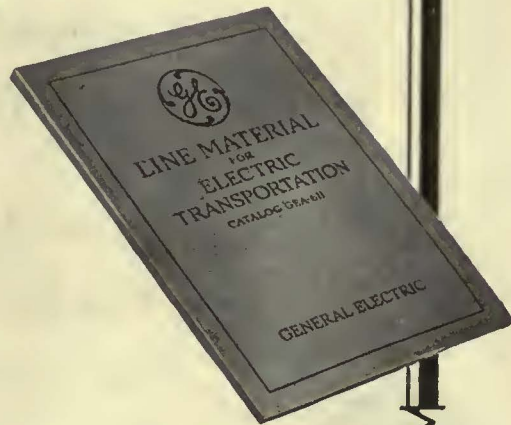
holds in the hardest service



*Keg-type
Strain
Insulators*



*Form HT
Suspension*



THESE G-E line-material devices and many others are described in the new catalog, GEA-611. A copy is available without charge. Simply address your nearest G-E line-material dealer, your nearest G-E sales office, or General Electric Company, Schenectady, New York.

General Electric is constantly developing and testing new line-material devices to simplify your overhead construction problems. All standard parts are available for immediate delivery from G-E warehouses and from G-E line-material dealers throughout the United States.



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JOHN A. MILLER, JR., *Managing Editor*

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Public Transportation Gaining Steadily in Large Cities

MORE than 6,500,000,000 electric railway and bus passengers were carried last year by the public transportation systems in a group of ten of the largest cities in the United States, according to preliminary reports of operating companies. This figure sets a new high record for traffic in these cities. While 1929 was not a record breaking year in every city in the group, the slight recessions in some places were more than offset by substantial gains in others. The total is an increase of nearly 33 per cent over the total for the same cities ten years ago, when approximately 5,000,000,000 passengers were carried. Considering only the passengers carried on the electric rail lines the increase was a little over 25 per cent.

Cities included in this group are New York, Chicago, Detroit, Cleveland, Baltimore, Boston, Pittsburgh, St. Louis, Milwaukee and San Francisco. Taken together their transportation systems handle a substantial part of the total city transit traffic of the country. During the past decade the population of these cities, together with a few adjoining communities served by the same transportation systems, has increased about 16 per cent. Thus the growth in riding has been more than twice as rapid as the growth in population. Expressed in another way, the number of rides per inhabitant per annum has increased from an average of 330 ten years ago to about 375 at the present time. A similar trend toward increased use of public transportation facilities is evident also in other cities, but complete figures are not available at this time.

Extension of rapid transit service in New York, Chicago and Boston has played an important part in the growth of the traffic in this group of cities. It is significant, however, that substantial traffic increases have been recorded also in those cities of the group which have no rapid transit facilities.

The relative importance of bus service has been increasing steadily. Ten years ago buses carried less than 1 per cent of the total number of passengers while the electric rail lines carried over 99 per cent. Today the buses are carrying nearly 6 per cent and the rail lines 94 per cent of the total. By far the largest part of this increase in bus traffic has resulted from the development of new services, as there has been comparatively little replacement of rail service in these cities. Express and de luxe bus service, as well as local service reaching new territory, has brought additional business to the transportation systems while the electric rail lines have continued to render highly efficient service on heavily traveled routes.

That the total number of riders in public transportation vehicles has increased during the past decade in this

group of growing cities is not surprising. That the average number of rides per inhabitant per annum should have shown a substantial increase, however, is worthy of note. And that this should have occurred simultaneously with the phenomenal development in the use of the private automobile is, indeed, remarkable. Better than could any words these few figures show the essential character of public transportation service.

Defining the Place of the Taxicab

SELDOM has it been possible to obtain any exact measurement of the extent to which the cruising taxi contributes to traffic congestion. For that reason the experience of the city of Pittsburgh, where a taxicab strike has been in progress for some weeks past, is particularly interesting. Notable improvement in traffic conditions has been evident since the taxicabs have been off the streets. Congestion has practically disappeared although there has been no decrease in the total number of persons entering the downtown area. This is easy to understand as counts made previous to the strike showed that more than 75 per cent of the taxicabs moving through the downtown streets were empty.

Relief of congestion has been of great benefit to both the users of private automobiles and the users of street cars and buses. The speed of all vehicles has been substantially increased and the maintenance of schedules has been greatly facilitated. The additional revenue accruing to the railway has not been a matter of any importance since the average number of persons who formerly used taxicabs did not amount to much more than 1 per cent of the railway and bus riding. But the improvement in service made possible by the elimination of the cruising cabs has been remarkable.

From this it would be easy to contend that taxicabs should be permanently banned from congested districts, but such is not the conclusion of transportation men who have been studying the situation. Rather it is thought that the strike has proved the need for regulation which will permit the taxicab to play its proper part in transportation without adding unnecessarily to congestion.

Of late there has developed a widespread tendency on the part of taxi operators to depart from the field of individual service which they are particularly well adapted to render and to encroach upon the field of mass transportation. Taxicabs cruising along lanes of heavy travel with the hope of picking up chance passengers are doing little more than duplicating existing service of street cars and buses. Not only does this add unnecessarily to the total volume of traffic on the street but it constitutes an uneconomic use of the roadway, because the number of passengers carried is

disproportionately small compared with the number of vehicles. Probably the taxicab operators have drifted into this practice almost unconsciously. The legitimate demand for taxicabs fluctuates widely. Sufficient equipment is provided to meet the maximum demand. Fares have been cut down to a minimum in most cities. Hence it has become necessary to drum up business in slack hours and the cruising cab with all its attendant evils has come into being.

To correct this situation it is necessary only to restore the taxicab to its legitimate field by eliminating cruising, establishing stands off the main streets and placing call boxes at convenient locations. Taxi service can thus be made entirely satisfactory for those who desire individual transportation, without clogging the streets with empty vehicles going nowhere.

Agencies interested in traffic regulation throughout the country have been studying the situation in Pittsburgh. Developments there are proving the soundness of many theories previously held and it is not too much to hope that the result of this experience will be a clearer understanding of the place of the taxicab and a larger degree of regulation to control its operations to the best advantage of the public at large.

Public Protection or Private Profit?

RECENT developments in connection with legislation concerning the practice of engineering in the state of New York deserve the close attention of electric railway men. On the one hand the architects' law has been changed to make it a misdemeanor for any person other than a registered architect to "design plans and specifications for structures or alterations exceeding \$10,000 in cost." On the other hand, a proposal has been made to amend the engineer license law in a way which might make it necessary for track foremen and substation operators to hold engineers' licenses. The potential danger in these regulations is too serious to be ignored.

When these laws were first enacted some years ago, the avowed purpose was to make sure that the designers and builders of important structures should be competent to perform their work. Consistent efforts have been made, however, to convert the laws intended for the protection of the public into instruments for improving the financial condition of architects and engineers by restricting the performance of certain jobs to a limited number of officially authorized persons. Many engineers, however, being wholly out of sympathy with these efforts, have refrained from applying for licenses. Thus it has become a common practice of corporations doing engineering work to have one license holder sign all such plans and designs as require the signature of a licensed engineer. To a considerable extent this practice has defeated the original purpose of the law.

It is now proposed to correct the situation by defining an engineer as one "who engages in, or who holds himself out as able to engage in—the designing, the preparing and filing plans and specifications for, the supervising and inspecting of—structures, machines, processes and (or) other engineering work or appliances involved in public or private projects, the safety and control of which are essential to the public welfare." Just how far-reaching this amendment would be in actual practice is difficult to foretell. Nevertheless it is evident that it might easily be interpreted to include a large number of persons whose work is in no sense real engineering.

Sufficient opposition to the new definition has developed, however, so that its adoption at this time appears improbable. Efforts to amend the law so as to place engineers on an equal footing with architects as regards structural design appear more likely to succeed.

Whatever the feeling of individual engineers may be concerning these license laws, their existence is a condition and not a theory. They are in effect in some 26 states, in several of which trends have been evident similar to those in New York. Undoubtedly there is need for correcting certain conditions now existing. But care must be exercised to see that the cure is not worse than the disease. It would be easy to go too fast and too far with changes in the present law. Rather than remain aloof because of their disapproval of these developments, all engineers should participate and help steer them so that the rights of engineers shall be adequately protected without extending the scope of the law to cover too broad a field.

Co-ordinated Transit Makes Progress

WHEN a community passes from the small city stage to that of metropolitan center a demand comes for transit of a different kind from that which was satisfactory before. People do not all want to reach one central point, and a radial system breaks down. This is particularly true because of increasing street traffic congestion. Even higher schedule speeds, while essential, will not alone compensate for wrong methods or indirect routes. Accordingly, some form of co-ordination in which all the available means of transit are used to best advantage is necessary to the continued growth of the community.

The latest city to follow this course is Rome, Italy. Beginning with the first of this year a radical change was made. Outlying routes of street cars were consolidated and now feed into a belt line surrounding the central part of the old city. On account of crooked, narrow streets, all cars have been excluded from this area and buses are used to furnish such distributing service as may be necessary. Crosstown passengers transfer to the belt line and do not enter the congested district at all. This system replaces the one that was in use for many years. A multiplicity of street car routes, most of them with infrequent headways, reached many destinations, and nearly all of them ran through the most congested portions of the city. Buses supplemented the service, principally in the outskirts.

To complete the new system a subway has been planned. When completed—it will take several years to build—it will give direct routing to central points, with schedule speeds that cannot be approached by surface transportation. It is to be presumed that a further rerouting of surface lines will be possible when the subway is built.

In some respects the new system in Rome resembles that built up in the Boston area in this country. Rapid transit plays a large part in the success of the Boston system. Surface routes, for the most part, are local in character and terminate at the nearest rapid transit stations, where transfer is made to one of several trunk lines passing through the center of the city underground. Such surface cars as do enter the heart of the city do so in subways and terminate at locations convenient to the most important points.

London also has a system which is not unlike these two. In one respect it more closely resembles the new

Rome system—surface cars are excluded from the central area and buses furnish all the service. Here again there is the problem of crooked, narrow streets. There is a comprehensive network of subways such that the passenger from the outlying districts does not need to use the surface routes at all. The buses should be of chief advantage to the short rider who does not leave the central area. However, most of the routes radiate out for several miles. As a consequence there are many buses on the streets and the congestion has become so great that movement is very difficult. The function of the buses for local riding is all but defeated. In this respect the Rome plan is superior, although it involves a transfer for anyone who travels between the suburbs and the center of the city.

Such a plan as the one just started in Rome is bound to be watched with interest. It is too early to pass judgment on it until more definite results can be had than are available after a trial of a few weeks. In fact, it is not possible to determine the full value of the plan until it is rounded out with the completion of the subway system, and operation of that cannot begin for several years at the very least.

A Study in Financial Fortitude

ANOTHER electric railway has been reorganized on a basis that gives every reason to believe it will meet successfully the new economic conditions. The road is the Chicago, South Bend & Northern Indiana Railway and its affiliate, the Southern Michigan Railway. The history of what has been done with it financially is reminiscent of the suggestions contained in the report of the American Electric Railway Association's committee on finance made some few years ago. Whether or not those responsible for the reorganization had in mind the recommendation of the committee on finance of the association is not disclosed, but the process of procedure followed the committee's recommendation and the successor company has emerged with a financial structure which does resemble the typical one suggested.

Significant, indeed, is the fact that the reorganization was not voluntary. Only occasionally can security holders be made to see the value of voluntary action under the theoretically sound doctrine of the greatest good to the greatest number. This was not one of those rare occasions. So the stage was set for the auctioneer and his hammer.

But that is said and done. To recapitulate the financial set-up here is not necessary. It is important, however, to note that the Indiana Railway first mortgage of \$426,000 emerges as an extended obligation to be amortized out of current earnings within six years. When that has been done the funded debt will be \$1,533,085. Meanwhile treasury bonds will be issued to finance additions and extensions and the equipment trust method will be called into use to finance the purchase of ten new city cars and ten new interurban coaches. Again obligatory amortization out of earnings will tend to keep the structure of bonds within the reasonable earning capacity of the property. Accrued interest on other bond issues has been cared for by additional evidences of indebtedness.

All in all, the new structure has been so arranged as to make it possible to continue operation on a basis that will attract capital and credit and permit the properties to be properly rehabilitated. The successor organi-

zation is regimented financially for a gait fit for the economic company in which it finds itself, not for the step of the wooden soldier. The facts are a study in financial fortitude.

Municipal Operation Not Immune from Economic Law

CASH fares on the Detroit municipal railway will go from 6 cents to 8 cents on March 15 and cash bus fares from 10 cents to 8 cents. The ticket rate on cars has been nine for 50 cents, but will become four for 30 cents or ten for 75 cents for use on either cars or buses. These changes follow the determined stand of Mayor Bowles to the effect that the railway shall meet, in fact as well as spirit, the mandate of the charter that it charge a rate of fare adequate to pay its debt obligations and at the same time provide current maintenance money sufficient to keep the system healthy.

Apparently the Mayor had little cause for dissatisfaction with the system as it was being run. But he was not satisfied that the fares were sufficient to provide out of earnings for the orderly development of the system to meet the expanding requirements of the city. So he asked John H. Morgan, auditor to the system, to report to him. The principal source of trouble, Mr. Morgan said, was that the rate of fare had never been sufficiently high to produce revenue to pay all necessary obligations as provided by the city charter.

If the Mayor was not prepared to recommend one way or another about fares when he took office, Mr. Morgan's statement removed the last iota of doubt from his mind. The street railway commission then backed him up. It voted two to one for the increase. Frank Couzens, son of Senator Couzens, under whom municipal ownership was brought about when the latter was Mayor of Detroit, was the recalcitrant. He is understood to have taken the position that the alleged neglect in the past to provide funds sufficient for depreciation was no reason why fares should be advanced now. But they are to be advanced. They are to be advanced because the municipal railway is no more immune from the play of the economic forces around it than are the private companies operating under comparable circumstances. This, the most recent operating statistics prove.

For twelve months ended Jan. 31, 1930, the net profit on the municipal lines was \$106,576 after charges, taxes and sinking fund requirements, compared with a net profit of \$399,873 in the preceding twelve months. That is not much to brag about under the circumstances. As for the future, if there is no decrease in traffic and several other ifs prove to be correctly diagnosed, gross revenue should increase by \$3,000,000 for the current year over that for the one recently closed. Other phases of the matter are reviewed elsewhere in this issue.

Meanwhile, \$8,760,322 will be needed by June 31, 1931, for new equipment, extensions and repairs. The 1930-1931 budget sets up a bond issue of \$7,000,000 to take care of the major part of this cost. If General Manager Smith has his way, 100 new cars and 75 buses will be purchased at once at a cost of \$2,225,000. He also feels that a similar number should be purchased during the 1930-1931 fiscal year. Detroit really needs them. Of that there is no doubt. To buy them the railway will have to pay real money, and the Mayor intends that the city shall get that money from the people who use the service.

Traffic Officers as

Transportation Men

By

CLARENCE P. TAYLOR

Assistant Traffic Engineer Department of Public Works
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Promoting safe, orderly and expeditious use of the streets is the primary function of police traffic officers. They should approach the problem from the standpoint of transportation rather than that of law enforcement



ENFORCEMENT duties of traffic officers should be incidental to their primary functions of promoting safe, orderly and expeditious use of the streets and highways. A traffic officer should be more of a transportation man than an enforcement officer. The failure of some officers to grasp this point of view cannot be properly charged against them as individuals. The fault lies deeper. The rapid growth in the size and complexity of travel created baffling problems of automobile fatalities and traffic congestion. No precedents were available for meeting the difficulty, nor did time permit customs to evolve or best practices to develop. As a result it was only natural to try legislation as the first "cure." Certain acts and omissions were made crimes and the whole problem thereafter turned over to the police to struggle with as best they could.

Previously policemen dealt chiefly with vicious criminals, or at least with definitely anti-social persons, and seldom had to bother with forgetful and careless citizens. The situation now is that, according to law, both traffic law violators and burglars are criminals. Hence, is it any wonder that men who have spent a large portion of their lives handling hardened criminals should have difficulty in adapting themselves to the handling of a totally different class of law-breakers?

The traffic problem might have been given to railroad men to solve. Indeed, such an assignment would have been quite logical. Perhaps, if this had been done, the railroads with their superior experience in the transportation field and their special facilities might have been more successful than the police. Police departments had no men who were trained and able to do the necessary research and engineering work. They had no staff of



The police officer, as a controller of traffic, is becoming an expert in the management of people and vehicles

men experienced in the training of the public mind. They had no funds with which to promote the needful enterprises. All that the police had was a large fund of knowledge and experience in the handling of criminals. Considering the handicaps, it is a wonder that any progress has been made.

Not only has the problem of the regulation of traffic

been a source of much trouble to the police, but in size it now bids fair to eclipse that of crime. Many chiefs of police find that more than half of their own time is spent working on traffic problems and that if the public were to have its own way all of the policemen would be on traffic duty most of the time.

The police were among the first to recognize the special nature of street traffic control. As a result, all of the foremost police departments have traffic bureaus or divisions to which all traffic functions are attached. This specialization has been furthered by the advent of the local traffic engineer, who takes charge of the engineering features of street traffic, and the local safety council, which disseminates safety education. When these two agencies are active it is possible for a traffic division to concentrate on enforcement.

Enforcement, however, has come to have a broader meaning than the apprehension and prosecution of law violators. In traffic, it no longer stands for wholesale arrests, but for the performance of those duties which will best promote safe, orderly and expeditious use of the existing street surfaces. Such a conception of a traffic officer's purpose may be less definite than one which prescribes the arrest and prosecution of all offenders, but it is certainly more apt to produce the results which legislators sought when they passed traffic laws.

QUARRELSOME DISCIPLINARIANS DISAPPEARING

Traffic officers still vary considerably in their notions of how they should conduct themselves and what they should expect from the public. A change for the better is observable as the blundering, officious type is being displaced by men who are both efficient and pleasant. The latter are experts in the management of people and vehicles and not quarrelsome disciplinarians.

When viewing the traffic officer as a transportation man one finds some striking similarities between the duties which he performs and those of railroad men. A railroad switchman, in an interlocking tower where two lines cross at grade, signals approaching trains so as to prevent conflicts and collisions. A traffic officer directing traffic at an intersection does the same thing for vehicles. A train dispatcher decrees that certain trains shall wait for others and gives the most important trains the preference. Also, he sees that there is ample time in the schedule for the necessary movements to be made in safety; so, too, with a traffic officer when he sets the timing of traffic signals. To the main flow of traffic he gives the most time and the advantage of progressive movement in trains if possible. He also allows a short interval after stopping the traffic on one street to permit the last few vehicles to clear before a signal to proceed is given the traffic waiting to cross.

A railroad general superintendent has many executive functions that are not analogous to the duties of a traffic officer, but his principal objective of keeping things moving is the same. While such a superintendent is directing his attention to congested lines and idle rolling stock, traffic officers are looking after congested streets and automobiles that are parked overtime.

When a parade or caravan is to pass through a city the traffic officer often plays an important part in assembling and running it. In the work of making up the procession does he not do something very similar to what a yardmaster and switching crew do when they make up a train? As soon as the procession is under way he is generally charged with seeing that the correct routes are taken, that the schedule is kept, and that all necessary

precautions are taken for the safe and uninterrupted movement of the column. In this rôle his responsibilities are obviously like those of a conductor.

In both fields a certain amount of police work is required. But as the work of the railroad police is small compared with that of the whole organization, so, too, should the arrests and prosecutions by traffic officers constitute a small part of their total efforts.

Both the railroad safety engineer and the traffic officer are employed to prevent accidents without unduly interfering with transportation. The work of each involves the investigation of traffic hazards and the taking of appropriate action toward the elimination of dangerous conditions. In fact, a traffic officer should be guided by the same principles and practices as are followed by safety engineers.

These few examples of similarity between some of the work done by railroad men and that performed by traffic officers may help to make it clear why it is desirable that a traffic officer should be more of a transportation man than an enforcement officer. In the capacity of a transportation man a traffic officer would serve the public by keeping things moving and by working diligently and intelligently to prevent accidents. On this basis the value of an officer would not be measured by how large a number of arrests he made or how large the gross receipts from fines were but by how few people he arrested, coupled with how smoothly and efficiently he kept traffic moving, how few accidents occurred and how few complaints were made about traffic conditions or the officer.

TRAINING EFFICIENT TRAFFIC OFFICERS A PROBLEM OF PERSONNEL MANAGEMENT

To train a group of traffic officers to work efficiently is a difficult problem, and one in which the details vary with each individual department. However, assuming that a particular traffic division is well organized, political interference small, and new men selected carefully for their fitness, the problem resolves itself chiefly into one of management of personnel. The practice of sending men out to handle traffic without a single instruction, other than where they are to go, is proving too costly to continue. Uniformed officers make numerous mistakes and sometimes irreparable blunders. The time required for their superior officers and the courts to straighten out case after case of avoidable error is sufficient ground for some educational effort. And when to this is added the wasted time of the officer himself as well as that of clerks, attorneys, witnesses, juries and defendants, the need is apparent. Moreover, a difference in the accident and congestion situation may properly be a debit against an incompetent officer.

One of the basic principles of good management is that the worker should be instructed thoroughly in what he is to do. For this purpose, Baltimore, Boston, Detroit, Los Angeles, New York and many other cities have training schools for traffic officers. Several states, some counties, and a few universities, too, have joined in the movement by offering special opportunities to ambitious officers. The rapid growth of associations of traffic officers is indicative of a general desire on the part of traffic men themselves to learn from the experiences of each other. It is also true that each year sees a greater number of traffic officers visiting in different parts of the country in order to see first-hand how things are done in other cities. It is important that electric railway men know of these movements in order that they may

encourage them in their own localities, for these are some of the best means for training traffic officers.

A well-rounded course of instruction should include a working knowledge of police practice, criminal investigation, law and psychology. Special effort should be made to teach the practical details connected with the characteristics of traffic flow, the handling of traffic at intersections, enforcement of parking regulations and other important traffic rules, handling of violators, handling of crowds and processions, the proper procedure at fires and major disasters, the testing of brakes and headlights, the prevention of accidents, the investigation of traffic hazards, the investigation of accidents, the proper procedure and conduct in court and the way to get along congenially with fellow officers, other departments, the press and the general public.

No modern business enterprise would attempt to direct its employees without some form of supervision; yet there are still many traffic divisions in which there is little, if any, check for determining the extent to which orders are obeyed and policies carried out. Every squad of traffic officers needs a field supervisor to show them how their work should be done, to see that it is done according to instructions, and to see that there is sufficient work planned ahead to keep them busy. In

the office, it is vitally necessary to keep track of each officer's assignments, to see that they are attended to.

But officers cannot do their best work unless they are in a favorable frame of mind. The cultivation of good morale is perhaps the most difficult task that any chief faces. Success can come only when a chief is able to demonstrate leadership and unflinching fairness. In addition, there should be allotted to each man sufficient work to keep his mind constantly occupied. Ambitious men want to get ahead, and unless consideration is given to them they may leave the department or spread dissatisfaction. Increase of pay, special details on difficult cases or problems, promotions and recommendations to executive positions in other traffic departments are means of keeping this class of men happy in their work. Politics, always a disturbing element, should not be permitted to interfere in the appointments or the work of a traffic division. Every reasonable means should be taken to make the work interesting to the men.

Modern business methods of managing personnel must be adopted to make traffic officers efficient transportation specialists. Such methods will be selected not just because they are used in the best-managed businesses, but because they are right and will yield great benefits to the traffic officer, his department and the public.

New Track Construction Methods Prove Speedy and Economical

BY R. H. DALGLEISH
*Chief Engineer Capital Traction Company,
Washington, D. C.*

BY THE adoption of a new track design in which bent steel ties are imbedded in monolithic pre-mixed concrete, delivered by truck and thoroughly tamped and vibrated by special power-driven apparatus, the Capital Traction Company, Washington, D. C., has found it possible to lay track faster and more economically than in the past. In May, 1929, the company rebuilt 3,104 ft. of surface track by the new method. This track has now been in operation about eight months, during which time the temperature has ranged from zero to 100 deg. F. A few lateral cracks have developed, but there is no indication of any separation between the rails and concrete. The results obtained are considered so satisfactory that it has been decided to standardize on this method of construction until some better one is developed.

The design consisted of 103-lb., A.E.R.E.A. 7-in. grooved girder rail installed on a new type International twin steel tie, thermit welded joints, and monolithic concrete pavement from below the ties to grade. The original track had been constructed on a 9-in. crushed stone bed, which was not materially disturbed in the reconstruction work. The new type steel tie, which is bent upward in the center, reduces the amount of excavation necessary as compared with that of the straight tie by about 5 cu.yd. per 100 ft. of track, with of course a corresponding decrease in the amount of concrete. At the same time it provides for an ample depth of concrete in the center of the track to take care of vehicular traffic.

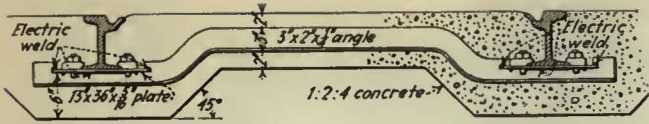
Ties and rails were installed in the usual way, but as the concrete was placed the entire track structure was vibrated by means of a machine with two pneumatic hammers, mounted on a piece of channel iron in such a position that each hammer operated over a block of steel placed approximately over the lip of the rail. A thorough machine tamping of the concrete was followed



This type of track structure installed by the Capital Traction Company on Connecticut Avenue has now been adopted as standard

immediately by the vibration treatment. The result was extremely interesting. Air bubbles could be seen along the rails for a distance of 5 ft. ahead of the machine, clearly proving that what had been previously considered well-tamped concrete, in reality contained many voids. The vibrating machine was moved along the rails about a foot at a time. In addition to a very dense concrete with a perfect bond around rails and ties, the treatment also brought the mortar to the surface so that a good finish was obtained easily.

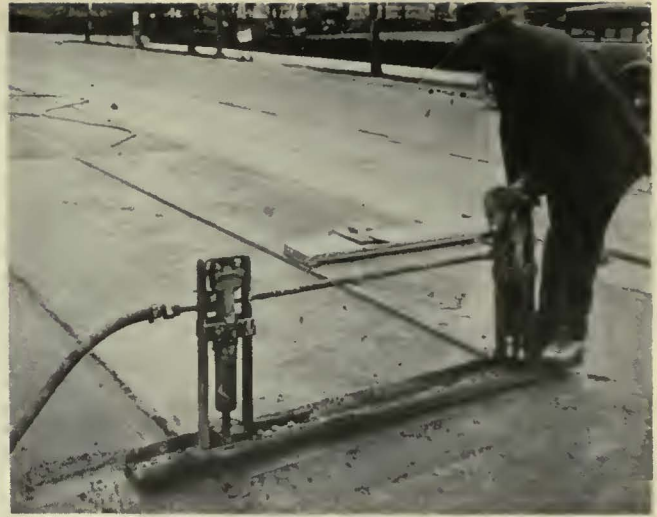
It might be thought that the cost of excavation neces-



Use of bent steel ties imbedded in monolithic concrete has proved economical and satisfactory

sary to install the bent ties would more than offset the saving in concrete, but this did not prove to be the case. After the renewal of the old track, practically all that was necessary was the trenching under the rails, and by means of a template made of 2-in. lumber the trenches were easily kept to the proper size and grade.

The concrete for this job was furnished by a contractor in mixer trucks, the materials subject to inspection by the railway at his plant and on the job. The use of truck-mixed concrete also serves to keep the street clear of mixers, aggregate piles, water lines, etc., resulting in lower overhead costs and fewer accidents. Mixing of the concrete was done on the job under the supervision of the concrete foreman, who carefully regulated the amount of water used. It is interesting to note that the actual amount of concrete necessary to complete the job was found to be about 7 per cent more than the estimated amount, as based upon past experience in the use of straight ties. This excess probably was due to the settlement and compacting of the concrete by the vibration treatment.



Vibration treatment compacted the concrete to an extent that required the use of 7 per cent more material than had been estimated

The total cost of this new type of construction was \$8.976 per foot of single track. Labor (6.258 hours) cost \$2.712, hauling cost \$0.219, and material cost \$6.045 per foot of single track. These figures include the cost of installing and removing temporary crossovers, hire for switchmen and signalmen, etc.

Baltimore Substation Wins Architectural Distinction



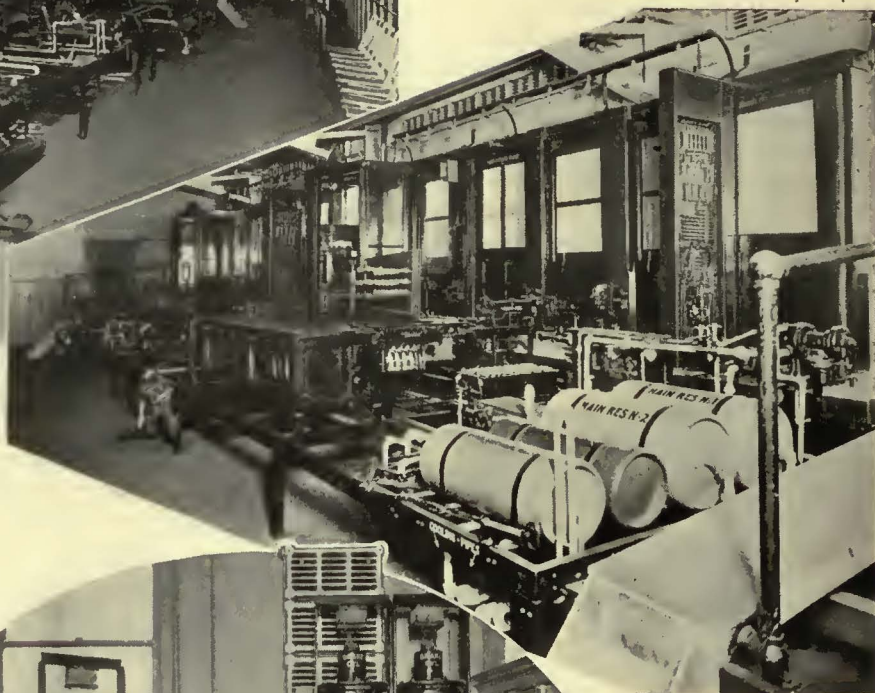
Newest electric railway substation of the United Railways of Baltimore, with two 2,000-kw. converters. It is semi-automatic and was completely in service for the first time in December, 1929. It is early American in style and is the design of Addison F. Worthington, a Baltimore architect. The

building was one of three that received honorable mention in the *Baltimore Evening Sun's* annual competition for the most artistically designed business or industrial building erected during the year. It is located in Hamilton, a suburb in the northeastern section of Baltimore.

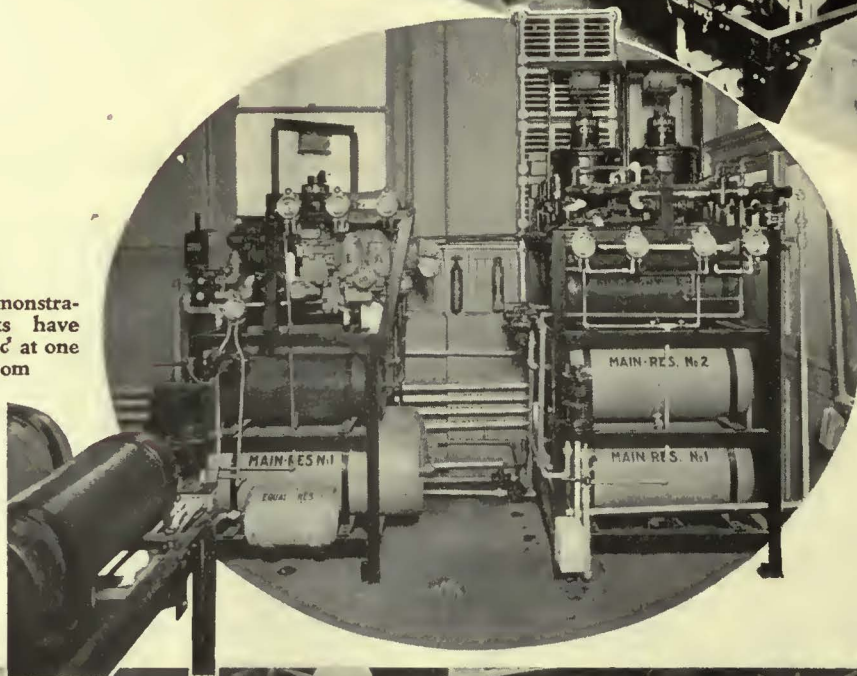


Interior of new instruction school in trainmen's room of 69th Street Terminal

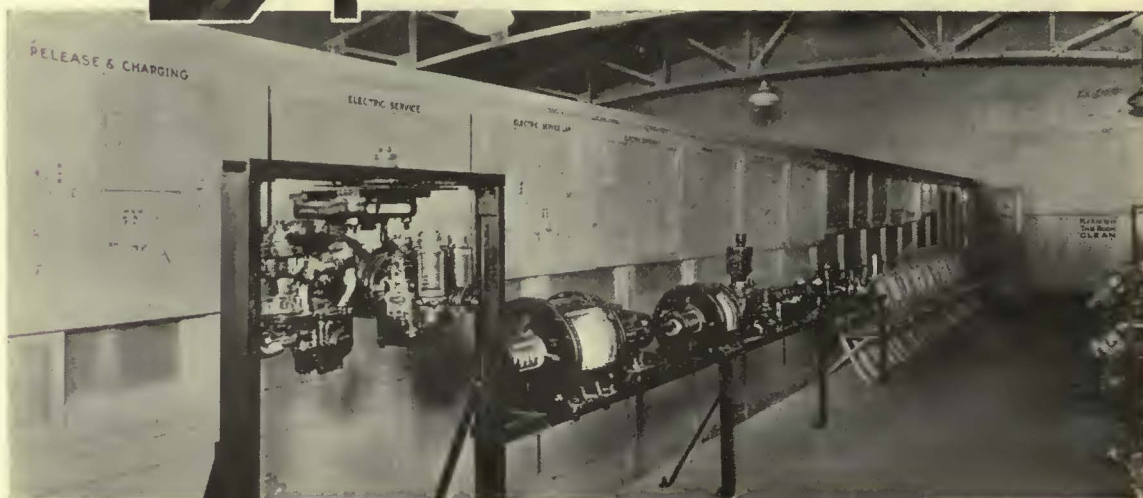
Set up of equipment used on one type of rapid transit car

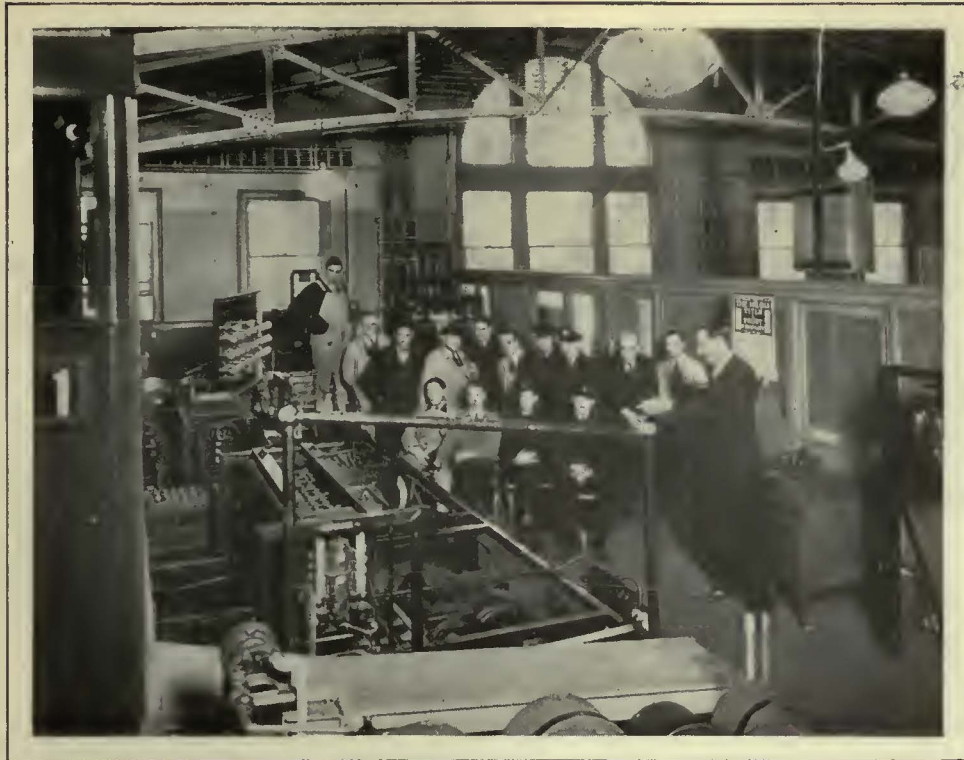


Brake demonstration racks have been placed at one end of room



Walls are covered with charts and diagrams. Cut sections of individual pieces of equipment are mounted near by





Philadelphia Rapid Transit trainmen receiving instruction in mechanical and electrical details of subway-elevated equipment

Operating Delays Reduced

By Practical Instruction Methods

By

L. E. Summers

Assistant Operating Manager Elevated Division
Philadelphia Rapid Transit Company

DELAY of a few seconds to a rapid transit train leaving one end of the line may easily develop into a ten- or fifteen-minute "drag" before the completion of the trip, and a delay of a few minutes duration as the result of a slight mechanical failure is almost a calamity. It is of the utmost importance, therefore, that each train, when leaving the yards, be as mechanically fit as possible. The track, signal and electrical equipment must be in almost perfect condition, and the employees must be intelligent, alert and resourceful. As a means of developing these characteristics in its subway-elevated men, PRT recently completed the installation of a new instruction department, located in the trainmen's room at the 69th Street terminal of the Market-Frankford subway-elevated line.

The instruction policy of the management, in so far as its subway-elevated employees are concerned, is based upon the premise that practically any mechanical or elec-

P.R.T. management has found that almost all mechanical or electrical defects which develop in service can be temporarily corrected by trainmen if they are thoroughly familiar with details of equipment

trical defect in rolling stock which may develop in service can be temporarily corrected by the motorman or conductor, provided he has been carefully and thoroughly instructed in the details of the equipment he is operating. Although yard inspections and repairs are conducted with the greatest care, it is not possible to eliminate entirely the possibility of a defect's occurring when the



Manipulation of this switchboard by the instructor will produce symptoms of any ordinary type of electrical or mechanical failure

train is in service. In order to minimize the difficulties arising from such occurrences, PRT has carried its instruction program into great detail.

The trainmen's room was decided upon as the ideal location for the instruction department, since this room serves as the gathering place for motormen and conductors with spare moments before, after or between runs. There is no doubt that convenience has played an important part in arousing the interest of the trainmen in their school.



Motorman receiving individual instruction in brake valve operation

In the instruction room are sections of three full-sized subway-elevated cars, placed end to end and stripped of ceiling, seats and floor. One side of each car has been removed for purposes of clear vision. In all other respects they are similar to those in regular service. Rolling stock on the Market-Frankford line consists of two types of cars: the older Market Street cars, equipped with GE Type M Control and Westinghouse electric-pneumatic AMRE brake equipment, and the more modern Frankford cars equipped with Westinghouse Type ABF control and Westinghouse electric-pneumatic AMUE brake equipment. Thus two types of instruction equipment are required.

A completely equipped motorman's cab has been set up. Doors, door controls, and every air pipe, coil, valve, wire, etc., in and under the body of the cars are exposed to view. Air pipes and reservoirs are painted in different color schemes for purposes of easy identification and explanation. Two brake demonstration racks stand side by side at the end of the room. A complete set of movable couplers is provided to show the trainmen how to couple and uncouple cars. Walls are covered with charts, diagrams and blackboards.

An especially interesting feature is a device whereby the instructor, through manipulation of a switchboard located in the far corner of the room, can produce in the equipment of the cars the external symptoms of practically any failure likely to occur in actual operation. The student, standing in the cab, is assigned the task of determining and temporarily correcting the difficulty. Every defect which might occur in actual operation is manufactured for him, and he is rigidly instructed in the procedure necessary to locate it promptly and overcome it temporarily.

When a new employee enters the elevated division as a student conductor, he is first placed in actual operating service for at least three days under the guidance of an experienced conductor who teaches him how to manipulate the doors and instructs him in the various duties he is expected to perform. He is then assigned to the instruction room where the details of equipment are thoroughly explained to him until he is familiar with all phases of his duties. Finally, he is required to take an examination, part oral and part by demonstration, which he must pass with an average of at least 85 per cent.

While working as a conductor the new employee continues to study in the school for advancement to a motorman's position. After having served as a conductor for six months, he enrolls for the motorman's in-

struction course. This course consists of one week's actual study of train operation under a motorman instructor. The student is next given instruction on cars in the yard, followed by an examination which he must pass with an average of 85 per cent. The minimum time in which a student may complete this course is eleven days. Instruction is given individually or in groups as occasion and convenience dictate, and by demonstration or lectures.

A chart on which are shown types of signals in use, with their various positions and indications, is used in the examination and instruction of trainmen. No explanations are given on the chart, and the student is required to read correctly each indication as he would see it in actual operation.

Thus, in the instruction room, a trainman not only learns how to operate a car, as does the average motorist receiving instructions for an operator's license examination, but, he learns his lessons to the extent and in the sense in which an auto mechanic learns his. Trainmen can see what occurs when the controller handle is moved to the extreme right, when the brakes are applied and released, or what takes place when either of the two fails to function properly. The degree of thoroughness to which this instruction procedure extends may be illustrated by the fact that the examination for motormen contains a list of 83 questions and that for conductors 35 questions. Not only must new men survive this rigid examination, but all employees must go through the instruction school once a year for brushing up purposes, submitting to the same examination as the beginners, and passing it with the same average. Should either a new or an old man fail to pass the quiz, he is required to attend the instruction school until he has satisfactorily shown his ability to master the questions.

Should a motorman or conductor be the cause of an unnecessarily long delay or, as a result of continual checks by members of the instruction department, be found deficient in any point of operation, he is sent to the school for additional instruction. Not until he has clearly demonstrated his ability to prevent a recurrence is he allowed to return to his train. These checks cover the manner in which a motorman stops and starts his train, with particular attention to smoothness and rapidity; the degree of accuracy he maintains in his running time schedules; his response to unexpected signal tests; the conductor's carefulness and time in opening and closing doors and the behavior of both members of the crew in an emergency.

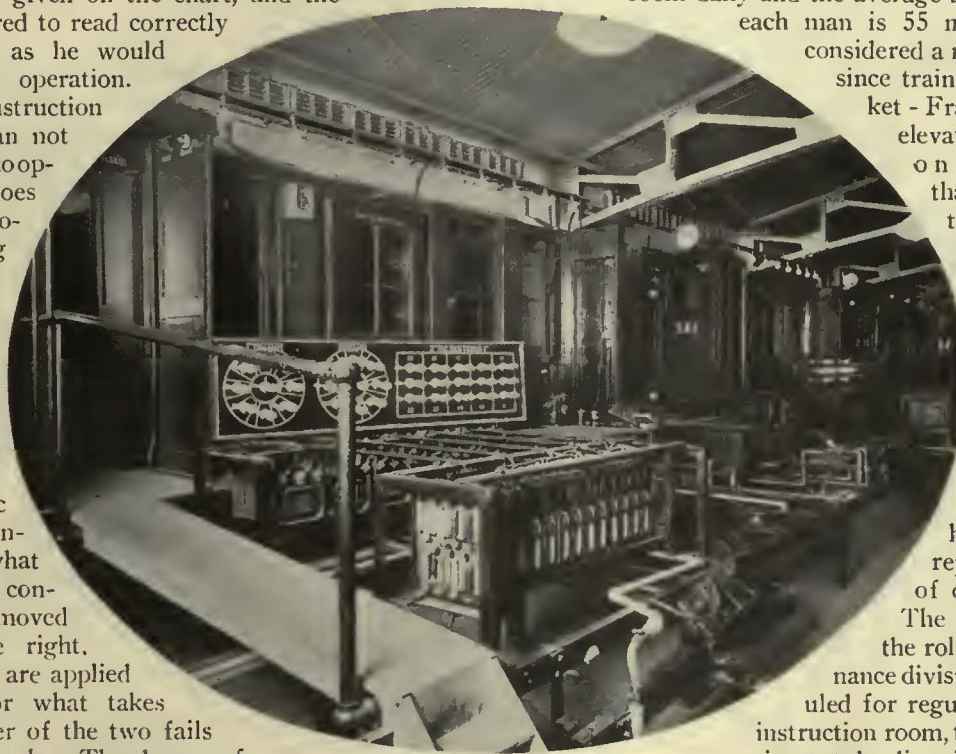
Records of trainmen's voluntary attendance at the

school give the best indication of the interest displayed. The instruction room, open seven days and two evenings each week, has supplanted the outside trainmen's room as the gathering place for motormen and conductors during their spare moments. Idle chatter and newspaper reading have given way to pipe line and valve discussions, as men bend over the car "chassis" and pump question after question at the instructors. One motorman, for instance, made 23 visits to the instruction room in the course of a month, spending 61 hours and 35 minutes among the reservoirs and brake demonstration racks.

An average of twenty trainmen visit the room daily and the average time consumed by each man is 55 minutes. This is considered a remarkable record since trainmen on the Market-Frankford subway-elevated line number only slightly more than 170. Superintendent of Instruction Harry Keely and Instructor Frank James, who are largely responsible for the organizing and development of the department, are frequently hard pressed for replies to a barrage of questions.

The employees of the rolling stock maintenance division are also scheduled for regular periods in the instruction room, the demonstrating equipment lending itself in an ideal manner to study by these men responsible for inspection and maintenance of rolling stock. Their course of instruction naturally varies in some degree from that of trainmen. Classes for electrical and air brake maintenance employees are conducted each year from September to June. Air brake employees, in the first part of their course, are instructed in the theory of the equipment in the instruction room, each man being required through use of charts and actual equipment to follow the course of the air through all the pipes, reservoirs, valves, etc., explaining the functions of each, and "shooting trouble." These men are then taken into the shop and required to demonstrate their ability in determining and correcting defects in the various valves in the complete brake equipment. Employees working on electrical car equipment are divided into a primary and an advanced group. Their classes are held one night a week in the school, for instruction in the theory of all electrical equipment and for training in locating and repairing trouble.

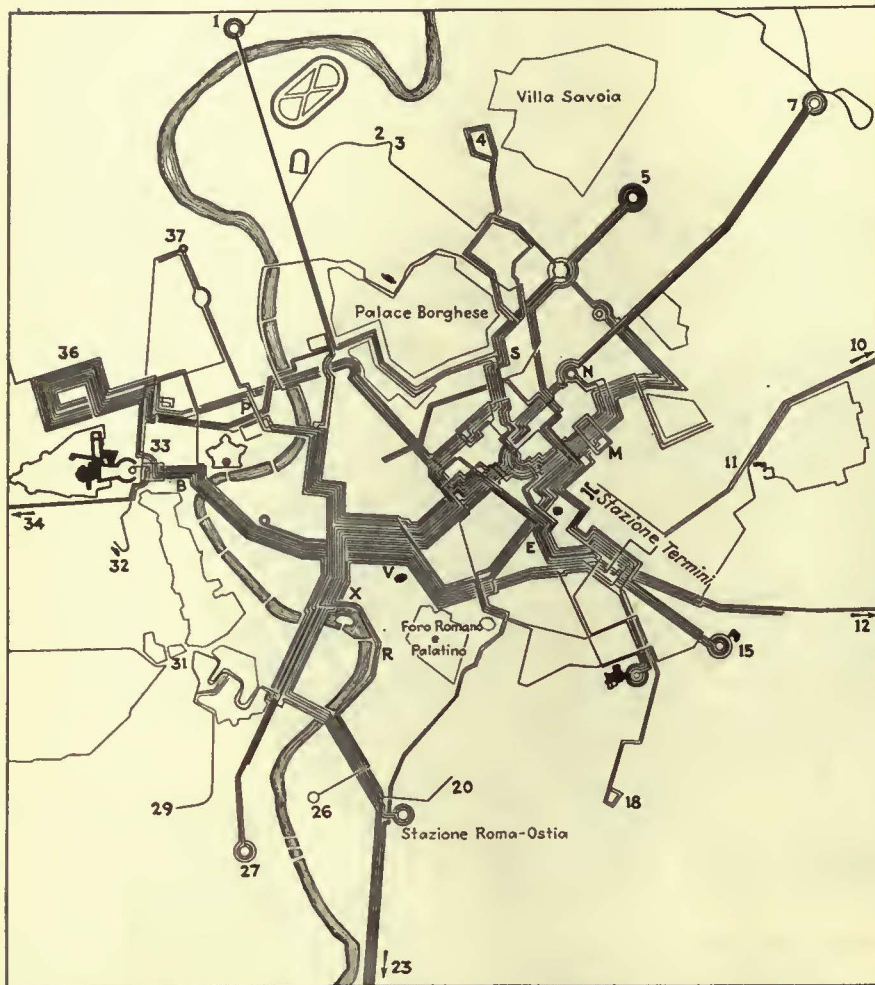
The remarkable interest on the part of all subway-elevated men has been directly reflected in the delay sheets. Long delays on the line have been considerably reduced as a result of these instruction methods. Experience has proved already that the voluntary visits which the men pay to their school make the routine examinations practically nothing more than a matter of form.



Lights indicating motor and resistor circuits show students where current goes as the various contactors are actuated by controller and sequence switches

Rome Readjusts Car

and Bus



Street cars replaced by buses in business district. Unified transfer system between car and bus. New belt line affords direct communication among districts outside of business area. Special work necessitated by new system installed in four hours. Sightseeing with buses encouraged by municipal transportation system

give a series of through routes from the outer portions of the city to the principal railroad stations, going underneath a portion of the central district.

For a number of years the transportation lines in the city have been controlled by the municipality through an organization known as the "Azienda delle Tranvie e Autobus del Governatorato di Roma" (A.T.A.G.), but no previous plan has been worked out for a co-ordination of the various means of transportation. The original companies which preceded the municipal consolidation were privately owned and had been consolidated into one system, following the conversion from horse to electric traction many years ago. In 1911 the municipality organized and constructed a small rail-

When street cars went through the business district before lines were taken out of this area, traffic was slowed down considerably due to congestion in narrow streets

- | | | |
|-----------------------|---------------------|----------------------------|
| 1—Piazza Ponte Milvio | 20—Santa Saba | B—Ponte Vittorio Emmanuele |
| 2, 3—Acqua Acetosa | 23—San Paolo | C—Piazza Colonna |
| 4—Villa Vellicelli | 26—Testaccio | E—Santa Maria Maggiore |
| 5—Piazza Verbano | 27—Staz. Trastevere | F—Piazza Flaminio |
| 7—Monte Sacro | 29—Monte Verde | M—Piazza Indipendenza |
| 9—Q. Itala | 31—San Pancrazio | N—Piazza Pia |
| 10—Portonaccio | 32—San Pietro | P—Piazza Cavour |
| 11—Campo Verano | 33—Vatican City | R—Piazza Bocca Verita |
| 12—Acqua Bullicante | 34—Porte Braschl | S—Piazza Flume |
| 15—Santa Croce | 35—Santa Maria Plea | T—Piazza Garibaldi |
| 16—G. Applo | 36—Trionfale | V—Ponte Venezia |
| 18—Porta Latina | 37—Piazza Banskizza | |

COMPLETE rerouting of all street car and bus routes in the city of Rome was effected Jan. 1 of this year. The outstanding feature of the rerouting is that all street cars are excluded from the center of the city, service in that district being given by a number of short bus routes. A double-track street railway belt line surrounds this area and serves as a means of transfer from one route to another. Car and bus routes radiate from this belt line to the outer districts of the city, and several outlying crosstown lines make transfer between the outer districts of the city possible without entering the center.

The plan has been worked out in anticipation of the construction of a subway system which probably will be completed within the next six or eight years, and will

way system, principally in the outlying districts. Due to the war this system was only slightly expanded, but in 1920 when most of the franchises of the private companies expired, the lines were taken over by the city. The inefficiency of the old transportation system then became apparent and in 1923 plans were begun to rehabilitate and consolidate the lines. These plans have been modified several times and have culminated in the system which has just begun operation.

The main purpose of the consolidation of the street car systems was to facilitate transportation among the various sections of the city and to eliminate transferring from one system to another. While the service was adequate for the city as it existed before the war, growth in the last ten years has been so rapid that it has been

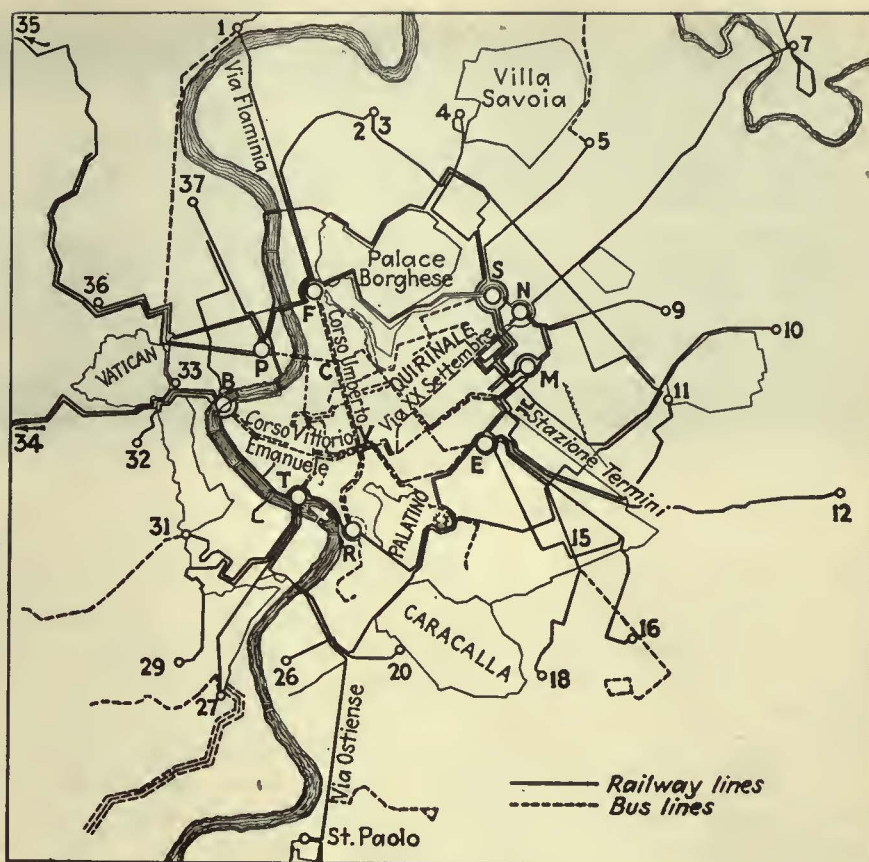
Routes

By

Eng. MARIO ASCARELLI

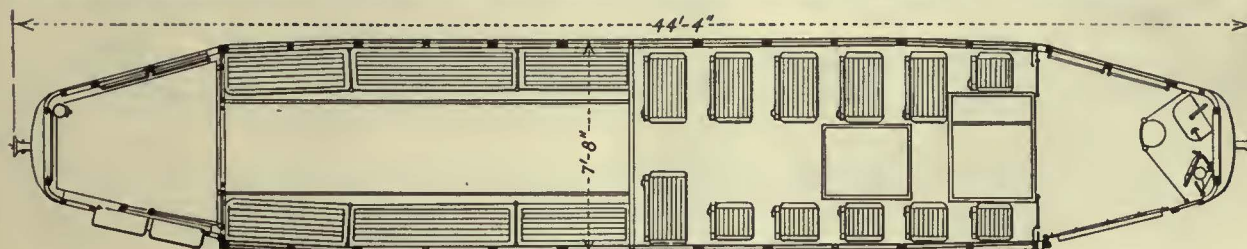
Manager of Track and Shops
Azienda Tranvie e Autobus del Governatorato
Rome, Italy

necessary to expand the transportation facilities greatly to keep pace with it. An accompanying table shows the increase in rolling stock and track of the surface lines between Jan. 1, 1920, and Dec. 31, 1929. Rome is one of the few large cities in Europe in which a considerable amount of construction has been undertaken since the war. The total amount spent was approximately 2,000,000,000 lire (\$10,600,000). With the construction of 37 miles of track the surface lines have been extended proportionately more rapidly than the population has increased. This expansion program



When surface cars were taken out of business districts, better service was rendered on radial and belt lines

- | | | |
|-----------------------|----------------------|---------------------------|
| 1—Piazza Ponte Milvio | 20—Santa Saba | B—Ponte Vittorio Emanuele |
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| 4—Villa Velicelli | 26—Testaccio | E—Santa Maria Maggiore |
| 5—Piazza Verbano | 27—Staz. Trastevere | F—Piazza Flaminio |
| 7—Monte Sacro | 29—Monte Verde | M—Piazza Indipendenza |
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| 18—Porta Latina | 37—Piazza Bainsizza | |



New street cars of the MRF type have eighteen seats facing forward and twenty seats arranged longitudinally



Train service consists of one motor car and trailer, both of the one-truck type. Cars in these trains have all seats facing forward

was carried out mainly to open up outlying districts where little or no transportation was available.

It was in the center of the city that the greatest difficulty was experienced. No additional street car traffic was possible, as the streets were too narrow to accommodate more vehicles than already were passing through. Rome, like other cities constructed during ancient and medieval times, has crooked, narrow streets, and circuitous routes have to be followed to reach the various districts. Despite the growing difficulties caused by traffic congestion, however, transportation facilities have increased about 10 per cent per year. The congestion finally became so serious that it was necessary to find some sort of relief to prevent a complete breakdown of the system.

As a means of meeting this situation, it was believed that much relief could be obtained if street cars were replaced by buses in the center of the city after the independent companies were taken over. This plan was first put in operation in 1927, when a few privately owned lines were acquired, but the resulting improvement was insufficient to solve the increasingly serious traffic problem. Certain street car lines had been eliminated or re-

placed by buses as an experiment, however, and the results indicated that this plan would bring some relief from congestion. Accordingly, between 1927 and 1929, plans were made for a replacement of all street cars by buses in the central business district of Rome. The entire transportation system has been laid out with the idea that ultimately passengers will be carried from outlying districts to the business centers by means of a subway in addition to other means of public transportation.

SIMPLIFICATION OF ROUTING BASIS OF NEW PLAN

In making the traffic survey for the new routes, it was found that the principal difficulties of the old street car service could be summarized under three heads:

1. There were too many long lines with infrequent headways, irregular service, and indirect routes.
2. Many lines went through the congested district.
3. All cars covered the entire line and were heavily loaded in the center and almost empty at the ends.

Accordingly, in order to provide uniform means of traffic circulation in the central zone after it definitely had been decided to remove street cars from the congested

Table I—Growth of Rome Street Car System 1920-1929

	Jan. 1 1920	Dec. 31 1929
Miles of track.....	93	130
Number of track switches.....	400	831
Substation capacity, a. c. kw.....	4,400	10,100
Substation output, kw.-hr. per annum.....	20,000,000	60,000,000
Carhouse capacity, cars.....	550	1,000
Cars available.....	500	900

Table II—Comparison of Old and New Services in Rome

	Before Rerouting	After Rerouting
Miles of street with track.....	72.5	58.9
Miles of double track.....	130.2	104.8
Miles of street car route.....	217	...
Miles of bus route.....	67	...
Total miles of line.....	284	154
Number of street car routes.....	51	33
Number of bus routes.....	26	23
Number of car trains.....	486	400
Number of buses.....	91	200
Seats and standing room offered per hour per mile of route.....	125,000	123,100
Car-miles run per annum.....	24,200,000	...
Bus-miles run per annum.....	2,800,000	...
Total vehicle-miles per annum.....	27,000,000	26,040,000
Schedule speed of street cars, m. p. h.....	6.63	7.44
Schedule speed of buses, m. p. h.....	6.51	7.13
Energy used per annum by street cars, kw.-hr.....	55,900,000	...
Gasoline used per annum by buses, gallons.....	841,500	...



Electric buses are of the battery type and accommodate 18 seated passengers and 22 standees

Table III—Classification of Routes

	Before Rerouting	After Rerouting
Total number of tramway routes.....	51	33
Inner belt routes (two directions).....	...	2
Radial lines.....	...	26
Outlying crosstown lines.....	...	3
Suburban lines.....	...	2
Total number of bus routes.....	26	23
Through routes in center.....	...	8
Lines entering center.....	...	3
Suburban lines.....	...	11
Radial line.....	...	1
Average length of route, street cars.....	4.3	2.5
Average length of route, buses.....	1.5	2.0

Table IV—Types of Street Cars of the Rome System

Type	MRS	CT-135	Trailer
Number.....	100	370	200
Class.....	Double truck	Single truck	Single truck
Number of windows.....	7	8	8
Two motors per car; horsepower of each.....	56	58	...
Brakes.....	Air	...	...
Over-all length.....	44 ft. 4 in.	...	...
Seating capacity.....	38	24	24
Standing room.....	47	21	25

Table V—Buses of the Rome System

Type	34-S.P.A. Short	34-S.P.A. Long	Lancia Omicron Long	Lancia Omicron Short	Electric Battery VAI
Number.....	70	70	160	160	40
Length.....	28 ft. 4 in.	30 ft. 10 in.	32 ft.	28 ft. 4 in.	21 ft. 4 in.
Width.....	7 ft. 6 in.	7 ft. 6 in.	7 ft. 9 1/2 in.	7 ft. 9 1/2 in.	7 ft. 6 in.
Seating capacity.....	16	24	26	18	18
Standing room.....	30	24	24	28	22
Weight, pound.....	13,860	14,960	15,620	13,640	14,740
Rating, horsepower.....	45	45	97	97	16



A Lancia bus of the Omicron long type affords seats to 26 passengers and room for 24 standees, and has a rear exit

business area a study was made to determine where the limits of the district could be established. Due to the topography of the city, which is hilly, and the various old monuments and buildings which can not be removed as being the last samples of a bygone civilization, traffic is slowed down considerably, and it was found impossible to give the exact limits of the district. Accordingly, a zone was laid out which includes practically all of the old Papal City excepting the Borghi and the Trastevere areas and also a part of the newer city. A double-track belt line encircles this district.

From the belt line the street railway routes radiate outward, having their outer terminals in the suburban districts. These lines enter the belt line at nine points where passengers can transfer directly to the latter or to the buses which run into the business district.

From these intersections the series of bus lines pass through the central points of Rome including the Piazza Colonna and Piazza Venezia.

In order to facilitate direct communication among outer portions of the city, it was planned to have a second

or outer belt line, but since there appeared to be no need for carrying this line completely around Rome, only parts of the proposed route have been put in operation in the northwest, northeast and southeast sections. In addition to the surface lines which go out to the suburban districts, several bus lines serving these territories have been retained. They will be replaced by electric service, however, as soon as the traffic increases to such an extent that the change is desirable from the viewpoint of efficient transportation.

The fare system has been changed because the number of direct through lines was reduced and also to encourage passengers not going to the center of the city to take routes which do not enter the congested area. It was also desired to increase the riding habit of the public on the street cars because the latter have lower operating costs than buses.

Under the new arrangement the city can be considered as divided into three zones. First, the central zone in which service is given by buses only; second, the outer zone, which is served by street cars exclusively, and third, the suburban district which is served by street cars



While new trackwork was installed service was continued uninterrupted over old track

and independent bus lines. There are some exceptions to this arrangement, where bus lines are being run beyond the inner belt line and reach points in the intermediate zone. This was done because no track construction was possible in the districts thus served, which needed transportation facilities badly.

Transfer between street cars and buses is available to those passengers traveling from the center of the city to the outer districts and back. Separation of the routes improves service for both cars and buses, and reduces traffic delays in the center of the city. Another advantage is the flexibility of the routes, which can now be changed easily without disrupting the entire system.

The layout of the service is shown in an accompanying diagram. The belt line connects the nine principal transfer points indicated by letters. The bus lines are indicated by the initials of the two terminals they connect. The cars of each route carry the same number as the one given for the outer terminal.

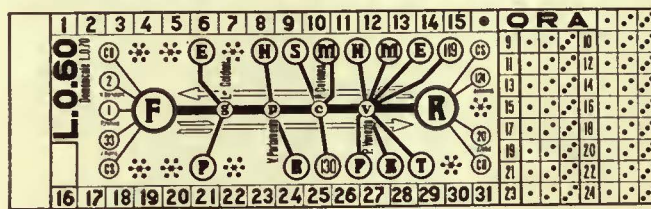
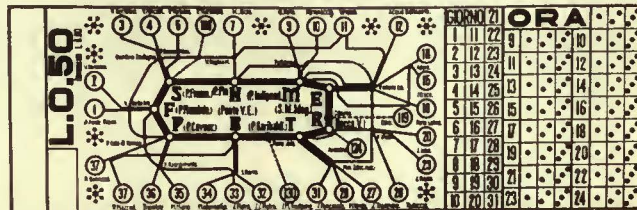
In the new fare system, it was considered desirable to discourage the transit through the central business area of passengers who did not have to stop there. Although the fare system was wholly revised it was considered

necessary to retain the existing minimum fare. New tickets were issued permitting transferring for a continuous trip from one point in the city to another, but the ride was limited to one direction only. The number of transfers permitted depends entirely on the routes of the lines involved. Two transfers are necessary when the entire trip is made by a street car and one transfer when the trip is made by buses or by a combination of bus and car. The time limit of the tickets has been set at one hour as it was considered that this was time enough to reach any transfer point during one continuous trip. In order to keep within this time limitation, three types of transfers have been provided. The first is priced at 50 centesimi (2.6 cents). This is the old rate and the ticket is good on street cars only. The second type of ticket is priced at 60 centesimi (3.2 cents) and is good on buses or a combination of car and bus. The third ticket, costing 1 lira (5.26 cents), is good for travel from one side of the city to the other. The car ticket shows the various routes and transfer points. The ring in the center represents the belt line surrounding the central business district. The bus ticket is similar except that it covers a specific route between two of the transfer points. These two tickets, with an extra fare for entering the business area, will keep practically all the passengers in the outer district who do not have to transact business in the restricted zone. The 1-lira ticket is good on all cars or buses for the date and hour punched, and has been in use for several years. Corresponding to each of the three types of tickets there is a season ticket, which

eliminates paying a fare each time bus or car is boarded.

A comparison of the old and new services is given in an accompanying table. It will be noted that there has been a material reduction in the number of miles of street in which car tracks are used. While the old rails have not been torn up so far they have not been used since the beginning of the year. There has been a reduction of 25.4 miles of double track. Due to the elimination of duplication of routing, the total miles of car routes and bus lines has been reduced from 284 to 154, a saving of 130 miles of route. The principal saving is

in the reduction of the number of car lines from 51 to 33, although the bus routes have been decreased from 26 to 23 only at the same time. The number of car trains has been greatly reduced, while the number of buses in service now is more than double. The total number of vehicle-miles per annum, however, has been decreased slightly, while it will be noted that the scheduled speed both for cars and buses has been increased a little over 10 per cent. The number of car and bus routes and the number of lines serving the various territories are given in an accompanying table. A list of the various types of rolling stock operated by the transportation system is



Three different types of transfers are issued for the unified service

given in tables 4 and 5, which list the cars and buses separately. In addition a few cars and trailers of an old type are being retired.

About two months of construction work was necessary and a new electric substation was installed. This new substation transforms 8,000 volts a.c. to 600 volts d.c. through mercury vapor converters with a rating of 350 kw. built by the Societa Officine Subalpine of Turin. Cables for the distribution system have been installed to an aggregate length of 6.2 miles. It also is expected that a new substation with a rating of 2,000 kw. will soon have to be installed in the Piazza San Pietro.

The most important track construction was the installation of special work at the newly created transfer points, while some sections of nearby lines were connected in order to complete the inner belt line. Apart from these changes comparatively little new track work had to be laid. The change-over of the old system to the new was effected in four hours on New Year's Day, from 1 to 5 a.m. The new installation comprised 12.2 miles of track, 106 switches and 362 frogs.

In order to familiarize the public with the new routing, signs were placed at all transfer points and at various locations along the line, where sections of maps and tables were also available.

EDITOR'S NOTE—Since the new system was put in operation Jan. 1 of this year, there has not been sufficient time to determine whether the results are satisfactory. Conflicting reports have been received at this office. Definite information is awaited with interest.

Electric Coaches Installed on New Orleans Shuttle Line

By

W. S. Rainville, Jr.

Equipment Engineer New Orleans Public Service, Inc.
New Orleans, La.



Equipped with two 50-hp. motors each, the New Orleans electric coaches are capable of attaining a maximum speed of approximately 25 m.p.h. and maintaining a schedule speed of more than 10 m.p.h. This view shows the Twin Coach on Carrollton Avenue.

CONFRONTED recently with the necessity for rebuilding track on a short, unprofitable street car line, the New Orleans Public Service, Inc., decided to substitute trackless trolleys. The management felt that the substitution would not only put the line on a paying basis, but would also afford an opportunity of becoming familiar with this type of vehicle and studying its possibilities for use on other railway lines with light patronage.

Two electric coaches were purchased, one from the Twin Coach Corporation and the other from the American Car & Foundry Motors Company. On Dec. 2, 1929, the two 28-passenger, single-truck cars were withdrawn and the new vehicles placed in service. The

Two vehicles being operated on short feeder route through residential and business districts. Company seeking experience to determine possibilities of this type of vehicle on other light traffic routes

route, which is 1.214 miles in length, parallels the Carrollton Avenue street car line in the western part of the city for two blocks, extends northwest on Oak Street to a district called Southport, goes two blocks northeast on Eagle Street and then back to Carrollton

Avenue by way of Willow Street. With the exception of two short blocks the entire route is over paved streets. On Willow Street, where the street car tracks were eliminated, new paving was laid in 1929.

The cash fare of 7 cents charged on the electric coach line is the same as on the company's car lines. Transfers are accepted from other car lines and are issued free. A headway of eight minutes is maintained on the route by one coach, the other coach serving as a standby.

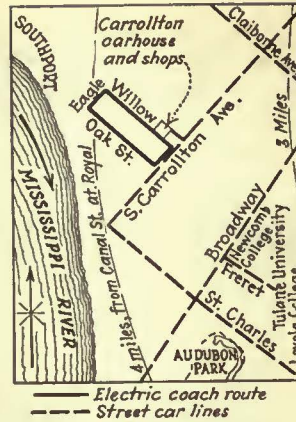
The total daily mileage of the operation is approximately 175 miles, the coaches being alternated in morning and afternoon service. Although this operation is a small one, it is sufficient to familiarize the distribution, transportation and rolling stock and shop departments with electric coach operation.

Overhead construction for the route is of the simplest type, the same materials being used as in the street railway overhead system on tangent and curve construction. Both positive and negative trolley wires are of No. 00 copper, spaced 24 in. apart. Positive feeder taps are essentially the same as those used for the previous street car operation. The negative trolley wire is grounded to existing rails on near-by streets at several points. There are no spring frogs, special insulated crossings, wyes or loops in the installation.

ELECTRIC COACHES ARE OF LATEST DESIGN

The electric coach supplied by the American Car & Foundry Motors Company is constructed entirely of steel along the lines of the A.C.F. "Metropolitan" bus. It weighs 19,000 lb. and is mounted on 38x9-in. tires, with duals on the rear. An entrance door is located behind the front wheels, and a treadle-operated exit door is at the rear. National Pneumatic electro-pneumatic door control, with full brake interlock safety features, is provided. The coach has a nominal seating capacity of 40 passengers, but this was cut to 38 by removing two seats from over the forward wheel housing at the right.

This vehicle is powered with two General Electric 298, 50-hp., automotive type railway motors. They are supported rigidly from the body framing and are connected to a Timken inverted worm-drive axle by two single section 3½-in. tubular drive shafts provided with two all-metal joints per shaft. A gear reduction of 11 to 1 is used. The motors are controlled by the General Electric type PCM foot-operated automatic control, without dynamic braking. The main motor controller is located in a compartment beneath the rear cross-seat. This unit can be reached for inspection by removing the rear seat or an exterior panel in the rear of the coach. The controller includes three contactors for making the series and parallel connections of the motors, two line breakers for the positive and negative trolley leads, an overload relay, an accelerating relay and two motor cut-out switches. The resistor portion of the controller is operated by a camshaft driven by an air engine. Nine series and nine parallel steps are provided, so that the current changes on each step are small.



Relation of the new electric coach line in New Orleans to the Carrollton Avenue and other near-by street car lines. Although only 1.214 miles in length, the route goes through a business district and a well-built-up residential section

Operation of the main controller is by a master controller mounted in the floor of the coach at the operator's position. The pedal on this controller has four operating positions—off, switching or holding, full series running and full parallel running. Movement of the pedal is about 3 in. and only a very slight pressure is required.

The motor reverser, which is mounted horizontally at the driver's left, is of the hand-operated drum type, with three positions—forward, off and reverse. This device is so arranged that the control circuit is complete only when the handle is in one of its operating positions. Motor resistors are

of the edgewise-wound ribbon type. Current collection equipment includes 4-in. Kalamazoo wheels, the Ohio Brass Company's swivel harp, 18-ft. 6-in. poles, the O.B. Form 5 trolley base and O.B. trolley retrievers.

Brakes on the A.C.F. electric coach are of the four-wheel air-operated type. The CP-25, 10-cu.ft. air compressor, MJ compressor governor and VB-2 foot-operated brake valve are of General Electric manufacture. The air brakes are supplemented by a mechanical hand brake, consisting of a 16-in. disk brake mounted on each propeller shaft. This is controlled by a lever to the right of the operator.

The electric coach manufactured by the Twin Coach Corporation is constructed of Plymetl and steel, weighing 16,500 lb. completely equipped. It is mounted on single 40x10½-in. medium pressure tires in the front and 38x7-in. high pressure duals on the rear. The entrance door on this coach is located ahead of the front wheels. The circulating load feature is provided by a treadle-operated exit door in the rear. This coach has a seating capacity of 42 passengers and is equipped with bellows type seats, upholstered in rattan.

Two Westinghouse No. 1426, 50-hp. automotive type



The trolley poles of the coaches are 18 ft. 6 in. in length, permitting a wide range of travel on the streets. In this view the A.C.F. coach has swerved far from the line of the overhead to receive passengers at the curb

railway motors are used. These are connected to the special Timken-Twin Coach underslung dual worm axle by two 2-in. diameter shafts with Cleveland Universal joints at each end. The motors are controlled by Westinghouse type VA foot-operated automatic control, without dynamic braking. All main control apparatus is located under the rear seat, accessible from both the interior and exterior of the coach.

The motor control equipment is operated by a master controller mounted beneath the floor and connected to a pedal at the operator's position. The motion of the controller drum operates the main circuit switches directly and also changes the setting of the limit relay. In this manner the rate of acceleration is governed by the distance to which the accelerator pedal is depressed.

To the left of the operator is mounted the motor reverser, of the hand-operated type and with four positions—off, forward, reverse and emergency braking. The main resistors are of the edgewise-wound Type M, and are mounted beneath the floor. Current collection equipment is the same as that for the other coach.

Brakes for the Twin Coach are of the four-wheel air-operated type, using ABS Brakebloks and gun iron

drums. The DH-10 air compressor, R-414 compressor governor and B-4 brake valve were furnished by the Westinghouse Traction Brake Company. The air brakes are supplemented by an emergency brake consisting of two drum-type driveshaft brakes actuated by a hand lever.

Both vehicles are housed in the Carrollton Station and are inspected and maintained by the regular carhouse crew. Because of the simplicity of the electric coach no skilled mechanics are required. It is the intention of the company, however, to place pitmen in the bus garage for short periods so that they may become familiar with the rear axle, steering mechanism and other distinctly automotive parts. Inspection and greasing have been placed on a 2,000-mile basis. One of the street car inspection pits has been adapted to the use of the electric coach by installing guard rails along its sides. A negative wire is suspended in the carhouse, parallel to the street car positive wire, for bringing coaches over the pit. A portable outfit for inflating the tires was constructed a DH-16 railway air compressor and two air reservoirs being used. With the exception of a Manley Hi-lift jack, no special equipment has been purchased for the maintenance of the new vehicles.

Road Builders Recommend Relief of Paving Obligations

VARIOUS recommendations directly affecting electric railways were embodied in the report of the sub-committee on street railway tracks and paving of the American Road Builders Association presented at Atlantic City, Jan. 13-18. The conclusions in the report were based on a survey covering some 4,000 miles of track. Particularly significant is the recommendation that the cost of paving in the track area should not be borne by the railway alone.

Girder rails varying in height from 6 in. to 9 in. are used in 80 per cent of the cities, according to the report. The 7-in. girder rail is the most popular. Girder rails have many advantages over the T-rails from the paving engineers' standpoint. The low joints which were so common in old track construction, with their resulting breaking of the pavement, seem to be overcome through the general use of a combination bolted and welded joint.

The use of wood ties predominates, according to the committee. A few cities use both wood and steel ties, and some use only steel ties. The majority of the users of wood ties use broken stone or slag ballast from 6 in. to 8 in. thick, while the users of the steel tie use 8 to 12 in. of concrete, or from 6 to 8 in. of broken slag or stone for ballast under the ties. Concrete is quite generally placed between and over the ties to support the paving surface or for the surface itself. Brick, stone blocks and concrete are used in about equal amounts for the paving within the track area. Some asphalt paving is used, especially along the outside of the rails. The roadway pavement wearing surface is carried to the outside rail in about 60 per cent of the surveyed cities.

The survey disclosed the fact that in 70 per cent of the cities, the city engineer determines the type of track construction, and in 75 per cent of the cities he supervises the track and paving construction, although 80 per cent of the railway companies pay for the paving in the track area. In only two instances does the city maintain, at its own expense, the pavement in the track area, and

in only two other instances does it do the maintenance at the expense of the railway company.

After pointing out the heavy expense involved in construction of a suitable pavement, the committee suggests that the public, as represented by the taxpayer or the users of motor vehicles, should contribute toward the paving of that portion of the roadway within the track area. Under this arrangement, it is intimated that a more substantial type of track construction might be provided, which would be of advantage to both the users of the railway cars and bus and automobile riders.

In the construction of street railway tracks, in city streets, the committee believes the most permanent type possible to be obtained should be adopted. The sub-base for track construction should be thoroughly drained and unyielding. Special effort should be made to produce such a result, and, if necessary, a sub-base of concrete should be provided, in order to secure a firm base. In cities where an 8-in. concrete slab has been used as a sub-base, the results have demonstrated its superiority over other types. Experience seems to indicate that, from the standpoint of paving surface, the best results can be obtained by the use of grooved rails, although some cities seem to be getting fairly good results with T-rails. With grooved rails it is much easier to secure and maintain a satisfactory paving surface, since the pavement can be finished flush with the steel. With such construction the cross movement of traffic is greatly facilitated.

It is felt that the use of brick and stone block paving in the car tracks gives more satisfactory results than other types. The block type, with asphalt filler, is easily removed when repairs to the rails are necessary, and absorbs more readily the vibration set up by car traffic.

Whatever the design of the track construction and its paving, it seems logical to make a complete separation between the roadway pavement and the track structure. Each should be capable of supporting the maximum traffic loads independent of the other.



Comfortable travel through sections of scenic beauty is provided by many intercity bus routes

De Luxe Bus

Finds Wide Application

WITHIN the past five years, no phase of surface transportation has expanded more rapidly than has that of intercity bus operation. At the beginning of 1930, a total of approximately 29,500 buses, most of which are of the de luxe type, were regularly rendering such service over 300,000 miles of route. Nearly 33,000 miles of intercity lines, both intrastate and interstate, were added in 1929. The electric railways of the country have been among leaders in this development. They have extended their fields of operation with new intercity lines, in many instances through territories already served by inter-urban cars, have absorbed competing independent bus companies and co-ordinated the selective services, and have stabilized intercity operation in a number of instances by the abandonment of long unprofitable inter-urban car lines and the substitution of more direct, fast and comfortable bus routes.

Important factors contributing to the progress in intercity bus transportation are the luxurious features of the buses themselves, the growth of convenient terminals, the extension of improved highways, the co-ordination of interline services and the extensive merchandising of nation-wide travel by bus. The great majority of buses now being used on long distance routes are comparable in comfort and convenience to

the private automobile, with adequate facilities for handling small baggage. They travel on the newest and most direct highways between two cities, beginning and ending the trip at comfortable, centrally located terminals where connections with other lines are made with minimum delay.

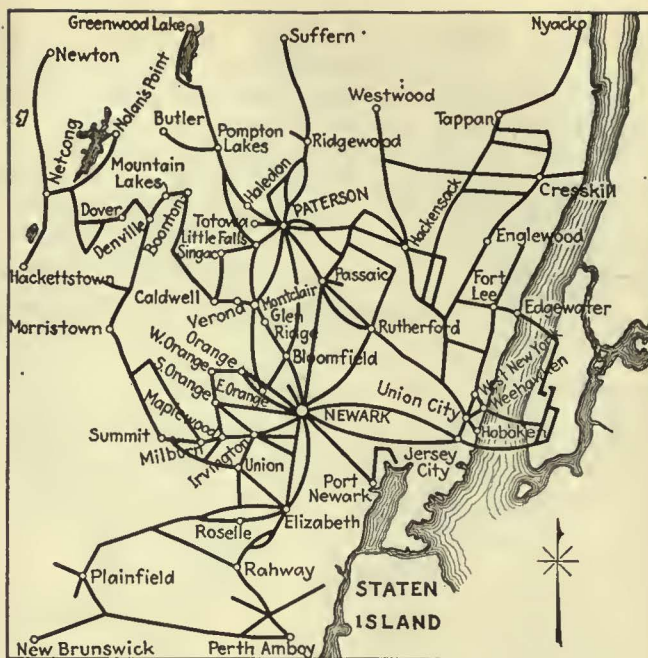
Co-ordination of interline services and the joint use of terminals by two or more companies, serving different territories, are the two factors which are doing most to stabilize intercity bus operation. Facilities on a network of routes covering the whole country are gradually assuming the form of one large unified system. Not only is this true of the routes themselves, but it is true from operating, economic and maintenance standpoints. Interline agreements and service arrangements between the Pennsylvania-Ohio System and the number of through bus lines operating in the state of Ohio form a notable example of this co-ordination. Practically every bus line from the West or Middle West, traveling to the Eastern states, passes through the state of Ohio and into the town of Youngstown. In Youngstown a central terminal is maintained and operated by the Pennsylvania-Ohio System to which all these through lines report for the interchange of passengers. Mechanics and service equipment are located at this terminal for the use of any line.

Unification of intercity systems and construction of improved highways have been major factors in the steady expansion of long-distance bus operations. Increasing popularity of this type of service promises continued growth

Efforts to secure as many direct interline connections and as many interline joint tariffs as possible with other lines in this district have resulted in suitable arrangements with practically every operation which would be of value to the system in the state. A rather unusual agreement for the sanding of hills during icy weather has been made. The through lines purchase the sand or ashes, the Pennsylvania-Ohio System transports it to important points along the routes and the highway department of the state does the actual spreading.

A comparative study of intercity de luxe bus operations as carried on by three companies will be found in an accompanying table, showing details of fare structures, territories served and equipment used.

Public Service Co-ordinated Transport, operating throughout the entire state of New Jersey, is the largest bus operating organization in the United States. In a consideration of intercity bus operation a great majority of the local lines could properly be put under that classification, as their services join more than 300 municipalities in the state. Two accompanying maps show interstate and intercity bus routes in north



Public Service operates an extensive intercity service in northern New Jersey

outbound and in the evening only one or two used it inbound. At first the public was slow to use this service, but patronage grew until there was sufficient demand for this high-class service all day, so four new buses were purchased. These coaches, designed for 29 passengers, were equipped to seat only 25, giving 36 in. between seats. This made it possible for a person sitting next to the window to leave without disturbing the person on the aisle. Provision for two card tables was made at the rear, where the last two seats over the wheel casing face backwards.

The route was extended a mile further to Avondale Heights, a new and highly restricted subdivision, and an all-day schedule was put into effect on Nov. 25, 1929. The new schedule called for a half-hour headway between 7:30 a.m. and 8:30 p.m. and hourly service from 8:30 p.m. to midnight. The fare on this line was established at 25 cents, with five tickets for a dollar, no transfers and no standing passengers.

During the latter part of December, patronage grew during the rush hour until certain trips had to be double-headed. This continued after the holidays, so on Jan. 13, 1929, a new schedule, giving fifteen-minute service during the evening and morning rush hours between Government Square and old Avondale, and 30-minute service to the Heights, was placed in effect. Service outbound after 6:30 p.m. and inbound after 7 p.m. was discontinued, as experience had shown it was not patronized. The line competes with an independent bus operation at a 10-cent fare and a street car line over about 60 per cent of the route, and with a 10-cent bus line belonging to the Cincinnati Railway over about 85 per cent of the route. Despite all this the receipts are gradually increasing and it is estimated that the line will be on a paying basis within a period of twelve months.

The Twin City Rapid Transit Company, Minneapolis, Minn., furnishes without competition all the local bus transportation in Minneapolis, St. Paul and suburban territory. De luxe bus service is operated on eight lines of which the total route mileage is approximately

in Interurban Service

By

J. R. Stauffer

Assistant Editor
Electric Railway Journal

and south New Jersey. The operations extend into New York from northern New Jersey and into Philadelphia from southern New Jersey.

Interstate service is operated to New York City from Nyack, New York, Elizabeth, Montclair, the Oranges, Maplewood, Paterson and Passaic, all in New Jersey. From Philadelphia, Pa., lines operate to New Jersey to Vineland, Millville, Bridgeton, Pennsgrove and Billingsport. A number of de luxe intercity bus operations are carried on wholly within the state operating from the cities of Newark, Paterson, Camden and New Brunswick.

The Cincinnati Street Railway has operated for the past two years a de luxe motor coach line during the morning and evening rush hours between Government Square and Avondale, a one-way distance of 4.6 miles. One bus was used in this service, making two trips inbound in the morning and three trips outbound in the evening. In the morning no one patronized the line

97 miles. Three of these lines, with a total of 52 miles, operate into suburban districts. All serve territories having street car lines, thus giving the district preferential service but over different routes.

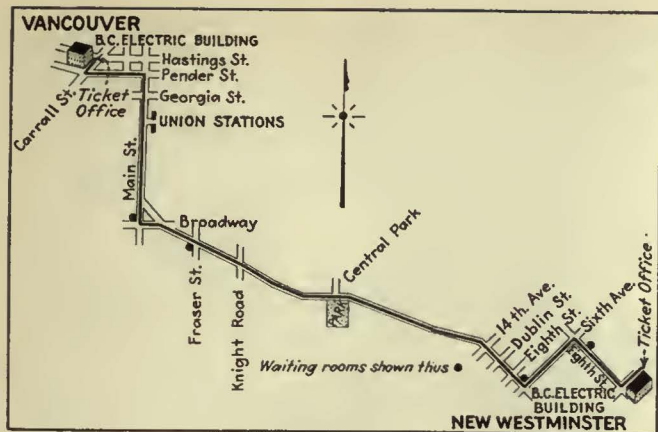
The fare on two of the three intercity de luxe bus lines, operating between the loops of Minneapolis and St. Paul, a distance of about 10 miles, is 25 cents for the entire distance, or any portion thereof. On the

third intercity line tokens are sold at the rate of two for 25 cents, one token being accepted as fare within the limits of either Minneapolis or St. Paul, the intercity ride requiring two tokens. A passenger making the Minneapolis-St. Paul trip by street car is required to pay a fare in each city, the present fare being 10 cents cash, or a token sold at the rate of six for 45 cents.

The speed on the intercity buses between the loops

Comparative Study of Twenty-Six Intercity De Luxe Bus Routes

Company	Line	Mileage One Way	Equipment Used	Cities or Towns on Route	Other Transportation on Route	Through Fare	Fare on Competing Lines	Headways	Speed M.p.h.	Speed of Competing Lines M.p.h.	Standees
The Connecticut Co. New Haven, Conn.	New Haven to Bridgeport	18	Type Y Yellow Coaches	West Haven Milford Stratford	Interurban car circuitous route	60c.	5 tokens @8½c. cash 50c.	1 hour	17.68	13.22	Yes
	Bridgeport to East Derby	14.5	Type Z Yellow Coaches	Stratford Shelton Derby	Bus service replaced interurban car	4 tokens @8½c. cash 40c.		1 hour	19.49		Yes
	Meriden to Middletown	9	Type Z Yellow Coaches		Bus service replaced interurban car	30c.		1 hour	22.44		Yes
	Meriden to Wallingford	7	Macks	Yalesville	Bus service replaced interurban car	3 tokens @8½c. cash 30c.		30 min.	14.74		Yes
	Meriden to New Britain via Berlin	11	Whites	Berlin	Interurban car via Plainfield & Southampton	4 tokens @8½c. cash 40c.	4 tokens @8½c. cash 40c.	40 min.	16.78	16.09	Yes
	Hartford to New Britain	11.5	Yellow Coaches	West Hartford	Interurban car	3 tokens @8½c. cash 30c.	2 tokens @8½c. cash 20c.	1 hour	13.92	14.56	Yes
	Norwich to Putnam	35	Yellow Coaches		Bus service replaced interurban car	11 tokens @8½c. cash 1.10		1 hour	19.67		Yes
Pennsylvania-Ohio Public Service Corp. Pennsylvania-Ohio Coach Lines Youngstown, O.	Youngstown to Cleveland	70	6 cyl. Whites 35 passenger	Girard, O. Niles, O. Warren, O. Chagrin Falls, O.	Erie R.R. Penna R.R.	\$2.00	Erie \$2.39 Penna \$2.39	2 hours	24.0	42.0	No
	Youngstown to Akron	50	Fageols 33 passenger	No incorporated communities	Erie R.R. B. & O. R.R.	\$1.60	Erie \$1.92 B. & O. \$1.92	2 hours	26.0	40.0	No
	Newcastle, Pa. to Cleveland via Youngstown	90	6 cyl. Whites 35 passenger	Youngstown, O. Girard, O. Niles, O. Warren, O. Chagrin Falls, O.	Interurban car Youngstown to Newcastle	\$2.50	Youngstown Newcastle 45c. Bus 75c.	4 hours	24.0	40.0	No
	Youngstown to Greenville, Pa.	30	Fageols 26 passenger	Hubbard, O. Sharon, Pa.	Erie R.R.	\$1.00	\$1.10	3 hours	24.0	30.0	No
	Youngstown to Warren	15	4 cyl. Whites 25 passenger	Girard, O. Niles, O.	Interurban car Erie R.R.	50c.	Cash 40c. Tickets 30c. R.R. .51	1 hour	20.0	13.0 30.0	No
	Sharon to Newcastle, Pa.	24	Fageols 26 passenger	Farrell, Pa. W. Middlesex, Pa. New Wilmington	Penna R.R.	\$1.00	.72	2 hours	24.0	36.0	No
	Youngstown to Sharon	15	Fageols 26 passenger	Hubbard, O.	Interurban car Erie R.R.	50c.	40c. .51	1 hour	25.0	35.0	No
Northern Ohio Power & Light Co. Cleveland-Akron-Canton Bus Co. Akron, Ohio	4 Routes from Akron to Cleveland via (a) State Road (b) Hudson Road (c) Brecksville Road (d) Broadview Road	38.9 41.6 37.85 35.45	Twin Coaches Whites Yellow Coaches	Northfield Hudson Brecksville W. Richfield	Interurban cars and railroad	\$1.40	Interurban car \$1.00 Railroad \$1.34	30 min. to 1 hour alternating between 4 routes			Yes
	Akron to Canton	24.40	Twin Coaches	Uniontown Greentown N. Canton	None	70c.	No comp.	30 min. to 1 hour			Yes
	Canton to Wooster	33.90	Whites	Massilon Dalton East Union	None	\$1.00	No comp.	Every 2 hours			Yes
	Canton to Dennison	40.10	Yellow Coaches	N. Industry Dover New Philadelphia	None	\$1.50	No comp.	Every 2 hours			Yes
	Massillon to Dennison	37.9	Yellow Coaches	Justus Dover New Philadelphia	None	\$1.35	No comp.	Every 2 hours			Yes
	Akron to Wadsworth	17.1	Whites	Copley Loyal Oak	Interurban car	35c.	35c.	5 trips daily			Yes
	Akron to Edinburg	26.5	Various types	Stow Kent Ravenna	Interurban car	75c.	Comp. only to Ravenna	2 trips daily			Yes
	Dover to New Philadelphia	3.0	Various types	Dover New Philadelphia	None	15c.	No comp.	Every 15 min.			Yes
	Harberton to Wadsworth	7.36	Various types	Norton Center	Interurban car	15c.	14c.	City schedule			Yes



British Columbia Rapid Transit Company has co-ordinated a de luxe bus line with an existing car line

of Minneapolis and St. Paul ranges from 13 to 14 m.p.h. On the three suburban de luxe lines the speed ranges from 14 to 18 m.p.h. These speeds compare with 9 m.p.h. on city and feeder service, and 10 m.p.h. on street cars.

The British Columbia Rapid Transit Company, Vancouver, B. C., a subsidiary of the British Columbia Electric Railway, operates two services, de luxe motor coach and express. The lines are confined to districts in which the railway operates and terminate at the same depots, thus co-ordinating and getting the maximum use from railway and coach equipment at peak hours.

Between Vancouver and New Westminster, the railway operates over three routes, the de luxe motor coaches paralleling one of these. A one-way fare of 25 cents is charged on the coaches, and a round-trip fare of 35 cents on the rail cars. There is about five minutes difference in the running time. The interurban cars operate a twenty-minute service, and the motor coach schedule calls for a fifteen-minute headway throughout most of the day. A second de luxe bus operation parallels an interurban railway line into the Fraser Valley for a distance of about 72 miles. The motor coach fares on this route are based on the rate of 4 cents per mile, whereas the railway fares are based on 3 cents per mile, excepting at points where there is competition, when the competitive rate is met.

Eleven Fageols, two Whites, and one Federal sedan type bus, all fully equipped for de luxe service, are used on these lines. The motor coach service has proved satisfactory, and, from a financial standpoint, though the coaches take away some revenue from the railway, as a whole the earnings have increased. This is due to the fact that the motor coaches have eliminated strong competition by jitneys which gave a door-to-door service.

Intercity bus service carried on by the Connecticut Company in the state of Connecticut consists of seven lines. In the case of three of these lines, namely, Bridgeport-New Haven, Hartford-New Britain and Meriden-New Britain, the terminals are also connected



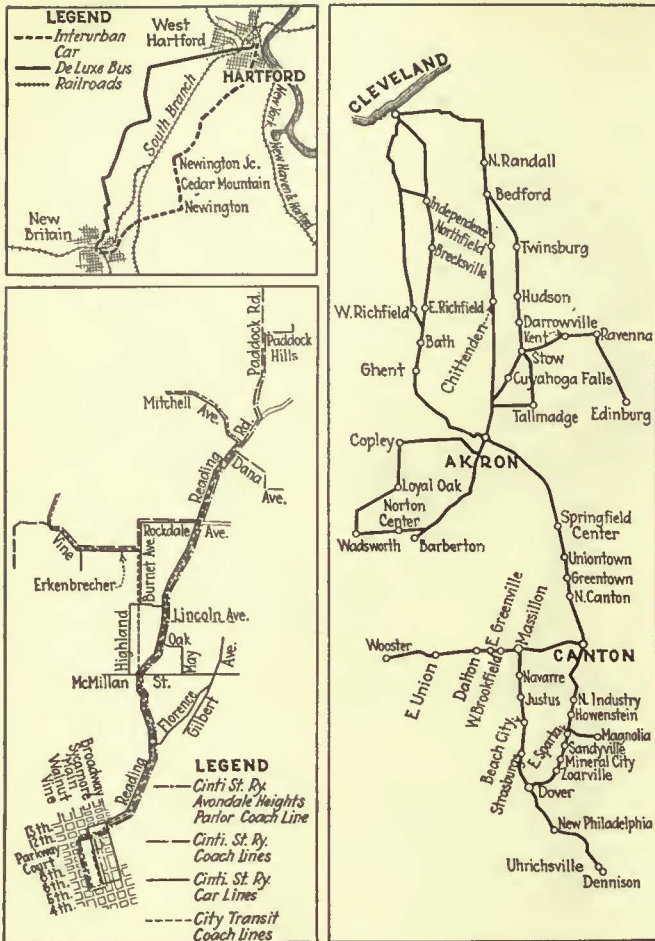
Bus operations by Public Service have steadily expanded in southern New Jersey

by interurban car lines. The lines between Meriden and Wallingford, Norwich and Putnam, Meriden and Middletown, and Bridgeport and East Derby replaced trolley operations. In most instances where interurban cars and buses are operated, the cars cover a different or more circuitous route than the buses.

Between Bridgeport and New Haven a comparison of the two services is as follows: On the interurban cars the fare is 50 cents cash or five tokens at 8½ cents apiece; the running time is one hour and 45 minutes and a headway of 30 minutes is maintained. On the bus, the through fare is 60 cents cash and no local business is done in the city where street cars are paralleled, excepting between Stratford and Bridgeport, where the minimum fare is 20 cents as compared with 8½ cents

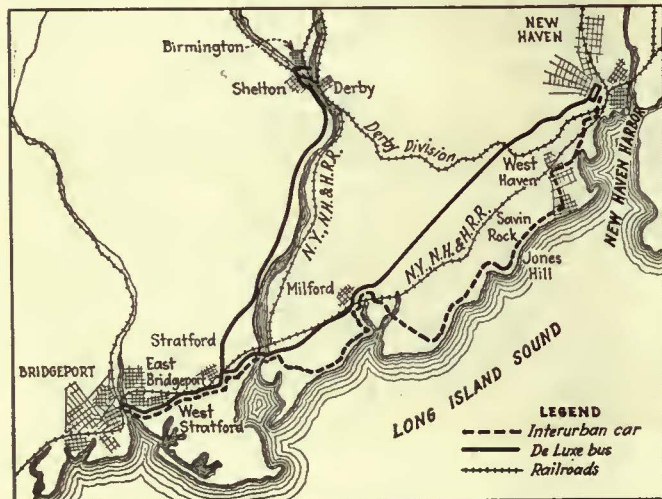


Union bus terminal is located in heart of Youngstown and serves all through lines



Upper left—Connecticut Company has car and bus services between Hartford and New Britain. Lower left—Superior type bus service is being operated by Cincinnati Street Railway to Avondale Heights. Right—Northern Ohio Power & Light Company operates de luxe buses over 383 miles of route

on the cars. The running time is 58 minutes and the headway is hourly. Between Meriden and New Britain, by way of Plainville and Southington, the interurban car runs on a headway of 30 minutes and consumes one hour and 17 minutes to make the trip, while the bus operates on a 40-minute headway with a running time of 38 minutes. The fare on these lines is the same, four tokens at 8½ cents each or four cash fares at 10 cents each. On the Hartford-New Britain line,



De luxe buses use more direct route than interurban cars between New Haven and Bridgeport, Conn.

the interurban car operates on a 30-minute headway during the non-rush hour and on a 20-minute headway during the rush hour, the fare being two tokens at 8½ cents each or 20 cents cash, while on the bus, the fare is 25 cents using tokens or 30 cents cash. The running time is 55 minutes and the headway is hourly.

The Pennsylvania-Ohio Public Service Corporation and its subsidiary, the Pennsylvania-Ohio Coach Lines, began de luxe intercity bus service on Aug. 1, 1922, between Youngstown and Warren, Ohio. This original installation of bus service was made to eliminate a hack competition which was drawing patrons from the interurban car service between the two cities. On Nov. 1, 1922, a second line was inaugurated between Youngstown and Sharon, Pa. The hack competition continued to grow and additional bus lines were put in throughout the territory but by the latter part of 1923 the competition was eliminated and it was only necessary for the company to purchase two out of ten lines.

At the present time the Pennsylvania-Ohio Coach Lines operates over seven routes and operates bus terminals in Cleveland, Youngstown and Warren, Ohio. Two lines, namely, between Youngstown and Warren, and Youngstown and Sharon, Pa., are in direct competition with interurban car service. For the other lines competition consists of railroad service. On the New Castle, Pa., to Cleveland, Ohio, route, which operates by way of Youngstown, interurban car service is run between Youngstown and New Castle.

Co-ordination between the lines operated by the Pennsylvania-Ohio System and all connecting long distance lines operating through the state has been one of the chief factors in the success of the operation carried on by this company. After extensive preliminary work they have been successful in adjusting the schedules of their lines and connecting lines so that proper connections can be made at various points throughout the state. Likewise they have co-ordinated the sale of tickets or commutation mileage for use on other lines as well as their own. Commutation mileage books having a travel value of \$10 and which are sold for \$7.50 are handled by the Great Lakes Stages, Southwestern Bus Company and the Penn-Ohio Coach Lines, and are honored on practically all lines in the community. The mileage is redeemed by the company at the reduced value. Through-ticket sales for long hauls have been comparatively easy, but it has taken a great amount of effort to secure the many interline connections and joint tariffs with short routes which are now in existence. The results are indicated by the fact that one interline connection alone, involving a stub end of 15 miles, owned by an independent operator, gives and accepts from the Penn-Ohio lines as many as 1,400 passengers per month, all of whom are interline passengers. Another service rendered by this company is its direct connection between points on its line and the boats of the Detroit & Cleveland Navigation Company. Certain buses are run right to the docks of the company and through tickets will be sold for through travel by bus and boat in the near future.

Extensive merchandising of the various services by intercity buses is carried on by the company. Schedules are mailed by a group of bus operators to about 3,000 residents of the state. In addition to this approximately 1,200 schedules are mailed by the company to a group of people who previously received them and answered a letter asking about the effect of mailing such time-tables and information. These 1,200 people requested

that the schedules continue to arrive at their homes. Every hotel in the state and most of the department stores receive schedules in bulk which are placed at convenient points for the use of their patrons.

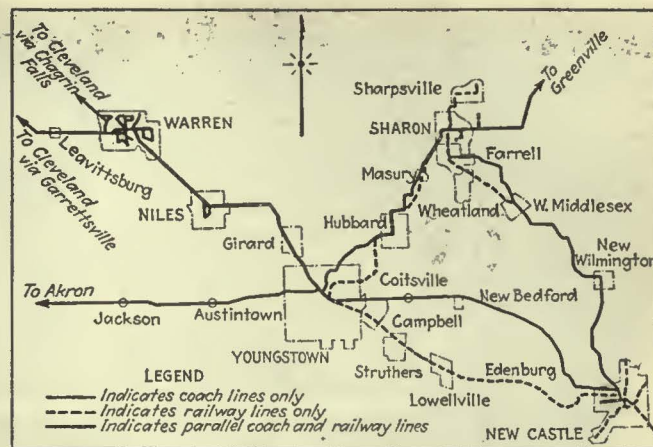
De luxe bus operation carried on by the Pacific Electric Railway, Los Angeles, Cal., consists of one line, known as the Beverly Boulevard Motor Coach Line, running between Los Angeles and Castellammare, a distance of approximately 23.8 miles. Castellammare is located on the coast, north of Santa Monica. This line serves a territory in which there is no other motor coach or street car service with the exception of a portion of the route within Los Angeles that is served by local lines of the Los Angeles Railway and Los Angeles Motor Coach Company. The line is restricted, however, in handling local traffic within the territory served by these other companies.

Twenty-nine passenger Yellow coaches equipped with individual, comfortably upholstered seats, are used on this route. Standees are not carried. Fares on the Beverly Boulevard Motor Coach Lines are on a slightly higher basis than on the other bus lines. The average one-way fare is 2.7 cents per mile, compared with the regular one-way fare basis of 2 cents per mile within a radius of 12½ miles from Los Angeles, and 2½ cents per mile outside of that zone.

The greater portion of the losses in the operation of this de luxe route is subsidized by a group of real estate operators owning extensive properties along the line. The line was established at their instance, approximately two years ago.

Through its subsidiary, the Shore Line Motor Coach Company, the Chicago, South Shore & South Bend Railroad operates a de luxe bus service between Chicago, Ill., and Benton Harbor, Mich., which is separated into two divisions, Chicago, Ill., to Michigan City, Ind., and Michigan City, Ind., to Benton Harbor, Mich. This route is 105 miles in length. The service operates through a territory just east of the Indiana-Illinois state line, which is also served with local street car operations. The equipment used on the de luxe service is of the parlor car type, whereas in the local operations the ordinary street car type of coach is used. The average speed on the de luxe route is 23¼ miles per hour, whereas on the local routes the average is only 10 miles per hour.

The Eastern Massachusetts Street Railway, Boston, Mass., operates one de luxe bus line, between Taunton, Mass., and Providence, R. I., the operation in Providence being joint with the United Electric Railways Company of that city. These cities are also connected by an interurban car line. The fare on the interurban line is 60 cents one way or \$1 for a round trip, while on the bus line the fare is 50 cents one way and 75 cents a round trip. The reduced rate on the buses is due to very severe jitney competition. The bus line does local business over its route, but the fare and territory served tend to make it an express operation.



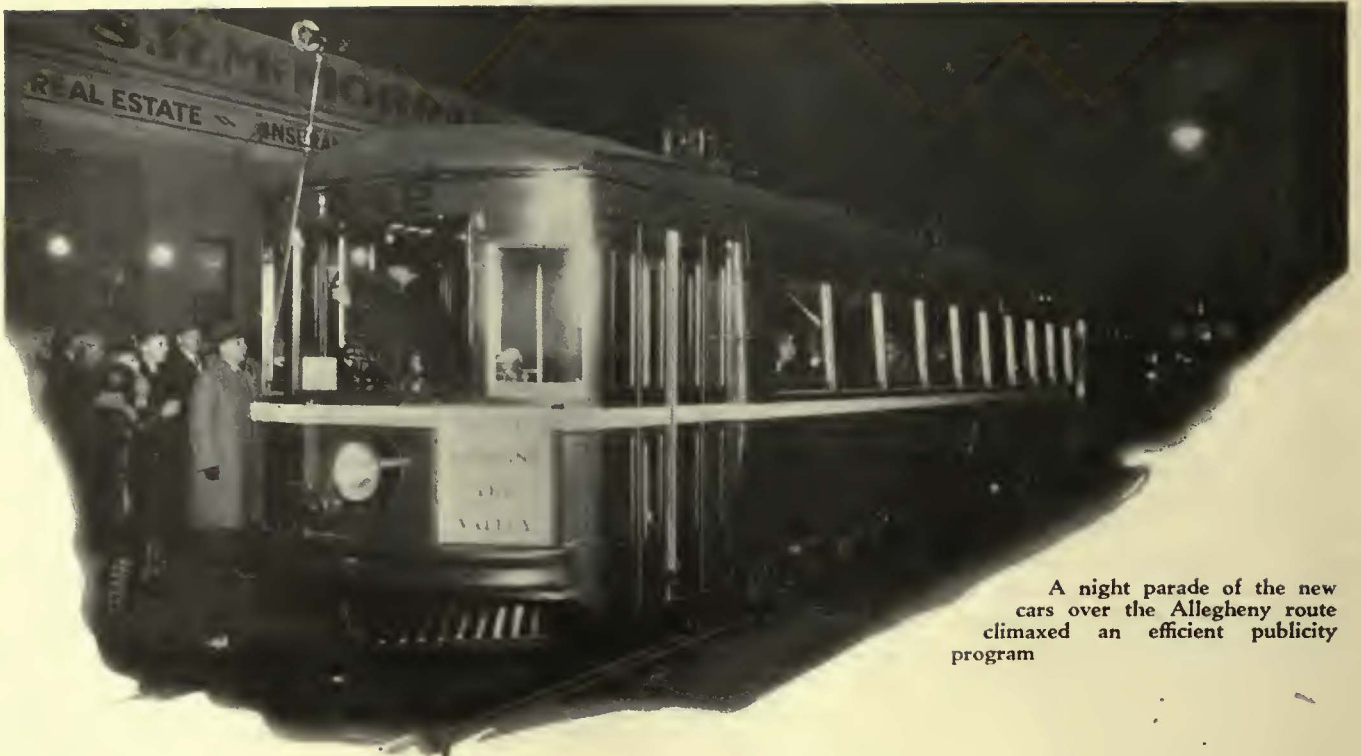
De luxe bus operations of Pennsylvania-Ohio System extend over wide area in the two states

The Northern Ohio Power & Light Company on twelve intercity de luxe bus routes operates 50 buses over a total of 383 miles. Between Akron and Cleveland there are four routes using four different roads. Service is also supplied between Cleveland and Akron by interurban cars operated by this company. Two other de luxe bus lines, namely, between Akron and Wadsworth, and Akron and Edinburg, have interurban car competition. On the remainder of the routes there is neither car nor other bus competition. An accompanying map shows the territory served by the Northern Ohio Power & Light Company and the table gives the details of these lines.

The Pacific Northwest Traction Company and the North Coast Transportation Company operate in a main trunk line from Portland, Ore., through Washington, to Vancouver, B. C. The latter company also operates several small branch lines. Although a very high type of equipment is used and a de luxe service rendered, this line is classed as express, rather than de luxe. No standees are permitted on any of the lines unless in a case of emergency. The schedule speed, including stopovers, is approximately 28 m.p.h. No regular stopping places are scheduled, but the buses stop on signal from intending passengers. The coaches do not average more than one stop every 3 or 4 miles.



Parlor bus route from Los Angeles helps build up shore resort at Castellammare



A night parade of the new cars over the Allegheny route climaxed an efficient publicity program

Complete Car Replacement

on Allegheny

Valley Route

Twelve new cars have been placed in regular service following a three-day ceremony, including parade, public inspection and free riding

MODERNIZATION in practically every phase of operation was completed on the Allegheny Valley division of the West Penn Railways with the installation of twelve new cars on Feb. 14. An intensive and effective publicity campaign directed by the company and ably supported by the newspapers of the district laid the foundation for a three-day ceremony which included a parade of the new cars, public inspection of the cars in each town on the line and two hours of free riding.

This division, operated as the Allegheny Valley Street Railway, serves an industrial district lying on the west of the Allegheny River between Aspinwall and Natrona, Pa., with an extension across the river to New Kensington, Pa. The route is approximately



Each of the twelve new cars was christened in the town whose name it bore

20 miles long and is operated as two lines, one from Aspinwall to New Kensington and the other between New Kensington and Natrona. The fact that there are twelve towns on the route and twelve cars were needed to replace the old equipment led the company in their plan for the installation celebrations.

In order to bring forcefully before the residents of

As a result of this preliminary advertising the parade of the new cars was a pronounced success. At 7:30 on Friday evening, each car was spotted at a location within the town for which it was named in charge of a host, an official of the company, who received the guests that had been invited to make the first trip. The parade began in Natrona where two cars were spotted, the first carrying the West Penn Band. The second car, "Miss Natrona," was christened in the presence of approximately 500 residents of the town and the procession moved south along the route. As the leading car came to the location where another car was waiting, christening ceremonies were held and the new car fell in line and moved on with the rest. This procedure was carried out the whole way down the line until all cars were together in the Aspinwall loop.

During the ride, the guests, consisting of the town

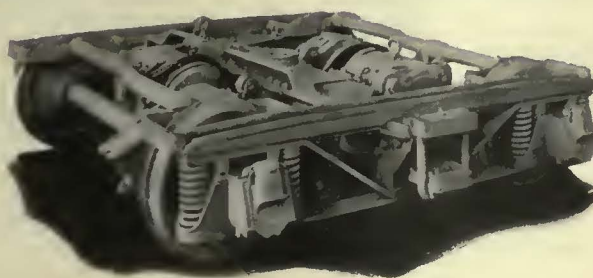


Comfort in every detail was a prime factor in the construction of the cars



Safety features and simplicity of control permitted the inauguration of one-man operation

each town the completeness of the modernization program, each new car was named for one of the towns, with the name printed on the car above the number. One car was called "Miss New Kensington," one "Miss Aspinwall," etc. Representatives of the company went before the borough councils of the towns



The fundamental features of the trucks are cantilever elliptic springs and wing type journal box installation

and laid before them the general plan for the installation ceremonies and asked their co-operation for its success. Each council was asked to select a young lady from the town to act as sponsor for the christening of the car bearing that town's name, the christening to take place during the parade to be held on the evening of Feb. 14. The selection of these sponsors in itself was one of the most effective bits of advertising that could have been done. In some cases the burgesses appointed the sponsor; in one town a contest was held and the sponsor chosen from among a number of contestants. Special street railway editions of two newspapers were printed and distributed throughout the whole section announcing the names of the sponsors and giving the details for the three-day celebration attending the inauguration of the new service.

Councilmen and their families together with prominent citizens in each town, were entertained by the host who answered any questions about the new service. He gave them each a little booklet entitled "These Cars Are Yours," which explained some of the details of the new cars and told of the desire on the part of the West Penn Railways to give a modern service throughout their territory. Cigars and cigarettes were supplied to the gentlemen, while the ladies received candy and other favors. That the publicity had been effective was thoroughly demonstrated over the whole line of march. In every town the streets were lined with people and at the points where the cars were located, crowds gathered to watch the christenings. When the parade reached the southern end of the line, the formation was broken and each car proceeded back over the line alone, discharging passengers at points convenient to them. Because the regular service on the line was somewhat disrupted due to the parade, the intending passengers waiting along the line were picked up on the new cars and without charge were taken to their destination. On the next day, the cars were placed

at central locations in each town where they were open for inspection by the public. A representative of the company was in charge of each car during this time to answer any questions about the equipment or the new service. He also explained the safety devices and their adaptability to one-man operation, an innovation with the new cars. In every case the townspeople turned out in full force to inspect the new cars. On the following day, Sunday, between 2 and 4 p.m. the public was invited to ride free. Anyone boarding the cars between those two hours could make a trip at the company's expense and become familiar with the features of comfort and speed of the new cars.

The new cars were built by the Cincinnati Car Corporation, and were assembled at the West Penn shops in Connellsville, Pa. They are much lighter, faster and more comfortable than the old equipment. The length over all is 47 ft. 3 in.; width, 8 ft. 6½ in.; height, 10 ft. 3 in.; truck wheelbase, 5 ft. 4 in.; and the weight is approximately 31,000 lb. The truck is known as the Cincinnati Car Corporation's Type 101, the fundamental features of design being cantilever elliptic springs and wing type journal boxes. These have two coil springs per box, the box being movable vertically on rectangular slides which are held between the continuous tiebar underneath the boxes and the truck side frame by means of a through-bolt passing through the side frame, the rectangular slide and the bottom tiebar. Support of the motor by means of brackets attached to the truck side frame and a tube running across the truck from bracket to bracket is one of the features. Other specifications follow:

Air brakes.....	Westinghouse
Car signal system.....	Faraday
Curtain fixtures.....	National Lock Washer Company
Curtain material.....	Pantasote No. 86 M
Door mechanism.....	National Pneumatic C 10980
Doors.....	Folding
Floor covering.....	¾-in. battleship linoleum
Glass.....	Plate
Hand brakes.....	Straight staff
Heat insulating material.....	1-in. compressed cork
Heaters.....	Single coil panel type, Consolidated Car Heating Company
Headlights.....	Ohio Brass S.O.S. stationary type
Headlining.....	1-in. Agasote
Journal bearings.....	Plain 3½x7½ in.
Journal boxes.....	3½x7-in. pedestal type
Motors.....	4 Westinghouse No. 1425-A, inside hung
Registers.....	Ohmer
Roof type.....	Arch
Roof material.....	No. 8 canvas
Seats.....	Reversible type cross-seats, 37-in. long
Seat spacing.....	32-in.
Seating material.....	Brown Spanish leather
Steps.....	Stationary
Trolley.....	Retrievers, Earl No. 4
Trolley base.....	West Penn standard
Trucks.....	Cincinnati Type 101
Ventilators.....	Ten Nichols-Lintern
Wheels.....	Rolled steel 22-in. diameter.

Accident Causes Analyzed at Cleveland

INSTRUCTIVE information concerning the cause of accidents on the Cleveland Railway has been developed by an investigation made by the company in collaboration with the Metropolitan Life Insurance Company. The data are based on an intensive study extending over a period of months and embracing the records of 167 motormen at the Woodhill station. To determine which operators were particularly prone to accident, the 1928 record of each motorman at the station was carefully studied. Accidents from all causes were included in determining an individual record so that all contributing factors might be given consideration.

It developed that there was a definite relationship between accident frequency and the length of service of

the motormen, the veteran men in general having fewer accidents than the new men. It was shown that the motormen with unsatisfactory accident records were also inclined to use an excessive amount of power when operating their cars. No relationship was found to exist between accident frequency and delinquencies in reporting for work, tardiness, absence, etc.

Physical difficulties, such as defective vision, organic diseases, high blood pressure, etc., were found to be primarily responsible for about 12 per cent of the accidents. In 22 per cent of the cases an improper attitude of mind, or a personality unsuited to the work, was found to be a primary factor. The remaining 66 per cent were attributable to shortcomings such as failure to recognize potential hazards, inattention to work, etc.

"Dark Period" Before Sunrise Creates Accident Hazard

EXISTENCE of an accident hazard not generally recognized is indicated by investigations made recently by the Capital Traction Company, Washington, D. C., under the direction of H. V. Schreiber, safety engineer. These investigations were directed toward ascertaining conditions which exist during the "dark period" after the street lights have been extinguished and before sunrise. Because the company has a considerable number of vehicles in operation on the streets during the early morning hours, this study is of particular interest to the railway, but it was extended to include also the general collision hazard.

In Washington, as in most cities, the street lights are operated on the 4,000-hour schedule. This is roughly equivalent to lighting the lamps one half-hour after sunset and extinguishing them one half-hour before sunrise. An interesting exception to the usual practice in this regard is found in St. Louis where astronomical clock control is used to turn on the lights automatically at sunset and turn them off at sunrise.

Data furnished by the Weather Bureau in Washington show that a large proportion of days are cloudy, foggy, or rainy at sunrise. During the three years from Oct. 25, 1926, to Oct. 24, 1929, there were on the average 5.1 days per month when the weather was rainy, 12.9 days when the weather was cloudy, and 12.7 days when the visibility was poor for one reason or another. Monthly averages are given in the following table:

Three-Year Average of Weather Conditions at Sunrise

Month	Rainy Days	Cloudy Days	Poor Visibility Days
January.....	7.0	14.3	19.0
February.....	8.0	10.0	16.3
March.....	7.0	12.7	11.5
April.....	3.7	12.6	8.1
May.....	4.7	16.3	11.4
June.....	3.0	14.3	5.9
July.....	2.0	16.3	6.6
August.....	1.7	21.3	9.8
September.....	3.7	15.0	12.2
October.....	6.3	10.4	16.3
November.....	6.0	16.7	16.8
December.....	8.3	13.7	18.6
Average.....	5.1	12.9	12.7

These figures were further classified by the Weather Bureau to show the approximate distance at which objects could be distinguished on foggy mornings.

Average Visibility Distance on Foggy Days

Month	50 M	200 M	500 M	1,000 M	2,000 M	Total
January.....	0.9	1.0	3.8	5.2	8.1	19.0
February.....	0.1	0.6	3.5	5.2	6.9	16.3
March.....	0.2	0.3	0.3	3.6	7.1	11.5
April.....	...	0.1	1.1	1.7	5.2	8.1
May.....	...	...	1.9	1.4	8.1	11.4
June.....	...	...	0.8	2.0	3.1	5.9
July.....	...	...	0.5	1.8	4.3	6.6
August.....	0.1	0.1	1.4	2.0	6.2	9.8
September.....	0.3	0.1	1.4	3.6	6.8	12.2
October.....	0.4	0.4	2.5	4.0	9.0	16.3
November.....	0.1	0.2	3.4	4.9	8.2	16.8
December.....	0.8	0.5	1.9	6.0	9.4	18.6

As to the actual occurrence of accidents during this period of the day, complete data are not available. The company's records, however, show some twenty collisions which occurred during the dark period in a year's time. Also the company had one negro track greaser killed by an automobile while he was at work. Records of the Traffic Bureau covering a period from January, 1926, to September, 1929, show 167 accidents during these hours.

Four-Year Accident Record for Dark Period

Month	Time A.M.	Accidents	
		Fatal	Non-fatal
January.....	6:30-7:30	3	28
February.....	5:30-6:30	1	13
March.....	5:30-6:30	0	11
April.....	4:30-5:30	0	11
May.....	4:30-5:30	0	4
June.....	3:30-4:30	0	11
July.....	4:30-5:30	0	9
August.....	4:30-5:30	1	9
September.....	5:30-6:30	0	8
October*.....	5:30-6:30	2	13
November*.....	5:30-6:30	2	10
December*.....	6:30-7:30	2	29
Total.....		11	156

*Three years only.

From these figures the conclusion is reached that the prevention of accidents during this "dark period" justifies the extension of the lighting schedule in order to protect properly all users of the streets on cloudy, foggy and rainy days.

LETTER TO THE EDITOR

Statistics on Pittsburgh Railways Securities Amplified

INFORMATION on the Pittsburgh bonds published in the Annual Statistical Number was based on compilations by well-known financial authorities, supplemented by statements sent directly to the editors. The omissions of disposition of the Pittsburgh securities in Table III was made because correct information was not obtainable up to the time of going to press. The statement of defaults of interest is similar to that published in the Annual Statistical Number of the JOURNAL for Jan. 12, 1929, and the same bonds are included in the earlier list. Where the maturity date is given in the table of bonds in default it is assumed that both principal and interest remain unpaid. In the present instance the interest is being met, although bonds are in default of principal.

The JOURNAL is glad to have this information and to publish it as an addition and correction to that given in the article referred to.—EDITORS.

Pittsburgh Railways Company

PITTSBURGH, PA., Jan. 31, 1930.

To the Editor:

Our attention has been called to an article on page 44 of ELECTRIC RAILWAY JOURNAL for January, in which we find a number of incomplete statements with respect to matured bonds on the properties operated by the Pittsburgh Railways Company:

TABLE III—DISPOSITION OF ELECTRIC RAILWAY MATURITIES IN 1929

The \$200,000 of Pittsburgh Railway equipment trust, due Feb. 1, 1929, were retired.

The Central Traction Company firsts, due July 1, 1929, in the amount of \$325,500 have not been extended. The principal is in default, but interest is being paid each six months at the rate of 5 per cent per annum.

The Wilkesburg & East Pittsburgh Street Railway

firsts, due Sept. 1, 1929, in the amount of \$1,989,000 were refunded by an issue of Monongahela Street Railway first refunding mortgage 5 per cent bonds, due Dec. 1, 1928.

TABLE VIII—OUTSTANDING ELECTRIC RAILWAY BONDS IN DEFAULT OF INTEREST

Included in this table are the following issues of mature bonds of the Pittsburgh Railway system which are in default with respect to the payment of principal, but upon which interest has been and is being paid in full, semi-annually:

	Amount	Matured
Bloomfield Street Railway 5's.....	\$250,000	Aug. 1, 1923
Brownsville Avenue Street Railway 5's.....	300,000	Aug. 1, 1926
Central Passenger Railway 6's.....	125,000	Oct. 1, 1924
Citizens Traction Company 5's.....	246,000	Oct. 1, 1927
Millval., Etna & Sharpsburg Street Railway 5's.....	741,000	Nov. 1, 1923
Penn Street Railway 5's.....	250,000	Dec. 1, 1922
Pittsburgh, Crafton & Mansfield Street Railway 5's..	164,000	July 1, 1924
Pittsburgh Traction Company 5's.....	666,000	Oct. 1, 1927
Pittsburgh & West End Passenger Railway 5's.....	303,000	July 1, 1922
Washington Electric Street Railway 5's.....	125,000	Feb. 1, 1927

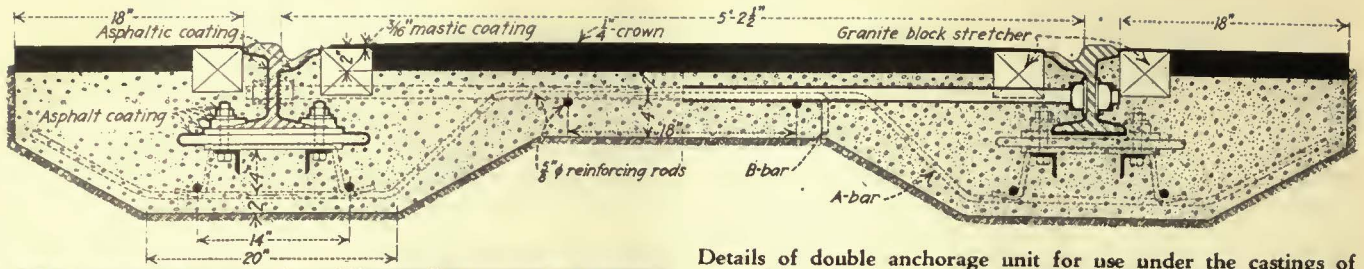
There is also included in this table \$993,000 principal amount of Monongahela Street Railway 5's which mature June 1, 1898, and were refunded by a similar amount of first refunding mortgage 5 per cent bonds of that company, due Dec. 1, 1928; also, \$1,989,000 principal amount of Wilkesburg & East Pittsburgh Street Railway 5's, due Sept. 1, 1929, which were refunded by the issue of a similar amount of Monongahela Street Railway first refunding mortgage 5 per cent bonds, due Dec. 1, 1928.

The \$1,500,000 principal amount of Pittsburgh & Birmingham Traction 5's due Nov. 1, 1929, were extended, at the same rate of interest, to Nov. 1, 1930.

As the interest on all outstanding matured and unmatured bonds of the Pittsburgh Railway System has been and is being paid, when due, we would thank you to publish in the next issue of the ELECTRIC RAILWAY JOURNAL, a statement correcting the erroneous statements published in the January issue with respect to the bond issues indicated above.

C. S. MITCHELL.

Controller.



Details of double anchorage unit for use under the castings of special work. The bolt holes in the plate are slotted to permit fastening to variable width special work castings



Completed section of tieless track laid in New Orleans. Steel reinforcement is in place and ready for pouring of concrete

TRACK

By

I. O. Mall

Assistant Superintendent of Roadway
New Orleans Public Service, Inc.

longitudinal angles embedded in the concrete to which are fastened the rail anchorage units. These angles are held in parallel alignment by deformed straps welded to the angles at the points of contact. These same deformed straps support and carry the entire system of bar reinforcement.

The resilient rail anchorage consists of two oval-shaped thin steel plates crimped on the outer edges over a round steel ring and welded at the periphery to form a closed container. This weld fuses the edges of the plates together and the whole is fused to the steel ring, forming a very stable marginal periphery within the diaphragm. An oval-shaped bearing plate is welded to both the top and bottom diaphragm plates. These bearing plates are substantially smaller than the diaphragm plates and concentric therewith. The rail is held in place by rail clips, the anchorage bolts passing through the diaphragm and bearing against the embedded angles in the foundation. The inside of the diaphragm contains an asphalt-asbestos mixture forced into place under pressure and while hot.

The load from the rail is transmitted through the upper bearing plate to the top of the diaphragm. As the diaphragm plate flexes inward a compression is built up in the confined asphalt-asbestos cushion and this pressure is reacted to by the bottom bearing plate of the diaphragm which in turn transmits the load to the foundation. When the load is relieved the residual compression in the cushion acting in conjunction with the resilient diaphragm plates returns the upper bearing plate to its normal position. The asphalt-asbestos cushion serves a dual purpose in that it affords stability to the diaphragm and aids in dissipating the vibration absorbed from the rail.

The resilient rail anchorages are spaced on 4-ft. centers and staggered with respect to parallel rails, this latter feature minimizing the foundation stresses. The steel bar reinforcement in the foundation is so distrib-

ENGINEERS of the New Orleans Public Service are of the opinion that the design of paved track is susceptible of rational analysis and that a paved track to be economically satisfactory must combine the materials of construction in the most scientific manner. With this thought in mind the matter was approached as an original problem in engineering design and a design was developed differing radically from ordinary practice. The track structure consists primarily of a reinforced concrete foundation to which the rails are anchored in parallel surface and alignment by means of resilient rail anchorages.

Due to the commercial considerations involved in the manufacture of steel rails, the existing A.E.R.E.A. standard 7-in. girder rail was chosen for use and the track structure developed around this rail. Analysis determined the requirements of the rail anchorage, and since a unit was not available on the market, a new design was developed. The resilient rail anchorage utilized in this construction was subjected to detail development tests and its dimensions and properties proportioned to meet service conditions.

The foundation is shaped so as to form a continuous girder beneath each rail. The reinforcement consists of $\frac{5}{8}$ -in. straight and deformed bars placed both longitudinally and transversely at points where they will efficiently resist the stresses set up in the foundation. Just beneath and parallel to each rail are two continuous

Design adopted after prolonged experimentation has little resemblance to usual types. Reinforced concrete foundation acts as unit to hold rails in position. First cost is \$75,000 per mile. Maintenance cost is estimated at less than \$100 per mile per year

Without TIES

Built at New Orleans

uted as to absorb the live-load and temperature stresses developed in street service.

The reinforced concrete foundation acts as a unit to hold the rails in parallel surface and alignment and in this capacity displaces the conventional crosstie used in track construction.

Rails are maintained independent of the pavement by being coated with approximately $\frac{1}{4}$ in. of plastic asphaltic mixture. This material maintains its normal plastic condition under the maximum and minimum temperatures that are met. This coating functions as a vibration insulator and prevents water from entering between the pavement and the rail. An Elastite strip $\frac{1}{4}$ in. in thickness is placed under the base of the rail and held in place by special wire clamps. Thus the foundation and pavement concrete is not allowed to come into bonding contact with the rail and sufficient leeway is provided for the resilient action of the rails.

Basic advantages of this type of track construction are believed to be:



After the trench is graded, precast concrete pedestals are placed in position. The steel framework, made up in 20-ft. sections with anchorages attached, is then placed in position over the pedestals

1. Proper recognition of the dynamic action produced in the rail by the progressive movement of a rolling wheel load.

A moving wheel load is essentially a moving impact load. The entire wheel load is concentrated on a narrow line area on the surface of the rail. If the rail cannot give slightly and ease the shock of the suddenly applied load the intense local stress developed in the surface structure of the rail approaches and sometimes exceeds the bearing strength of the steel. As a consequence the rail wears away rapidly, due not so much to abrasion as to the peening action of rolling.

If, however, the rail can give or deflect slightly with a resilient reaction, the impact stress is distributed over the cross-sectional area of the rail body with a lessened intensity of local stress. Commercial steel rails are of a beam section which gives them stiffness and a resilient capacity when acting as a beam. Due to the stiffness of the rail the deflection wave tendency extends a considerable distance on either side of the wheel loads. In order to permit elastic reaction in the rail, sufficient resiliency is provided in the rail anchor-



Rails in position with the anchorages attached and clips tightened. Wooden wedge blocks are used on top of pedestals to obtain surface grade adjustment



The rail is coated with about $\frac{1}{4}$ in. of plastic asphalt material applied with a paddle as shown

ages to allow the deflection wave to spread out and proceed uniformly.

The effect of resilient rail action within controlled limits on rail life is of course problematical. Experience in New Orleans with approximately 100 miles of ballasted track without pavement, which is flexible rather than resilient, indicates that rail failure will result from fatigue rather than from abrasive and rolling wear. It seems logical to conclude that rail life under a given tonnage movement will be very materially increased over that obtained in the past with rigid rail construction.

2. Rail anchorage has durable resilient properties and allows resilient movement without mechanical wear.

The resiliency of the rail anchorage is dependent upon the flexing action of the diaphragm plates. The diaphragm is designed so that a load of 10,000 lb. causes it to deflect 0.025 in. Thus the banding stresses set up in the plates are very small and the plates should have a long fatigue life. The asphalt-asbestos cushion is inert and confined so that it cannot be dissipated. Properly protected from corrosion and electrolysis the life expectancy of the anchorage is certainly commensurate with the rest of the structure.

Firm anchorage to the foundation in conjunction with resiliency in the rail support is provided by extending the anchorage bolts through the reinforcing angles in the foundation. Repeated impact tests over a long period of time show that vibrations set up in the rail are absorbed by the diaphragm and this destructive action is eliminated before it reaches the pavement.

It has been thoroughly demonstrated in industrial practice that surfaces in variable pressure contact with bolts are most effectively held tight when a resilient element is incorporated at the plane of surface contact. This element of design is provided in the diaphragm. It is important to note also that movement in the rail anchorage occurs without attendant mechanical wear, a factor which assures uniform action throughout its life. Attention is also called to the action of the diaphragm which permits a lateral or tipping action of the rail. This allows the rail and wheel to make full contact under variable conditions of wear and improves the adhesion characteristics between the wheel and the rail.

3. Rail action is maintained independent of and not constrained by the surrounding pavement with a water-tight seal between the rail and the pavement.

With a uniformly controlled rail movement it becomes possible to separate the rail and the pavement with an assurance of maintaining water-tight construction. The sealing material between the rail and the pavement breaks the line of vibration and materially reduces and deadens the

operating noises. The asphalt is impervious to water and is protected from atmospheric reactions which might cause it to deteriorate.

4. Design provides for unlike strength and elastic properties of rails and concrete foundation in resisting the effect of expansion and contraction due to temperature change.

Under the influence of temperature change the rail acts independently of the foundation. Expansion builds up a compressive stress in the rail. The rail fastenings hold the rail to alignment and prevent buckling, and the compressive stress is absorbed in the rail. Contraction builds up a tension in the rail which requires no assistance from the fastenings in holding the rail to alignment.

Expansion and contraction of the reinforced concrete



Pneumatic hammers with block tool points were used to drive the concrete thoroughly to place in the foundation



Single rail anchorage unit for use under curve rails

foundation occur independently of the rails in accordance with the elastic properties of the unit. Steel and concrete have the same coefficient of expansion, but due to their unlike strength and elastic properties they cannot act together under the influence of temperature change. Steel rails have sufficient strength to resist the range of temperatures encountered in service. Concrete does not have sufficient strength to resist the range of temperatures encountered, the failure being due to contraction with attendant cracking. Sufficient steel bar reinforcement to prevent and control visible cracking has been utilized in this design to provide for flexural load stresses acting in conjunction with temperature stresses.

5. The foundation and base pavement are made integral and the reinforced unit precludes the use of a conventional cross-tie member.

Integral construction of the foundation and pavement concrete into a monolithic mass provides maximum strength with a minimum of material. The introduction of steel bar reinforcement controls and stabilizes the concrete which is in accordance with the fundamental requirements of a

properly designed concrete structure. Sufficient time has not elapsed in the industrial world to prove the life expectancy of reinforced concrete but it can logically be expected to have a life far greater than concrete without reinforcement.

As long as the concrete maintains its homogeneous stability the rails will be held in parallel surface and alignment. The conventional cross-tie, when embedded in concrete, functions only as an anchorage for holding the rails. In this design the steel which would commonly be utilized as a direct member between the rails has been incorporated as bar reinforcement in the concrete foundation and the cross-tie eliminated.

Tie rods are used at sufficient intervals between the rails to hold them in a parallel position and to facilitate proper alignment during construction. They are covered with asphaltic material to prevent their bonding to the concrete, which in turn prevents their interfering with the resilient action of the rail.

6. Marginal stability of the pavement alongside the rails permits the use of an asphalt surface pavement.

The granite paving block laid parallel to the rail and embedded in the green concrete provides lateral stability for the edges of the asphalt pavement. An asphalt pavement protected in this manner can develop its full life without destruction. The surface pavement is renewable without disturbance to the rest of the structure. The cushioning of the traffic wheel load inherently gained with asphalt pavement adds materially to the life expectancy of the concrete foundation.

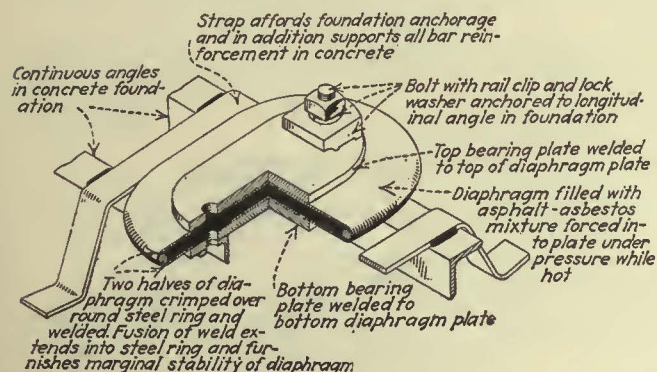
7. Design provides for renewal of rail with minimum disturbance of surface pavement and no disturbance at all to the foundation.

The rail may be removed by breaking out the granite block and sufficient concrete between the block and the rail to allow access to the clip fastenings. On the assumption that the resilient rail will fail ultimately, its replacement can be made without disturbing the foundation.

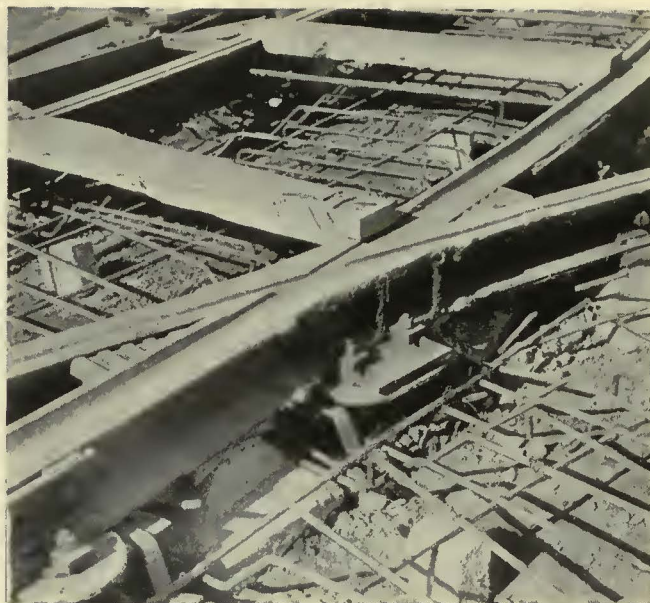
8. First cost of this type of construction is high, but this is offset by the reduced cost of maintenance and the longer life.

It is obvious that this design is not a cheap construction. Comparison with rigidly constructed track utilizing steel cross-ties shows that the differential cost factor between the two is based upon rail anchorage cost. Manufacture of the resilient rail anchorages on a production basis has potential possibilities of balancing the cost of steel in the two units of construction. The track constructed on the project as outlined in this article cost \$75,000 per mile.

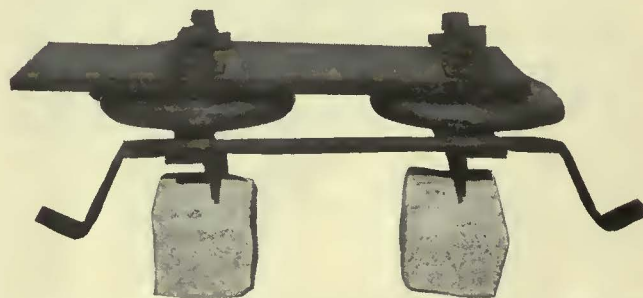
Analysis of the maintenance requirements of this design indicates that there should be practically no maintenance at all. In fact, an underlying motive in the development of the design was to construct a track that would require no major maintenance. If the structure holds up as it should and as has been proved by concentrated tests, track maintenance will be confined to welding and grinding at the joints and to repairs of the asphalt pavement occasioned by vehicular traffic.



Details of resilient rail anchorage



New design of track being tried in New Orleans differs from customary practice in that no ties are used



Application of double anchorage unit under silico-manganese frog. Clips are adjusted to fit the base of the casting and then welded to base plate and to frog casting

While it is desirable from the investment point of view to keep the first cost as low as possible, this should not be done at the expense of subsequent maintenance and depreciation. Longer life with reduced maintenance justifies a higher first cost. Our analysis indicates an average maintenance cost not exceeding \$100 per mile per year throughout its full life, and a depreciation rate of not greater than 3 per cent to cover renewals and replacements.

This design of track has been used in the reconstruction of Canal Street at New Orleans in which four parallel tracks occupy the center of the street in a raised neutral strip 56 ft. wide. This strip is paralleled by 35-ft. roadways on either side. The construction involves approximately 4 miles of tangent track interlaced with 32 special work layouts. Three-fourths of the special work layouts and over one-half of the tangent tracks were constructed under car operation.

Single Life vs. Renewable Track

Opinions of prominent way engineers on this interesting subject will be presented in the April issue

Prizes Awarded for

First Period of New Maintenance Contest

Atlanta and Cleveland Railway men are winners in way and structures, rolling stock and shops, and bus departments. No award made in the electrical and line department.

DURING the first quarter of the ELECTRIC RAILWAY JOURNAL Maintenance Contest started in November, 1929, a total of 23 maintenance items were submitted. Many properties not having participated in previous contests contributed valuable ideas. All items submitted were carefully considered by the committee of judges consisting of C. A. Smith, superintendent of roadway Georgia Power Company, chairman; G. C. Hecker, general secretary American Electric Railway Association; Dwight L. Smith, electrical engineer Chicago Rapid Transit Company; T. H. Nicholl, research department Cleveland Railway; and John A. Miller, Jr., managing editor of the JOURNAL.

In the department of rolling stock and shops, the prize was awarded to the article "Hood Rims and Carlins Reshaped by Machine," submitted by James Davidson, assistant foreman in the mechanical department of the Cleveland Railway. This machine is unusual in its design and greatly facilitates the forming of hood rims and carlins as described elsewhere in this issue. The prize in the department of way and structures was won by W. H. Hayes, supervisor of welders and grinders of the Georgia Power Company, for his article "Welding and Cutting

James Davidson

THE winner of the prize in the department of rolling stock and shops is James Davidson, assistant foreman in the mechanical department of the Cleveland Railways, Cleveland, Ohio. Mr. Davidson was born in 1886, and started to work for the company during September, 1907, as a carpenter in the department of equipment and building. With the exception of one year, when the Cleveland Railway was operated by the Municipal Traction Company, Mr. Davidson has been in the employ of the same company since 1907. He advanced to the position of assistant foreman of the erecting department in 1913, which position he is holding at the present time. Mr. Davidson has always been much interested in the simplification of methods in the shops of his department, and many improvements have resulted from ideas which have been originated by him during his connection with the Cleveland Railways.

Richard Grant

IN THE department of buses and garages the prize winning item was submitted by Richard Grant, foreman of the Berea Garage, Cleveland Railway, and was entitled "Double Air Chuck Inflates Dual Tires Evenly." Mr. Grant died on Feb. 11, 1930, as the result of injuries received in an automobile accident. He was 39 years old and had been in the employ of the Cleveland Railway since August, 1926. He was greatly liked by his fellow workers and his death will be felt very keenly by all those who were in close contact with him in the daily performance of their duties.



James Davidson



W. H. Hayes

Equipment Combined." The item tells in detail how an oxyacetylene cutting apparatus and a complete welding outfit were installed on one truck. This arrangement has proved to be of great benefit to the maintenance of way repair men, who are now enabled to do

the cutting and welding of rails more quickly.

In the department of buses and garages, the article "Double Air Chuck Inflates Dual Tires Properly" was awarded the prize. This article was submitted by Richard Grant, formerly foreman of the Berea Garage of the Cleveland Railway. A unique method of inflating dual tires devised by the Cleveland Railways is described in this item, which appears elsewhere in this issue. In the electrical and line department only one item was received and for this reason the judges decided to make no award but to consider this article in the second period of the contest,

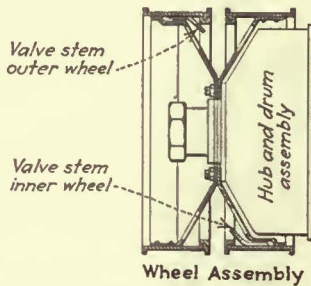
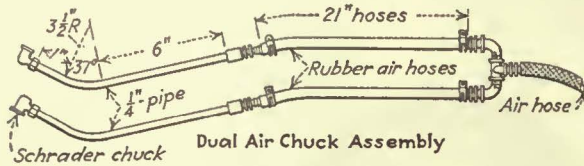
W. H. Hayes

IN THE department of way and structures the prize was awarded for the article "Welding and Cutting Equipment Combined," submitted by W. H. Hayes, assistant roadmaster Georgia Power Company, Atlanta, Ga. Mr. Hayes worked from 1908 to 1918 as bill clerk and rate clerk for the A.&W.P. R.R. at Hogansville and La Grange, Ga. Not being satisfied with this type of work Mr. Hayes decided to take up welding, a practice which gained a great deal of favor during that time. He joined the Navy in 1918, and followed a six months training course, after which he was detailed at the Navy Yard in Norfolk as ship welder, and held this position until 1921. When leaving the Navy Mr. Hayes was employed by the Georgia Power Company as a welder, and after two years was promoted to the position of supervisor of welders and grinders, which he is holding at the present date.

Double Air Chuck Inflates Dual Tires Evenly*

By RICHARD GRANT
Foreman Berea Garage Cleveland Railway

DEVELOPMENT of a double air chuck has greatly facilitated inflation of rear wheel dual tires to the proper pressure on buses of the Cleveland Railway. The single fitting was found unsatisfactory, since it was difficult if not impossible to inflate the inside and outside



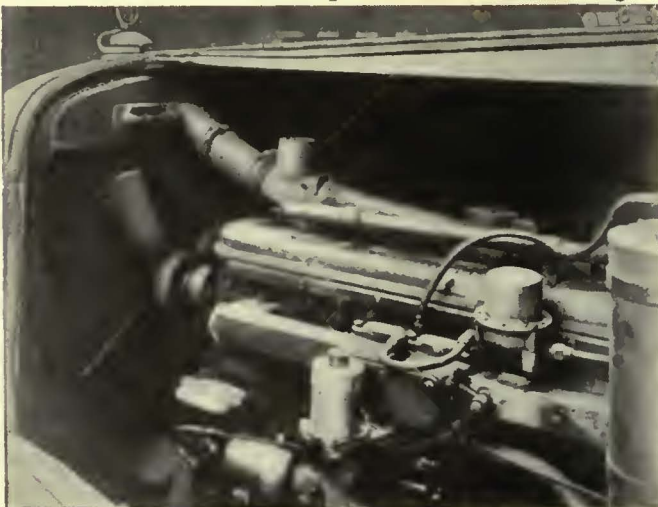
Use of this double air chuck developed by the Cleveland Railway has facilitated inflation of dual tires

tires properly with several sizes in use. Correct inflation is of importance if maximum mileage and minimum road failures are to be attained.

The double air chuck illustrated enables the operator to reach without difficulty the valve stems, regardless of type or angle. Its use has brought about a far better condition of the tires on rear wheels, and has reduced the time for inflation materially, resulting in a saving of labor.

Electric Governor for Buses

HOOKEED in the control circuit of the generator which supplies energy to the motors driving the bus, an automatic electric governor built by the General Electric Company according to specifications of the In-



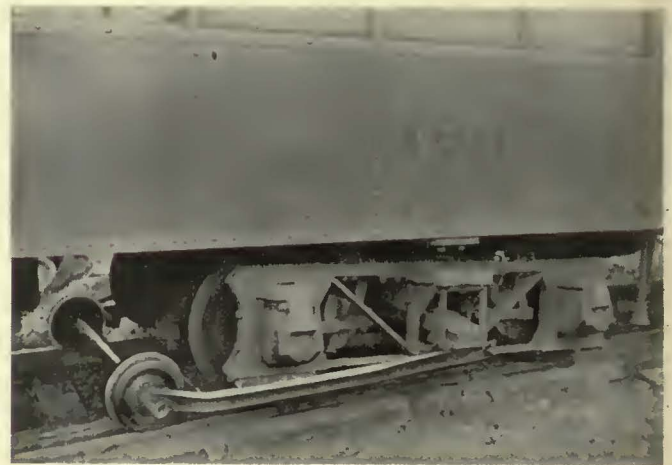
An automatic electric governor is located directly above the carburetor on buses of the International Bus Company, Buffalo, N.Y.

ternational Bus Company, Buffalo, N. Y., prevents high generator voltage. Excessive speed of the bus is thus avoided, as is also flashover on the motor commutator. The device consists of a solenoid-actuated lever which operates a butterfly valve on the carburetor. All gas-electric buses operated by the International Bus Company have been equipped with this new device.

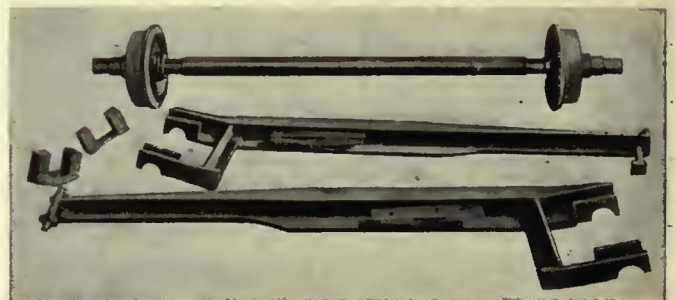
Emergency Dolly for Broken Axles*

By E. J. JONAS
Superintendent of Equipment Cincinnati Street Railway

TRAFFIC delays due to broken axles are reduced to a minimum by means of a dolly designed in the shops of the Cincinnati Street Railway. The device can be harnessed to a broken truck by the repair crew to bring the car in to the shops. The device used has a weight of 445 lb. The center portion of the dolly axle



Dolly used by Cincinnati Street Railway to bring in car with broken axle



When not in use dolly can be taken apart easily and carried on the emergency truck

is of 3-in. steel tubing shrunk on to 2-in. solid ends. The wheels are free to revolve on the axle, and each has an annular groove in a bronze bushing which is filled with lubricant by means of a pressure gun. Two sets of truck frame supporting blocks accommodate the two types of trucks used by the company.

On a paved street two men can install the emergency dolly with ease in a short time. To accomplish this the truck is jacked up and wheels rolled into place. This being done, the end members are then coupled and the car is ready to move. A 2-mile run at normal operating speed over curves and special work has been made with this device without trouble of any kind.

*Submitted in ELECTRIC RAILWAY JOURNAL Prize Contest.

Safety Holder for Dipping Armatures*

By W. A. TRAW

Armature Room Foreman Dallas Railway & Terminal Company

WITH a new safety yoke of $\frac{1}{2}$ x2-in. iron bar designed and used in the shops of the Dallas Railway & Terminal Company an armature prepared for dipping and baking is supported from the bottom and is locked



Holder for armatures designed and used by the Dallas Railway and Terminal Company

in such a position that it is almost impossible for it to slip out of the holder before being dipped. Formerly on one or two occasions the old-style clamp put on the commutator end of the armature shaft slipped off with an almost disastrous result when an armature fell to the floor, barely missing a workman.

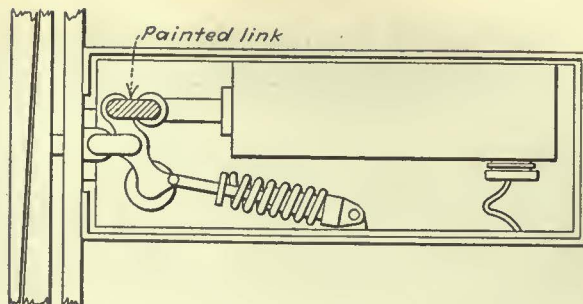
It should be noted that one size yoke will take practically every size and type of railway armature from 25 to 65 hp.

Disconnecting Locked Tongues of Electric Track Switches*

By G. I. GRANT

Chief Inspector School of Instruction
Toronto Transportation Commission

LOCKED tongues due to ice-coated plungers in electrically operated switches make it necessary for operators to disconnect the tongue from the plunger by the removal of a link in the mechanism. Several car derailments have occurred on the lines of the Toronto



When the link to be removed to release a frozen electric track switch was painted a distinctive color derailments were reduced in Toronto

Transportation Commission when the wrong link has been removed and the tongue thereby cut free from its locking spring. In addition to diagrams posted in car-houses and lectures given to new men in the school of instruction, a further aid to operators has been provided by painting the proper links with a distinctive color.

Electrically Heated Inspection Lamps*

By CHRIST REINKER

General Foreman Mechanical Department
Cleveland Railway

A TROUBLE light that is particularly adapted for use in cold weather has been designed at the Havard shops of the Cleveland Railway for the use of the line department. It consists of a handle, 8 in. long and 2 in. in diameter, with a conical reflector 5 in. long. The wooden handle, drilled with a number of $\frac{1}{4}$ -in. holes, contains a 2,500-ohm resistance, properly insulated, which acts as a heater. The resistance is in series with a 110-volt, 23-watt Mazda lamp located within the reflector. This light is especially advantageous when work must be done to the overhead in tunnels, under bridges, or at night when the weather is cold, as it keeps the hands of the workman warm and permits him to do his best work.

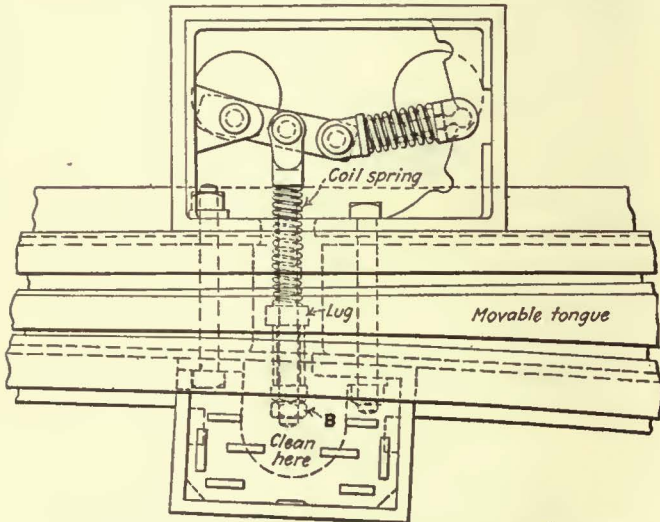


Inspection light used by Cleveland Railway has electrically heated handle

Improved Connecting Rod for Tongue Switches*

By E. B. SPENZER
Way Department Cleveland Railway

DECREASED wear on the working parts of lock boxes of track switches has resulted in Cleveland from the use of a coil spring placed on the connecting rod between the tongue and the yoke. This spring is ad-



Coil spring on connecting rod reduces wear on switches of the Cleveland Railway

justed just under tension and takes up any slack motion due to the wear that occurs, thus reducing the likelihood of having a split switch. The frequency of inspection is materially decreased, which gives the switch crew more time for other work. Construction of this connecting rod is simple and easy. Ordinarily the connecting rods are

*Submitted in ELECTRIC RAILWAY JOURNAL Prize Contest.

threaded the entire length to provide for the nuts, which hold and adjust the pipe separators. With the new design this is not necessary, for the entire adjustment is taken care of at the nut *B* at the end of the rod, as shown on the accompanying sketch.

Welding and Cutting Equipment Combined*

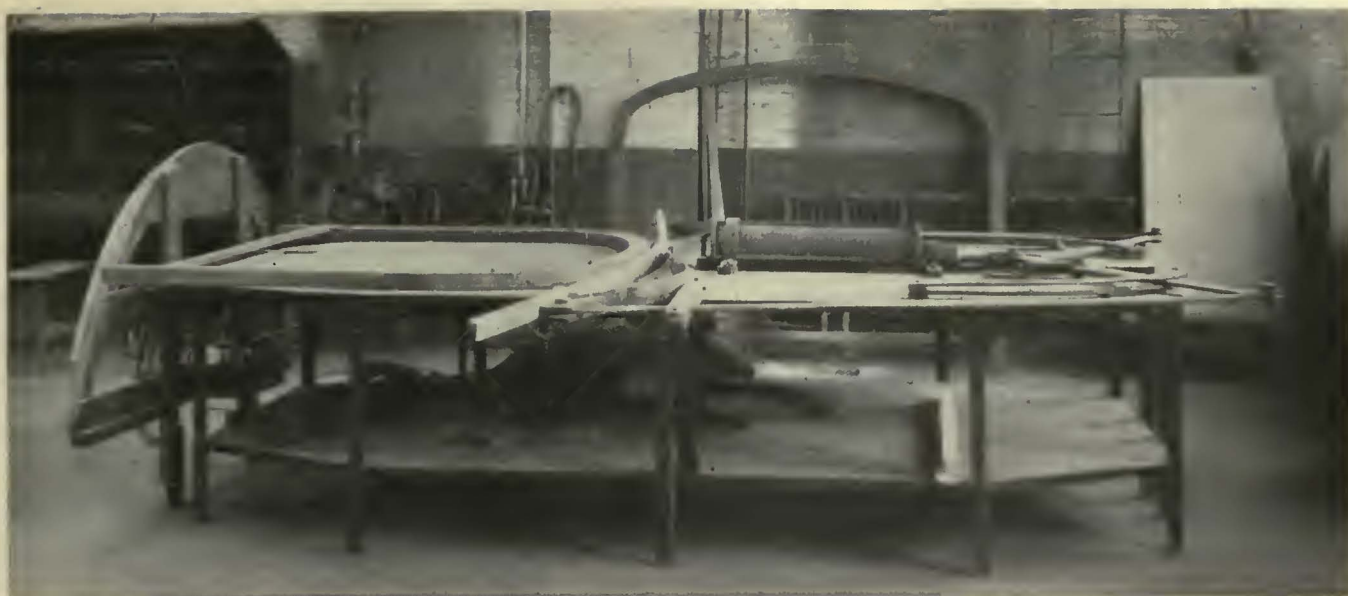
By W. H. HAYES
Assistant Road Master Georgia Power Company
Atlanta, Ga.

COMPLETE welding and cutting equipment in a single unit, consisting of a Una Type D-4 electric welder and an oxy-acetylene cutting outfit, installed on a 1-ton White truck, has been found very useful by the Georgia Power Company. Two such trucks have been equipped. Considerable time has been saved by having these units together, as the men do not have to wait for the equipment to be moved, especially when jobs located at various places have to be taken care of. In particular, each man can do his own burning instead of having to wait for someone to come and do it for him.

When special work has worn down and become noisy it is built up by welding and ground to a smooth surface. This repair lasts about two years under heavy traffic and longer when traffic is lighter. A hard center broken beyond repair is taken out, and a piece of steel cut and laid in the casting and welded into place. Then it is built up to the same dimensions as the old hard center by welding and ground down to a smooth surface. This lasts as long as the other work in the same location, which saves the expense of taking out the whole frog and replacing it with a new one or installing a new center. If the ball of the rail is broken away from a joint a plate is put on the outside of the rail and welded to the base while it is ground to a smooth surface after cooling.



A complete electric welding set and an oxy-acetylene cutting equipment are mounted together on a 1-ton White truck by the Georgia Power Company



This machine in the Cleveland Railway shops is used to shape hood rims or carlins

Hood Rims and Carlins Reshaped by Machine*

By JAMES DAVIDSON
Assistant Foreman Mechanical Department
Cleveland Railway

FORMING hood rims and carlins in the shops of the Cleveland Railway has been expedited by the development of a machine for forming these parts. This replaces the old method of shaping by hand with clamps.

The machine consists essentially of a table with the form for a hood rim or carlin placed on it and a flexible steel band attached to a pneumatic cylinder. A cylindrical steam chest is conveniently located to steam the wood. The strip to be bent is placed in position; then the air is admitted to the cylinder, and by means of levers the steel bands shove the board to the required position of the hood or carlin. After the piece is shaped it is placed on a form and slats are nailed in position.

Reclaimed Crank Case Oil for Curves and Switches

By LOUIS T. BORRO
Superintendent Maintenance of Way
San Antonio Public Service Company

AFTER considerable experimentation the maintenance of way department of the San Antonio Public Service Company has adopted the practice of using oil drained from automobile crank cases for oiling the curves and switches over its system. This oil has a very high lubricating value and is much more satisfactory than the crude oil formerly used. Its use has resulted in a saving of \$30 per month.

Corrections

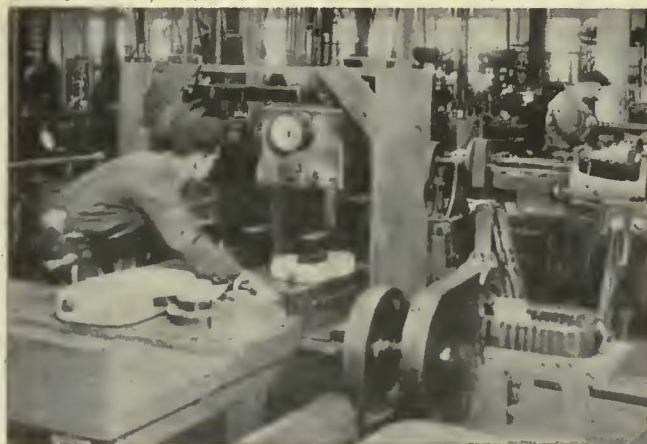
In the article "Spray Equipment Effective for Weed Killing" appearing on pages 104-105 of the February issue of this paper, it was stated that a speed of 40 m.p.h.

is required to discharge 472 gal. per mile of track. The figure 40 m.p.h. is a typographical error and should read 14 m.p.h.

On page 108 of the same issue, in the article "Combination Tie Plate for Various Rails," the phrase "tie plates in various sizes" should read "a combination tie plate" to fit the different rail widths.

Field Testing and Taping

TESTING field coils is considered of sufficient importance in the Cold Spring shop of the International Railway, Buffalo, N. Y., to have an especially designed testing outfit for this purpose. All coils are checked at some time between their final taping and their dipping. A first test is usually made when the coils come out of the motor; the second test after the coil is repaired and the third test after the coil has been dipped. A Peerless Equipment taping machine saves the labor of three men at 50 cents per hour, with a resultant saving of something like \$4,050 a year on the basis of a 54-hour week. The \$300, which represents the cost of the taping machine, is paid for a dozen times over, as a consequence.



Field coil testing device and taping machine used in Cold Springs shop of the International Railway, Buffalo, N. Y.

Advantages of Single-Motor Drive for Gas-Electric Buses

By C. A. ATWELL
Design Engineer

Westinghouse Electric & Manufacturing Company

GAS-ELECTRIC buses of recent design use either one, two or four driving motors. There are certain fundamentals in the design of a single motor of large capacity, however, which give it advantages over two or more motors of equivalent total capacity. These advantages are: less weight; less cost; more rugged construction; higher efficiency; less inspection and maintenance required and the use of simpler control and wiring allowed.

The decreased weight of one motor as compared to two or more motors of equivalent capacity is due to the requirement of less total active copper and iron to produce the same result, and also to the fact that the weight of the mechanical parts of the single motor is less than the total for the smaller motors. The net result is that the single motor weight is 15 to 20 per cent less than the weight of two motors which do the same service, and this percentage will be increased in a comparison of the single motor with four motors capable of performing the same service.

The manufacturing cost of the single motor is less, not only because of less total material used, but also because of the reduced number of manufacturing operations. It is easy to see that it will not take as much labor to wind one armature as it does to wind two smaller ones of approximately half the size.

Better mechanical construction can be obtained in the single motor because of the relatively larger parts throughout. This applies especially to the electrical windings. A single motor, for example, uses a single-turn armature coil while the usual motor for a dual drive equipment uses a two-turn armature coil. It is generally true that electrical apparatus of larger rating has higher efficiency. Comparison of existing single-drive and dual-drive bus motors shows the single motor to have between 2 and 4 per cent higher efficiency over the operating range. The point of maximum efficiency for the single motor is around 92 per cent, and for the dual-drive motor, 89 per cent.

Inspection and maintenance for a small motor require practically the same work as for a larger one; thus the amount of this item will be practically proportional to the number of motors. The bus wiring is simplified by the use of a single-drive motor as it is necessary to carry only one set of power cables from the controller to the motor.

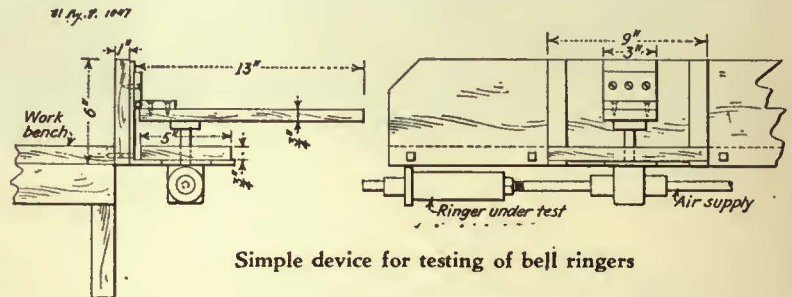
In general, it appears that the disadvantages of the single motor drive are: lack of the "motor series" connection; 1 to 1½ in. increase in bus floor height or decrease in ground clearance; inability to obtain independent traction on each driven wheel.

Opposed to these disadvantages are the six inherent advantages of the single motor already mentioned and, in addition, the weight and cost savings effected in the bus construction by the fewer number of motor supports, driving gears, propeller shafts and universal joints or couplings. Evaluation of these advantages and disadvantages for a gas-electric bus of given size and weight

to operate in a certain service should give a rather definite indication as to whether the single-motor drive should or should not be used.

Hand Lever for Testing Pneumatic Bell Ringers

TESTING pneumatic bell ringers is done by means of a simple and convenient device in the shop of the Richmond Railways, Staten Island, N. Y. This outfit was designed and constructed by Equipment Inspector Nicksie. A 1-in. x 6-in. plank is bolted to the end of the work bench. A standard foot valve and pin are



mounted on a ¾-in. x 5-in. x 9-in. plank which is supported by two 1¼-in. x 1-in. hangers fastened to the work bench plank. One side of this foot valve is connected to the air supply and the other side is supplied with a long nipple threaded on both ends.

The ringer to be tested is screwed on the end of this pipe. A tapered wooden handle, 13 in. long, ¾ in. thick, 3 in. wide on one end and 1 in. wide on the other, is hinged and fastened to the bench plank directly over the center of the valve plunger. Pressing down on this handle compresses the valve plunger, admitting air to the ringer under test.

Proper Fit of Brushes Reduces Chatter

By W. E. WARNER
Brentford, England

APART from mechanical vibration of the motor, brushes chatter from two causes, an uneven commutator surface or a bad fit of the brushes in their holders. If the micas stand above the segments the brushes are sure to vibrate, and sometimes with recessed micas vibration occurs also. This is caused by the sharp edges of the segments and can be prevented by filing a very slight bevel on the edges so as to present a rounded edge to the brush. It is desirable to sand the commutator after the micas have been recessed. If the brushes are badly fitted in their holders they will vibrate, although a certain amount of clearance is necessary to permit the free movement of the brush, which, however, should not be excessive. A well-fitted brush should slide freely up and down, although motion backward or forward is undesirable. When brushes do not fit properly and others cannot be procured, a practical remedy is to dust the edges of the brush and the inside of the holder with powdered flake graphite. This graphite will take up the clearance between the brush and the holder and take up the play, and not prevent free movement of the brushes.

NEWS of the Industry

LATE NEWS

Akron, Ohio—Approximately \$400,000 will be spent in Akron during 1930 by the Northern Ohio Power & Light Company looking toward a betterment of the railway lines and the improvement of car service.

New York, N. Y.—The Interborough Rapid Transit Company is to install a turnstile at the Grand Central Terminal station with a new type of gears, designed to eliminate noise. If successful the device will be placed on all turnstiles.

Louisville, Ky.—In police court, on Feb. 18, Robert Falls, seventeen years of age, was fined \$10 for hooking a ride on the back of a car of the Louisville Railway. Neil W. Funk prosecuted the case as head of the claim department of the railway. He cited numerous instances of boys and other persons who hang to street cars, and asked that an example be set in this case.

Albany, N. Y.—The New York State Automobile Association went on record on Feb. 25 opposing any increase in the motor fuel tax this year.

Indianapolis, Ind.—The Public Service Commission has approved a petition of the Peoples Motor Coach Company and the Pennsylvania Railroad to establish a new bus line between the Union Station in Indianapolis and the Hawthorne freight yards. The English Avenue route will be abolished as soon as the new line direct to the downtown district is started. The Peoples Motor Coach Company is owned by the Indianapolis Street Railway.

San Francisco, Cal.—The Key System Transit Company announced that deposits as of Feb. 14 indicate payments under subscription for new preferred stock of \$3,995,825 against required amount of \$3,500,000.

St. Louis, Mo.—The aldermanic committee on streets and sewers has approved a proposed ordinance for the widening of Broadway between Morrin Avenue and Switzer Avenue. The Broadway tracks of the St. Louis Public Service Company are to remain on the west side of the street. Alderman Kuhs informed the committee that neighborhood opposition to the tracks on the west side had been withdrawn. The railway said it would substitute buses for the street cars north of Taylor Avenue should it be required to undertake the costly work of placing the car tracks in the center of the widened street.

Washington, D. C.—The Federal Trade Commission resumed on Feb. 24 its hearing in connection with the financial phase of the public utilities.

(Late News Continued on Page 00)

Fares to Be Increased by Detroit Municipal Railway

New Cars, New Buses and Trackless Trolleys
Included in Program for Modernizing System—\$3,000,000 Increase in Gross Expected

A FLAT rate of 8 cents for both street car and bus fares with no charge for transfer has been voted by the Detroit Street Railway Commission to go into effect on March 15. The new rate is an increase of 2 cents for cash fares on the cars and a decrease of 2 cents in bus fares. It was passed by a vote of two to one, Commissioner Frank Couzens dissenting. The increase has been approved by Mayor Bowles. The fares charged on the department's de luxe buses will remain unchanged.

The new plan calls for selling four tickets for 30 cents or ten for 75 cents for use on either street cars or buses. The present rate on street cars is 6 cents cash fare or nine tickets for 50 cents. One cent is charged for transfer on street cars. No tickets are now sold on the buses, the cash fare being 10 cents with free transfer. Children will be allowed to ride on cars and buses for 6 cents.

Price, Waterhouse & Company, public accountants, estimate that on the basis of the relative number of cash and ticket riders carried on the system in 1929, and after making allowance for a possible shift in the trend of traffic from cars to

buses, it would appear that the suggested fare adjustments should produce in 1930 \$3,000,000 more in gross revenue than was produced in 1929, provided there is no decrease in the number of passengers carried.

General Manager Smith stated that the additional revenue derived from the increased fares will permit the department to expand its express service on several main arteries and will enable it to add approximately 200 units of rolling stock to present equipment this year. It is planned to retire entirely this year all of the department's single-truck cars and to add a number of buses to the present service, establish new routes, etc. Many substantial improvements will be made at once, but the full program of modernization is not expected to be completed for two years.

Mr. Smith said that within 30 days he can have all of the present rolling stock in good shape and can place 150 cars, now in the yards, back in service before March 15. The percentage of crippled cars is higher now than usual because shop forces were decreased due to losses in revenue during December and January. An endeavor was made to keep operating expenses commensurate with income.

In replying to the Mayor Mr. Smith said he was sure the 8-cent fare need not be continued in force longer than eighteen months or two years, because at the end of 1931 the department will have finished paying off its D.U.R. debt (approximately \$9,000,000), and other carrying charges

(Continued on Page 167)

COMING MEETINGS

March 11—Twelfth Annual Convention—Oklahoma Utilities Association, New Tulsa Hotel, Tulsa, Okla.

March 19-20—Illinois State Electrical Association, Illinois Gas Association, Illinois Electric Railway Association—Hotel Abraham Lincoln, Springfield, Ill.

March 28—Annual Meeting—Maryland Utilities Association, Willard Hotel, Washington, D. C.

April 9-10—Central Electric Railway Master Mechanics Association, Mansfield, Ohio.

April 29-May 1—United States Chamber of Commerce, Washington, D. C.

May 14-15—Association of Electric Railway Equipment Men, Middle Atlantic States, Scranton, Pa.

June 23-26—American Electric Railway Association, 49th annual convention, San Francisco, Cal.

July 23-25—Electric Railway Association of Equipment Men, Southern Properties, Nashville, Tenn.

Scope of Brady Awards Broadened

A new basis has been announced by the American Museum of Safety for the Anthony N. Brady Memorial Medals for 1929. Instead of requiring the presentation of a formal brief the contest will be judged upon the comparative showing of the electric railways in the various classifications as set forth in their accident statements submitted on the forms provided for the purpose to the American Electric Railway Association.

The committee on award will take into consideration also any supplementary statement or information bearing upon accident prevention or safety work received prior to the closing date, April 1, 1930. The winners will be announced at the A.E.R.A. convention in San Francisco in June. Under the conditions all electric railways which file the stipulated statements will be afforded an equal opportunity in their respective classes.

LATE NEWS

(Continued from Page 165)

Boston, Mass.—Postponement for two weeks has been ordered on hearing of the bill which would authorize the Eastern Massachusetts Street Railway to acquire the securities of the Boston & Revere Electric Street Railway, Winnisimmet Railroad, Boston & Chelsea Railroad and East Middlesex Street Railway.

Denver, Col.—The Denver Tramway Company has placed two more bus routes in service and abandoned the railway route operated from the Union Station far out into the Park-Hill district. The bus lines connect in the outlying residential district with other railway lines which start from the Union Station. This eliminates duplicate transportation throughout the business section of the city.

Springfield, Ill.—Realizing the possible need of future electrification, the Chicago & Illinois Midland proposes to purchase the Chicago, Springfield & St. Louis line from Springfield to Lock Haven, Ill., on condition that it can acquire a 200-ft. right-of-way in open stretches and 100-ft. around towns. With this same idea in mind, the Midland has acquired a 200-ft. right-of-way from Springfield to Peoria.

Los Angeles, Cal.—A petition has been filed with the Los Angeles Council to require the Los Angeles Railway to extend its West Adams Street line to Culver City. The same petition asks that the line of the company be extended to Moynier Lane.

Ithaca, N. Y.—The Public Service Commission has authorized the Ithaca Railway, Inc., to exercise a franchise from the city for the operation of its trolley line in that city. On Dec. 5 last the commission denied a like application because the company had not applied to and received approval from the commission for the reorganization of the Ithaca trolley line. The reorganization was approved on Jan. 23 last.

Richmond, Va.—An investigation into a revision of rates in the interest of increasing travel on the line will be undertaken by the Richmond-Ashland Electric Railway. President Zimmer reports that traffic has improved in recent months and that it now appeared that the company would be able to meet the interest on its bonds in July. Because of the extraordinary expense connected with repairs and a loss of traffic while this work was under way, the company defaulted its interest payment on Jan. 1. To bring about a closer relationship between the company and people living in the territory served by the line, J. A. Schermerhorn and J. R. C. Brown have been added to the board.

Boston, Mass.—Differences of opinion between the city and the Boston Elevated Railway over the question of financing a subway under Governor Square appeared just as pronounced as ever before the legislative committee on metropolitan affairs at the recent hearing, but Henry I. Harriman, chairman of the Elevated board of trustees, sug-

gested that the committee appoint a sub-committee to meet with the trustees and the Mayor with a view to bringing about an agreement so that legislation could be passed at the present session. The burden of Mr. Harriman's argument has been that the Elevated road could not meet the entire cost of rental, which is \$135,000 a year on the \$3,000,000 relief project.

New York, N. Y.—The Pennsylvania Railroad's proposal to establish bus transfer service at Newark and New York has been assigned by the Interstate Commerce Commission for hearing on March 26. The commission previously had suspended operation of the tariff filed by the Pennsylvania to meet the competition of the Baltimore & Ohio. The commission has not formally announced whether the investigation incident to the Pennsylvania's tariff will also include the Baltimore & Ohio's practice, inaugurated several years ago without authorization from the commission, but it is probable that the legal status of the Baltimore & Ohio's policy will be brought into the issue at the hearing.

Kansas City, Mo.—The limited-stop plan of street car operation will be applied to several more lines by the Kansas City Public Service Company. Streets on which lines involved in the change now operate have been made safety stops for intersecting vehicular traffic. An actual check on lines to which the skip-stop plan has been applied shows a saving in time of from 18 to 25 per cent. Under the plan, stops usually are made at every other block on north and south streets, and every third block on east and west streets. The plan aims at passenger stops from 1,100 to 1,200 ft. apart.

Youngstown, Ohio—The Youngstown Municipal Railway has asked permission of the state Public Utilities Commission to buy the Park & Falls electric line, 3.8 miles long, for \$575,333, to be paid for with a 7 per cent promissory note. The West End Company has asked authority to buy the Youngstown-Sharon interurban line, 13.6 miles in length, for \$2,133,978, to be paid for by a 6 per cent promissory note.

Fishkill, N. Y.—The Fishkill Electric Railway has applied to the Public Service Commission for permission to substitute buses for street cars in Fishkill. The municipal authorities have consented to the substitution. It is proposed to operate buses along the Beacon-Fishkill road from the Beacon city line through Fishkill township and village to the eastern terminus of the present trolley line.

Louisville, Ky.—A plan to sell two power plants and all substations of the Louisville Railway to the H. M. Byllesby Management & Engineering Company for \$3,000,000 and an underwriting of \$3,000,000 in refunding bonds by a local syndicate have been suggested as a means for the refinancing of \$6,000,000 in first mortgage 6 per cent bonds due on July 1, 1930. The proposal for the

sale of the power plants is not a new one, but the prospects for the consummation of the deal would appear to be good, particularly since it is understood that rates for purchased power as recently suggested come closer to meeting the ideas of the railway management than any that have heretofore been suggested.

Cascadia, Wash.—The Oregon Electric Railway's project to build a line from Albany to Cascadia, Wash., 40 miles, has been modified to provide for joint use of the Southern Pacific's line between Albany and Lebanon. The rest of the project, which includes three branch lines, will be carried out as originally planned in the application submitted to the Interstate Commerce Commission by the Linn County Logging & Lumber Railway. The application has been amended accordingly and the Southern Pacific has withdrawn its opposition to construction of the line, which will tap extensive timber lands on the west slope of the Cascade mountains.

St. Louis, Mo.—Bids are being taken on the concrete substructure for the Illinois Terminal Railroad's new elevated line in St. Louis to connect the McKinley Bridge with the proposed subway under Twelfth Street between Cass Avenue and the new freight and passenger terminal at Twelfth Street and Lucas Avenue. President Fischer, of Illinois Terminal, says the steel for the superstructure is being fabricated. Excavating for the 3,000-ft. subway portion will be started as soon as the elevated line has been installed and the city has completed condemnation of property needed to widen High Street to a 100-ft. boulevard. Two tracks will be installed in the subway, but it is designed to care for six tracks eventually.

Ottawa, Ont.—Red Line, Ltd., has appealed to the Second Divisional Court at Toronto against a judgment of Magistrate Hopewell of Ottawa who fined it \$10 and costs for unlawfully competing with the Ottawa Electric Railway within the city limits in carrying passengers. Appellant operates a sightseeing bus from the Chateau Laurier under agreement with the hotel, charging \$1 per head. The Ottawa Electric Railway also operates a sightseeing bus line along the same route.

New York, N. Y.—Stockholders of the Commonwealth & Southern Corporation, Allied Power & Light Corporation and Penn-Ohio Edison Company approved on Feb. 10 a plan of merger and consolidation of the Commonwealth & Southern Corporation, Allied Power & Light Corporation, Commonwealth Power Corporation, Penn-Ohio Edison Company and Southeastern Power & Light Company, and specifically approved the agreement of merger and consolidation of the three companies incorporated in Delaware, namely: the Commonwealth & Southern Corporation, Allied Power & Light Corporation and Penn-Ohio Edison Company, thus completing the first and most important step in the simplification of the corporate structure of the Commonwealth & Southern System. Stockholders of the Maine corporations, namely, Commonwealth Power Corporation and Southeastern Power & Light Company, over 96 per cent of the common stock of which is already owned by the Commonwealth & Southern Corporation, will meet later.

Progress Reported on Washington Merger Legislation

After having decided to separate the section pertaining to court appeals from the resolution permitting the Washington railways to merge, the Senate District committee has announced that action on the merger proposal will be deferred until disposition has been made of the court section. Under the present arrangement, the section formerly attached to the merger agreement, which limits the right of utility companies to appeal to the courts in rate cases, will be handled as an amendment to the utility act. It is contended by the utility commission that under the present law the companies can submit matters of fact as well as matters of law to the courts.

Meanwhile, practically every section of the bill has been agreed upon by the committee. There is some dispute, however, over the rates of fare for school children. Although the amendment relating to court appeals on rate cases will be reported out first, both of the bills will be placed together on the Senate calendar.

Under the terms of the merger bill, the lines of the Westinghouse Railway & Electric Company and the Capital Traction Company will be consolidated as the Capital Transit Company. The bus properties of the Washington Rapid Transit Company also will be acquired by the new organization. It is also provided that the rates of fare in effect on Aug. 1, 1929, shall remain unchanged for a period of

two years after the consummation of the merger. The companies are relieved of their present burden of paying the expenses of traffic policemen at street railway crossings and intersections. In addition, instead of being compelled to pay the entire cost of maintaining the paving between the rails and for 2 ft. outside of the outer rail, the new company will only have to pay one-fourth of this expense.

New Franchise Proposed for Rochester

The New York State Railways, Rochester Lines, now in receivership, and the city of Rochester have reached an agreement whereby the service-at-cost contract, controlling railway operations, may be continued to Aug. 1. Meanwhile a new contract will be drafted to supplant the present one, voided automatically with the receivership.

The railway acceded to demands of the Council that a 5-cent fare be established for school children and that tickets be sold on electric cars and buses at a rate of six for 50 cents or twelve for \$1. The straight fare is 10 cents.

Changes in New York Utility Regulation Recommended

Two reports have emanated from the commission on revision of New York state utility laws. Of these reports, that prepared by Colonel Donoyan, counsel to the commission, proposes a revision of the New York statutes which would recognize

the established law of the land regarding valuation. He recommends further that the Public Service Commission be given the legal powers and facilities it needs to effect real regulation, based upon adequate research of its own and including supervision of utility accounting and finance. These provisions he would supplement by a declaration of legislative policy favoring voluntary agreements between the commission and the service companies for rate regulation through accounting control, in the hope of reducing the great volume of protracted and unsatisfactory litigation over rates.

Professor Bonbright and Frank P. Walsh, two of Governor Roosevelt's three appointees, declare for enactment of the "prudent investment" theory of valuation. They embrace the idea of duplication of gas and electric plants and distributing systems by municipalities, if only as a means of compelling the companies to "help rather than hinder regulation in order to retain the private ownership method," and favor creating a so-called people's counsel. Continuation of the existing situation, say the Governor's appointees, will inevitably present government ownership in some form as the only solution, but they hasten to add that "we do not feel that public opinion is yet ready for that alternative."

Detroit Fares to Be Increased

(Continued from Page 165)

will also be much reduced by reason of the added revenue. The last installment on the D.U.R. purchase debt is due Dec. 31, 1931. The clearing up of this obligation will release more than \$2,000,000 annually to the department.

On Feb. 19 Mr. Smith announced that the purchase of 150 new street cars, 125 motor coaches, installation of express railway service on Fort Street and Michigan and Hamilton Avenues, and rebuilding of tracks on several lines, will be among the first improvements undertaken by the Department of Street Railways, under the fare increase. In addition, the first installation of trackless trolleys will be effected at an early date on Plymouth road.

The new trackless trolley line is to be about 3½ miles long. The new cars will be of the Peter Witt type, and the majority of the new coaches will be of the single-deck street car type.

Auditor Morgan says that despite the increase in fares the department, if it insists upon purchasing 125 new cars and 125 motor coaches, may find itself in debt again. He said:

"I can not say whether we will actually be in debt until the budget has been made up and careful estimates prepared. In the D. S. R. budget there is an item of \$2,530,000 for 100 street cars and 75 motor coaches. The department has wanted this additional equipment for a year but I opposed it because the money was lacking. If the funds are not in sight in the future, I will continue to oppose the purchase of this equipment."

According to Mr. Morgan the fare increase is necessary to take care of past accruing deferred maintenance and to set up a depreciation reserve with which to meet future replacements of worn-out equipment.

The D. S. R. is including \$7,000,000 in bonds in its new budget. This, Mr. Morgan said, is to take care of "past neglected maintenance" and to take up \$3,000,000 in short time obligations which are now on a 6 per cent interest basis. The new bonds will reduce this charge to 4½ per cent.

Arrange Your A.E.R.A. San Francisco Itinerary Now!

American Electric Railway Association headquarters has just mailed to all members a handsomely illustrated brochure covering the three special trains for the San Francisco convention—a red, a white, and a blue. The first two trains provide for travel through some of the most picturesque points in the country. The blue special is a fast train for those whose time is limited. All prospective passengers must determine their return routing when tickets are purchased for the going trip in order to take advantage of the special round-trip summer tourist rates. Return tickets are good until Oct. 31. Intending passengers are asked to consult their local railroad ticket agents. A special railroad travel expert will also be glad to discuss plans for the entire trip, make up a definite itinerary and procure accommodations. No charge is made for this service.

June is a month of particularly heavy travel, and in order to secure the newest and most up-to-date equipment the committee should know well in advance the number of persons for whom accommodations are to be arranged on each train. The letter and the confirmation blank enclosed with each booklet contain instructions as to how to arrange for the trip.

A.E.R.A. delegates are October minded so far as the American Electric Railway Association convention is concerned. The convention this year takes place in June, three months earlier than usual.

The hotel committee has issued a circular giving hotel rates and instructions about securing accommodations in San Francisco. Delegates should communicate with Chair-

man Heise at the address shown in the hotel folder. For the convenience of those who intend to visit Los Angeles for the special two-day program to follow the convention, the committee will have a representative at the registration desk in San Francisco. A stopover for a day at Portland, where they will be entertained locally, is planned for the white special enroute to San Francisco. As in the past, railroad and Pullman representatives will have a headquarters at the registration desk to validate tickets.

The West Coast entertainment committee will shortly announce its program for the entertainment of delegates.

It is fifteen years since A.E.R.A. delegates and their ladies have had an opportunity to visit California for a convention.

Get Set for San Francisco

PRESIDENT SHOUP extends a most cordial invitation to come to California next June. The West Coast committees under W. V. Hill, manager of the California Electric Railway Association, as general chairman, are sparing no pains to help make this one of the most memorable of association conventions. The officers and the executive committee are enthusiastic and hope for a large delegation. They join with President Shoup in extending a cordial and hearty welcome to all delegates, their families and guests.

South Bend System Reorganized

New Company Formed to Take Over Chicago, South Bend & Northern Indiana Railway and the Southern Michigan Railway

WITH the approval of the federal courts on Feb. 11, one of the final steps was taken in lifting the receivership of the Chicago, South Bend & Northern Indiana Railway and the Southern Michigan Railway. A new company known as the Northern Indiana Railway, Inc., will take over the assets of both the former companies. It is believed that under the new capital plan it will be possible to rehabilitate the properties, add new rolling stock, and extend the lines to take care of the expanding requirements for transportation of the communities the company serves.

Faced with continued losses in riding due to competition from the private automobile, the Chicago, South Bend & Northern Indiana Railway was forced into receivership in July, 1927. In December of the same year its affiliated property, the Southern Michigan Railway, also went into receivership. In both cases R. R. Smith, vice-president and general manager of the companies, was named receiver by the federal courts. Attempts made previously to effect voluntary reorganization were found to be impractical. It was believed, however, that a plan of reorganization could be formulated which would provide a financial set-up making it possible to continue operations on a basis where capital and credit could be attracted and the properties rehabilitated.

OLD FINANCIAL SET UP UNWIELDY

Under the financial set-up prior to the receivership there were three underlying mortgages in addition to the Chicago, South Bend & Northern Indiana Railway mortgage. Of these three prior liens, the first underlier, the Indiana Railway first mortgage, with principal maturing on Jan. 1, 1930, has paid interest regularly. The properties were, therefore, sold subject to this mortgage, which is being extended for six years during which a sinking fund will retire the bonds. The old funded debt was as follows:

Indiana Railway first mortgage 5's, \$426,000.

Northern Indiana Railway first consolidated mortgage 5's, \$558,000.

LaPorte & Michigan Traction Company first mortgage 5's, \$312,000.

Chicago, South Bend & Northern Indiana Railway first mortgage 5's, \$3,089,000.

Funded debt on the property of the Chicago, South Bend & Northern Indiana Railway totaled \$4,415,000. In addition there were \$2,500,000 in 5 per cent non-cumulative preferred stock and \$5,000,000 in common stock.

Funded debt of the old Southern Michigan Railway was as follows:

South Bend & Southern Michigan Railway first mortgage 5's, \$536,000.

Southern Michigan Railway first consolidated 5's, \$395,000.

This made a total of \$931,000 in bonds.

Up to Jan. 1, 1930, the funded debt of the Chicago, South Bend & Northern Indiana Railway was \$598,350 in arrears on interest. This accrued interest is being so adjusted in the reorganization that with the bonds on both properties the total funded indebtedness amounts to \$5,944,350.

Under the new set up, the Northern Indiana Railway, Inc., will have the following capitalization:

Indiana Railway first mortgage 6's, \$426,000.

Northern Indiana Railway first mortgage 5's, \$1,533,085.

No par common stock to the amount of 100,000 shares.

This compares with the old capitalization of \$5,944,350 in bonds and \$5,000,000 in common and \$2,500,000 in preferred stock.

After six years, when the \$426,000 in Indiana Railway bonds has been paid off through the sinking fund, the funded debt of the new company will be \$1,533,085.

The newly organized Northern Indiana Railway, Inc., will control and operate the railway and bus lines in South Bend, Mishawaka, Elkhart and Michigan City and the interurban lines connecting South Bend, Elkhart and Goshen; South Bend, LaPorte and Michigan City, and South Bend, Niles and St. Joseph.

The local lines in South Bend and Mishawaka, cities which adjoin and have a population of 135,000 people, operate on thirteen different routes. They serve the Studebaker Corporation, the Oliver Farm Equipment Company, Bendix Aviation Company, Mishawaka Rubber & Woolen Mills and a large number of other manufacturing industries. Operation in South Bend covers approximately 49 miles of track and the bus lines operate over 16 miles of streets.

The city street car fare is 7 cents cash, four tokens for 25 cents. The bus fare is 10 cents cash or three tokens for a quarter. An additional charge of 2 cents is made on transfers issued from street cars to buses.

In Elkhart, with approximately 35,000 people, the cars operate over approximately 14 miles of track. In addition a bus line covers a section of Elkhart not served by rail. Here also transfers are issued between cars and buses.

In Michigan City, with 30,000 people, the

cars operate over 7 miles of track, serving the Pullman Car Company, the Sullivan Machine Company and other industries.

The interurban lines operate in three directions from South Bend. They serve a thickly populated district from which many passengers commute to the cities through which these lines pass. Freight is moved over these lines. On the line east of South Bend, connections are made with electric lines serving the Central Electric Railway territory with freight service, direct connection by electric lines being afforded to the Ohio River at Louisville and Cincinnati, with through tariffs with steam roads operating in the southern territory.

The interurban line north of South Bend connects with the Michigan Central Railway south of St. Joseph, Mich., and through tariffs are afforded from points on this division to all steam roads in the Central Freight Association territory.

PLANS ADDITIONS TO TRACK AND ROLLING STOCK

Arrangements have been made to issue treasury bonds to finance additions and extensions required by the growth of South Bend and other communities served. Funds also will be obtained to rehabilitate the present rolling stock and to purchase ten new interurban and ten city cars under the car trust equipment method.

"Jim" Barnes Complimented by Louisville Employees

On the occasion of his tenth anniversary as president of the Louisville Railway on Feb. 11, James P. Barnes was the guest at a banquet in his honor. Five hundred members of the Louisville Railway family gave their chief a rousing ovation. Neill Funk, claim agent of the company, acted as toastmaster. He paid high tribute to Mr. Barnes as an organizer and executive, hailing him as "one of the finest men who has ever been connected with a transportation company in America."

After representatives of various departments had paid individual tribute to their chief, Mr. Barnes spoke briefly but feelingly. He told the employees that everything that had been accomplished had been due to their efforts; that his direction had been only incidental. He recalled that the company had won the Brady Award for safety several years ago and had twice received honorable mention in that contest. He said that the day-to-day friendly co-operation extended to him had been a real inspiration, responsible in large measure for any success the company had attained.

New Terminal Planned in Uniontown, Pa.

Plans for the new building to be occupied by the West Penn Railways in Uniontown, Pa., have been completed and work will be carried through to completion as rapidly as possible. The building is to be 140 ft. long, 50 ft. wide and two stories high. It will be finished in ornamental brick.

West Penn Railways will use part of the first floor for waiting room facilities and offices for the dispatcher and superintendent. On the second floor will be offices, as well as quarters for train crews. The railway track will form a loop around the building so that incoming cars will circle the terminal to discharge and pick up passengers from a platform protected by an overhanging roof.

Planning Wisely for Cleveland's Future

ONE virtue of the Cleveland Railway's plan to embrace the whole county in a single transportation system is that it will encourage Cuyahogans outside the parent city to think in terms of metropolitan development. The transportation future of this community is bound to the policies of the Cleveland Railway to a degree sometimes not understood. Reports submitted to the railway indicate that good service is considered by passengers more important than low fare. It is illustrated in the case of the 25-cent express bus line now serving a small area of the Heights. Speed and comfort outweigh in importance the amount asked at the fare box. If the company can deliver passengers downtown—where most of them want to come—quickly and in comfort at a reasonable rate of fare it will find its chief difficulty surmounted. The county should think in terms of metropolitan living.—*Cleveland Plain Dealer.*

Providing Rapid Transit a City Responsibility

Negotiations are under way to fund the \$3,690,284 floating debt of the Cincinnati Street Railway. So Walter A. Draper, president, told stockholders in his annual report made on Jan. 29. Mr. Draper's report showed a total capital value as of Dec. 31, to be \$34,996,240. The value of property fixed by city ordinance on Nov. 1, 1925, was \$27,000,000. Additions and betterments since that year total \$6,887,659.

Choosing the topic, "Looking Ahead," Mr. Draper said in part:

"In many cities the problem of local mass transportation has reached a status requiring pointed consideration and readjustment. Opinions may differ as to the transportation of the future.

"There is no doubt that private facilities have carried an increasing number of people each year. But some public transportation always must be ready to serve, and it is necessary for the modern operator to endeavor to provide facilities that will most readily meet requirements and at a reasonable cost.

"If transportation companies cannot provide the capital necessary for constructing subways and other forms of rapid transit, the municipality will be required to aid in providing facilities. In New York, Philadelphia, Boston, and other cities various forms of municipal assistance have been



Overcoats were much in vogue at the recent Birmingham, Ala., meeting of the Association of Equipment Men, Southern Properties, as evidenced by this view showing the delegates wading through 5 in. of snow on the grounds of the Continental Gin Company. Following a visit to the Birmingham Electric shops, the group went to the cotton gin plant for an inspection trip and luncheon as guests of Tom Elliott, president of the company and for several years previous an executive of the Cincinnati Car Company

extended, ranging from actual municipal ownership to the payment of subsidies of some nature.

"The form of contract existing between the Cincinnati Street Railway and the city lends itself readily to the working out of the problem as may be found necessary and best.

"The present transportation system with

addition of cars from time to time is adequate to care for many more passengers than now are carried. Nevertheless, new forms of rapid transit service are being urged. The substitution of such additional facilities could not be undertaken by this company without costs too great for the users of the service to bear. The extent to which the city could participate in providing rapid transit would depend entirely upon the plan that was to be followed.

"It is hoped the fare which has continued more than four years will provide funds sufficient to meet all requirements. Should the fare control fund, however, be materially reduced, there are several ways of helping to meet the situation. One would be to have the city relieve the company of all charges that still are imposed as burdens on the car riders. Another would be to have the city, with its ability to raise money at a low rate of interest, provide certain facilities to be used by the transportation system. A charge for transfers is becoming more general throughout the country."

Ideas for Selling the Service

Inspiration for electric railway advertising men was furnished at a recent sales meeting of the Procter & Gamble Company, Cincinnati, world famed makers of Ivory soap. The advertising department desired to impress the sales force pictorially with the strength of street car advertising as used by the Procter & Gamble Company to advertise its products and reinforce the efforts of the sales department.

Four large posters, two of which are reproduced herewith, were prepared by Barron G. Collier, Inc., and were loaned to the Procter & Gamble Company for this meeting. The original posters were brilliantly produced in color, making them extremely effective. They were 40 in. high and 24 in. wide. The novel comparisons employed suggest interesting copy for selling local transportation.

At 2,990 passengers per trip, it would take 166 LEVIATHANS to carry the car riders using Cincinnati's Street Cars every day . . .

Car Riders in Cincinnati. 496,497 daily

Roxy Theatre, New York seats 6,200 people

Atlanta, Ga. would need 43 Roxy's to accommodate at one time all its daily street car riders . . .

Atlanta Street Cars carry 267,160 daily

Rerouting Plan in Omaha Changed

As a result of dissatisfaction with the rerouting of the Omaha & Council Bluffs Street Railway, Omaha, Neb., which went into effect in December, a new plan has been determined by company officials to go into effect on March 2 for 60 to 90 days.

The new plan attempts to satisfy complaints made ever since the Harris rerouting plan was put into effect. Demands of Thirteenth Street property owners, who ask resumption of tram service on this street, have not been met, but President Shannahan has promised to endeavor to work out a satisfactory solution. Mr. Shannahan said: "The company is willing to give the city anything in the way of transportation it wants, providing it pays the bills. Rerouting has not proved the saving in expense anticipated. Any increased service now will only add to the company's deficit. If the commissioners will join with the company in applying to the state railway commission for better service, and if the city is willing to pay for it, we shall gladly join."

Novel comparisons made in Procter & Gamble (Ivory Soap) advertising suggest copy for selling local transportation

Unification Bill for New York City Introduced

A bill amending the public service commission law of New York State setting up a board of transit control in the city of New York was introduced in the New York State Senate and the Assembly on Feb. 25 by the minority leaders, Bernard Downing and Irwin Steingut. The measure represents the views of the city of New York on how unification of transit facilities can be brought about. Among other things it guarantees a 5-cent fare which would be maintained, in case of a deficit in operation, by the taxpayers of the city of New York. The bill is accompanied by a statement of the minority leaders. A similar bill introduced in 1928 and again in 1929 failed to be reported in either house. It is not thought likely that the measure which has now appeared will be reported this year.

Window Wipers for Providence Cars

Recently the United Electric Railways, Providence, R. I., appropriated sufficient money to equip all of its street cars with window wipers. For some time the company has realized that operation without window wipers during stormy weather was unsatisfactory, hazardous and not consistent with safety promotion work among the employees.

Experiments were made with several window cleaners, and a wiper has been selected which will keep the glass clean during rain and snow storms and will remove sleet. The window wiper is manually operated by a hand lever near the top of the window. The operator pulls this lever and the wiper sweeps the width and length of the window, cleaning it all in one movement. Up to Feb. 15, 28 cars had been fully equipped. Wipers are on hand sufficient to equip more than 100 cars within a few weeks. It is hoped that every car on the system will be equipped by March 1.

Simpler Car Parts Proposed

O. C. Wright, superintendent of equipment of the St. Louis Public Service Company, St. Louis, Mo., in an address before the February meeting of the Birney Club, called attention to the weight of accessories on the ordinary car. A pointed question asked by the speaker was if anyone ever heard of a street car, even if it was 30 years old, which during its entire life ever had anything taken off of it. He also questioned if apparatus designed to be used on a street car was worked out in conjunction with the car body or other parts to which it is to be attached.

A little-known fact brought out by the speaker is that for the purpose of taking power from the trolley through the motors to the ground and through the auxiliary apparatus on a modern car 50 ft. long, approximately 2,500 ft. of copper wire of various sizes is used. Some 400 ft. of pipe,

or eight times the length of the car, is used to provide air brake and power door operation. Most of this consists of expensive copper tubing.

Additions of one kind or another to the equipment, Mr. Wright believes, run the cost of the modern car up to figures almost prohibitive, increase the weight, and make the operation more complex and the maintenance more difficult. He believes the time is opportune to wipe the slate clean and develop a design of a railway vehicle in which all component parts will be worked out, each in its proper relation to the other. He believes that if this plan is followed, it should be carried forward with the initiative supplied by the operator and concurred in and supported by the car builders and manufacturers of car equipment.

Protest Against Competitive Service Sustained

Setting aside a decision handed down by the Ohio Public Utilities Commission last June, the Ohio Supreme Court has ordered the Salisbury Transportation Company to return to a two-hour schedule, sustaining a protest filed by the Stark Electric Railroad against the increased service.

The two companies operate between Alliance and Canton, Ohio. The Stark Electric operates interurban cars while the Salisbury company operates buses along a route part of which parallels the Stark Electric tracks and part of which is several miles from the railway.

Last summer the state commission authorized the bus company to use two buses on an hourly schedule. The Stark Electric said the increased service was not necessary. When its protest was ignored the Stark Electric appealed to the Supreme Court.

Conspectus of Indexes for February, 1930

Compiled for Publication in ELECTRIC RAILWAY JOURNAL by

ALBERT S. RICHEY

Electric Railway Engineer, Worcester, Mass.

	Latest	Month Ago	Year Ago	Last Five Years	
				High	Low
Street Railway Fares* 1913 = 4.84	Feb., 1930 7.87	Jan., 1930 7.85	Feb., 1929 7.75	Feb., 1930 7.87	Feb., 1925 7.24
Electric Railway Materials* 1913 = 100	Feb., 1930 142.9	Jan., 1930 144.4	Feb., 1929 145.0	Dec., 1926 159.2	Feb., 1928 139.5
Electric Railway Wages* 1913 = 100	Feb., 1930 231.7	Jan., 1930 231.3	Feb., 1929 229.9	Feb., 1930 231.7	Feb., 1925 221.0
Electric Ry. Construction Cost Am. Elec. Ry. Assn. 1913 = 100	Feb., 1930 203.9	Jan., 1930 204.5	Feb., 1929 205.2	Nov., 1928 205.7	July, 1929 199.0
General Construction Cost Eng'g News-Record 1913 = 100	Feb., 1930 206.5	Jan., 1930 209.0	Feb., 1929 210.4	Jan., 1927 211.5	Nov., 1927 202.0
Wholesale Commodities U. S. Bur. Labor Stat. 1926 = 100	Jan., 1930 93.4	Dec., 1929 94.2	Jan., 1929 97.2	Nov., 1925 104.5	Jan., 1930 93.4
Wholesale Commodities Bradstreet 1913 = 9.21	Feb., 1930 11.51	Jan., 1930 11.68	Feb., 1929 12.98	Dec., 1925 14.41	Feb., 1930 11.51
Retail Food U. S. Bur. Labor Stat. 1913 = 100	Jan., 1930 155.4	Dec., 1929 158.0	Jan., 1929 154.6	Nov., 1925 167.1	Apr., 1925 150.8
Cost of Living Nat. Ind. Conf. Board 1914 = 100	Jan., 1930 160.4	Dec., 1929 162.0	Jan., 1929 160.9	Nov., 1925 171.8	Apr., 1929 159.3
Industrial Activity Elec. World, kw.-hr. 1923-25 = 100	Jan., 1930 121.8	Dec., 1929 116.4	Jan., 1929 132.5	Feb., 1929 140.4	Aug., 1925 94.3
Bank Clearings Outside N. Y. City 1926 = 100	Jan., 1930 95.2	Dec., 1929 98.6	Jan., 1929 108.7	Oct., 1929 111.8	Nov., 1926 94.0
Business Failures Number Liabilities, Millions of Dollars	Jan., 1930 2368 78.55	Dec., 1929 1827 67.38	Jan., 1929 2184 56.19	July, 1929 1581 102.09	Sept., 1928 1348 23.13

*The three index numbers marked with an asterisk are computed 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 motormen, conductors and operators on 136 of the largest street and interurban railways operated in the United States, weighted according to the number of such men employed on these roads.

A Source of Facts on Track

"Uniform Paved Track" is the title of the new, enlarged third edition of the "Paved Track Notebook" issued by the International Steel Tie Company, Cleveland, Ohio. In it previous data are brought up to date. The addition of a wealth of new material makes this handbook 25 per cent larger, more interesting, more useful.

The mortar-flow principle, the improved method of concreting paved track with the revolutionary "Mortar-Flow Pulsator" is fully explained. Details of how best to install compressed concrete paving, and of how to use the new vibrated grout method of construction for early service are given.

Research results on concrete and steel bond are presented for the first time. Modernized twin ties with the new "Precision" rail clip and heat-treated bolts are completely described.

Two new types of track construction are shown. Paved track design is discussed from the executive's viewpoint.

Unit pressures on the subgrade with concrete foundation and stone ballast are compared. A new section has been added on waterproofing the track structure and subgrade drainage.

Initial cost comparisons are given for typical installations. A table of units of track work per man-hour on more than 60 miles of track, permits application of these data to local conditions.

A reference section with notes on concrete, and a convenient table of cubic contents of typical track trenches completes the "Uniform Paved Track Notebook."

Decision Reserved in Buffalo Fare Case

Federal Judge Hazel in United States District Court at Buffalo, N. Y., has reserved decision on the application of the International Railway for appointment of a three-judge court to fix a valuation figure upon which fares may be based. The railway seeks a 10-cent fare in Buffalo and increased fares in Niagara Falls and Lancaster. Judge Hazel indicated that he would give the cities in which increased fares are asked sufficient time in which to prepare for the suit. It also was indicated that the court would like to have the railway take its case back to the commission.

Another Fare Proposed in Columbus, Ohio

A 7-cent cash fare with five tickets for 35 cents has now been proposed by the Columbus Railway, Power & Light Company, Columbus, Ohio, but the City Council has voted to postpone action on the proposal. The company has been operating without a franchise since 1926, but has kept the fare at 6 cents cash since that time.

\$1,250,000,000 for New York's New Rapid Transit Lines

The 1929 annual report of the New York Transit Commission emphasizes progress in grade crossing elimination during the year, mentioning particularly the fact that plans have been agreed upon for doing away with "Death Avenue" in New York City as part of the West Side improvement.

It also mentions prominently settlement of a large number of disputed accounting items as a result of which the Interborough Rapid Transit Company paid New York City \$6,291,118 on account of accrued deficit up to June 30, and \$2,309,696 thereafter, and also put \$2,958,881 into the depreciation fund for the period up to June 30, and \$500,000 for the succeeding six months.

Of the new subways, the report says that although parts of the Eighth Avenue system are to be in operation in 1931, the commission's estimates of traffic are so large that already East Side trunk lines are being planned; the city's investment in existing subways is \$380,000,000; the Eighth Avenue system is to cost \$650,000,000 and the other new lines are to cost \$600,000,000 more.

The report traces the progress of the Interborough 5-cent fare litigation during the year. The commission says that this is-

sue "involved a tremendous amount of work, attracted national attention and engaged the leading lawyers of the country," and remarks that it "was most fortunate" in having as its chief counsel Samuel Untermyer, who, with his son, Irwin, "successfully upheld the contentions of the commission and the city on the contract" and performed all of these services without charge.

Engineers Inspect Cleveland Terminal

Inspection of the electrification being installed for the operation of the steam railroads entering Cleveland as operated by the Cleveland Union Terminals Company was the feature of the meeting of the committee on heavy electric traction of the American Electric Railway Engineering Association held on Feb. 19.

Following a short business meeting, luncheon was served in the rooms of the Cleveland Association of Commerce. The party was then taken over the terminal building, the electrified tracks and the locomotive repair shops. The meeting and trip were arranged by W. E. Huber of the Electric Railway Improvement Company and L. W. Birch of the Ohio Brass Company. It was made possible through the courtesy of Messrs. Jouett and Pinkerton of the Terminal Company.

Members who were present included L. C. Winship, chairman; H. F. Brown, C. H. Jones, K. T. Healy, Mr. Billau representing J. H. Davis, J. S. Hagan, O. E. Staples representing S. B. Cooper, E. P. Chase representing J. V. B. Duer, W. E. Huber, F. W. Butt, A. H. Daus, Morris Buck, J. M. Bosenbury, L. W. Birch, H. H. Febrey, J. T. Hamilton, W. M. Vandersluis, J. S. Thorp and G. I. Wright. Guests present included Messrs. Bovard, Pierce, D. H. Moore, E. B. Moore and Tieterman.

Brady Medals Awarded at Meeting in New York City

In the presence of members of the Metropolitan Section, A.E.R.A., and visitors from other cities the Anthony N. Brady Memorial Awards for safety of operation during the year 1928 were presented at the Engineers' Auditorium, New York City, on Feb. 7. Edward Dana, general manager, Boston Elevated Railway, accepted the gold medal for cities of the first class. He brought with him to share the honors five operators, one chosen from each division of the property because of outstanding accom-

plishment in safe operation over a period of years. The Tampa Electric Company, winner for the second time of the silver medal for cities in the second class, was represented by Superintendent Sheridan and two operators. The bronze medal for cities in the third class, was again awarded to the Tide Water Power Company, Wilmington, N. C. Honorary mention went to the Louisville Railway and to the El Paso Electric Company.

Charles Gordon, managing director, A.E.R.A., addressed the meeting. He said that accidents to passengers on electric railways are decreasing steadily. Only one passenger out of every 280,000,000 carried last year was fatally injured. This record was made possible by an unceasing and aggressive campaign of accident prevention in which the electric railways are constantly engaged.

An inspiring address by Harry Cordell, master mechanic, Chicago, North Shore & Milwaukee Railroad, was a feature of the meeting.

First Serious North Shore Accident in Ten Years

Eleven persons were killed and many were injured when a Chicago-bound passenger train of the Chicago, North Shore & Milwaukee Railroad struck an automobile at a grade crossing just north of Kenosha late on the night of Feb. 23 and was derailed.

The automobile was hurled directly into the path of a northbound freight train, as the five cars of the passenger train left the track.

The first car of the passenger train buried its nose in the soft mud of the ditch. The car behind piled into it. The three rear cars also went into the ditch, but their passengers were more fortunate than those in the two forward cars.

It was the first time in ten years that a passenger on the North Shore Line had met death in an accident.

The facts appear to be that the occupants of the automobile which was struck ignored the warning signal at the crossing, paid no attention to another private car which had been brought to a stop near the crossing and then in an effort to beat the northbound freight crossed directly in the path of the on-rushing southbound passenger train.

In accordance with its regular policy, the Interstate Commerce Commission will investigate the accident. To that end A. H. Leonhart, from Green Bay, and H. M. Burtch, from Chicago, inspectors of the commission, have been ordered to Kenosha. It is not believed that the report from these inspectors will be submitted to the commission much before the end of March.

TWENTY YEARS' GROWTH IN TOTAL OF REVENUE PASSENGERS

	1909	1919	1929
Interborough Rapid Transit Company:			
Subway	238,430,146	461,147,058	932,446,803
Elevated	276,250,196	348,188,600	348,569,124
New York Rapid Transit Corporation and predecessors	143,816,821	305,021,402	690,829,232
Total	658,497,163	1,114,357,060	1,971,845,159
Surface car passengers	729,728,127	879,536,422	984,596,886
Bus passengers	3,609,304	36,983,726	125,326,259
Grand total	1,391,834,594	2,030,877,208	3,081,768,304

RAPID TRANSIT TRAFFIC IN WORLD'S LEADING CITIES

	Passengers Carried in 1928	Miles of Double Track	Passenger Per Year Per Kilometer	Percentage of Total Traffic Carried by Subways
New York	1,910,000,000	211	6,200,000	57
London	465,112,000	155	3,000,000	30
Paris	818,334,000	68	7,300,000	55
Berlin	265,229,000	38	4,800,000	20

400 Newark Cabs Pass to the Public Service

Public Service Co-ordinated Transport, Newark, N. J., has acquired control of Yellow Cab, Inc., through purchase of the majority of the capital stock. Yellow Cab, Inc., is the largest taxicab company in north Jersey and operates in Newark and vicinity. It also controls the Yellow Cab of Union County and the Brown & White Taxicab Company of Newark. It operates 400 cabs in Newark. Public Service will take over active operation as soon as details can be arranged. No announcement was made as to the consideration paid for the stock.

Progress Reported in Springfield, Ohio

Settlement of the transit problem at Springfield, Ohio, apparently awaits a decision of the courts as to whether paving assessments and unpaid franchise fees constitute a lien on the company's assets, prior to the rights of the bondholders. A four-hour conference on Feb. 21, however, between the city officials and executives of the Cincinnati & Lake Erie Railroad, with Thomas Conway, Jr., president, acting as spokesman, served to clear up a number of confusing points.

The railway company proposes to purchase the property of the Springfield Railway from the receiver, and then to set up a

system whereby some of the present narrow gage tracks will be continued and others abandoned in favor of the standard gage service over the interurban tracks, augmented where necessary by trolley bus service. It was agreed that the company would be relieved of future paving assessments if the city loses in its present suit against the street railway receiver.

The main problems at present are those of a twenty-year franchise, a service-at-cost plan, and the appraisal of the railway under the service-at-cost plan. The company offered to reimburse the city for his service charge if an expert appraisal engineer estimated the property at a lower valuation than that contained in the company's proposal.

gress, held in Chicago, Sept. 30-Oct. 4, 1929, are now available. The volume contains authoritative papers and discussions on public education for safety, uniform traffic laws and ordinances, accident reports and statistics, law enforcement, traffic engineering and control, traffic signs and signals, mental and personal causes of accidents, school safety work, junior safety councils, vocational schools, and safety work of women's organizations.

Elektrische Bahnen

By D. O. Höring. Published by Siemens & Halske, A. G., and Siemens-Schuekertwerke, A. G., Berlin, Germany.

This book discusses in detail the development of the electric street railway and electric railroad since the first appearance of an electric train at the Industrial Exhibition in 1879 in Berlin. The extent of electrification in Europe is reviewed in the first chapter and it was found that at the end of 1927 the mileage of electric railroads amounted to 5,387 miles, while countries outside of Europe had electric railroads amounting to 3,157 miles.

The various types of electric motor cars and locomotives are discussed extensively while the advantages of alternating current and direct current are compared also. Although the book discusses especially the rolling stock, considerable attention is given to way and structures, and overhead and signal construction and installation.

Safeguarding Instalment Sale Contracts

"Conditional Sales, Law and Local Practices—for Executive and Lawyer." By Roger Sherman Hoar. The Ronald Press Company, New York. 521 pages. \$10.

Selling of goods on the instalment plan has become one of the standard commercial practices all over the United States. The author indicates in detail the legal differences between various plans in use for instalment selling, and the dangers that beset the seller if the contract is not properly drawn and executed. Since practice varies in the several states, each one is taken up in detail, and local practice and tactics are explained where the law is not clear.

While sales of rolling stock under equipment trusts are not considered in detail, the author points out that special laws covering such sales exist in all states and territories except the District of Columbia, Texas and Virginia. Some of the laws in other states do not differ greatly from the general laws.

Any railroad or other utility buying or selling merchandise on the instalment plan will find in this book a wealth of information, with specific references to decisions on the various points involved.

Steam Railroad Statistics for 1928

Forty-second Annual Report on the Statistics of Railways in the United States. Interstate Commerce Commission. Government Printing Office, Washington, D. C. For sale by the Superintendent of Documents. \$1.40.

This is the annual report of the Interstate Commerce Commission on the operation of the steam railroads for 1928, but it includes selected data on other common carriers subject to the interstate commerce act, among them statistics of 223 electric railways reporting to the commission. For 1928 the electric railways had gross revenues of \$167,173,838 on an investment of \$1,264,533,842 for road and equipment.

BOOK REVIEWS

Mastering a Metropolis

"Planning the Future of the New York Region." By R. L. Duffus. Harper & Brothers, New York. 302 pages, illustrated. Price \$3.

City and regional planners, architects, and those interested in the growth of the modern city will find this book fascinating reading. City dwellers and commuters, especially those who live in the New York region, will be relieved as well as interested by the projects now under consideration, which are so clearly and entertainingly set forth in this volume.

"Planning the Future of the New York Region" really is the authorized popularization of the ten detailed and technical volumes published by the Committee on the Regional Plan of New York and Its Environs. The author describes in popular language the outstanding features of the comprehensive plan worked out by this committee after seven years' study and research at a cost of \$1,000,000. Many maps and illustrations help the reader visualize the extraordinary development which is outlined here.

Review of New York Association's Work

Proceedings of the quarterly and annual meetings in 1924 and 1925 of the New York Electric Railway Association; 373 pages; published by the association.

The meetings of state and sectional associations, being smaller than those of national associations, afford an intimacy of contact among the members not offered by the larger organizations. They are, therefore, often productive of very valuable material. The sessions reported in this volume are of that nature.

Railroad Electrification Economics

"Electrification of Steam Railroads." By Kent T. Healy, assistant professor of transportation, Yale University. McGraw-Hill Book Company, Inc., New York. 395 pages, illustrated. Price \$5.

Professor Healy's treatise on steam railroad electrification was written following a six-month survey of the electrifications of Europe, which was made subsequent to several years of experience with one of the leading electrified steam railroads of America. The author has stressed the economics of electrification, devoting an entire chapter to this subject, and considering each element from this standpoint.

Power and its supply are given a prominent place in the book, taking somewhat more than half of the space. The power contract is analyzed in considerable detail, since the author devotes much of his attention to the purchase of energy from some outside source. Substations, switching and sectionalizing are taken up in two chapters, the various methods used in this country and in Europe being discussed in detail. Overhead supporting structures, the contact system, co-ordination of electric fields and economics of transmission and distribution are covered in five chapters. Motive power, including current collection, traction motors and control, transmission of power from the motors to the driving wheels and mechanical elements of locomotives, is analyzed for many types of equipment.

The book is valuable for the engineer or the economist who is considering electrification as a means of improving railroad operation. It gives information which is essential in making a comparison between existing methods with steam and the methods that have been developed in successful electrifications. The author does not contend that electrification is useful everywhere. He says that it now is possible to study "the principles involved which are decidedly topics for discussion, and the indication of the dangers which are ever present in any analysis."

Electric System Handbook

By Clarence H. Sanderson, editor-in-chief. First edition. Illustrated. McGraw-Hill Book Company, New York. 1,167 pages. \$5.

Here is a handbook different from those usually presented. It tells the story of the electric system as a whole in form which can be understood by the non-technical reader. It is more in the nature of a textbook than a handbook, as the term ordinarily is understood. Students of engineering, operators, inspectors, maintenance and test department employees and engineering draftsmen should find it helpful.

Railway substations, including the use of mercury arc rectifiers and automatic control equipment, are discussed in a separate section of 67 pages.

Annual Safety Congress Transactions

National Safety Council, Publicity Division, Chicago, Ill. 325 pages. 50 cents.

Complete transactions of the public safety, education and women's sessions of the Eighteenth Annual Safety Con-

PERSONAL MENTION

Henry Bucher of Interstate Assumes New Duties

**Takes Up Post in Indianapolis in Which
He Will Co-ordinate Interurban and
City Lines of Vast Insull Undertakings**

HENRY BUCHER, recently appointed general railroad executive of the electric railway properties in Indiana controlled by Midland United Company, has taken over his new duties at Indianapolis.

Operation of the electric interurban and street railways of the Indiana Service Corporation, Interstate Public Service Company and Northern Indiana Power Company will be co-ordinated under Mr. Bucher. This will involve no change in ownership or identities, but efforts will be made to obtain the advantages of one general supervision.

Mr. Bucher has been manager of railways of the Indiana Service Corporation

Indiana Service Corporation railway department since 1913, accompanied Mr. Bucher to Indianapolis, where he will continue as chief clerk of the co-ordinated railway department.

Mr. Bucher's position as division manager at Fort Wayne has been taken by Harry E. Vordermark, vice-president and treasurer of the Indiana Service Corporation. Assisting Mr. Vordermark as local managers are James S. Clark, light and power department; J. F. McKay, Fort Wayne city railways, and M. P. Royal, gas department.

A. J. Berta Treasurer of North American Power Company

A. J. Berta, formerly assistant treasurer of the North American Light & Power Company, Chicago, and its subsidiaries, has been elected treasurer of these companies, succeeding P. L. Smith. As assistant treasurer, he was in close touch with every operating group. Mr. Berta's career in the public utility field began with the Middle West Utilities Company, in 1918. The foundation of his banking experience was obtained with the Harris Trust Savings Bank and the National City Company. The latter company lost his services when he was employed by Mr. Smith. On Feb. 16, Mr. Berta celebrated his tenth anniversary with this company and its predecessors.

J. J. McNally in Advertising Field

James J. McNally, formerly with the advertising department of the Washington Railway & Electric Company and the Potomac Electric Power Company, Washington, D. C., has announced the organization of Associate Advertisers to conduct an advertising service specializing in utility accounts. The new service will also act as advertising counsel for public utilities and allied industries. Before going with the Washington Railway & Electric Company, Mr. McNally was connected with Samson Service.

"Tom" Minary Resigns as Chairman at Louisville

Thomas J. Minary, chairman of the board of directors of the Louisville Railway, Louisville, Ky., for the past ten years, and prior to that president of the company, recently tendered his resignation to the directors. It was accepted and the post of board chairman was abolished. Mr. Minary remains on the board of directors. The former chairman will have been

connected with the company and its predecessors 58 years in May. Mr. Minary is now 79 years old. He became secretary-treasurer of the Central Passenger Railroad Company in 1872. He was only 21 years old at the time.

Consolidation in 1889 of this concern with the Citizens' Passenger Company and the City Railway resulted in the establishment of the present Louisville Railway. Mr. Minary became general manager after the consolidation. Then for a period of 23 years he served as president of the company before his election to the chairmanship of the board.

Col. C. H. Harvey Made Chairman at Knoxville

Col. C. H. Harvey tendered his resignation on Feb. 8 as president of the Knoxville Power & Light Company, Knoxville, Tenn., a position he has held for more than 25 years, to gratify his desire for "greater leisure than is possible under present responsibilities." His resignation was accepted by the directors, who then elevated him to the chairmanship of the board—a post which will enable him to keep in close touch with the affairs of the company. The board took no action toward filling the presidency. The duties formerly performed by Colonel Harvey will be taken over by Fred. V. Underwood, the vice-president and general manager.

Colonel Harvey went to Knoxville in



Henry Bucher



Col. C. H. Harvey

at Fort Wayne for the past six years, having succeeded Sam W. Greenland in 1924. More recently, he also has held the position of manager of the Fort Wayne division of the Indiana Service Corporation, Northern Indiana Public Service Company and Northern Indiana Power Company, in charge of gas, electric and railway properties.

Prior to his going with the Indiana Service Corporation in 1924, Mr. Bucher was associated as a consulting engineer for ten years with Robert M. Feustel, now president of the Indiana Service Corporation and executive vice-president of the Midland United Company. While engaged in this work he made appraisals and valuations for many electric railways throughout the country. From 1910 to 1914 Mr. Bucher held a position with the joint engineering department of the Wisconsin Railroad Commission and the Wisconsin Tax Commission. He was graduated from the University of Wisconsin with an engineering degree in 1909.

William H. Snyder, chief clerk of the

1885, immediately following his graduation from the University of Michigan, and became secretary to the general manager of the East Tennessee, Virginia & Georgia Railroad, the predecessor of the Southern. While employed there, he worked at night on the books of the Knoxville Electric Light & Power Company. In 1902 he was appointed general manager of both companies and two years later was elected president and general manager.

Colonel Harvey organized the two utilities into the Knoxville Railway & Light Company, which later became the present Knoxville Power & Light Company. In 1925 Colonel Harvey gave up his duties as general manager, and since then has been engaged only in the administrative activities as president of the company.

Mr. Underwood went to Knoxville about five years ago to assume the duties of general manager. He has been connected with electric power interests practically all of his life and in Birmingham he held a position similar to that which he holds in Knoxville.

F. H. Brooks Now President of Lincoln Traction Company

F. H. Brooks of Lincoln, Neb., who was recently made president and general manager of the Iowa-Nebraska Light & Power Company and the Lincoln Traction Company, with headquarters at Lincoln, has been with the Continental Gas & Electric Corporation, a subsidiary of the United Light & Power Company, since its inception in 1913, first as general manager and then as vice-president and general manager of its properties in Nebraska, Iowa and Missouri, now known as the Iowa-Nebraska Light & Power Company.

Mr. Brooks' public utility career and operating experiences have been broad and varied. He started in the street railway field in Erie, Pa., in 1896. Later his activities took him into the copper regions of Michigan, where he did electrical engineering work for the Edison company of Sault Ste. Marie and the Peninsula Electric Light & Power Company. In this field



Frank H. Brooks

Mr. Brooks did pioneering work in hydro-electric and long-distance transmission development. Later he became general manager of the Vicksburg Railway & Light Company, Vicksburg, Miss.

In addition to management, operating and executive work, Mr. Brooks has also been active in state, sectional and national associations in the utility field.

Chairman Prendergast Resigns from New York Commission

William A. Prendergast, chairman of the New York State Public Service Commission, tendered his resignation to Governor Roosevelt on Feb. 4. Governor Roosevelt said:

"Mr. Prendergast has had a very long and distinguished career as a public official and as member and chairman of the Public Service Commission. I regret he is bringing this long service to a close."

Chairman Prendergast issued a formal statement in which he said:

"At an interview with Governor Roosevelt I presented my resignation. The Governor has certain ideas relative to the regulation of public utilities in this state with which I am not entirely in sympathy. I do not feel that the Public Service Commission, which has quasi-judicial functions, should be influenced in the exercise of those functions by the executive or any other state agency. I explained my attitude upon

these matters to the Governor. I appreciate the Governor's generous statement regarding my resignation."

The present commission is composed of three Democrats and two Republicans. The new chairman will be named by the Governor, but will have to be confirmed by the Senate. Mr. Prendergast's resignation became effective on Feb. 28.

Changes in El Paso Personnel

F. J. Gannon, since January, 1929, manager of the El Paso Electric Company, Rio Grande Valley Traction Company, and the Mesilla Valley Electric Company, has been made president of these companies and a member of their boards of directors. Mr. Gannon has been president of the El Paso & Juarez Traction Company, and a member of its board since his advent in El Paso. In his new position he will continue actively to manage all four companies.

R. O. Himel, formerly assistant treasurer of the El Paso Electric Company, Rio Grande Valley Traction Company and Mesilla Valley Electric Company, has been made treasurer of the companies. For some time he has been a director of the El Paso & Juarez Traction Company.

J. B. Ledlie, formerly superintendent of the Mesilla Valley Electric Company, Las Cruces, N. M., a subsidiary of the El Paso Electric Company, has been made vice-president of the Mesilla Valley company.

L. S. Thorne, general superintendent of railways, El Paso Electric Company, is also a director of the El Paso & Juarez Traction Company.

Central Association Vice-Presidents

R. R. Smith, of the Chicago, South Bend & Northern Indiana Railway, was elected first vice-president of the Central Electric Railway Association, and F. H. Wilson, of the Cleveland-Southwestern Railway & Light Company, was elected second vice-president at the recent winter meeting of the organization held in Cleveland. The names of the two vice-presidents were interchanged in the article in the *ELECTRIC RAILWAY JOURNAL* for February, 1930, page 90.

M. E. Welsh in Charge of Central's Electric Division

Michael E. Welsh, superintendent of the Syracuse division of the New York Central Railroad, has been made superintendent of the electrical division with headquarters in New York City. Charles E. Olp, superintendent of the Rochester division, will succeed Mr. Welsh at Syracuse.

Mr. Welsh has been associated with the New York Central ever since he was twenty years old. He entered the service as a brakeman on the Syracuse division in 1891. Four years later he was promoted to be freight conductor and in 1901 was made passenger conductor. In 1907 he became assistant trainmaster and was elevated to trainmaster of the Rochester division in the following year.

Three years later he was sent to Buffalo as trainmaster and in 1918 was made assistant superintendent there. Mr. Welsh was superintendent of the Ontario division with offices in Oswego in 1923, and superintendent at Buffalo later the same year. He went to Syracuse as superintendent of the Syracuse division in 1927.

Two New Vice-Presidents for St. Louis Car

Nelson L. Rehnquist and Howard R. Gass were elected vice-presidents of the St. Louis Car Company, St. Louis, Mo., at the annual meeting on Jan. 28. George L. Kippenberger was elected first vice-president and assistant general manager. Edwin B. Meissner was re-elected president and general manager.

Mr. Rehnquist joined the St. Louis Car organization in 1911 when President Meissner came from the Milwaukee Electric Railway & Light Company to accept the executive direction of the company. With the St. Louis Car Company Mr. Rehnquist worked up through several positions until in 1916 he was made purchasing agent. When the company entered the airplane construction field a year ago he was asked to give executive attention to that division, but continued to supervise the purchases for the company. As vice-president he will continue as execu-



Howard R. Gass

tive for the aviation and purchasing departments.

Mr. Gass has served as a sales engineer since he joined the company on May 1, 1921. As vice-president his duties will be connected with the sales department. For seven years prior to joining the company, he was with the Missouri Public Service Commission. He had charge of the field operations for the commission in connection with the United Railways, the Union Electric Light & Power Company, the Kansas City Railways and the Electric Light Company of Kansas City valuations as well as other similar undertakings. He also inspected all steam and interurban railroad properties for the state commission annually.

Prior to entering the service of the Missouri commission, Mr. Gass was a field engineer for the North Kansas City Development Company in charge of levee, sewer, street paving and building operations. He has also been associated with the Kansas City Southern Railroad, the Missouri, Kansas & Texas, the Chicago, Rock Island & Pacific, the St. Louis-San Francisco Railway and the New York Central Lines as a locating and construction engineer.

As a field engineer for Paret & Beard, consulting engineers, Kansas City, Mo., he made hydro-electric surveys on the Washita River in Arkansas, and also basic surveys and estimates for the Wichita Terminals and a valuation of stock yard properties in Wichita. He had charge of the subway and viaduct construction, third

division, Kansas City Terminal Railways, and also was in charge of pre-cast slab concrete construction and of all subways and viaducts during the building of the Union Station and terminal project in Kansas City, Mo.

A. N. Baldwin, long connected with the Central California Traction Company, Stockton, Cal., as secretary and treasurer, has been elected a director of the Yellow & Checker Cab Company, San Francisco, Cal.

Messrs. Draffan, Springer and Strickler Advanced

Announcement has been made by the Ohio Brass Company, Mansfield, Ohio, of the election of G. L. Draffan as secretary and of W. A. Springer as treasurer, and of the appointment of J. M. Strickler as general sales manager.

Mr. Draffan began his business career with the Roycrofters, under the leadership of the late Elbert Hubbard at East Aurora, N. Y. Here he devoted himself to a study of the advertising business until

career in 1906, Mr. Strickler joined the O-B company as office boy. Six months later saw him moving up the ladder. The order, traffic, hi-tension, car equipment, bond and third rail, line material, pintype insulator and general sales departments have all been stepping stones in his varied career. In 1927 he was made assistant general sales manager and now he has been made general sales manager of the organization.



J. M. Strickler



G. L. Draffan



W. A. Springer

the death of Mr. Hubbard, at which time he took a position in the office of the East Aurora Electric Light Company. In 1916 Mr. Draffan entered the employ of the Ohio Brass Company as assistant advertising manager. He served in this capacity until 1923 when he became assistant to E. F. Wickwire, then secretary of the company. In 1927 he was made general sales manager, a position he held until his election to the secretaryship which carries with it the duties of director of sales.

MR. SPRINGER ANOTHER LONG-SERVICE EMPLOYEE

Practically the whole of Mr. Springer's business life has been devoted to the Ohio Brass Company. He became a member of the Ohio Brass organization in 1912 after completing a four-year course at the Mansfield High School. His apprenticeship was served under B. F. McLean in the record department. He was next transferred to the managership of the traffic department, in which the opportunity was presented to learn much of the business in connection with his work of supervising O-B shipments to all parts of the world. For the past five years he has been assistant to the treasurer, handling, among other things, the forwarding and collecting of export shipments, and at the same time learning under the tutelage of C. V. Marks to master the intricacies of the company's finances. In this capacity he served until his recent election to the post of treasurer of the company.

At the completion of his high school

Messrs. Mathias and Covert New Assistant Auditors for Westinghouse

H. N. Mathias and V. F. Covert have been elected assistant general auditors of the Westinghouse Electric & Manufacturing Company.

In rising from the ranks of the accounting department the two men took paths widely separated at first. Mr. Mathias has a service record with Westinghouse which began in 1899. Mr. Covert came to Westinghouse in 1911 from the old E.M.F. Motor Company, Detroit.

Mr. Mathias was born in Madison, Pa. After a business course in Pittsburgh he joined the Westinghouse Company. In 1908 he was made chief cost clerk. In 1917 he was made assistant to the general auditor. In 1928 he was appointed supervisor of costs and budgets. In his new post Mr. Mathias will have charge of installing standard cost and works accounting and will direct all works auditors.

Mr. Covert's first position with the Westinghouse Company was as payroll clerk. In 1917 he became assistant auditor of the Krantz Manufacturing Company, Brooklyn, a subsidiary. The same year he was sent to the Westinghouse South Philadelphia Works in charge of general accounts. In 1924 he was made works auditor in South Philadelphia. He returned to East Pittsburgh in 1926 and in 1928 he was appointed supervisor of district accounting.

W. P. Jackson in Safety Work for California Commission

W. P. Jackson has been appointed service inspector in the safety division of the California Railroad Commission in charge of inspection of mechanical and electrical equipment on electric railway systems and stages under the jurisdiction of the commission. He will work under the direction of H. L. Engelhardt, safety engineer of the commission.

Mr. Jackson has been connected with the Sacramento Northern Railway, first division, for a number of years, in charge of mechanical equipment. Prior to that he was superintendent of equipment for the Key System Transit Company, Oakland, Cal. Many years experience on electric railways throughout the country further qualify him for the work he is undertaking.

Through the establishment of a separate division of safety the commission is making a concerted effort to insure uniform safety conditions of operation and equipment on all electric railway systems and stage lines throughout California. Field inspections, it is hoped, will eliminate unsafe practices and faulty equipment among the common carriers. The division has been in existence only a little more than seven months.

Personnel Changes Follow Expansion in New Jersey

Public Service Co-ordinated Transport, Newark, N. J., has made the following changes in operating personnel:

Edward D. Cone has been appointed assistant manager of the Essex division. Mr. Cone was superintendent of transportation in the Hudson division.

In the Essex division, Spencer G. Harvey, Aaron H. Hill, J. B. McCallum and George M. Klement have been named district superintendents, each to have charge of one of the four districts into which the division has now been divided.

They report to James M. Symington, manager, who will continue in general charge of the division. Mr. McCallum has charge of the northern district, which includes Big Tree carhouse, Summer Avenue garage, Miller Street carhouse, Rutherford carhouse, Harrison carhouse and Belleville Pike garage; Mr. Klement, Bloomfield district, including Montclair carhouse, Great Notch garage, Lake Street garage and Sixteenth Avenue carhouse; Mr. Harvey, Orange district, including Central Avenue carhouse, Roseville carhouse, City Line garage, Orange and Passaic Valley carhouse and Grove Street garage; and Mr. Hill, southern district, including Hilton carhouse, South Orange carhouse and Sherman Avenue garage.

The superintendents have jurisdiction over carhouses and garages in their districts. Jurisdiction over service in the territory embraced in the city of Newark is assigned to division superintendents whose lines serve it.

George A. Rothery has been appointed assistant manager, Hudson division. Mr. Rothery was manager of the company's southern division. David H. Roszel also remains as assistant manager, Hudson division.

Herbert E. Harper has been appointed manager of the southern division, and George W. Booz and Claude L. Sell have been appointed assistant managers in that division.

L. C. Bullington Appointed General Sales Supervisor

L. C. Bullington, formerly manager of the Detroit office of the Westinghouse Electric & Manufacturing Company, has been appointed general sales supervisor of that company with his office at the East Pittsburgh Works.

Mr. Bullington joined Westinghouse, Church, Kerr & Company in 1889. In 1903, when the organizations entered into a merger, he was transferred to the sales department of the Westinghouse Machine Company with his headquarters in Atlanta. Later Mr. Bullington was transferred to the Buffalo office in a similar capacity. In 1918 he went to East Pittsburgh as assistant to the manager of the power department. From that position he was promoted in June, 1922, to assistant manager of the power sales department. In 1925 he was made manager of the Cincinnati office; and in 1928 he went to the Detroit office.

Curtis F. Jones Named to Louisville Board

Curtis F. Jones, employee of the Kentucky Carriers, Inc., bus subsidiary of the Louisville Railway, Louisville, Ky., has been nominated for employee-director of the railway. An employee-director has been chosen for seven years. Mr. Jones is 32 years old. He has been employed by the company for ten years. He is a veteran of the World War and was a member of the 91st Division. His brother, Wilbern T. Jones, motorman of the Broadway line, recently was awarded the Anthony J. Connelly medal and \$75 as the employee rendering the most outstanding service in 1929.

J. P. Potter to Head Pacific Railway Club

J. P. Potter, vice-president of the Key System Transit Company, Oakland, Cal., has been named by the nominating committee of the Pacific Railway Club for the office of president during the coming year. He is at present the club's vice-president.

Frank E. Russell, now mechanical engineer of the Southern Pacific Company, has been nominated for first vice-president, and L. L. Galbraith, a conductor for the Atchison, Topeka & Santa Fe Railway, for second vice-president. D. C. Wilkins, commercial agent of the Western Pacific Railroad Company, is the committee's nominee for treasurer. The club's election occurs March 13.

W. H. Onken, Jr., Retires from the "Electrical World"

William H. Onken, Jr., for years prominent in the electrical industry as an editor of *Electrical World*, a McGraw-Hill publication, has resigned and retired from his long association with this paper. Since 1900 he has been active as a writer and editor in the electrical field. Mr. Onken began his journalistic work as a reporter on the staff of the *New York Evening Post*. Leaving this work he took a course in electrical engineering at the Brooklyn Polytechnic Institute. He came to the *American Electrician* in 1901 as an experienced reporter and writer with a definite faculty for news gathering. Later the *American Electrician*, a monthly, was

consolidated with *Electrical World*, a weekly, and Mr. Onken has continued with the paper since that time as associate editor, as managing editor, as editor and more recently as senior editor.

Charles J. Ellis Now with Brill

Charles J. Ellis, until recently chief engineer of the Cincinnati Car Company, Cincinnati, Ohio, has been appointed sales engineer in the electric car and truck division of the J. G. Brill Company. Mr. Ellis has a broad experience in the car-building field, dating back to 1911 when he started with the Cincinnati Car Company as a draftsman. He subsequently served in various other capacities, successively becoming chief draftsman, sales engineer and chief engineer.

Harry Maze has resigned as superintendent of motor coach operations of the Union Traction Company, Anderson, Ind., to accept a position with an insurance company in Indianapolis. No successor has been named. The Union Traction Company operates more than 220 miles of bus route in Indiana.

Hugh M. Tate, a lawyer of Knoxville, has been nominated by President Hoover to be a member of the Interstate Commerce Commission, to succeed Richard V. Taylor of Alabama, whose term expired Dec. 31. Mr. Tate was born in Morristown, Tenn., Sept. 15, 1882; received academic and law degrees from the University of Tennessee and began to practice law in 1903. He was judge of the Eleventh Chancery Division of Tennessee from 1918 to 1920. He is a republican.

Robert M. Feustel, president of the Indiana Service Corporation, Fort Wayne, Ind., has been elected president of the Central Indiana Power Company, Indianapolis, Ind. He has been vice-president of the power company for more than a year. Samuel Insull, Jr., Chicago, who has been president, simultaneously was elected vice-chairman.

Edward B. Schoultes, formerly with the Barron G. Collier service, has been engaged as an assistant to C. Melvin Sharp in charge of advertising work for the Washington Railway & Electric Company, Washington, D. C. Before accepting this position with the Washington company, Mr. Schoultes was connected with the H K Advertising Service in Washington.

C. H. Quick, chief clerk of the voluntary relief department of the Interborough Rapid Transit Company, New York, for the past 23 years, has been appointed superintendent of that department to succeed the late Anson T. Berry. As chief clerk, Mr. Quick was Mr. Berry's first assistant. By virtue of his service with the company since Jan. 15, 1907. Mr. Quick is well known throughout the system.

George E. Tebbetts, engineer of structures of the Chicago Rapid Transit Company, Chicago, Ill., was elected president of that company's A.E.R.A., Section No. 6 for the ensuing year at the recent meeting. He succeeds Luke Grant, manager of the publicity department, who served as president during the year just closed.

Fred K. Baker, of Everett, Wash., has been appointed director of the Department of Public Works of Washington, by Governor Hartley. He succeeds Judge J. C. Denney. Mr. Baker served for some months as supervisor of transportation. The department regulates all bus operations within the state and passes on all applications for new lines or extensions.

A. R. Gardner, formerly secretary-manager of the Motor Coach Association of Washington, has resigned as head of the Department of Efficiency of the state, to become state secretary of the Savings and Loan Association.

Augustine A. Bragassa, a clerk in the offices of the Lynchburg Traction & Light Company, Lynchburg, Va., since last July, has been promoted to the ways and structures department of Roanoke Railway & Electric Company. Both the Lynchburg Traction & Light Company and the Roanoke Railway & Electric Company are subsidiaries of the Central Public Service Corporation.

Edgar Hymans, assistant transportation engineer of the Public Utilities Department at Cincinnati, Ohio, has resigned to become traffic manager of Ohio Bus Lines.

Charles J. Heacock, Warsaw, Ind., has been named treasurer of the Winona Interurban Railroad. Mr. Heacock has been office manager of a large machinery manufacturing company of Warsaw for several years.

H. Takada, general passenger agent, M. Tsukada, superintendent Sendai division, and H. Yamawaki, secretary to the vice-minister of the Japanese government-owned railroads, recently spent three days in inspecting the properties and operations of the Pacific Electric Railway in Los Angeles. The three railway officials are making an extended tour of this country and Europe in an inspection and study of steam and electric railway properties.

Thomas Adams has resigned as the general director of the committee on the regional plan of New York and its environs, but will remain as an adviser to the committee which will undertake to make effective the plans designed to carry out his conception of the future city. The task Mr. Adams took up nearly seven years ago entailed the collection of basic information, the composition of a comprehensive plan which has taken form in the several volumes issued by the committee, and in communicating to the public the nature and importance of the projected changes.

Herbert B. Flowers, president of New Orleans Public Service, Inc., New Orleans, La., has been re-elected chairman of the industrial bureau of the Association of Commerce of New Orleans.

H. Mozley, general manager of Burnley Corporation (England) transport department for about 30 years, is retiring.

A. George W. Brown, who has been research engineer of the Fifth Avenue Coach Company for the past eight years, on March 1 will become automotive engineer for the Borden's Farm Products Company.

OBITUARY

C. T. Hutchinson

Charles T. Hutchinson, president of the McGraw-Hill Company of California, died on Feb. 12, at the age of 54. Mr. Hutchinson's active association with McGraw-Hill began in April, 1922, when he came to the company from the Dewey Publishing Company of San Francisco, publishers of the *Mining and Scientific Press*. Prior to this time he had played an active and prominent part in engineering circles on the west coast.

In November, 1922, he was elected vice-president and general manager and a director of the McGraw-Hill Company of California. He also occupied the position of editorial director of the *Journal of Electricity*, now known as *Electrical West*.

On Nov. 22, 1926, he was elected president of the McGraw Hill Company of California. During the last four years Mr. Hutchinson also occupied the important



C. T. Hutchinson

position of chairman of the California Electrical Bureau.

His experience with the Joshua Hendy and the Union Iron Works gave Mr. Hutchinson a knowledge of the technique of engineering that proved invaluable during his successful participation in the publishing of engineering periodicals. To all his work, and to his play, he brought a genial sense of humor of the O. Henry kind; he was courteous, companionable, and capable. Mr. Hutchinson was widely known in literary, scientific and engineering circles, particularly on the Pacific Coast.

C. P. Taft

Charles P. Taft, who died at his home on Pike Street, Cincinnati, Ohio, on Dec. 31 occupied an important place in the life of Cincinnati. His long connection with the local transportation system was fittingly recognized by the directors of the Cincinnati Street Railway in a memorial which recites the fact that while Mr. Taft's financial interest in the company was not very great compared with that in many other enterprises with which he was identified, he had been associated in one way or another with the local transportation companies for more than a quarter of a century. He was active in the work of reorganizing these companies, and he not only retained his place as director, but kept his interest in their affairs up to the last.

The progress in rehabilitating and improving the system was a source of great satisfaction to him, and he was not slow in expressing this satisfaction and giving credit to those who were responsible for doing the work. When he was able to do so, Mr. Taft visited the general offices and different parts of the property, showing his interest at all times.

F. F. Bixby

Fred F. Bixby, manager of the materials department of the American Car & Foundry Company in St. Louis, Mo., died at his home in Webster Groves, Mo., on Jan. 27.

Born in Adrian, Mich., on Aug. 9, 1866, and educated in the public grade and high schools of that city, Mr. Bixby became connected with the purchasing department of the Missouri Pacific Railroad in 1882 and five years later accepted a similar position with the Texas & Pacific Railroad at Dallas, Tex. He returned to St. Louis in 1891 to join the purchasing department of the Wabash Railroad. He was made district manager for the American Car & Foundry Company in 1899 and later was transferred to the materials department.

F. C. Pratt

Francis Cole Pratt, a vice-president of the General Electric Company, died on Jan. 26 in New York at the age of 63. Mr. Pratt was graduated from the Sheffield Scientific School of Yale University in 1888 and had been with the General Electric Company for about twenty years. In December, 1924, having served previously as vice-president in charge of engineering, he was appointed vice-president in charge of manufacturing, to fill the vacancy caused by the resignation of George E. Emmons. With this appointment he also assumed the chairmanship of the manufacturing committee of the General Electric

T. A. McCusker

Terrance A. McCusker of the sales department of the J. G. Brill Company, died suddenly in the Jefferson Hospital, Philadelphia, on Jan. 30, Mr. McCusker, more familiarly known as "Terry" to his many associates in the electric railway industry, was born on May 3, 1874, at Philadelphia. He graduated from Girard College, Philadelphia, in 1891 and joined the Brill sales department as a stenographer on April 3 of that year. During his long connection with the Brill organization, he served in various capacities and positions of responsibility.

He possessed a remarkable memory, being steeped in the knowledge of the industry's history during his long identification with it, and quickly recalling the minutest details pertaining to the development of car design and equipment.

James A. Brock, "Anderson's first citizen," is dead. Mr. Brock was 82 years old, a Civil war veteran and one of the pioneer business men of Anderson, Ind. For more than 50 years he was president of the Bank of Anderson. Mr. Brock played an important part in founding the city's water and light company and the electric railway system.

Thomas Gerehart, long connected with the Interborough Rapid Transit Company, is dead. He was 86 years old. In October, 1867, a few years after he had been honorably discharged from the Federal forces during the Civil War, Mr. Gerehart entered railroad work with the West Side & Yonkers Patented Railway. He served in the capacity of bookkeeper and paymaster and later became a conductor on the original elevated in New York. In 1878 Mr. Gerehart was appointed assistant secretary and treasurer and held this post after the Manhattan Railway acquired control. He served as claim agent of the elevated until he was promoted to be general claim agent of the Interborough Rapid Transit Company in 1905. He served in this post until 1921, when he retired.

Walter Lee Frazier, superintendent of carhouses of the Cincinnati Street Railway, Cincinnati, Ohio, died at his home in Walnut Hills on Jan. 8. Mr. Frazier joined the company on Nov. 9, 1904, as general foreman of all carhouses on the western side of the city. Later he was given full charge of the company's carhouses. The remains were taken to his birthplace in Maryland for burial.

A. H. Henry, formerly track superintendent of the Monroe Street Railway, Monroe, La., now the Monroe Municipal Railway, is dead.

Thomas Worthington, 78 years old, for 35 years an active Wyandotte County Democrat and former chief claim agent for the Metropolitan Street Railway, predecessor of the Kansas City Public Service Company, died on Jan. 24.

Alfred C. Lee, for 26 years in charge of the line work of the Indianapolis & Cincinnati Traction Company and its successor, the Indianapolis & Southeastern Railroad, died in Shelbyville, Ind., recently, at the age of 66. Mr. Lee formerly represented Shelby County in the Indiana Legislature.

John F. Dinkey, 75 years old, railroader and business man, is dead. Mr. Dinkey retired on June 30, 1928, from the office of auditor and treasurer of the Buffalo, Rochester & Pittsburgh Railway. He entered the railroad industry in 1874, joined the B., R. & P. in 1881, and gave to that railroad, through its many vicissitudes, the best years of his life until his retirement. For three years he was connected with the Manhattan Elevated Railway. That was during the formative years of the company following the construction of the elevated lines in New York.

E. L. Sleeper, for fifteen years personal representative of G. J. Kuhrt, president and general manager of the Los Angeles Railway, is dead. Mr. Sleeper was a native of Boston, Mass. A civil engineer by profession, he had been employed on a number of large engineering projects in the East before he went to southern California in 1908. From 1910 to 1913 he was city engineer of Pomona, Cal. In 1913 he became superintendent of construction in the outer harbor at San Pedro, a position he held until he joined the forces of the Los Angeles Railway.

INDUSTRY MARKET AND TRADE NEWS

Public Service of New Jersey Places Largest Bus Order

In order to take care of replacements, extensions and new business throughout its territory, Public Service Co-ordinated Transport, Newark, N. J., recently placed what amounts to the largest order for buses ever given by a single company. In the order, which totals 381 buses, are 211 of the gas-electric type, to be used in city service, and 170 of the gas-mechanical type for the long distance intercity routes. The city type buses will provide seats for 40 passengers, while the intercity buses will seat 30 passengers.

Of the total order 338 chassis are to be supplied by the General Motors Truck Company, Public Service building the bodies for this type in their own shops. The Mack Company is to supply ten buses of the city type and two parlor car de luxe buses, and the White Company supplies eleven buses. American Car & Foundry Motors Company's order is for twenty complete Model 40 33-passenger de luxe type buses for service on the Morris County division. These buses are equipped with Hall-Scott 120-hp. motors, are of 240-in. wheelbase, and are provided with a recently developed fresh air system of heating and ventilation. Seats are of the individual bucket type, upholstered in leather.

Features in the new buses will include the elimination of wheelhouse seats, improved ventilation facilities, exterior and interior baggage racks, sound insulator equipment, shock absorbers and balloon tires. Engine horsepower is, on the average, heavier than the present standards on the property.

Twin Coach deliveries during the month include one parlor car to the Milwaukee Electric Railway & Light Company, two 21-passenger urban type coaches to the El Paso Electric Company, and three 21-

passenger urban type coaches to the Houston Electric Company. American Car & Foundry's Motor Company reports the delivery of one 33-passenger urban type coach to the Poughkeepsie & Wappingers Falls Railway, and one 40-passenger gas-electric coach to the Brooklyn & Queens Transit Corporation.

Denver Tramway Company has received two White Model 65 buses. The White Company has also made delivery of four model 65 six-cylinder buses to the Community Traction Company, of Toledo, Ohio, and one bus of similar model to the Houston Electric Company.

Mack-International Motor Truck Corporation reports delivery of one Model BC 29-passenger city type bus to Denver Tramway Company, one 33-passenger city type bus to Winnipeg Electric Company, and four 29-passenger city type buses to Community Traction Company, of Toledo.

Multiple Coin Turnstile Developed

A new multiple coin device turnstile which will accept 5 and 10-cent coins or tokens through the same slot, then separate and record separately, has been brought out by the H. W. Alexander Company, automatic merchandising engineers, New York. It is now being exhibited at the Ohmer Fare Register Company display rooms, New York.

The turnstile appears of safe, sturdy construction and provides rapid, easy operation. It was designed for traction systems, subways, elevateds, steam railroads, parks, concessions and theaters. It has no electrical connections, hence meets the market demand for inexpensive apparatus to buy and to operate almost everywhere.

The turnstile will soon be in trial operation on one of the New York street cars.

Westinghouse Closes Year with Large Orders

Westinghouse Electric & Manufacturing Company entered the current year with unfilled orders approximating \$65,000,000, the largest total since 1921, and more than 40 per cent greater than at the beginning of 1929. On April 1, 1928, or almost two years ago, when the company's accounting was on the fiscal year basis terminating March 31, the backlog of orders amounted to \$47,742,204.

Orders booked by Westinghouse since Jan. 1, last, have also shown an upward trend compared with like period of 1929.

Westinghouse completed its best year of operations in 1929 with net income estimated in excess of \$26,500,000, after all charges, or about \$10 a share on 2,665,315 shares of combined preferred and common stocks outstanding. This would compare with \$20,814,940 after charges, or \$8.78 a share on 2,370,063 shares of combined stocks issued in 1928.

Orders booked last year were at a new high mark, approximating \$240,000,000, an increase of about 24 per cent over the \$193,224,000 of bookings in 1928, the previous record year. Sales billed for 1929 will also be at a new figure; they probably amounted to around \$217,000,000, against \$189,050,302 in 1928.

Fageol Companies Close Successful Year

In the first consolidated statement published by the Fageol Motors Company and the Fageol Motors Sales Company, Oakland, Cal., embracing the operations of the two companies, a net profit, before deduction of federal income tax, of \$153,658 is reported for the year ending Dec. 31, 1929. Since this is the first statement issued in consolidated form, comparative figures for previous years are not available. Total sales during the year amounted to \$3,971,858.

Ten Double-Deck Buses and 50 New Cars for Baltimore

The United Railways & Electric Company, Baltimore, Md., has ordered twelve additional double-deck buses for use on the Charles Street line. Delivery is expected within the next two months. The company also is negotiating for 50 or more new cars. These it hopes to have ready for use in the fall.

Large Order for Car Heaters

Electric heaters for the 300 subway cars for the New York Board of Transportation have been ordered from the Consolidated Car-Heating Company. The heaters are of the panel type, light weight, double coil. There are to be 28 heaters per car.

Socony Lubricants for B.-M.T.

Contracts were closed on Feb. 1 by the Standard Oil Company, New York, to provide all the lubricating products required for the subway, elevated, surface railroads, buses, power stations and shops of the Brooklyn-Manhattan Transit Corporation in Greater New York.

ELECTRIC RAILWAY MATERIAL PRICES—MARCH 1, 1930

Metals—New York	
Copper, electrolytic, delivered, cents per lb.	18.00
Lead, cents per lb.	6.25
Nickel, cents per lb., ingot	35.00
Zinc, cents per lb.	5.50
Tin, Straits, cents per lb.	39.00
Aluminum, 98 to 99 per cent, cents per lb.	24.30
Babbitt metal, warehouse, cents per lb.:	
Commercial grade	42.00
General service	31.00
Bituminous Coal	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	\$4.35
Somerset mine run, f.o.b. mines, net ton	1.70
Pittsburgh mine run, Pittsburgh, net ton	1.50
Franklin, Ill., screenings, f.o.b. mines	1.45
Central, Ill., screenings, f.o.b. mines	.90
Kansas screenings, Kansas City	1.50
Track Materials—Pittsburgh	
Standard steel rails, gross ton	\$43.00
Railroad spikes, drive $\frac{1}{2}$ in. and larger, cents per lb.	2.80
Tie plates (flat type), cents per lb.	2.15
Angle bars, cents per lb.	2.075
Rail bolts and nuts, cents per lb.	3.90
Steel bars, cents per lb.	1.90
Ties, white oak, Chicago, 6 in. x 8 in. x 8 ft.	\$1.40
Hardware—Pittsburgh	
Wire nails, base per keg	\$2.30
Sheet iron (24 gage), cents per lb.	2.65
Sheet iron, galvanized (24 gage), cents per lb.	3.35
Galvanized barbed wire, cents per lb.	2.95
Galvanized wire, ordinary, cents per lb.	2.90
Waste—New York	
Waste, wool, cents per lb.	14.00
Waste, cotton (100 lb. bale), cents per lb.:	
White	11.00
Colored	10.00

Paints, Putty and Glass—New York	
Linseed oil (5 bbl. lots), cents per lb.	14.4
White lead in oil (100 lb. keg), cents per lb.	14.25
Turpentine (bbl. lots), per gal.	0.61
Putty, 100 lb. tins, cents per lb.	5.725

Wire—New York	
Copper wire, cents per lb.	19.875
Rubber-covered wire, No. 14, per 1,000 ft.	\$6.15
Weatherproof wire base, cents per lb.	18.50

Paving Materials	
Paving stone, granite, 5 in., f.o.b.:	
New York—Grade 1, per thousand	\$150.00
Wood block paving 3 $\frac{1}{2}$ x 16 lb. treatment, N. Y., per sq. yd., f.o.b.	2.70
Paving brick 3 $\frac{1}{2}$ x8 $\frac{1}{2}$ x4, N. Y., per 1,000 in carload lots, f.o.b.	50.00
Paving brick 3 $\frac{1}{2}$ x8 $\frac{1}{2}$ x4, N. Y., per 1,000 in carload lots, f.o.b.	45.00
Crushed stone, 4-in. carload lots, N. Y., per cu. yd., delivered	3.40
Cement, Chicago, in carload lots, without bags, f.o.b.	1.85
Gravel, 4-in., cu. yd., delivered New York	3.40
Sand, cu. yd., delivered New York	2.15

Old Metals—New York and Chicago	
Heavy copper, cents per lb.	14.75
Light copper, cents per lb.	12.50
Heavy yellow brass, cents per lb.	8.00
Zinc, old scrap, cents per lb.	2.75
Lead, cents per lb. (heavy)	4.75
Steel car axles, Chicago, net ton	\$17.00
Cast iron car wheels, Chicago, gross ton	15.50
Rails (short), Chicago, gross ton	19.00
Rails (relaying), Chicago, gross ton (65 lb. and heavier)	28.50
Machine turnings, Chicago, gross ton	8.00



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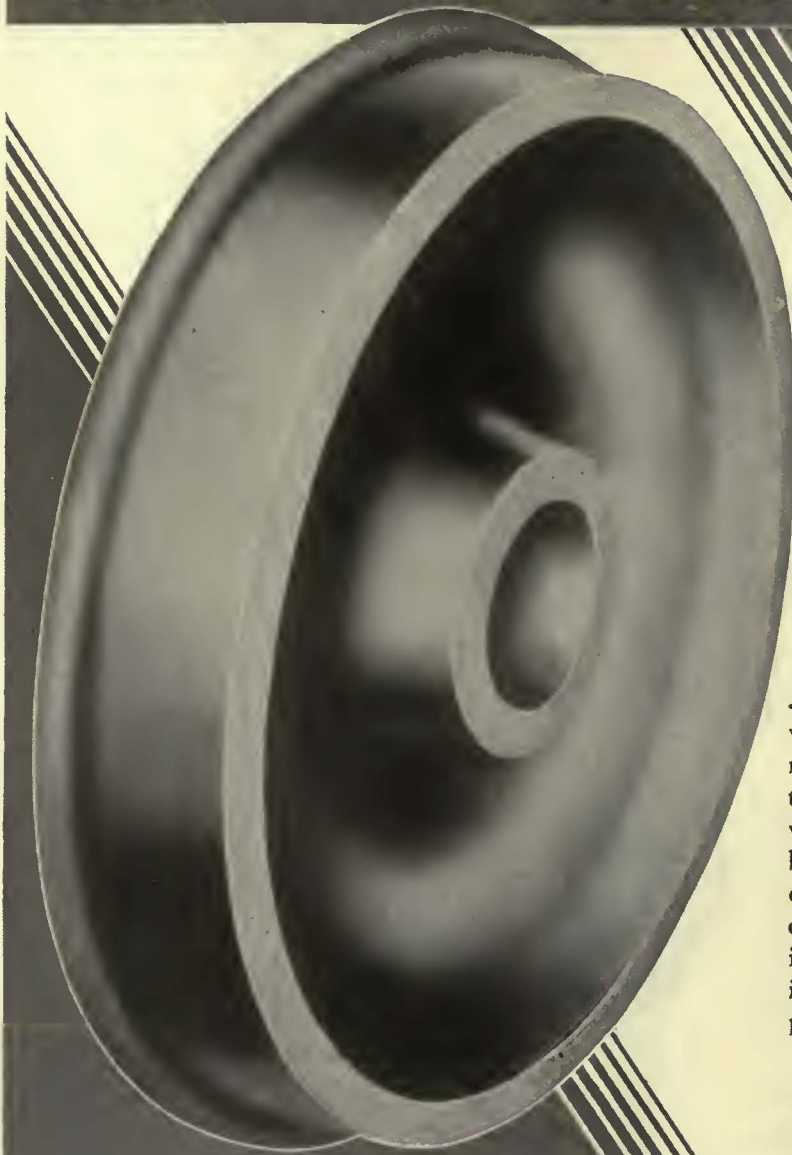
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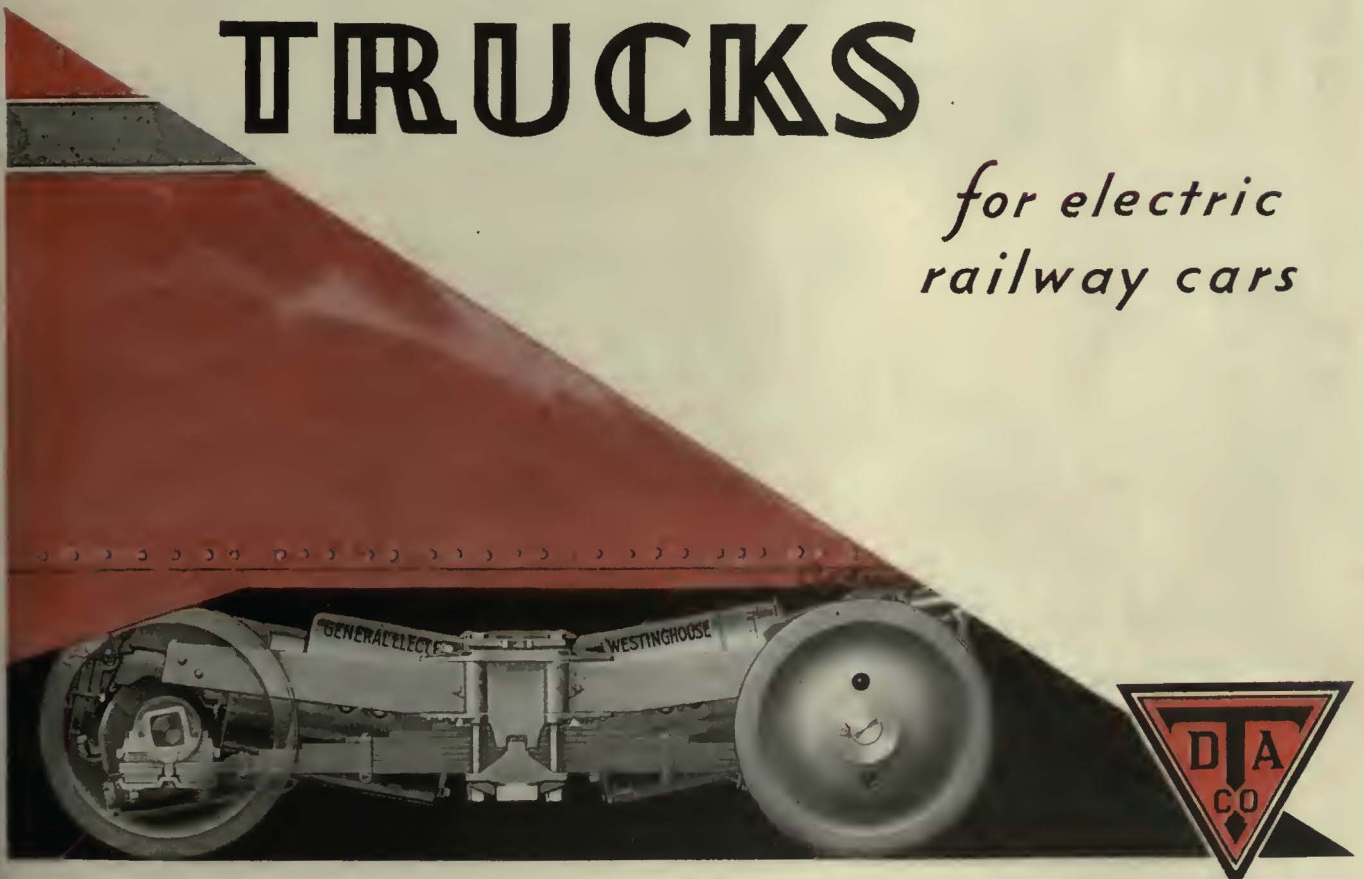
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For five years, from 1919 to 1925, Peninsula plugged along with mediocre equipment.

But in 1925, the initial purchase of 4 Model AB Macks marked the turning point in the company's career. Improved equipment resulted in more satisfied passengers. Revenue figures began to climb. Soon, old routes were extended and new routes established. In each case, additional Macks were purchased.

In 1929, Peninsula secured the franchise for through-schedule service from Norfolk to Richmond—a 92 mile run. For this, its newest and longest [route, the company wanted nothing but the most modern equipment available. For weeks, various makes of buses were rigidly tested and studied from every angle.

And in the end, Mack was again the choice. Seven Mack Model BK six cylinder buses for long distance service were purchased, bringing the company's total to 24. Past judgment had [been confirmed by this latest analysis.

Some of the comfort features of these completely Mack-built buses

Full view windows — non-shatterable glass.

Pneumatic shock absorbers.

Mack rubber shock insulation.

Reclining chairs — head rests and leather air cushions.

Electric fans—hot water heating.

Thermos ice water containers.

Pullman card tables.

MACK TRUCKS, INC.
25 Broadway, New York, N. Y.



An "on time" record



ONCE - ALWAYS



THE 64 motorcoaches of the County Transportation Co., Inc., in Westchester County, New York, were operated 2,388,869 miles in 1929, with an "on time" percentage for the year of 99.90 per cent. This remarkable record on 237,347 trips through the crowded thoroughfares of New York City's

most congested suburban territory reflects the remarkable efficiency of this Company's operation in which scientific Cities Service lubrication plus the use of powerful, clean burning Cities Service gasoline plays an important part.

This same scientific Cities Service lubrication is available to bus properties throughout the country.

CITIES SERVICE COMPANY

60 Wall Street

New York City



KOOLMOTOR PRODUCTS



over 2,388,869 bus miles

Company:

County Transportation
Co., Inc.

Number of Vehicles: 64

Yearly Bus Mileage:
2,388,869

Number of Trips:
237,347

Cities Service

Products Use:

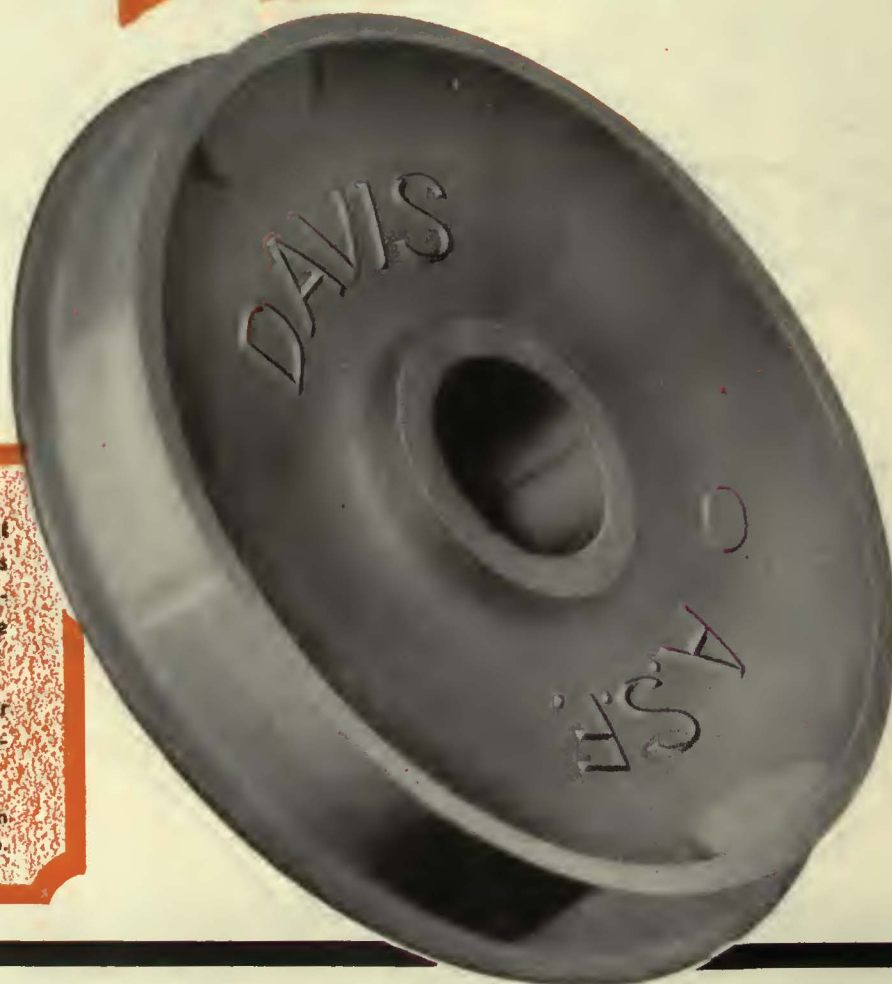
Cities Service Gasoline
Koolmotor Bus Oil XX
Koolmotor Transmission
Oil (Heavy)

Koolmotor Universal
Grease (Heavy)

Cities Service
Grease Guns



Much longer



Less wear at the point of rail contact means more service and reduced maintenance costs.
Longer life . . . greater mileage dependability —
All valuable points in modern car operation.

Makers of
Simplex Multiple Unit Clasp Brakes

AMERICAN
NEW YORK

wear here

DAVIS *One Wear* STEEL WHEELS

FLATS and shellouts cost money. They are a burden on revenue.

Such a situation is an unnecessary one. It is easily solved:

Davis "one-wear" steel wheels stay in service and out of the shop. The secret is in the material used in their manufacture. It is a special heat-treated composition steel . . . slow wearing and never needs re-turning.

Davis "one-wear" steel wheels have three outstanding qualities worth your investigation. They are: wear resistance,—strength,—lightness.

Eliminate the wheel re-turning items from your maintenance.

less
time
in
the
shop



STEEL **FOUNDRIES**
CHICAGO **ST. LOUIS**





WHY CONSIDER THE COST OF LUBRICANTS?

ELECTRIC railway lubrication practices are changing. A new system of car lubrication has been developed and has effected striking economies.

Operating engineers now realize more than ever before that the cost of lubricants per gallon or per pound is such a negligible factor that it is entirely unimportant as compared to the possible savings in power, waste consumption, labor for repacking bearings, elimination of hot boxes and reduced bearing and journal maintenance cost. It is a new view point.

The Texas Company, always a leader in providing better lubricants and lubrication practices, has been foremost in bringing this about.

The Texaco System of Lubrication, of which Texaco Lovis Oil and the Texaco Oil Seals are important elements, has demonstrated conclusively that power consumption and maintenance cost per car-mile can be substantially reduced. Write The Texas Company for the facts. A Texaco Engineer will gladly give you full details—or arrange for any desired test on your own lines.



TEXACO

The Texas Company, 17 Battery Place, New York City

OFFICES IN PRINCIPAL CITIES

LUBRICANTS



GOODYEARS

meet the trains and boats

IN NEW ORLEANS

Between five railroad stations and steamship wharves, the New Orleans Transfer, Inc., move passengers and baggage. They are the contract agents for all railroad and steamship companies, and they have a 57 year reputation to maintain.

On the whole fleet of this company, Goodyears have been the only tires used for several years. They supply the sure-footed traction which safety of passengers demands, they have the dependability needed to run a fleet rigidly on schedule. More tons are hauled on Goodyear Tires than on any other kind, and scores of experiences like this serve to emphasize the reason. Let a Goodyear Truck Tire Service Station Dealer recommend the right type and size of Goodyears to meet your needs with greatest economy.

ON YOUR NEW BUSES
SPECIFY GOODYEARS



MORE PEOPLE RIDE ON GOODYEAR

TIRES THAN ON ANY OTHER KIND



338

more
YELLOWS
 for
 Public Service
 Coordinated
 Transport

... the 12th order for Yellow Coach from one of America's largest bus operators.

... the largest single order ever placed for coaches with an American manufacturer.



... this order brings the total number of Yellows owned and operated by the Public Service Coordinated Transport to

*** 1762**

—the largest standardized fleet of coaches in America.

... and not one Yellow Coach has ever been retired from active service.

The big new Yellow 150 Horsepower 616 engine will be used in each of the 338 coaches ordered and 160 of the coaches will be equipped with 40-passenger bodies. This order was placed on the

strength of *known performance* of Yellow Coaches operated by the Public Service Transport.

It is its eleventh repeat order since 1924, when the first Yellow went into the service of this operator.

EVIDENCE OF SATISFACTORY PERFORMANCE	
Record of Yellow Coaches bought each year by Public Service Coordinated Transport	
1924	76
1925	333
1926	62
1927	20
1928	354
1929	299
1930	338
Total number bought	1482
Acquired from other lines	280
*Total Yellow Coaches operated	1762
<i>and of this huge fleet of Yellows not one has ever been retired from active service.</i>	
Total Coaches operated, all makes	2500
Total Annual Bus Miles (1930)	85,000,000
Total Route Miles	2675

YELLOW COACHES

MAINTENANCE OF TRACK AND ROADWAY

ANY TIES

A Clean Sheet... eliminate your

12	4	7			28	1	17	54	18
20	25	3	4	41	14		3		31
21	14	6	7		12	67	14	9	13
26	20	5	09	25	81	27	26		18
27	4	8	16		31	47	36	47	18
1	4	7							
1	2	1	8		37	75	44		1
2	10				59				1
2	3	8	1			9	7		7
4	4	6	1		103	4			7
4	11								1
1	31				8	15			39
1	9	18							

MAINTENANCE OF TRACK AND ROADWAY

DAYTON TIES

Transfer to Profits!

STARTLING . . . yes, and true. Facts and figures gathered from seventeen years of actual installation under all conditions of traffic have proved conclusively that tracks using Dayton Ties require no major maintenance at all. Think what it would mean to your property if you could deduct the greater part of your maintenance of track and roadway account from your operating expenses. It would perhaps mean the difference between red and black, in many cases. Certainly it would mean a far greater return on your investment than is possible where expense of maintenance is out of all proportion to operating expenses. And

remember this . . . Dayton Ties can be installed more cheaply than the cheapest track you ever built. Progressive engineers who are ready to accept only proven facts are invited to write for full information regarding DAYTON TIES.

★ VIBROLITION

A coined word denoting demolition of rail substructure through rail vibration. Dayton Ties prevent VIBROLITION.

“The Better Tie

THE DAYTON INTEGRAL SYSTEM OF THE DAYTON MECHANICAL

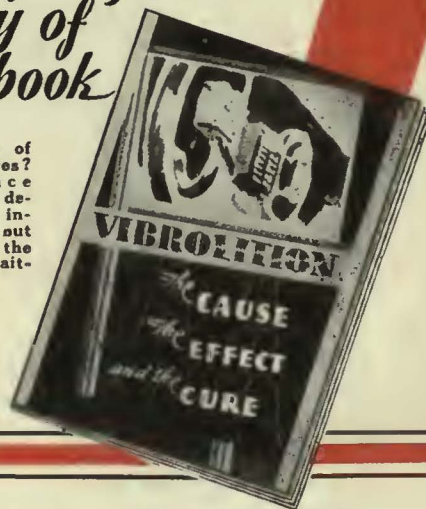
for your ledger! *track maintenance*



Dayton Ties recognize the fundamental law that you cannot hold a vibrating steel rail in a concrete structure without inviting its destruction under the vibration of traffic unless you protect the concrete from this force. And because Dayton Ties incorporate this exclusive vibration absorption element . . . in seventeen years they have yet to show the slightest failure under every conceivable condition of traffic.

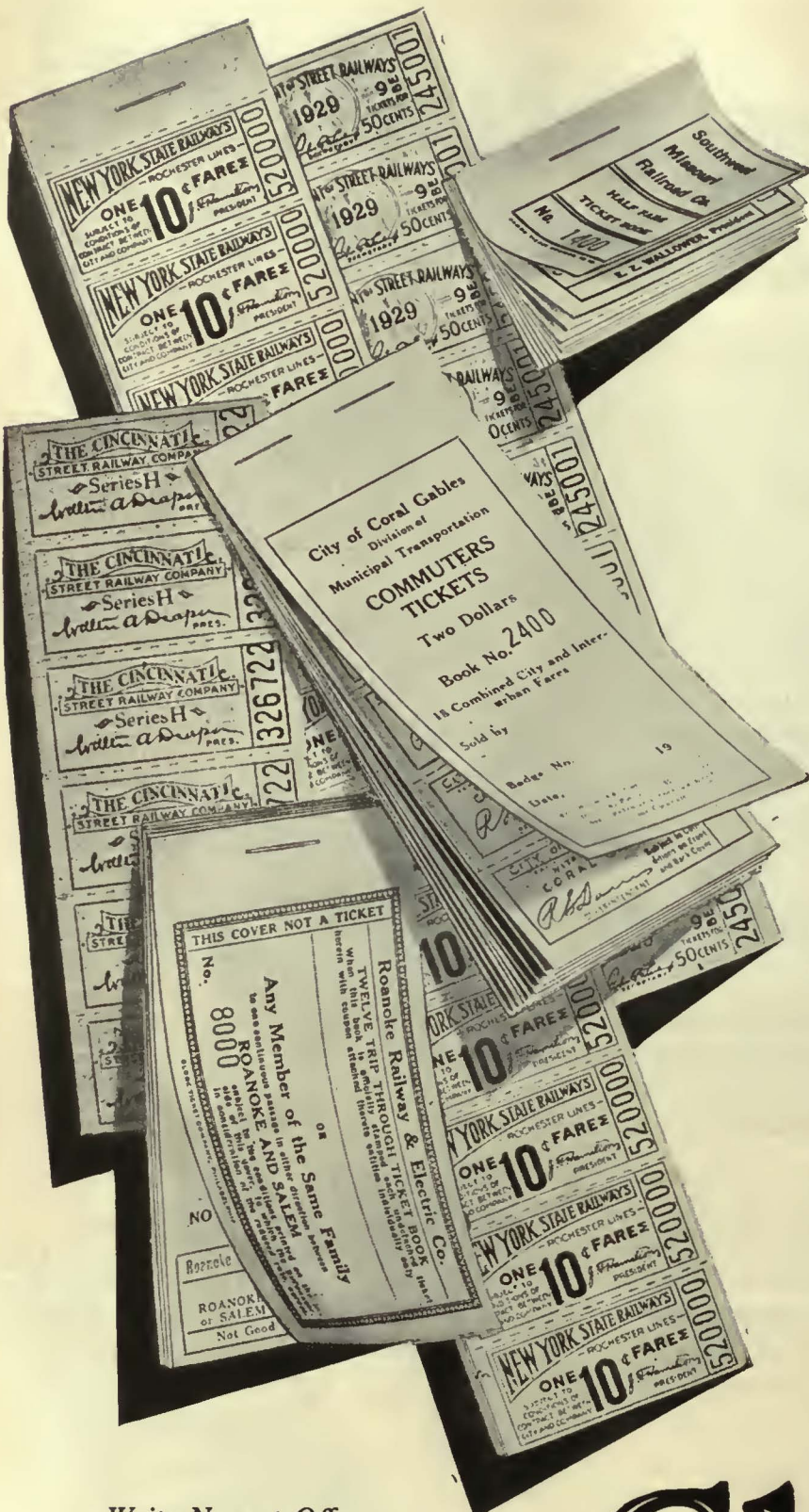
*Send for your
copy of
this book*

What is this disease of modern track structures? Every maintenance engineer knows its destructive effect. This interesting hook brings out the facts and points the cure. Your copy is waiting.



Without An Alibi”

TRACK AND PAVING STRUCTURE
TIE CO.,-DAYTON, OHIO



BOOKS PADS STRIPS

INCREASED Revenue possibilities of tickets in books, pads and strips are:

1. Attractive price to the public, yet *limited riding privileges*;
2. Faster collection and less change making;
3. Guarantee a definite number of rides which the auto will not get;
4. Secure money in advance;
5. Spent more readily than money;
6. Salable advertising space on covers and backs.

We recommend the 25/32 ticket size. It saves stock and 125 lbs. shipping weight per million, makes a small book that fits the pocket or handbag safely, does not fill up small fare boxes on long runs, and costs less per thousand in large lots.

Which style shall we send?

Write Nearest Office

Factories	Offices
Philadelphia	Syracuse
Los Angeles	Baltimore
Boston	Cincinnati
New York	Cleveland
Jacksonville	Pittsburgh
	Springfield, Mass.

Globe TICKET COMPANY

112 North Twelfth Street
PHILADELPHIA

Now Available— this 38 passenger City Service Coach

with the new Yellow 150 hp. engine. Capacity to handle maximum peak loads, meet difficult grade or traffic conditions, maintain fast schedules

with practically no increase in fuel consumption over engines of smaller displacement

with many new chassis improvements

with the safest, surest trouble free brakes ever developed for bus use, air operated

and

with entirely new type bodies of all-metal construction

with a service life equal to that of the chassis

with comfortable seats for 38 passengers or without rear exit door 40 passengers

with quick loading and unloading thru front and rear air operated doors

plus all the time proven, dependable qualities that have made Yellow Z models so popular in city service everywhere



New Type Bodies of All-Metal Construction (see next two pages)

Wheelbase 250 inches

616 Yellow overhead valve 6 cyl. 150 hp. engine

Rigid Z type frame with tubular cross members

Air operated clutch

4-speed transmission amidship

Full floating worm drive rear axle

4-wheel service brakes, air controlled with gun iron drums and easily removable brake liners

Balloon tires 40 x 9.75

Optional, Yellow Knight sleeve valve 100 hp. 6 cyl. engine

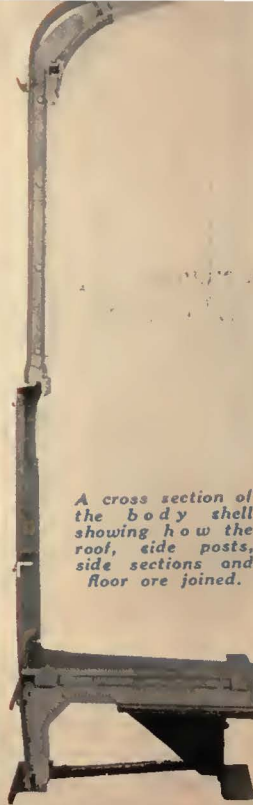


YELLOW

38 Passenger
**TYPE
Z**



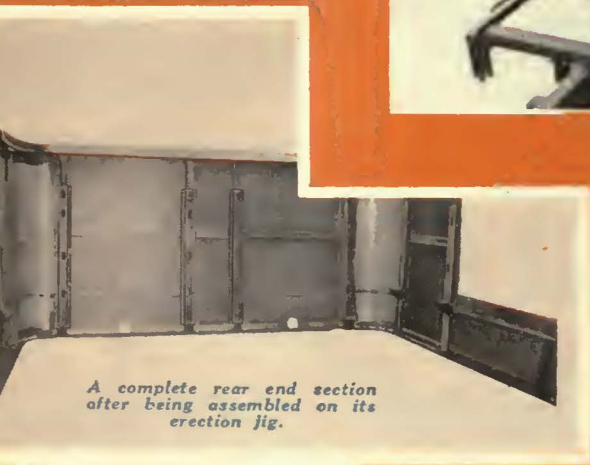
Assembling a side section in a special erection jig. The side panels are of plymstl.



A cross section of the body shell showing how the roof, side posts, side sections and floor are joined.



Assembling the body shell. Side sections, ends and roof are assembled over a fixture.



A complete rear end section after being assembled on its erection jig.

Assembling the roof side posts in a special erection jig. The posts will join the side section at the belt



A side post weighs 7 lbs. 8 oz. It is of forged duralumin; interchangeable with other posts in the body.



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New Type All-Metal Bodies

More substantial, remarkably light, longer service life, simpler and more economical to maintain.

Standard on the Z29 and Z38

The new all-metal coach bodies developed by General Motors Truck are now in regular standardized production. They represent a truly outstanding development both in the art of modern coach body engineering and in efficiency of manufacturing method.

For these coach bodies are of (1) rigid all-metal construction (chiefly duralumin and other aluminum alloys) (2) remarkably light in weight, yet (3) amazingly strong, with (4) a service life equal to that of the chassis. And like the chassis, these bodies are (5) precision built of standardized parts and sections which not only fit as accurately as the chassis parts, but (6) are just as easy to stock and renew. Yet with all these advantages it (7) costs no more than you would expect to pay for any well-built body.

Advanced engineering plus modern day principles of mass production are responsible for this important achievement.

The body shell consists of six major all-metal sections; a top, two sides, a rear, a front and a floor frame. Each section in turn is made up of smaller standardized body units. Each of these units is formed and assembled over precision jigs and fixtures from die-cut, drop forged or machine-shaped metal parts. Absolute precision of fit such as is found in the building of chassis parts prevails from the first manufacturing step to the last. As the small body parts come from the big machines cut, shaped or forged to a micrometer fit they are assembled over precision jigs and fixtures to make a body unit. These standard body units are next assembled over a master erection jig which draws each body unit under pressure into accurate position and alignment and the whole is then rigidly bolted together to make a complete top, side or end. The body sections, top, sides and ends, are then assembled over a body fixture and rigidly bolted together with specially designed bolts with thin flat heads and quick detachable snap on mouldings to form the completed body shell. No rivets,

no wood, no hand cutting, no fitting. An all-metal, mass production job with avoidable labor operations eliminated and with manufacturing costs reduced to a minimum.

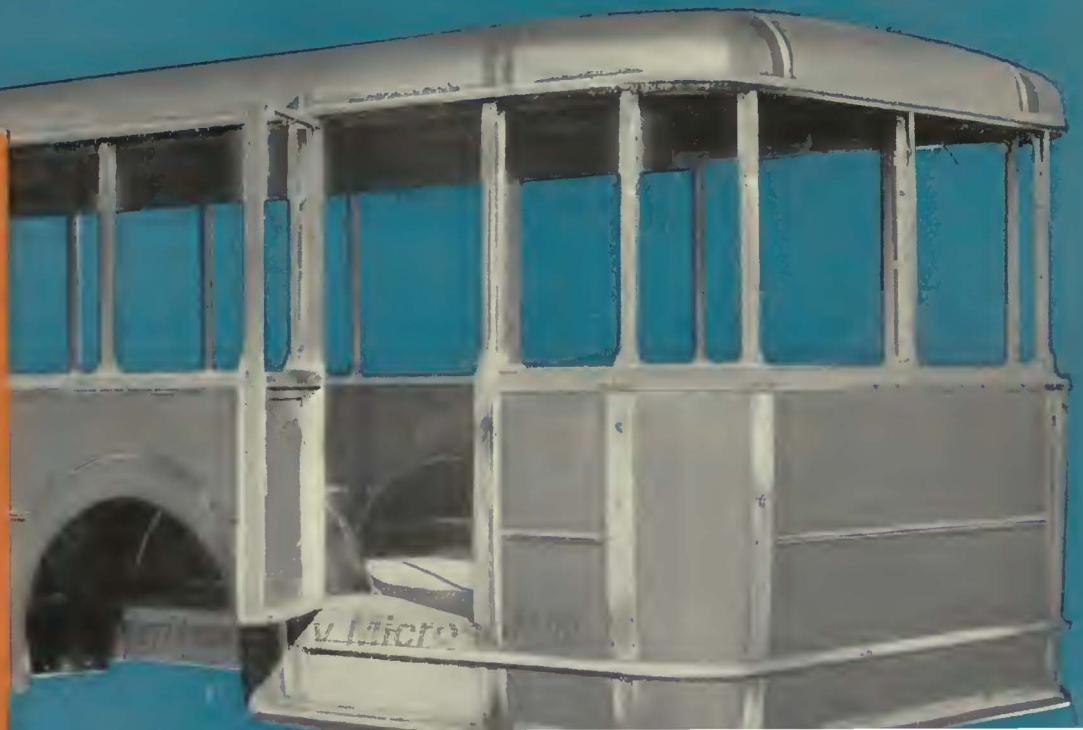
Because duralumin or other aluminum alloys are used wherever practical, the body is amazingly light. A lighter body means that heavier revenue loads can be substituted without increasing tire or gasoline costs. Being of all-metal construction it is exceedingly strong and enduring. It is fire resisting and safer. It contains no wood and will last longer. Its rigid metal construction successfully resists weaving, rattles and squeaks. It has much thinner wall sections and consequently provides more body and revenue area for a given over-all body width. The slender side posts of forged duralumin are much stronger than wood and have less bulk, providing greater window area and vision for passengers standing or seated.

Maintenance is greatly simplified. For the first time, standard body parts and sections are available that fit as accurately and easily as chassis parts. The number of different body parts has been greatly reduced; many are interchangeable and inventory requirements have accordingly been greatly reduced. In case of accident, damaged body parts, units or sections can be quickly and cheaply removed and replaced with unskilled labor. Because flat head bolts instead of rivets are used throughout, the work of replacing damaged parts has been facilitated and greatly simplified. There is no need for costly, time consuming hand fitting, shaping or riveting.

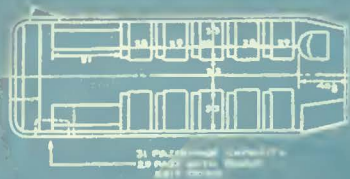
To make possible the many economic advantages of this new type all-metal body has necessitated an exceedingly large investment in special manufacturing equipment and tools—further evidence that General Motors Truck has confidence in the future of highway transport and will leave nothing undone to promote its progress and to keep pace with the specialized requirements of the industry.

A completed body shell ready for finishing. All joints are metal covered and watertight.

The roof is of three piece construction, one large center section full length of body and curved longitudinal corner pieces all of light plymetl panel. No corlins.



A New Z 29!



Body. All-metal construction
Wheelbase. 225 inches.
Engine. 110 horsepower 6 cyl.
Yellow Knight
Frame. Rigid Z type with
tubular cross members
Clutch. Manually operated
Transmission. 4-speed amid-
ship
Axle. Full floating worm drive
Service brakes. 4-wheel air
controlled with gun iron drums
and easily removable brake
liners
Dual fuel feed system
Tires. Balloon 40 x 9.00
Optional, 616 Yellow over-
head valve 150 horsepower
engine

Type Z, nationally famous for its years of dependable and economical performance on many of America's largest city operations is now available with many new and noteworthy improvements.

The wheelbase has been lengthened to 225 inches to make more room for the larger but lighter bodies of all-metal construction recently developed by Yellow and described on the preceding pages.

This new body in addition to its many other unequalled advantages makes possible an unusually liberal seat spacing (31 inches) to provide a maximum of comfort for 29 seated passengers, or as an alternative arrangement this body is available with a rear treadle door and seats for 29 passengers or without treadle door and seats for 31 passengers.

Other improvements are greatly improved riding qualities, 4-wheel service air brakes, balloon tires and many other chassis refinements. The total weight has been reduced resulting in more effective power and greater economy.

In addition to the worthwhile improvements that have been built into this popular city service model its dependable performance characteristics, low maintenance cost and high earning power has been rigidly maintained.

GENERAL MOTORS TRUCK COMPANY, Pontiac, Michigan
Subsidiary of Yellow Truck and Coach Manufacturing Company



29 Passenger
**TYPE
Z**

YELLOW



“Brrrrr! . . . thank goodness, there’s a warm-looking bus”

Brightly lighted motor coach promises warm, comfortable ride . . . attracts patrons



A COMFORTABLE ride means more than good springs. On these cold nights it means passengers can relax in a warm, cheery, brightly lighted interior . . . and read their papers with ease and comfort.

Modern coaches require modern lighting. Running lights must be powerful and well-focused . . . to stab the darkness and reveal curve and danger spot. Interior lamps must be bright and well-placed . . . to give fares reading comfort, to make their ride seem shorter. And the coaches that offer these get the business.

To insure proper lighting an adequate power plant is vital . . . a generator of the right capacity, backed by a dependable storage battery. You will find that scores of successful motor coach operators have chosen Exide Motor Coach Batteries as standard equipment for their fleets.

Exide Batteries are specially designed for their jobs. They are built by the world’s largest

manufacturers of storage batteries for every purpose and planned by skilled engineers. You can be confident that every Exide Battery will do its duty steadily, dependably and economically. Write for information on specially designed battery for motor coach service.

Exide
MOTOR COACH
BATTERY

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia,
 THE WORLD’S LARGEST MANUFACTURERS OF STORAGE BATTERIES FOR EVERY PURPOSE

Exide Batteries of Canada, Limited, Toronto

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The Cleveland Railway Company Increases Its Timkenized Car Equipment 129% In One Year

Profitable operation of electric railway systems is largely a matter of keeping public patronage up and operating costs down.

Timken Bearing-Equipped cars are helping to do both by wiping out wear and waste and increasing passenger convenience and comfort.

The Cleveland Railway Company is one of the progressive street car organizations that are profiting by Timken benefits.

This company placed its first order for 78 Kuhlman-Brill Timken-equipped cars in 1928. In the latter part of 1929, 100 additional cars were ordered, bringing the total up to 178 cars, and representing an increase of 129% in one year.

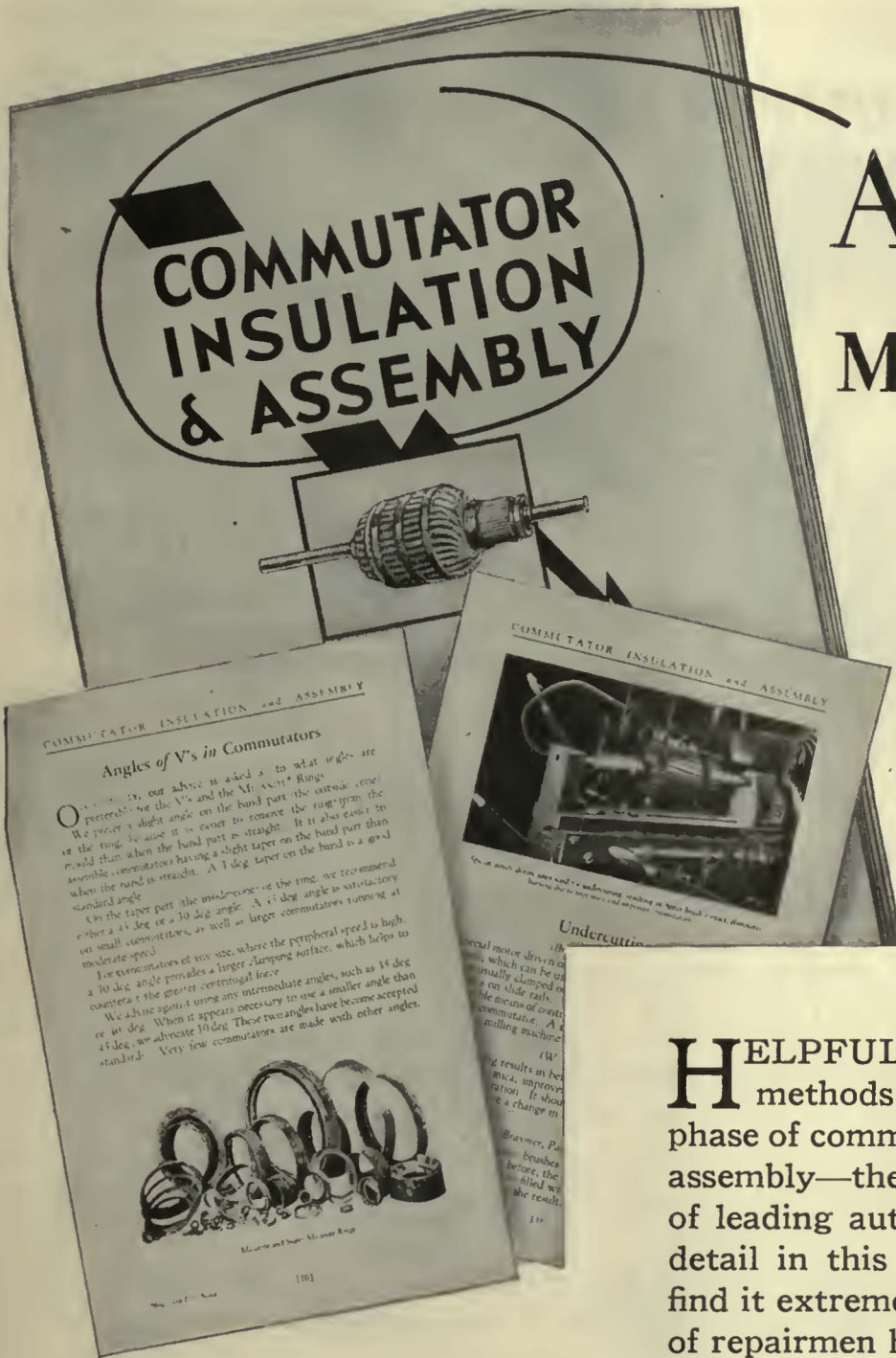
Easier, jerkless starting and smoother running distinguish cars with Timken-equipped journals. The drastic reduction of frictional load substantially lowers the power demand and saves lubricant. Wear is held in leash. Maintenance costs sink to new low levels.

And with these advantages there is the nullification of radial-thrust loads, cancellation of out-of-service charges due to plain bearing maintenance and the extension of truck life ... through the exclusive combination of Timken tapered construction, Timken **POSITIVELY ALIGNED ROLLS** and Timken-made steel.

THE TIMKEN ROLLER BEARING COMPANY
C A N T O N , O H I O

TIMKEN *Tapered Roller* **BEARINGS**





A new book
of
 Modern practice
 —*Yours*
 for the asking

HELPFUL, practical facts and methods dealing with every phase of commutator insulation and assembly—the consensus of opinion of leading authorities—all given in detail in this new book. You will find it extremely useful—thousands of repairmen have. A copy is yours for the asking.

MICA INSULATOR COMPANY

New York: 200 Varick St. Chicago: 542 So. Dearborn St.
 Cleveland Pittsburgh Cincinnati Birmingham Seattle San Francisco
 Los Angeles Toronto Montreal Works: Schenectady, N.Y. London, Eng.



Electrical
INSULATION



Another Development

by

LORAIN

THE DIXON TONGUE SWITCH



Lorain

- GIRDER RAILS
- GIRDER GUARD RAILS
- PLAIN GIRDER RAILS
- RAIL JOINTS AND TRACK ACCESSORIES
- EXPANSION JOINTS FOR ELECTRICALLY WELDED TRACK
- SPECIAL TRACKWORK
- SWITCHES, FROGS AND CROSSINGS

in
Solid Manganese Steel,
Manganese Insert Construction,
Chrome Nickel Steel Insert
Construction and Built-up
Construction of all
heights and weights of rail.

DURING the past 40 years, the name LORAIN has been identified with many important developments in track equipment. The Dixon Tongue Switch—developed by LORAIN—is a solid casting of manganese steel. In addition to the Tadpole Heel feature, the Tongue is held in place by means of the Heel Plate which is provided with a raised floor to carry the car wheels on their flanges over the tongue heel. This eliminates the usual pounding of wheel tread on heel of tongue in the trailing position.

The Heel Plate is made of heat-treated cast chrome nickel steel, which facilitates the building up of floor by electro-deposit welding. The hold-down bolts and nuts are sealed with asphaltum to exclude moisture. *Write our nearest District Sales Office for quotation.*

THE LORAIN STEEL COMPANY

JOHNSTOWN, PA.

SUBSIDIARY OF UNITED STATES STEEL CORPORATION

PRINCIPAL SUBSIDIARY MANUFACTURING COMPANIES:

AMERICAN BRIDGE COMPANY
AMERICAN SHEET AND TIN PLATE COMPANY
AMERICAN STEEL AND WIRE COMPANY
Pacific Coast Distributors—United States Steel Products Company, San Francisco, Los Angeles, Portland, Seattle, Honolulu.

CARNEGIE STEEL COMPANY
CYCLONE FENCE COMPANY
FEDERAL SHIPBUILDING AND DRY DOCK COMPANY
Export Distributors—United States Steel Products Company, New York City

ILLINOIS STEEL COMPANY
MINNESOTA STEEL COMPANY
NATIONAL TUBE COMPANY

THE LORAIN STEEL COMPANY
TENNESSEE COAL, IRON & R. R. COMPANY
UNIVERSAL PORTLAND CEMENT COMPANY
Export Distributors—United States Steel Products Company, New York City

Lorain Sales Offices—ATLANTA

CHICAGO

CLEVELAND

DALLAS

NEW YORK

PHILADELPHIA

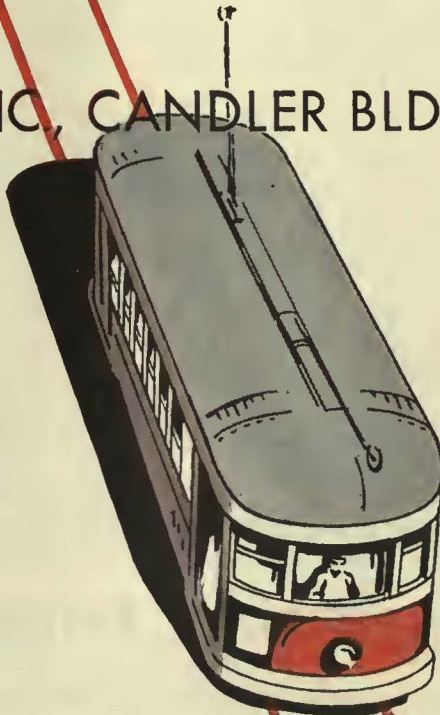
PITTSBURGH



FOR more than forty years street car riders have made good use of the service rendered by the Collier car cards in the fulfillment of their daily wants. This is confirmed by the fact that successful merchants and manufacturers are consistent users of street car advertising as an assured means of increasing business.

Since the car cards are really useful to the daily riders, they become, in effect, a part of the electric railway service. And so, in proportion, they assume a value to the electric railway company above and beyond the fact that they are a reliable source of income.

BARRON G. COLLIER INC, CANDLER BLDG., N. Y. C.



"CAR CARD ADVERTISING ALMOST EVERYWHERE"



NATIONAL SHELBY TROLLEY POLES

Minimum weight with maximum strength

TO keep daily service at the highest peak of efficiency means the elimination of delays or traffic tie-ups frequently caused by trolley poles failing to hold up in service. Reliable poles, therefore, are a good investment. Their selection should be based on design and tests that prove their fitness for the character of service in which they will be used.

NATIONAL-SHELBY Poles are designed with sufficient strength to meet all service requirements and yet not be of excessive weight. A special form of reinforcement at the proper place gives the pole great strength while the grade of steel used and a

special heat treatment after drawing gives a high elastic limit and assures long life and satisfactory service.

In addition, every NATIONAL-SHELBY Trolley Pole is individually tested before it leaves the mill—a form of test that approximates actual service conditions. This type of test is especially important in that it minimizes the possibility of any defective pole being installed—thereby helping to cut the cost of trolley pole service before it begins. A description of this test and complete information about these poles will be sent on request.

NATIONAL TUBE COMPANY

Frick Building, Pittsburgh, Pa.

SUBSIDIARY OF UNITED STATES STEEL CORPORATION

PRINCIPAL SUBSIDIARY MANUFACTURING COMPANIES:

AMERICAN BRIDGE COMPANY
AMERICAN SHEET AND TIN PLATE COMPANY
AMERICAN STEEL AND WIRE COMPANY

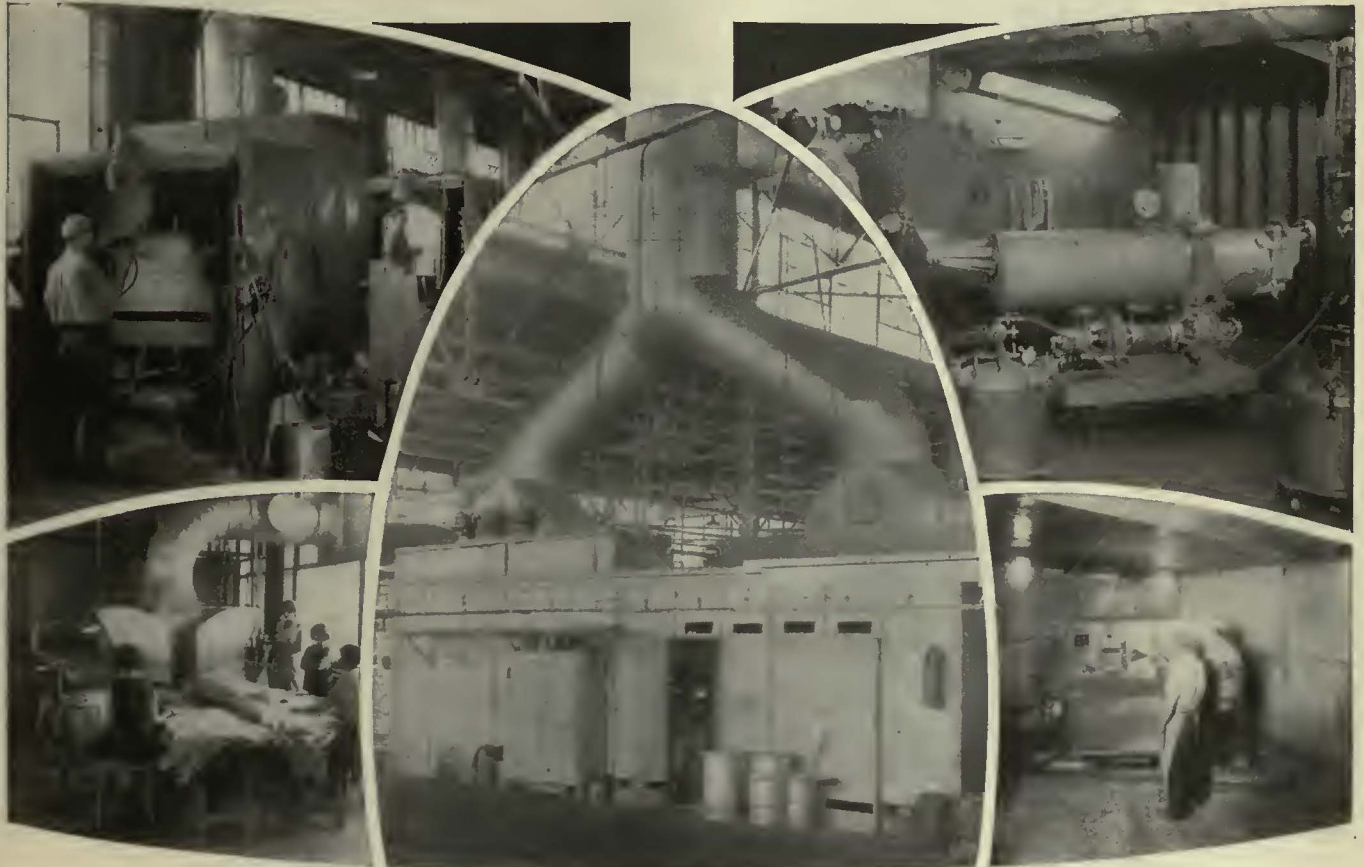
CARNEGIE STEEL COMPANY
CYCLONE FENCE COMPANY
FEDERAL SHIPBUILDING AND DRY DOCK COMPANY

ILLINOIS STEEL COMPANY
MINNESOTA STEEL COMPANY
NATIONAL TUBE COMPANY

THE LORAIN STEEL COMPANY
TENNESSEE COAL, IRON & R. R. COMPANY
UNIVERSAL PORTLAND CEMENT COMPANY

Pacific Coast Distributors—United States Steel Products Company, San Francisco, Los Angeles, Portland, Seattle, Honolulu. Export Distributors—United States Steel Products Company, New York City

» » » FOR ALL REQUIREMENTS OF ALL SPRAY PAINTING OPERATIONS



THE most efficient and economical spray-painting and spray-finishing equipment is that which embodies in the specialized outfit or installation for a particular industry, the most advanced knowledge gained in the service of all industries.

DeVilbiss spray outfits for finishing and finish maintenance of motor and electric transport units are made and installed especially for the place in which they are used and the methods employed by the user. And they also include efficiencies which can come only from a vast experience under widely varied conditions in the many industries where painting and finishing are parts of production or maintenance processes.

Your painting, finishing or ventilating problems may be peculiar to your own methods, materials and arrangements, but you will find that DeVilbiss has the equipment and the experience that assure the maximum advantages to you.

DeVilbiss engineers are working far in advance of the usual requirements of manufacturing and maintenance finish operations. Those who come to DeVilbiss obtain immediately the knowledge and the equipment which otherwise they would reach only through long and often costly experiment. It costs you nothing to learn what we can do for you.

Look to DeVilbiss for Modernized

- | | |
|---|---|
| Spray guns of various types and sizes. | Air transformers and accessories. |
| Pressure feed paint tanks and containers. | Air and fluid hose and connections. |
| Spray booths, exhaust fans, and approved lighting fixtures. | Complete outfits from the smallest hand-operated units to the largest industrial installations. |
| Air compressing equipment. | |

DeVilbiss
 Spray-PAINTING FINISHING System

THE DEVILBISS COMPANY

272 Phillips Ave., Toledo, Ohio

Sales and Service Branches

New York Philadelphia Cleveland Detroit Indianapolis Chicago St. Louis San Francisco Los Angeles Windsor, Ont.

Direct factory representatives in all other territories



Prospectors of 1930 find nuggets under the hood

Nearly a century ago, a rainbow flashed across the American skies, arching down into the newly discovered pot of gold in Sunny California. Later the rainbow moved behind Chilkooot Pass and lured hardy, eager men to the Yukon country.

Again it was the Transvaal . . . South America . . . Australia.

Today, the prospector of old has become a symbol of a by-gone era. But 1930 has his counterpart . . . and needs his tireless spirit. The prospector of 1930 is uncovering hidden sources of profit in the operation of his busses . . . is achieving ways to increase net earnings even when gross operating income remains stationary.

For such men, the engineers of the Shell Petroleum Corporation have a message, a

promise of help through the introduction of Shell *Applied Lubrication*. These engineers are at your command. If you feel the need for skilled counsel to help you eliminate losses due to less-than-100% lubrication, please feel free to call on the Shell specialists. There is no cost or obligation in a frank talk with them. And they will gladly come in response to a 'phone call or a letter directed to the nearest Shell office. Shell Petroleum Corporation, Shell Building, St. Louis.

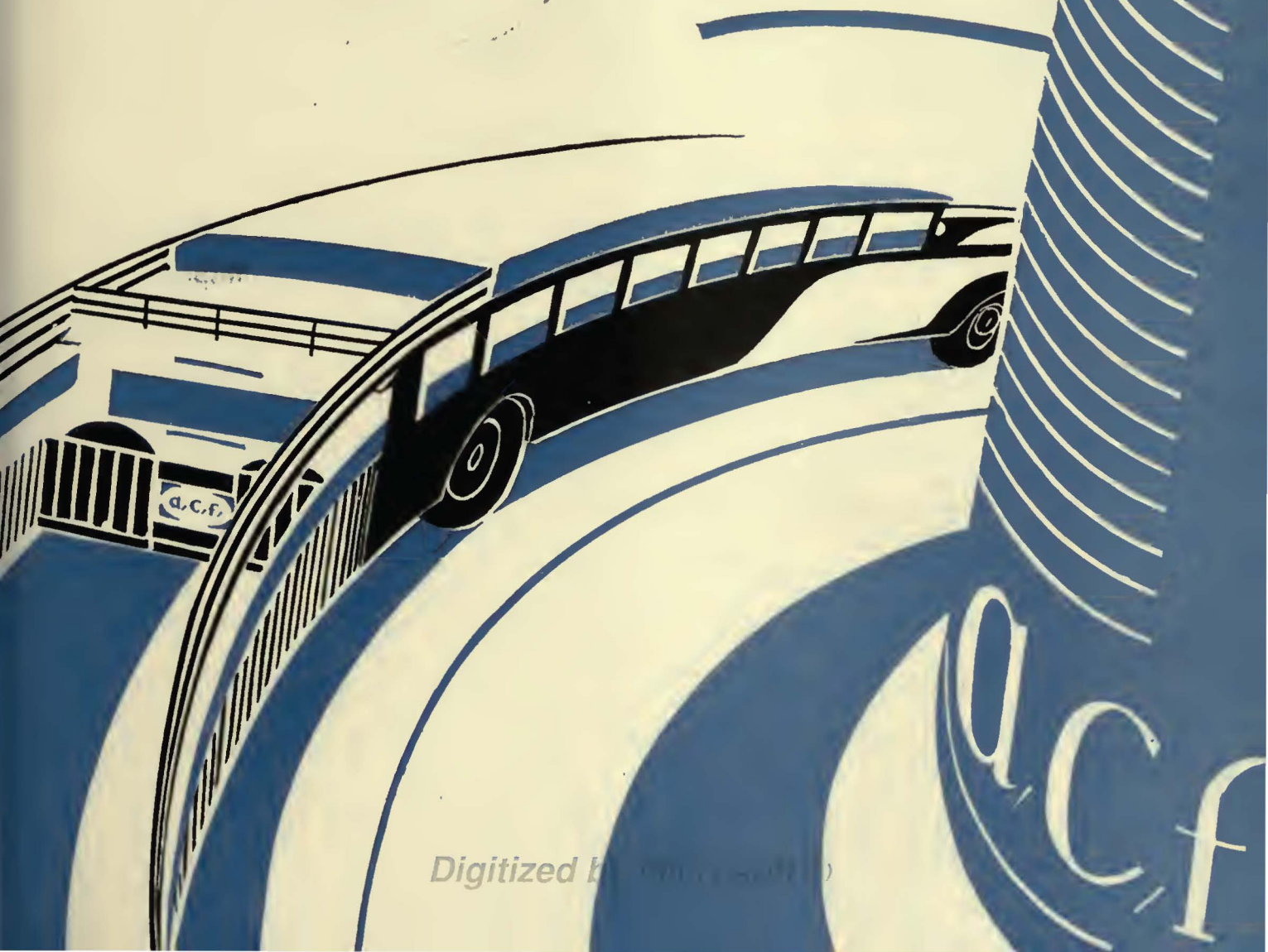


© S. P. C., 1930

Applied Lubrication

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**150,000 miles over mountainous
roads without overhauling . . .**



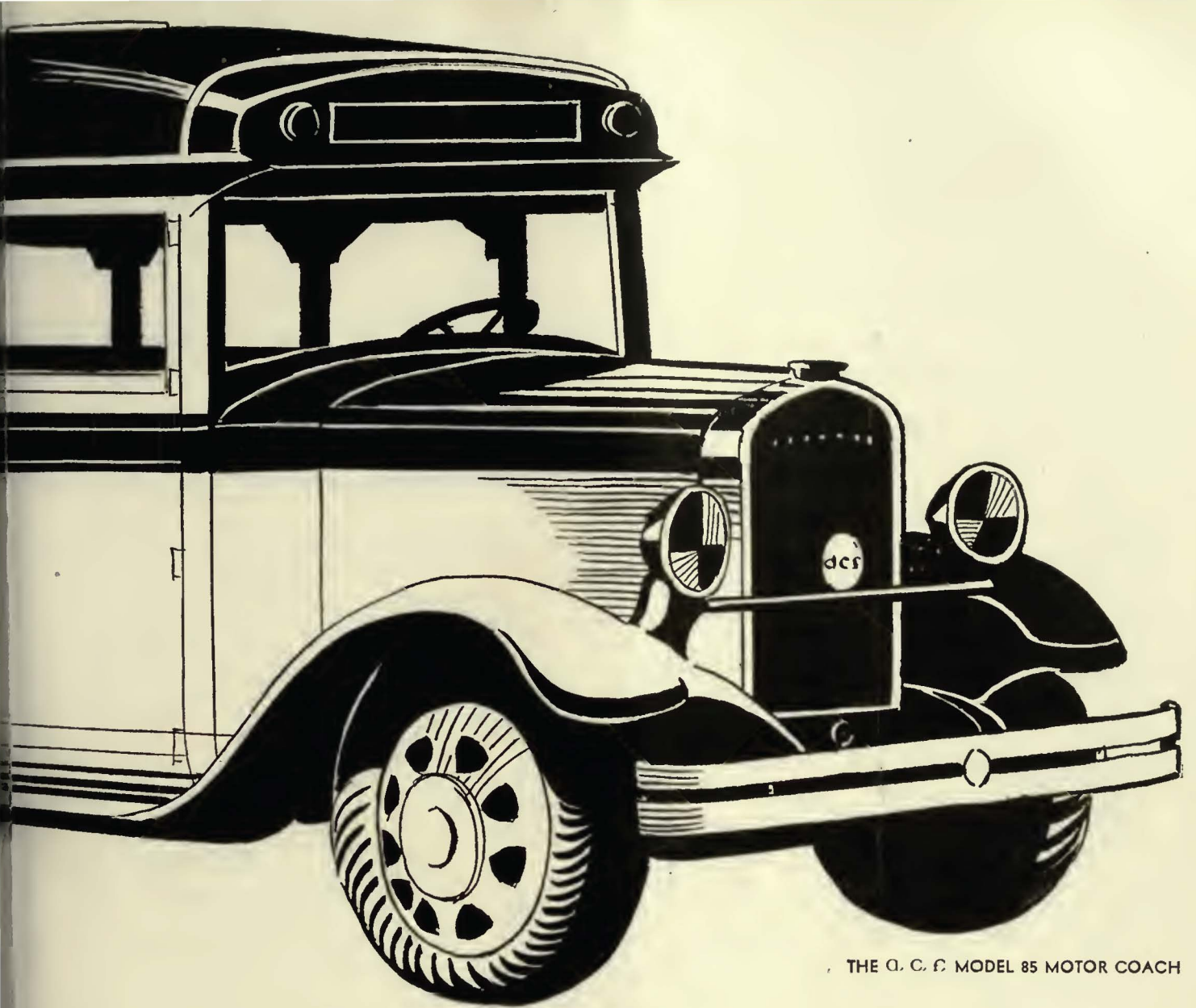


Take a look at the record that A. C. F. buses have run up in Yosemite Park!

Mr. Edwin T. Huffman, manager of the Yosemite Transportation System, writes that two of the A. C. F. buses in his company's service have given 150,000 miles service each without overhauling. More than this, he says that now, after their first overhauling, they seem as good as they ever were, both in appearance and the service they give.

The run of the Yosemite Transportation System through the mountainous Yosemite region covers roads that give a bus a good beating if it isn't built for them. It takes real stuff in a bus to stand up under the continual grind.

But that's the way A. C. F. builds every bus for you. All A. C. F. buses are built out of the finest materials we can lay our hands on . . . but there is a lot more than that to say for them. They are built by men who know buses . . .



THE Q. C. F. MODEL 85 MOTOR COACH

who know the things you absolutely must have in a bus to meet your operating requirements. As a result, Q. C. F. buses are built both for you and your patrons. They are built to answer the problems of your business . . . to give you dependable steady service, low running cost, long life, and absolute safety to your riders. They are built to give your riders the things that they demand from you . . . speed, comfort and luxury.

There's a business combination that simply can't be licked!

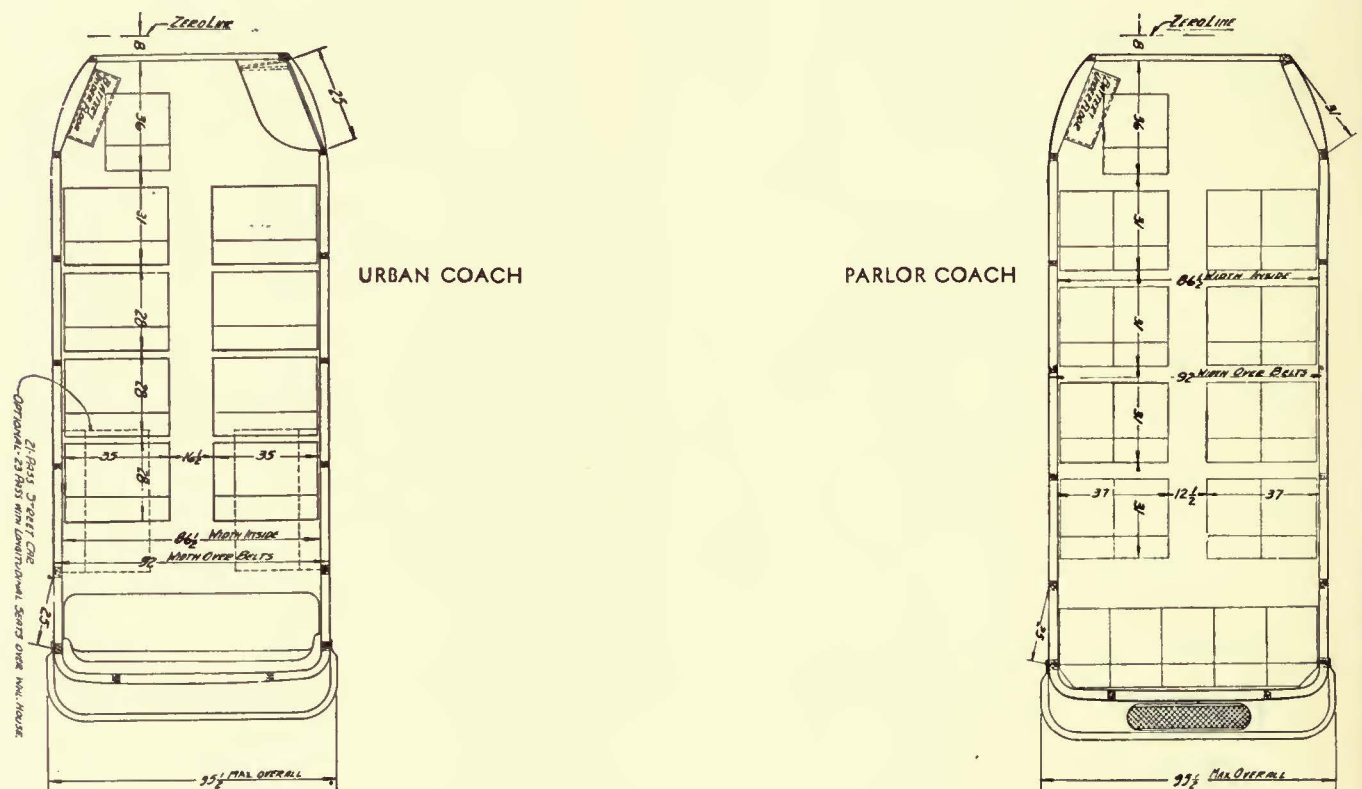
Here is a single example for you . . . the new Model 85 small capacity coach—a real bus, without a single adapted unit in the whole job brought over from truck or passenger car practice.

Every unit of the Model 85 coach is designed expressly for bus service. It has a smooth, powerful bus engine that will give you a high gear acceleration, from 10 to 25 miles per hour in only 15 seconds, which means high torque at low engine speeds, with power for acceleration right where you want it! The clutch . . . the transmission and drive line . . . the brakes . . . the

heater, which complies with all state requirements . . . every one has been designed expressly for bus service. And every part and every unit has been designed and built so that it is oversize and stronger than it needs to be for the work it is called upon to do.

You can have Model 85 in either of two body types: a 21 passenger parlor coach, with plenty of seat room and comfort for 21 full grown people, or a 21 or 23 passenger street car.

We will gladly send you more complete details on this model. Won't you write for them today?



AMERICAN CAR AND FOUNDRY MOTORS COMPANY
 30 CHURCH STREET _____ NEW YORK CITY



Fluted Steel Poles Point the Way to Economy

SINCE the first installation of heavy duty Union Metal Poles, utilities have been quick to realize the economies which this type of equipment affords. Here are some of the reasons why Union Metal Poles will save money for you when used for almost any type of overhead service.

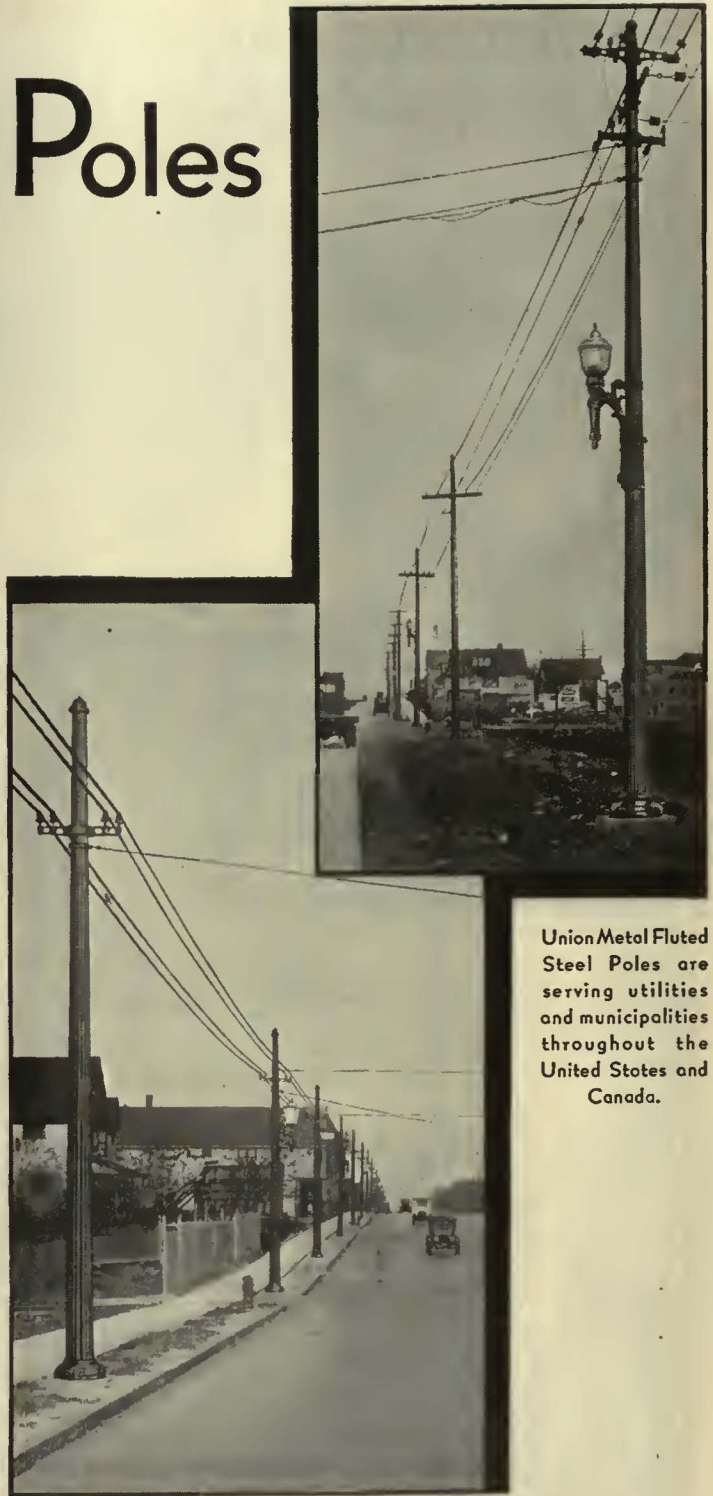
Long life. The pressed steel construction of Union Metal Poles assures much longer life than that of ordinary poles.

Fewer poles are required. Their strength permits heavy loading and the carrying of many different types of services.

Their ornamental appearance is such that property owners make no objections when the poles are installed on residential streets.

Replacements or repairs are economical and speedy.

Union Metal construction insures you of 100% salvage of the poles in case of removal. These are all money saving factors. If you would like to know the complete Union Metal Story, write one of the offices listed below.



Union Metal Fluted Steel Poles are serving utilities and municipalities throughout the United States and Canada.

THE UNION METAL MANUFACTURING CO.
GENERAL OFFICES AND FACTORY: CANTON, OHIO

SALES OFFICES: New York, Chicago, Philadelphia, Cleveland, Boston, Los Angeles, San Francisco, Seattle, Dallas, Atlanta

DISTRIBUTORS

Graybar Electric Company, Inc.

General Electric Supply Corp.

Offices in all principal cities



UNION METAL



DISTRIBUTION AND TRANSMISSION POLES

Are you receiving The Electric Railway Journal NEWS?



—the Newspaper of the Electric Railway Field

When *Electric Railway Journal* was changed from a weekly to a monthly magazine, electric railway men everywhere asked us to continue to supply the current news of the field.

For that reason, a supplementary service was started, known as the *Electric Railway Journal NEWS*. It appears as a separate newspaper on thirty-nine Saturdays during the year. On the other thirteen Saturdays, the magazine itself appears with current news.

The *Electric Railway Journal NEWS* keeps its readers posted on court decisions . . . recent bus developments . . . current legisla-

tion enacted concerning electric railways . . . changes in fare rates . . . news of purchasing activities . . . financial and corporate notes . . . editorial interpretation of vital news . . . personal items on men in the field. This newspaper constitutes the most complete guide to new developments in the field.

Subscription price is low—only \$2 for the complete year's service of thirty-nine issues. Foreign rate, \$4 annually. Sold in combination with the monthly edition of *Electric Railway Journal* for \$5 a year, domestic rate. Send no money now—simply fill in and mail the coupon today!

ELECTRIC RAILWAY JOURNAL

10th Ave. at 36th St., New York

Enter my subscription to *Electric Railway Journal NEWS*. Bill me for \$2.

Name

Address

City State

Company

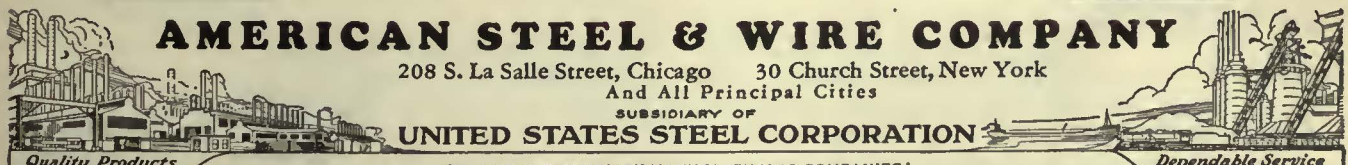


Bond Performance

One of the advantages of buying American Steel and Wire Company Rail Bonds is the assurance you will have of dependable performance. The reason is materials, design, and construction. Our experience has been of the kind that is worth money to you in Bond performance.

The AB-2 Bond is easily and quickly applied with a steel electrode. The open shape of this Bond terminal is especially desirable since the arc can be directed freely at the junction of the terminal and the rail.

Would you be interested in inspecting a sample?



AMERICAN STEEL & WIRE COMPANY

208 S. La Salle Street, Chicago 30 Church Street, New York
And All Principal Cities

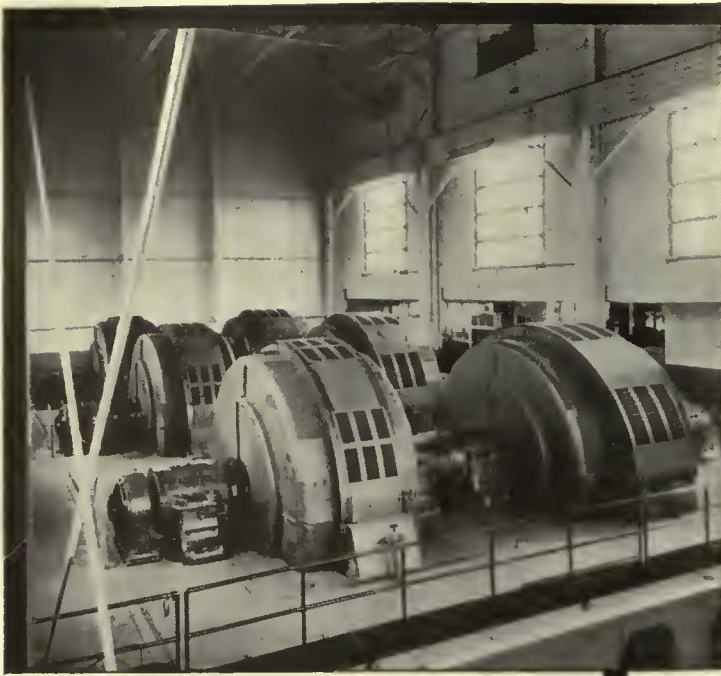
SUBSIDIARY OF

UNITED STATES STEEL CORPORATION

Quality Products **PRINCIPAL SUBSIDIARY MANUFACTURING COMPANIES:** **Dependable Service**

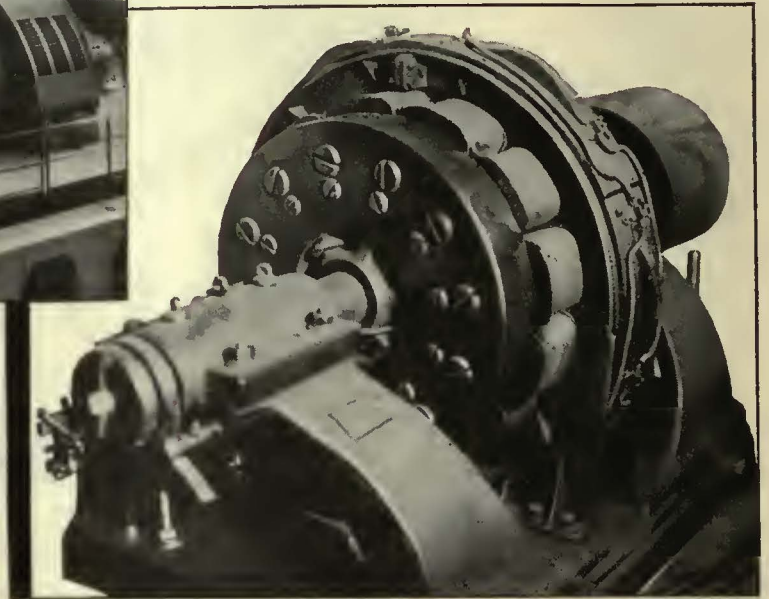
AMERICAN BRIDGE COMPANY	CARNEGIE STEEL COMPANY	ILLINOIS STEEL COMPANY	THE LORAIN STEEL COMPANY
AMERICAN SHEET AND TIN PLATE COMPANY	CYCLONE FENCE COMPANY	MINNESOTA STEEL COMPANY	TENNESSEE COAL IRON & R. R. COMPANY
AMERICAN STEEL AND WIRE COMPANY	FEDERAL SHIPBUILDING AND DRY DOCK COMPANY	NATIONAL TUBE COMPANY	UNIVERSAL PORTLAND CEMENT COMPANY

Pacific Coast Distributors—United States Steel Products Company, San Francisco, Los Angeles, Portland, Seattle, Honolulu. Export Distributors—United States Steel Products Company, New York City



Above: *Three 15,000 KW. Frequency-Converter Sets in a modern substation*

At right: *Pfaunkuche Alternator*



... the whirl of progress

"OBSOLETE!" says the engineer who glances at the old-time Pfaunkuche Alternator shown above. Obsolete, maybe, but nevertheless a monument to the early days of electric power that mark the beginning of a new civilization.

When this old A. C. Generator was new, National Carbon Company, Inc., already was a vital factor in the development of electrical equipment. Its efforts in consistently improving the quality of carbon brushes made possible persistent headway in motor designs.

The Pfaunkuche Alternator was belt-driven and the frequency very inaccurate. But it served its purpose. With the increasing use of electrical power came the standardization of frequency and the development of large central power stations. Then super-power

systems came into being. These required, at times, the bringing together of 25 and 60 cycle systems. The link between them is today's frequency-converter. Three frequency-converter sets are shown as they appear in a modern substation.

The coming years will see increased progress. And as greater turbines whirl in response to increasing demand, National Pyramid Brushes will continue to play the important part they have played up to now.

NATIONAL CARBON COMPANY, INC.

Unit of Union Carbide  and Carbon Corporation

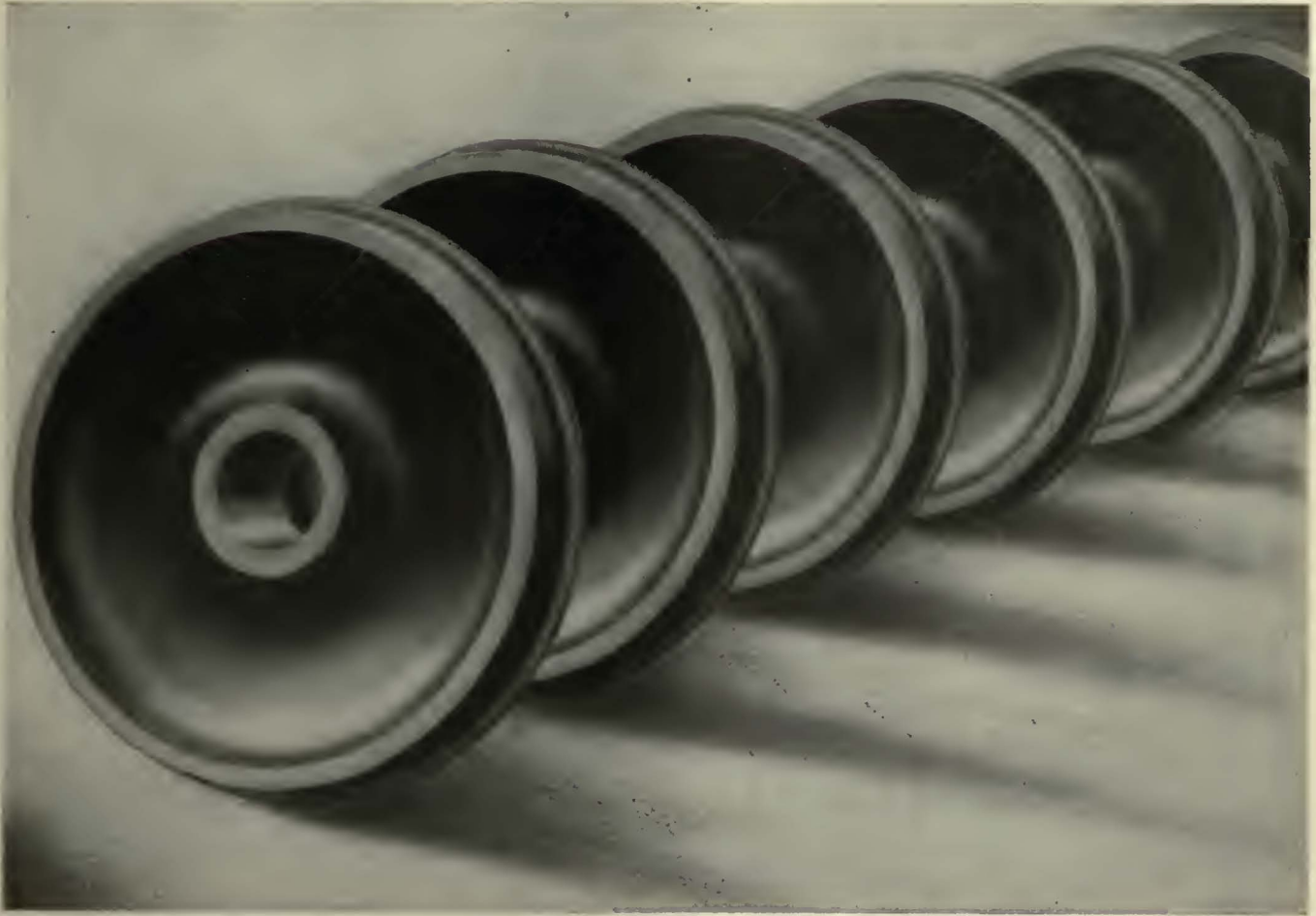
Carbon Sales Division



Cleveland, Ohio

Branch Offices and Factories

New York Pittsburgh Chicago Birmingham San Francisco



Safety...above all

Electric railway executives are realizing the many advantages of the Bethlehem Wrought Steel Wheel . . . its adaptability to today's severe traffic conditions . . . its ability to eliminate costly delays, due to slid-flats, shelled treads and broken flanges . . . the many thousands of miles of trouble-free service that it gives . . . and, above all, its safety!

The Bethlehem Wrought Steel Wheel has the strength, endurance and wear-resistance to stand up and deliver exceptional mileage under these severe traffic conditions. Five distinct forging and rolling operations are required to make a Bethlehem Wheel. The forging gives the metal toughness, and density; the rolling establishes a uniform grain structure throughout the wheel, virtually eliminating crystallization and reduc-

ing to a minimum the possibility of breakage.

In addition Bethlehem Wrought Steel Wheels have a liberal margin of safety. No wheels made by ordinary methods approach the high standard set by this type of wheel. That is why so many electric railways are turning to Bethlehem Wrought Steel Wheels. Your inquiry will receive prompt attention. Write today.

BETHLEHEM STEEL COMPANY

General Offices: Bethlehem, Pa.

District Offices: New York, Boston, Philadelphia, Baltimore, Washington, Atlanta, Pittsburgh, Buffalo, Cleveland, Detroit, Cincinnati, Chicago, St. Louis

Pacific Coast Distributor: Pacific Coast Steel Corporation, San Francisco, Los Angeles, Portland, Seattle, Honolulu.

Export Distributor: Bethlehem Steel Export Corporation, 25 Broadway, New York City.

■ **FORGED AXLES:** Extreme care is exercised in the manufacture of Bethlehem Axles. Special heat treatment gives them ductility and a high elastic limit. And they give excellent service under severe torsional stresses. ■

BETHLEHEM

Wrought Steel Wheels

Digitized by Microsoft®



**"Our 26 Coaches will exceed
a Million Miles in 1930
on Goodrich exclusively"**

MR. F. M. TEMPLE, Assistant Manager of the Inter-urban Transit Lines, Incorporated, (operating the "Short Way" Lines) and well known in Bus circles, makes the following comments regarding Goodrich Tires:

"Our twenty-six coaches which operate out of Toledo are equipped 100% with Goodrich Tires.

"During the year of 1929 our fleet covered in excess of 1,000,000 miles and we expect to exceed 1,200,000 miles in 1930 for our entire operation.

"We are pleased to state that during the last four years in which we have used Goodrich Tires exclusively, we have had every reason to be satisfied not only with the tires, but with the fine spirit of service and cooperation rendered by your local Branch and the factory."

The B. F. Goodrich Rubber Co., Est. 1870, Akron, Ohio.
Pacific Goodrich Rubber Co., Los Angeles, Calif. In Canada:
Canadian Goodrich Co., Kitchener, Ontario.

7 SUPERIOR SPECIFICATIONS

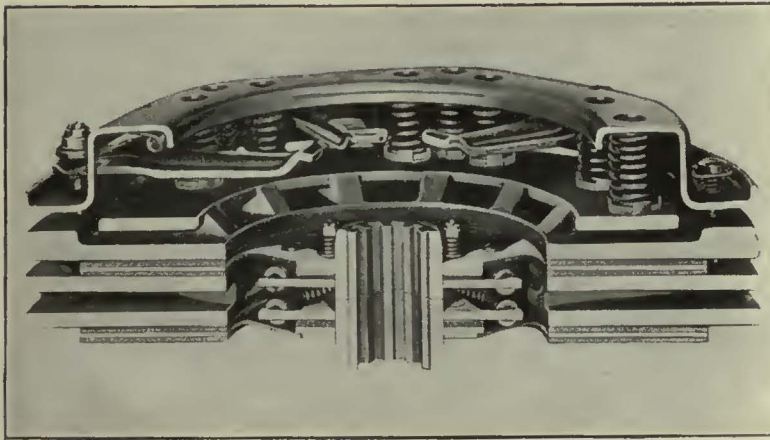
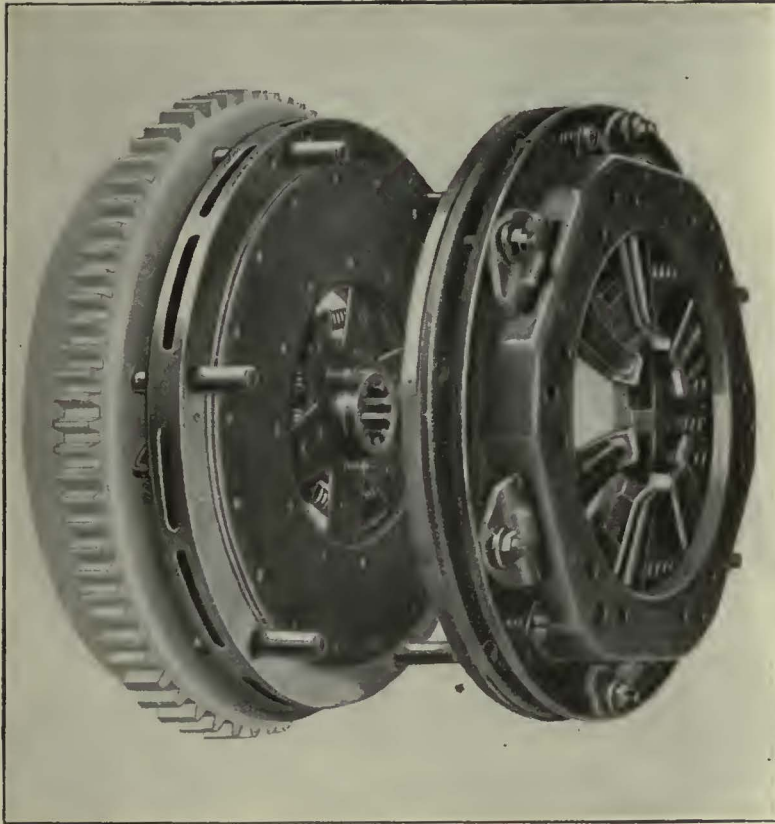
BUILT INTO EVERY
HEAVY DUTY SILVERTOWN

1. Heavily insulated stretch-matched cords.
2. Additional adhesion — from greater insulation between outside plies.
3. Heavy twin beads for better rim seating.
4. Extra gum fillers between plies for longer tire life.
5. Heat-resisting, interlocking cord breakers.
6. Tread designed correctly for heavy duty service.
7. The whole tire toughened by the famous Goodrich "water cure."

Goodrich HEAVY DUTY **Silvertowns**

• SPECIFY GOODRICH ON YOUR NEW BUSES •

Digitized by Microsoft



A
NEW
HEAVY
DUTY
DESIGN

FOR
BUSES
TRUCKS
AND
TRACTORS

LONG

AUTOMOTIVE
CLUTCHES

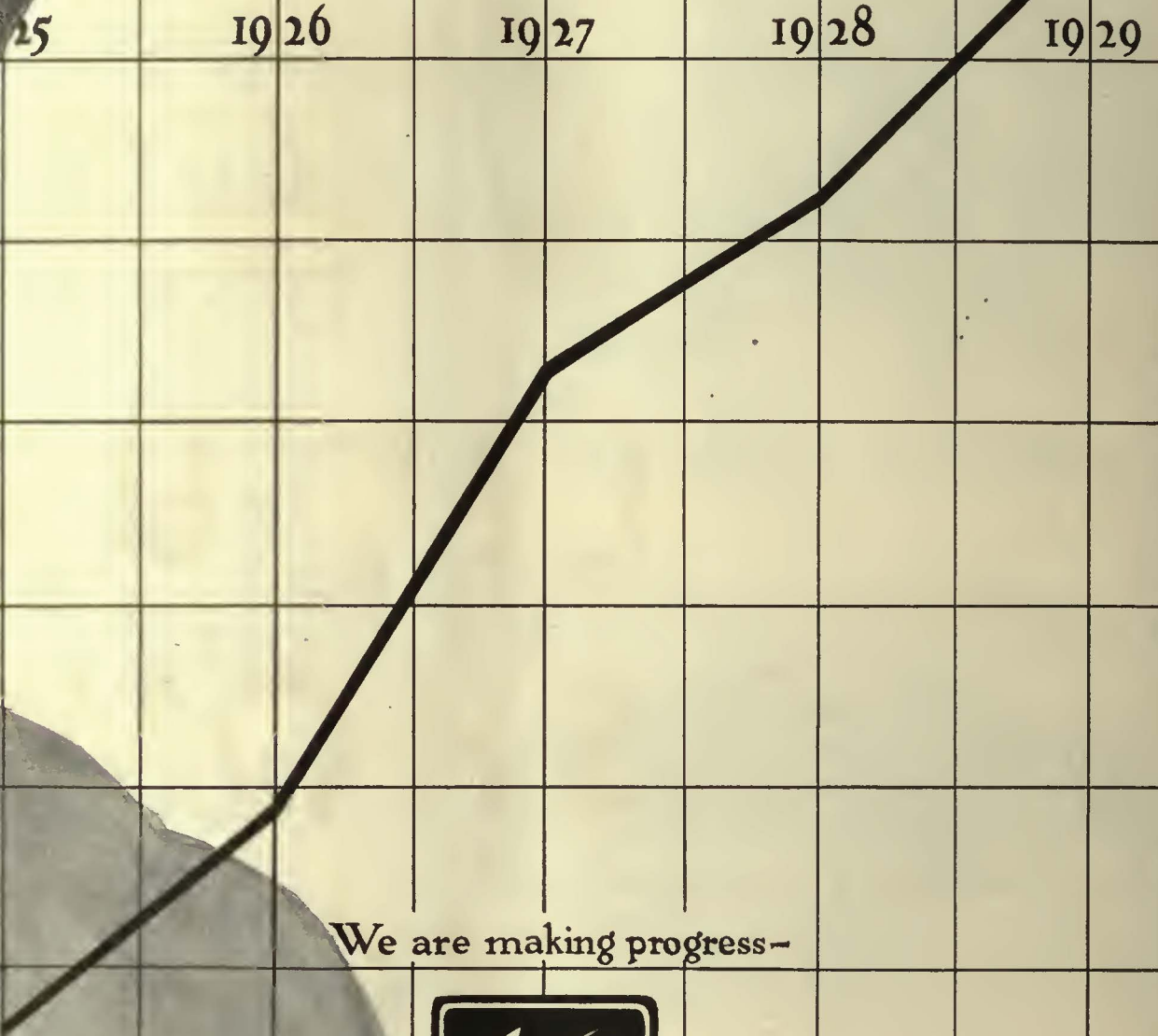


AUTOMOTIVE
RADIATORS

LONG MANUFACTURING
COMPANY
DETROIT, MICHIGAN

SALES BILLED

Camden Electrical Division Only



We are making progress—



AMERICAN BROWN BOYER



LET US
SHOW
YOU

◆ ◆ ◆ how costs
modernizing with



DODGE BROTHERS

Digitized by Microsoft®

are lowered by Dodge Coaches

**High costs give way to lower costs
when old equipment is replaced
with modern Dodge Coaches**

Operators, large and small, are fast coming to the sound realization that many a motor coach is too old to run economically. High operating cost, high maintenance cost and the discouraging of patronage with obsolete equipment—all are making stealthy inroads on investment returns.

Operators, large and small, are likewise finding in modern Dodge Brothers Motor Coaches the very qualities they need. These attractive coaches enable them to provide safe, comfortable, dependable service at a lower cost of operation and maintenance.



MOTOR COACHES

Low maintenance costs assured

CHASSIS: clean, sturdy and simple in design—easily accessible. Note absence of complicated brake linkages, rods and cables.

RADIATOR: honeycomb type; shutter controlled from driver's seat. Water-temperature indicator on instrument board and thermostat in engine provide additional temperature control for economical operation.

TRANSMISSION: heavy-duty type with four speeds forward. Built to withstand the constant gruelling service demanded by bus operators today.

STEERING: easy, quick and certain, is insured by the sturdy nut and lever steering gear. Simplicity and rugged design make maintenance negligible.

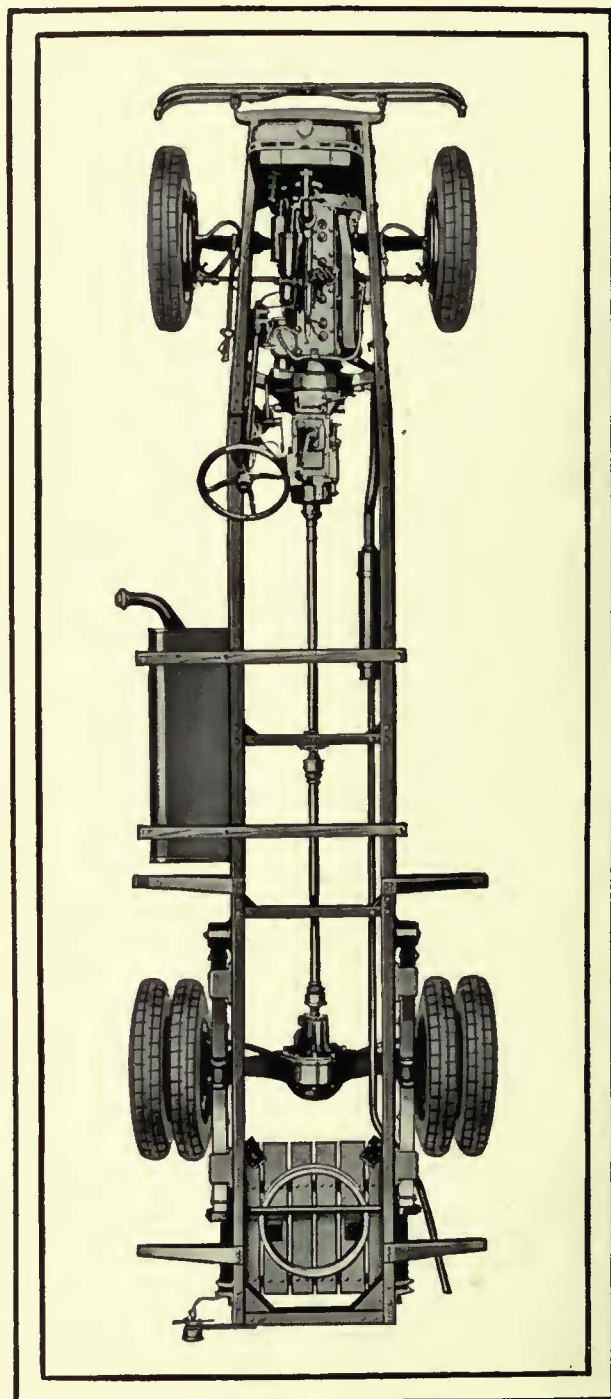
REAR SPRINGS: 3-stage, progressive type, provide surpassing riding comfort. Flexibility, without sacrifice of strength, is assured with varying loads by the progressive action of each of the three spring sections.

BRAKES: safe, 4-wheel hydraulic with American Brakeblok linings and gun iron drums. Large, certain-in-action, long-wearing, require but the minimum of periodic attention.

ENGINE: Dodge Brothers 6-cylinder, furnishes a smooth flow of power. Designed and built with special thought to the needs of users who seek simplicity, economy and long life.

CRANKSHAFT: of the 7-bearing type weighs 69 pounds; total projected bearing area 28.36 sq. in.

Weigh well the importance of these and other chassis refinements such as oil filter, air cleaner, gas filter and crank-case ventilator. They help to lower maintenance costs.



DODGE BROTHERS
MOTOR COACHES



GOOD WILL IS IMPORTANT— DON'T RUIN IT WITH FUMES

Good will is important to any business . . . it is a priceless asset to the transportation company. If your motor coaches are releasing objectionable fumes . . . if they are gassing pedestrians and potential patrons . . . they are seriously endangering good will and your business.

The sulphur and impurities that are present in many fuels and lubricants, are a major cause of obnoxious combustion odors. Red Crown Gasoline and Polarine Motor Oil, highly refined, pure and practically free from sulphur, do not produce these stifling combustion odors.

As a motor fuel Red Crown ranks at the top, giving power, mileage, economy. Polarine is pure and rich, supplying thorough, efficient lubrication to the motor. Working together they give that perfectly balanced performance which insures dependable service and low cost operation.

A test will convince you that Red Crown and Polarine form an ideal combination for your motor coaches.

STANDARD OIL COMPANY (INDIANA)

910 S. MICHIGAN AVE. CHICAGO, ILL.

1327

Chicago
Davenport
Decatur
Des Moines

Detroit
Duluth
Evansville
Fargo

Grand Rapids
Green Bay
Huron
Indianapolis

Joliet
Kansas City
La Crosse
Mankato

Mason City
Milwaukee
Minneapolis
Minot

Saginaw
Sioux City
Peoria
Quincy

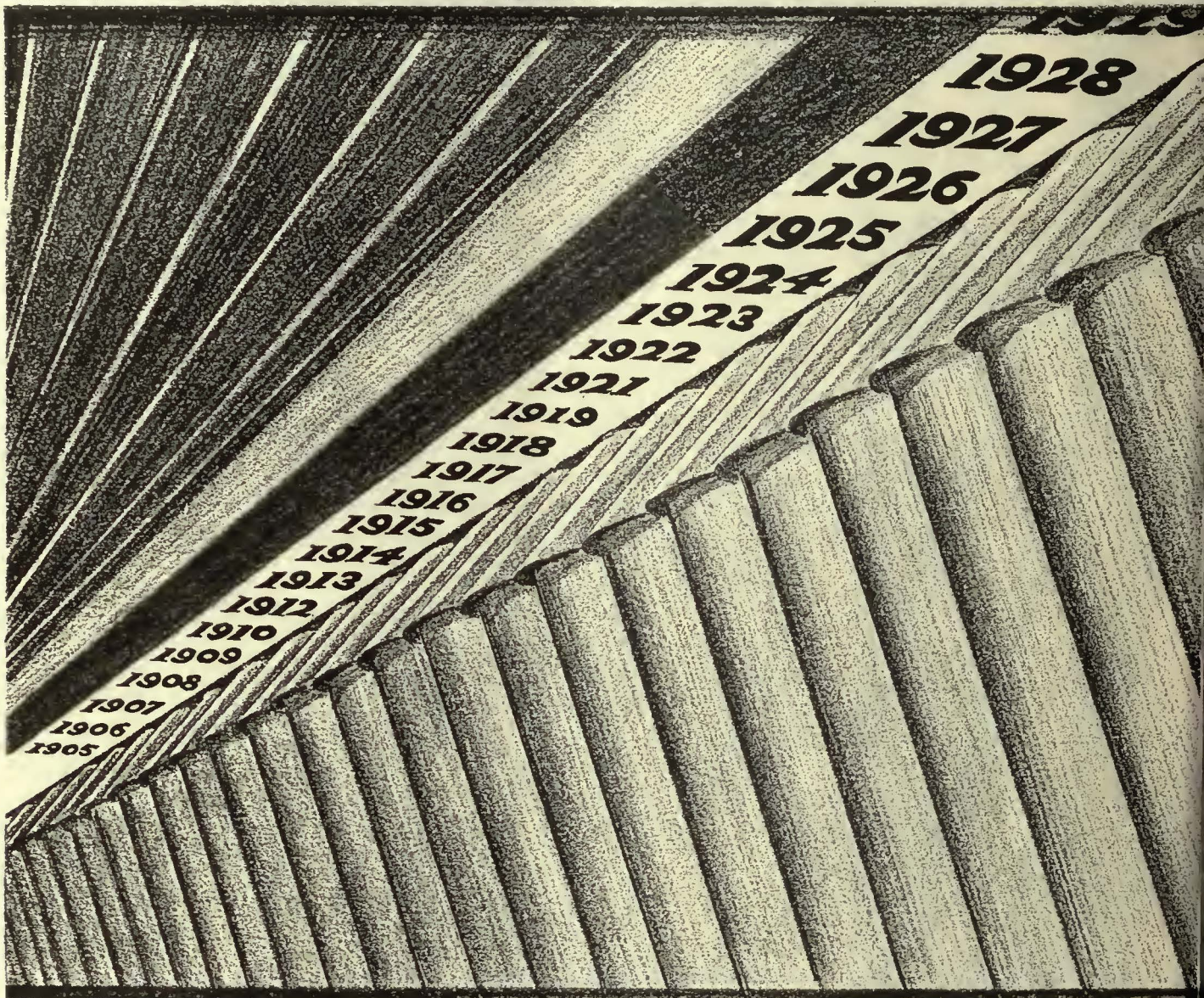
South Bend
St. Louis
St. Joseph
Wichita



RED CROWN GASOLINE

POLARINE MOTOR OIL

Through the years,



METAL & THERMIT
PITTSBURGH CHICAGO BOSTON 120 BROADWAY

1930

"THERMIT"

Back in 1905 this Company was formed to produce and sell Thermit in the United States. And because this process of welding was sound, and because its product has always been good, this Company has grown and prospered. Long time service is the real test of any product or process. Thermit Welds are permanent. They last as long as the rail itself. Cars are still operating over Thermit Welds which we made eighteen years ago. It was called "Thermit" then and it bears the same honorable name today. Although basically the same material, Thermit has been greatly improved by better control of the raw ingredients and the processes of manufacture, thus insuring the best possible product with absolute uniformity. Furthermore the methods of Thermit welding have been perfected and simplified. The Metal & Thermit Corporation has achieved its present size and prestige only by a continuous policy of research, study and improvement in its welding method. When you buy from the Metal & Thermit Corporation you are buying more than merely bags of material. You are buying engineering service. You secure the benefit of experience gained on many other properties. You have a guarantee of a satisfactorily completed job. We are not satisfied until you are.



CORPORATION

NEW YORK, N.Y.

SOUTH SAN FRANCISCO

TORONTO

This is one of a series of advertisements directed originally to advertising men in an effort to make industrial advertising more profitable to buyer and seller. It is printed in these pages as an indication to readers that McGraw-Hill publishing standards mean advertising effectiveness as well as editorial virility.

Does advertising schedule have anything to do with sales?

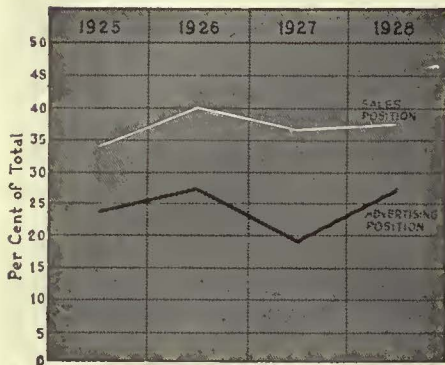
Yes, according to the experience of Manufacturer Smith whose sales staff from top to bottom is advertising minded. Smith's schedule has been consistently maintained over a period of years in every issue of two McGraw-Hill publications.

* * * *

Yes, according to the experience of manufacturer Brown whose sales executives are not so advertising minded. Brown's schedule in the same publications was consistent up to a certain point and then sharply curtailed. He believed that product quality would take care of most of his future sales.

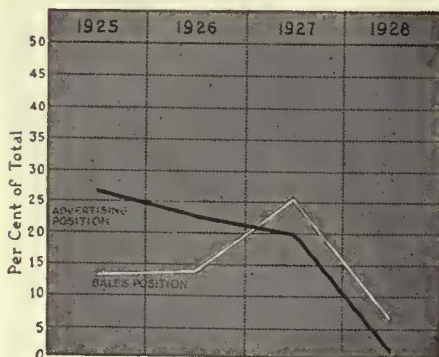
Printers' Ink says succinctly: "The way to make money by using advertising is to use it — not to fiddle with it." Do not these two experiences from the industrial field endorse this as something stronger than theory?

MANUFACTURER SMITH



These charts, compiled by McGraw-Hill, present the sales and advertising history of two competitors making the same kind of product and selling it to the same market through the same two publications.

MANUFACTURER BROWN

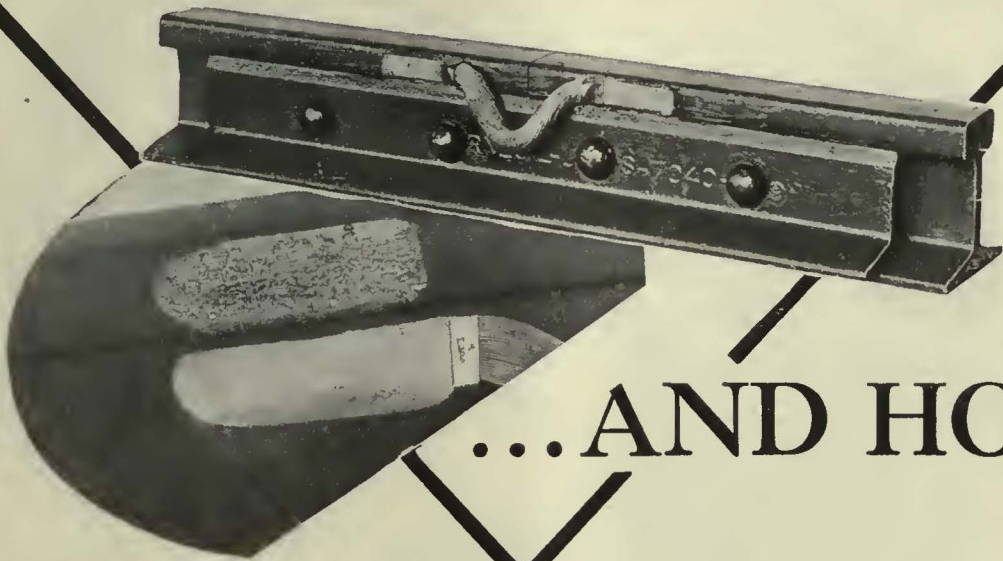


The white curve shows each manufacturer's share of total sales in the particular industry. The black curve shows how much of the total competitive advertising (on a page basis) each manufacturer used in this market.

McGRAW-HILL PUBLICATIONS

- New York
- Chicago
- Cleveland
- Detroit
- St. Louis
- Philadelphia
- Boston
- Greenville
- San Francisco
- London

STAY ON THE JOB?



...AND HOW!

LOOK at the terminal on the Type E A S Erico Brazed Bond! It took 30,000 pounds to shear it from the rail—and observe the area of copper left on the rail. Ask yourself if even the most severe service is apt to knock an Erico Bond loose.

Erico Bonds stay on the job, provide lasting, low resistance bonding. They can be applied in 60 seconds per terminal, with results shown in the unretouched photo above. Application is practically automatic. A few simple rules in operating the welding furnace and the bonder will secure uniformly good results.

The heat of application is *not injurious to the rail structure* and is so low that the entire process of application may be watched by the bonder with the naked eye.

E A S Brazed Bonds can be applied to standard or heavy beaded splice bars. Let us aid you in selecting the bond to fit your rail joint. Address

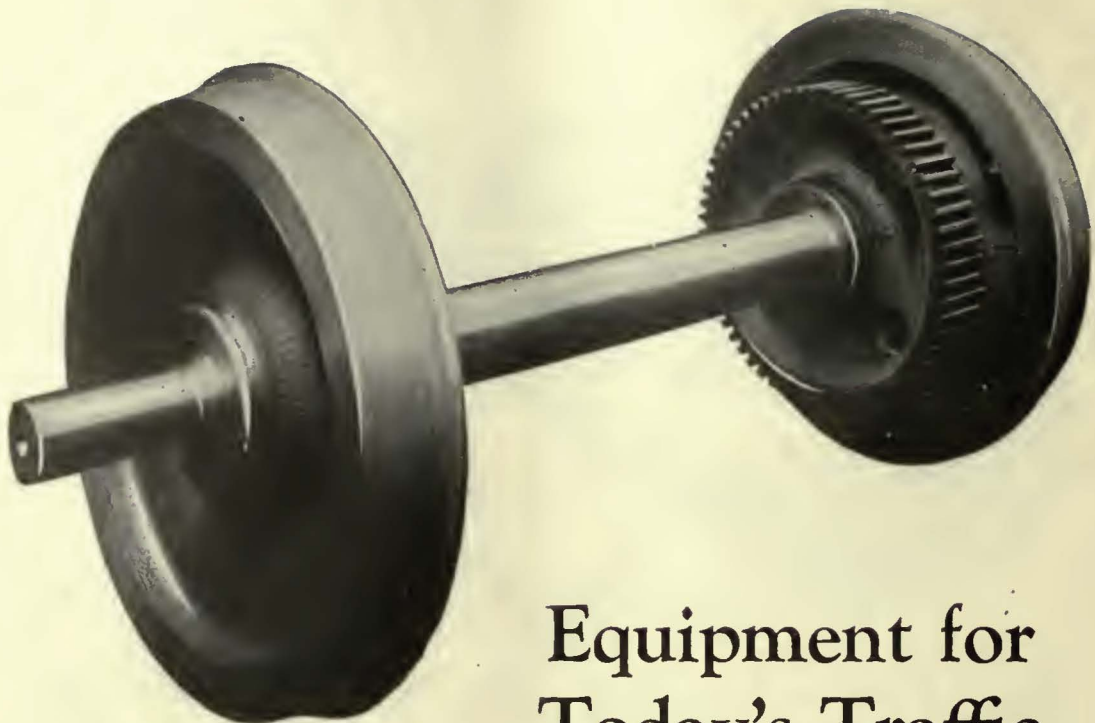
The

Electric Railway Improvement Co.

2070 E. 61st Place

Cleveland, Ohio

ERICO
RAIL BONDS AND BONDING OUTFITS



Equipment for Today's Traffic

In today's heavy traffic—increased wheel mileage with lower maintenance cost, can be obtained in "Standard" Wheels.

Durability, increased wearing qualities and safety are forged and rolled into "Standard" Wrought Steel Wheels.

STANDARD STEEL WORKS COMPANY
 PHILADELPHIA, PA. WORKS: BURNHAM, PA.

Products

Steel Axles
 Steel Springs
 Armature Shafts
 Rolled Steel
 Wheels



SALES OFFICES:

New York Chicago St. Louis
 Richmond Portland
 San Francisco

4½ years of Satisfaction + Economy with Socony Regular Gasoline



THE fourteen buses of the Interstate Street Railway Company run between Attleboro, Mass., and Providence, R. I., and are also chartered for special jobs. They have been fueled exclusively with Socony Regular Gasoline for four years.

Part of the fleet of buses operated by the Interstate Street Railway Company on Socony Gasoline.

Operation has been so economical and satisfactory that this company has never switched to any other brand of fuel.

Socony products offer the logical solution to all gasoline and motor oil problems. Not only do they increase performance, but also their use lowers operation costs.

Join the ranks of fleet owners who use Socony Gasoline. Once you have tried it, you will find no reason to change.

S O C O N Y

Gasoline Special Gasoline ^{plus} Ethyl

Motor Oil

Aircraft Oil

STANDARD OIL COMPANY OF NEW YORK

Don't Neglect Your Seats!

If they are right your service and revenues will increase, wrong and the passenger will leave your bus with a feeling of relief. You want satisfied customers not passengers who regret every riding minute.

Don't neglect your seats.

General Leathers for seat coverings can help you make satisfied customers. They are soft and comfortable, clean easily with soap and water, and will not get sticky in any weather. Attractive to the eye, fast in color, its a pleasure to ride on General Leathers.

Hides are furnished in all sizes and colors.

On quantity orders, we cut directly from your patterns to eliminate all waste.

Experience on bus work has proved that General Leathers do a 100% seat covering job.

*Our Specialties which we
Recommend for this Purpose:*

Majestic Full Grain Leathers
20th Century Spanish Leathers
Geneleaco Leathers
Salon Hand Buffed Leathers

Write for samples. Specify General Leathers on your next orders for Electric Cars, Buses and Taxi Cabs or when you overhaul your seat coverings.

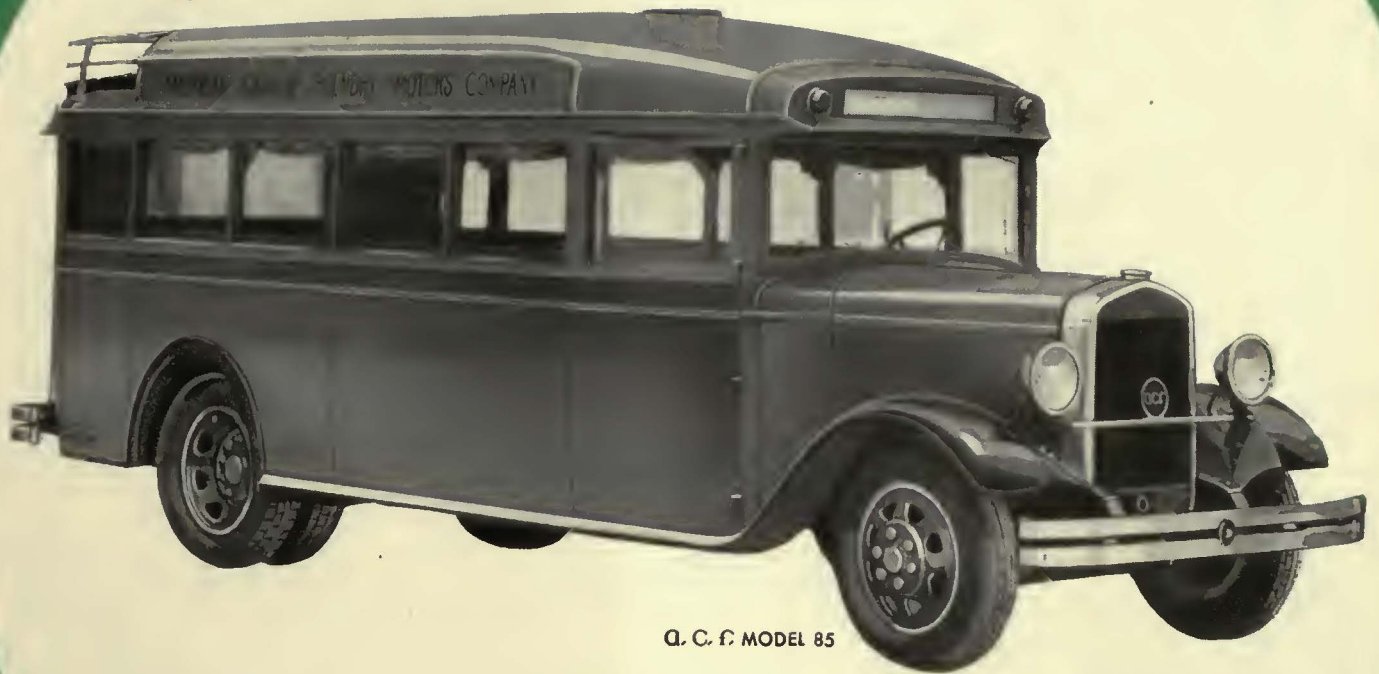
GENERAL LEATHER COMPANY
Makers of Famous Tried and Proven "00" Leathers
NEWARK, N. J.

Detroit Office
Stoddard Lovely & Co.
10-210 General Motors Bldg.

Canadian Office
Colonial Traders, Inc.
78 Williams St., Chatham, Ont.

London Office
R. & A. Kohnstamm, Ltd.
21 West Smithfield, London, E. C.

West Coast Office
A. J. & J. R. Cook, Inc.
237 Eighth St., San Francisco



Q. C. F. MODEL 85

**Here is an unusual “small capacity” coach —
Every single part and unit has been designed
expressly for bus service! A TRUE BUS!**



A. C. F. MODEL 85

A.C.F.

This new model 85 passenger coach is not a rebuilt passenger car nor a rebuilt truck! There is not a single unit in the whole job that has been brought over from passenger car or truck building practice.

A.C.F. has spent years in the study of the problems of coach transportation, and realizes very thoroughly that a bus must be designed... every part of it... FOR BUS SERVICE!

Model 85 is a bus in every sense.

It has a BUS engine — a flexible, dependable, economically operated 6-cylinder power plant designed especially to meet the requirements of motor coach transportation. It is an engine that will give you a high gear acceleration from 10 to 25 miles per hour in only 15 seconds. This means high torque at low engine speeds—power for acceleration right where you want it!

Every other part follows this right out . . . there's a BUS clutch, a BUS transmission and drive line, BUS brakes, and an efficient heater complying with all state requirements, as standard equipment.



A. C. F. MODEL 85

A.C.F.

Every part has been designed so that it is oversize, and stronger than it needs to be for the work it has to do. You can check every one of them, and you'll find that in every case, the parts of this Model 85 bus are heavier, larger and stronger than standard practice for a bus of this capacity and weight. Model 85 is built for steady, hard service and with ordinary regular maintenance there is not the slightest possibility of failure of any of its units because of too-small or too-weak parts!

You can choose either of two types, depending upon your requirements in the service you are offering:

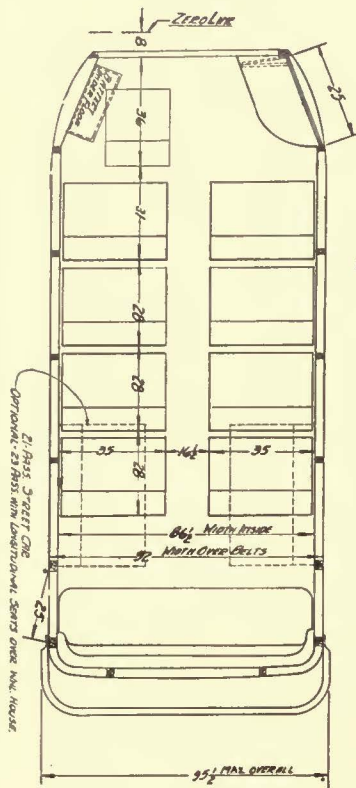
A 21 passenger parlor coach, with plenty of seat room and comfort for 21 fullgrown people.

A 21 or 23 passenger street car.

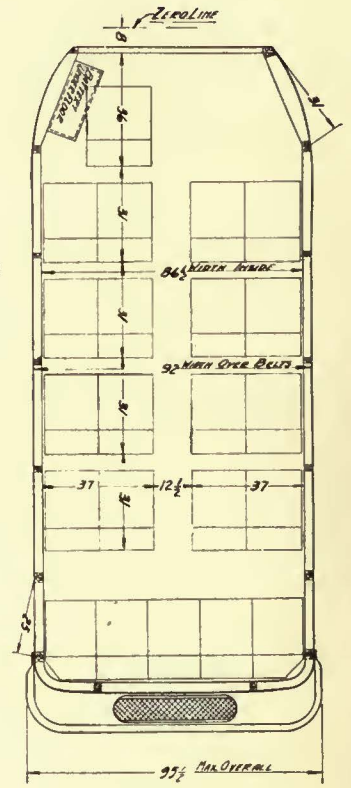
You can count upon maximum value from this new A. C. F. model, for A. C. F.

has taken care in every step of its designing and building to be sure that you get it!

We will be glad indeed to send you more complete specifications and details of this model. Why don't you write today?



URBAN COACH



PARLOR COACH

a, c, f

AMERICAN CAR AND FOUNDRY MOTORS COMPANY
30 CHURCH STREET _____ NEW YORK CITY



A. C. F. MODEL
INTERIOR

a, c, f



Three long established electrical materials every railway can use to advantage

TRANSITE... ASBESTOS EBONY... ELECTROBESTOS

THESE three Johns-Manville products are all proving their greater efficiency and added economy in an increasing number of applications on the electric railway car. For many years these durable materials, formed in combination with asbestos, have met the needs of the Electrical Industry for insulating panels and parts, for arc barriers or wherever high dielectric strength and fire-proofness are required.

J-M Asbestos Ebony is particularly well suited for electric insulating boards, spacer bars, panel boards and in many other instances where there is need for a board form of dielectric insulation. This rugged material, supplied in sheets or in moulded forms, is moisture-proof and will not warp or crack.

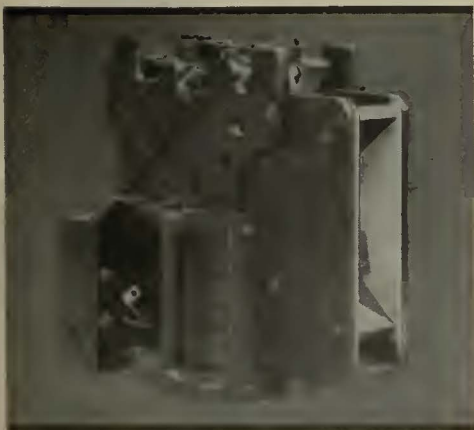
Wherever there is need for a highly efficient fireproof board, Electrobestos and Transite offer ideal materials for insert pieces on arc chute boxes, finger flash shields, circuit breaker boxes or any place where there is an exposed arc to capture. They are light in weight and easily handled and can be cut almost as readily as wood to fit any desired shape. Electrobestos is usually supplied in moulded form for convenience.

J-M Engineers will be glad to suggest the use of these low cost materials where they can do a job competent to meet the requirements of higher voltages and the demands for quicker service. Fill out the coupon for further information.

J-M Friction Tape

...another J-M Product

J-M Friction Tape has a reputation earned by giving years of satisfactory service. Woven from selected sheetings, impregnated with an insulating compound and coated with a high grade adhesive rubber composition, it provides a safe covering for exposed wires.



A typical J-M Arc Chute Box of Asbestos Ebony and Electrobestos



J-M Electrobestos Finger Flash Shields



Johns-Manville Asbestos Ebony Mator Lead Spacer Bars

Bus & Car Insulation Refractory & Insulating Cements
Fibre Conduit Asbestos Exhaust Pipe Covering Transite
Power Plant Insulations Masticoke & Truss Plate Flooring

Asbestos Shingles Brake Blocks & Linings Built-up &
Ready-to-lay Roofing Asphalt Plank Tile Flooring
Packings Electrical Insulating Materials Friction Tape

Johns-Manville

SERVICE TO TRANSPORTATION

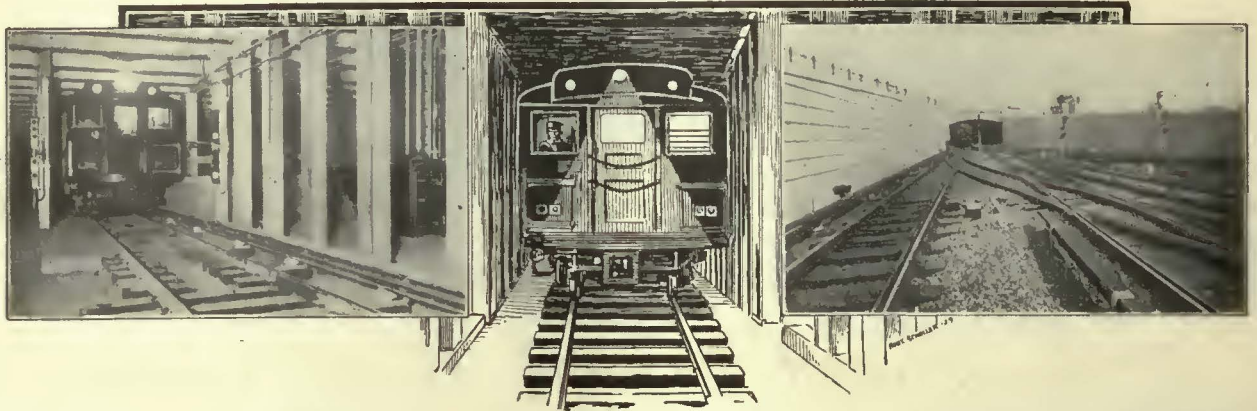


Address **JOHNS-MANVILLE**
At nearest office listed below
New York Chicago Cleveland San Francisco Montreal
(Offices in all large cities)

Please send me particulars on J-M Asbestos Ebony, Electrobestos and Transite Electrical Paris.

Name.....

Address.....



“Union” Signals Speed Traffic on P.R.T.

PHILADELPHIA'S newest high speed transit system, the Broad Street Subway, has been signaled by the Union Switch and Signal Company. This is a four-track structure having six interlockings in its seven-mile length. Trains are operated on close headway at the peak hours.

“Union” Subway Type Signals, Model 14 Electro-pneumatic Interlocking Machines, and auxiliary apparatus speed traffic on this system as on the others in Philadelphia. “Union's” half-century of experience in the signaling field enables it to meet your signaling needs and provide added economies.

Our specialists are at your service without obligation.

1881



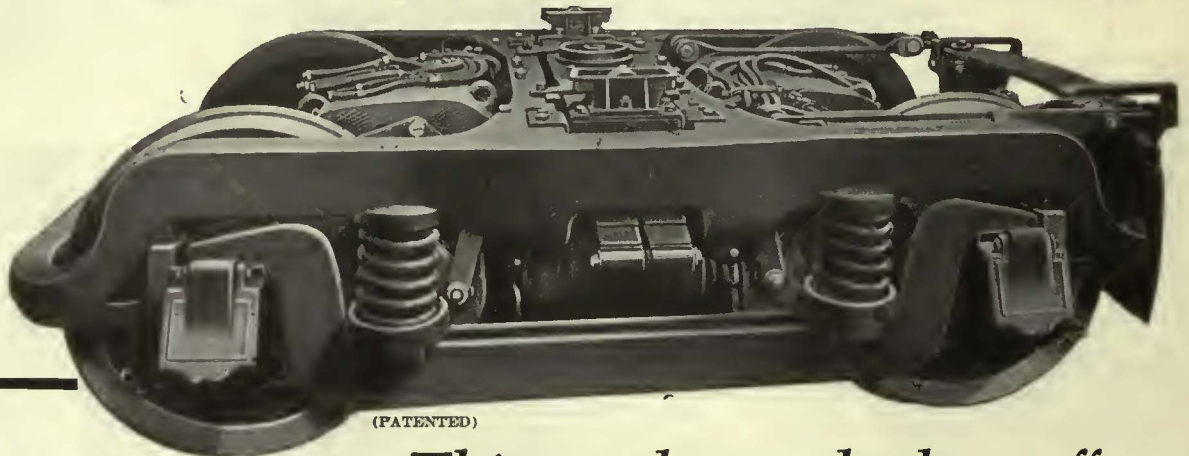
Union Switch & Signal Co.



1930

SWISSVALE, PA.

==COMMONWEALTH==



(PATENTED)

Cast steel frame, including cross and end transoms, a single strong unit.

Pedestals cast integral with frame. Removable hardened spring steel liners protect them from wear.

This truck stands the gaff of high-speed interurban service!

It's a Commonwealth Motor Truck. And the long service it gives at remarkably low maintenance has made it standard with many of the most progressive railways.

GENERAL STEEL CASTINGS CORPORATION

COMMONWEALTH DIVISION

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GRANITE CITY, ILLINOIS

**The SAFETY CAR
CONTROL EQUIPMENT**

» » » » **INCREASES
Safety of Operation**

INTERLOCK feature permits centralized operating responsibility . . . prevents opening of doors before car stops, or starting of car before doors close . . . and causes an emergency brake application if controller handle is released due to motorman's negligence or disability while car is in motion.

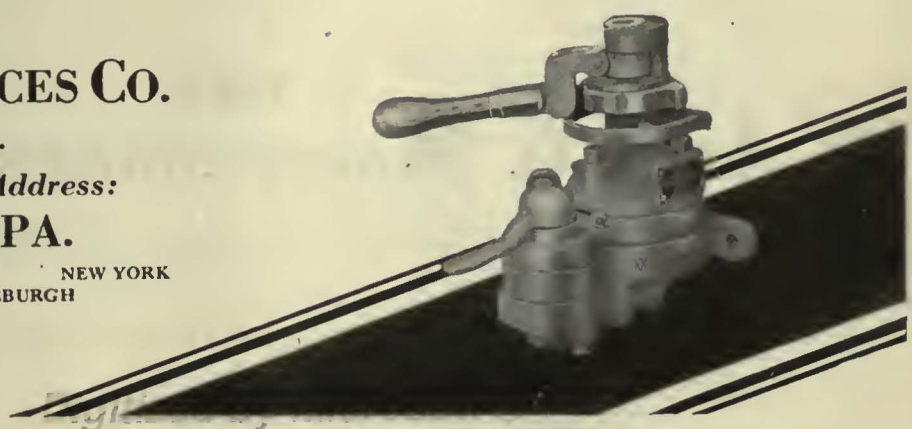
SAFETY CAR DEVICES CO.

OF ST. LOUIS, MO.

Postal and Telegraphic Address:

WILMERDING, PA.

CHICAGO SAN FRANCISCO NEW YORK
WASHINGTON PITTSBURGH



Electric Railways to Spend 371 Millions This Year

Based on an Investment of More Than 5 Billions
... a Gross Revenue of Over a Billion ... and
the Highest Net Income They've Ever Made

THE electric railway companies are budgeted to spend \$371,220,000 during 1930 ... more than a million dollars a day.

For new equipment and maintenance alone, they expect to spend \$251,530,000, an increase of more than 15 millions over 1929 ... more than 25 millions over 1928.

It is significant that not only the totals, but the appropriations for each account are increasing. This can only indicate that *the maintenance standards of the railways are being steadily raised.*

Increasing net profits, expanding bus operations, favorable track re-

adjustments, larger purchases of rolling stock ... all reflect the great improvement in the financial situation. Nearly 1,500 new cars were purchased, and a larger number of old cars scrapped than ever before, in 1929.

Electric Railway Journal's "Maintenance Contest" will be continued in 1930 for the fourth successive year, in cooperation with the American Electric Railway Engineering Association. These contests have aroused widespread interest in maintenance practices. Each year has produced an increasingly large number of competitors, nearly 200 having submitted suggestions for improved maintenance in 1929.

THIS YEAR, THEREFORE, the editorial pages, will have special significance ... the advertising pages extraordinary value ... in

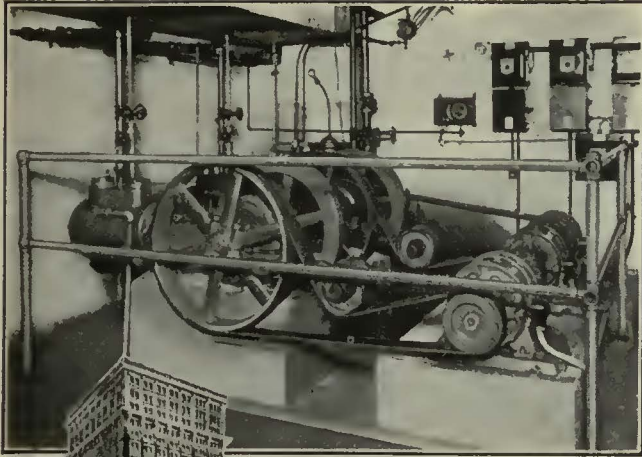
THE ANNUAL MAINTENANCE NUMBER

of *Electric Railway Journal*

APRIL ISSUE

Advertising Forms Close March 19.

Digitized by Microsoft®



Two Sullivan single stage belted compressors installed in the Farmers Bank Building, Pittsburgh, Pa.



where Air
improves
service
to the customer,
in 8 ways

Dependable, economical air power is a vital factor in servicing the customers of a large office building.

Air assures water supply to the topmost stories. It controls furnace dampers, opens and closes elevator doors, operates doctors', dentists', jewelers', and barbers' equipment, ejects sewage. Eight tasks or more, are done by air for many modern office buildings.

For this service, as well as for factory service—trouble-free, automatic operation has made Sullivan single stage belted compressors popular.

Details of the Sullivan "WG-6" Compressor

Short belt drive, automatic control, sweep-control unloading, splash lubrication, Wafer Valves, rugged construction, ample bearing areas, water jacketed cylinders and heads, continuous economical service.

Capacities 68 to 500 cubic feet per minute. Catalog 83-I.

SULLIVAN

SULLIVAN MACHINERY COMPANY

809 Wrigley Building

Chicago, Ill.

Protect it with a Nachod



Nachod Signal on Interurban lines of the Milwaukee Electric Railway and Light Co.

ANY of your highway crossings can be a "dead man's" crossing—but none of them will have that expensive reputation if they're protected with Nachod Highway Crossing Signals.

Durable and dependable, Nachods operate day and night. The powerful warning lights can be seen at a distance—combined with the vibrating bell, they give your crossings the best possible signal protection.

For more than a few properties, this economical highway crossing protection has paid profits. Write for details.

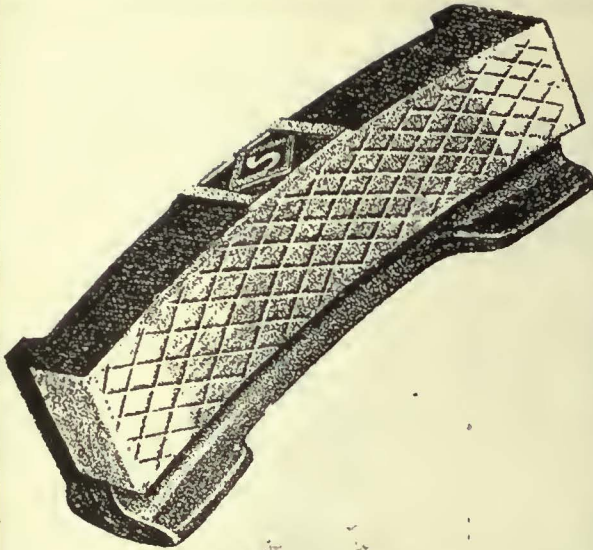
Nachod Spells Safety

Not alone on your crossings but throughout your system NACHOD equipment can spell safety. On those properties where accidents are the lowest you'll find NACHOD protecting life, property and equipment—saving untold dollars—contributing to uninterrupted service.

NACHOD & UNITED STATES
SIGNAL CO., Inc.

LOUISVILLE, KY.

WE ALSO MANUFACTURE: Turn-right Signals, Signals for Single and Double Track, Stub End Signals, Annunciator Signals, Headway Recorders.



GOOD SHOES are now imperative

AMONG the several improvements to trolley cars that permit faster operation in urban service are more powerful and quicker acting brake systems. They make great savings in time by increasing the rate of deceleration.

But the increased load on the brake shoes must be considered. The high speed, heavy pressures and quick application soon break down ordinary brake shoes. In this heavy duty service Diamond-S brake shoes are imperative. With their steel backs and expanded metal sinews holding them together, they maintain their full braking efficiency until worn to the limit.

The full economy of modern braking equipment cannot be realized unless Diamond-S brake shoes are a part of it.

The American Brake Shoe and Foundry Company

230 Park Ave., New York
332 So. Mich. Ave., Chicago



A complete manual covering generation, transmission and distribution of electricity

Here is a survey of the entire electric system. It meets an immediate need in the daily work of central station operators, draftsmen, inspectors, linemen, substation employes and students of electrical engineering.

ELECTRIC SYSTEM HANDBOOK

1131 pages, 5 x 8 inches, fully illustrated
\$5.00 postpaid

THIS book is the combined work of eight well-known engineers—each a specialist of wide reputation—and under the editorship of Clarence H. Sanderson.

Authentic and usable information is given on the fundamentals of electricity—generation—transformation—transmission—switching—trouble shooting—installation and inspection of wiring and equipment—etc., etc.

Section Headings

1. Electrical Energy and Its Transmission.
2. Auxiliary Electrical Equipment.
3. Switchboards.
4. Motors.
5. Generating Stations.
6. The Transmission System.
7. Alternating Current Substations.
8. Railway Substations.
9. Direct Current Substations for Light and Power.
10. Distribution.
11. Protection of Electrical Apparatus, Circuits and Systems.
12. Inspection and Maintenance.

See this book for 10 days FREE!

Nothing can convince you of the value of this book as the book itself. Examine it—put it to work—study it—for 10 days without cost or obligation.

Fill out, clip and mail this Coupon!

McGraw-Hill FREE EXAMINATION COUPON

McGraw-Hill Book Company, Inc., 370 Seventh Avenue, New York.

You may send me a copy of Sanderson's Electric System Handbook for 10 days' free examination. At the end of that time I agree to remit the price of \$5.00 or return the book postpaid.

Signed

Address

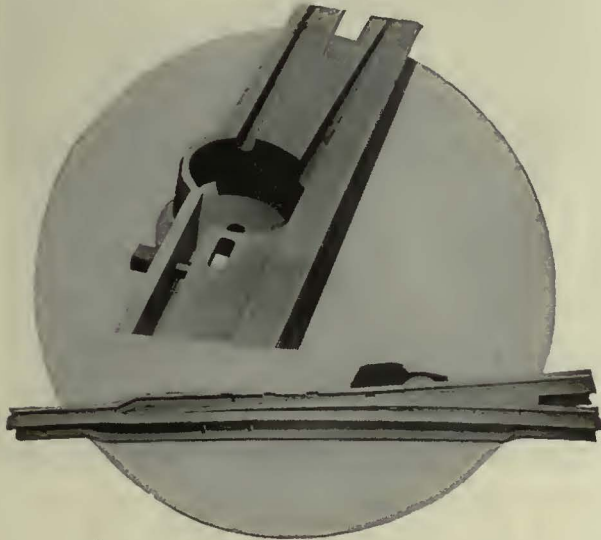
City and State

Official Position

Name of Company

(Book sent on approval to retail purchasers in U. S. and Canada only.) E. 3-30

**A New
WHARTON
Contribution
to the Industry**



THE Wharton Flexible Wall Switch has a heel tightening device based on the principle of a split collar. By means of a bolt the wall is flexed or drawn in until it hugs the tongue heel; thus all play caused by wear is taken up. The nut of this bolt is located in the drain box and is readily accessible.

The tongue pin is 9½" in diameter and 6" deep. This construction eliminates a holding-down device, prevents kick-up and forward movement of the tongue.

*Maintenance costs are lower on
New WHARTON Crossings.*

The only scientifically designed crossing
—now used on over 50 leading roads.
Send for bulletin 1 C.

**William Wharton Jr. & Co.
INCORPORATED**

Easton, Pennsylvania

Pittsburgh SALES OFFICES: Chicago
Houston New York San Francisco Boston
Montreal Philadelphia Los Angeles Scranton



SYNOPSIS
of
**A Long
INDUSTRIAL STORY**

For over thirty years the merits of brick pavements have made them first choice with electric railway officials for the paving of track areas.

For engineering data, write
National Paving Brick Manufacturers Association,
National Press Building,
Washington, D. C.

**Vitrified
BRICK PAVEMENTS**



We roll the mileage in ~ you roll it out

The process by which Carnegie Wrought Steel Wheels for interurban and city service are manufactured assures high resistance to the wear and tear of modern traffic conditions. A 10,000 ton hydraulic press imparts to the steel a homogeneous structure, free from irregularities that might cause failure. Then the wheel is thoroughly rolled, further refining the wearing surfaces. Mileage is forged in and rolled in—extra mileage that makes Carnegie Wheels the outstanding value in the wheel market today.

In city service these wheels have an added advantage in that cars may be speeded up with safety over crossings, with less possibility of damage to special track work.

Before you invest, investigate the many advantages of Carnegie Wrought Steel Wheels. *Catalogue on request.*

Carnegie Steel Company, Pittsburgh, Pa.

Subsidiary of United States Steel Corporation

41

CARNEGIE WROUGHT STEEL WHEELS

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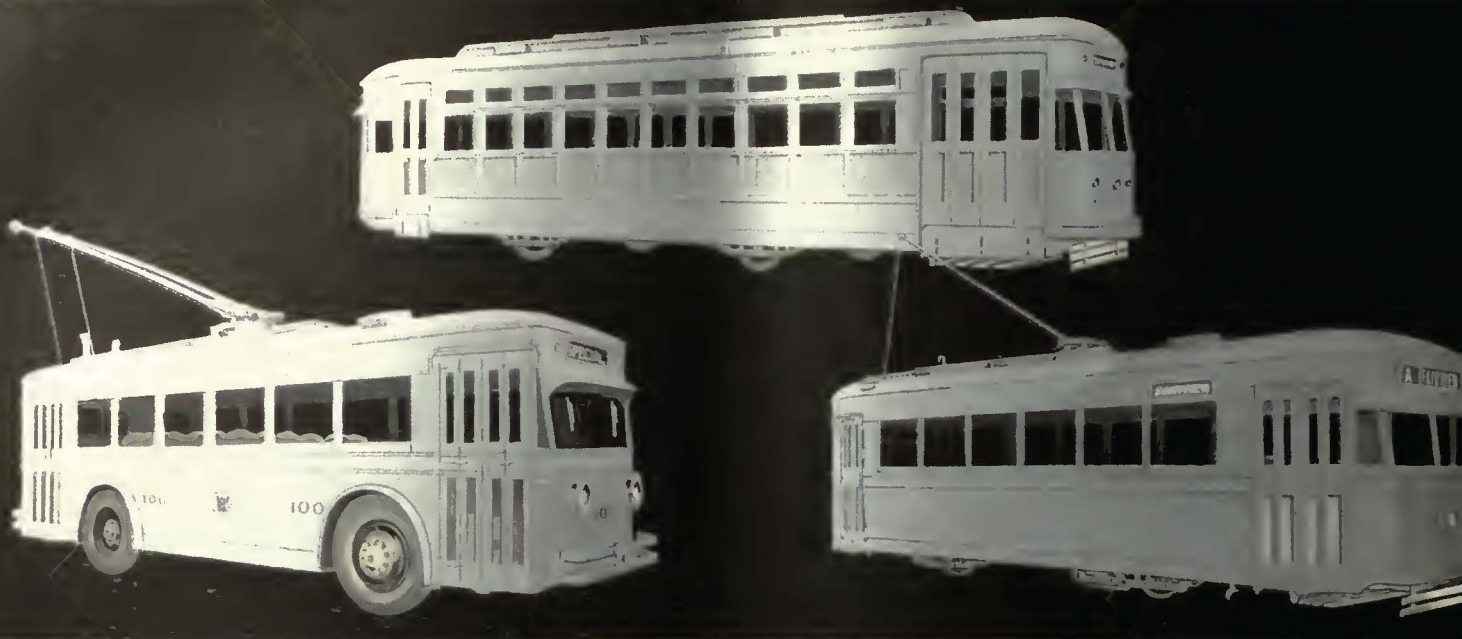
STRONG TO BEAR BURDENS
— LIGHT TO MOVE

$$E = \frac{MV^2}{2}$$



ALCOA ALUMINUM

"FAST BECOMING A LOGICAL ECONOMIC
FACTOR IN STREET CAR CONSTRUCTION"—
SAYS THE J. G. BRILL COMPANY



Profit replaces loss when pay-load replaces dead-load

A 30% reduction in non-pay load has turned losses into profits for street car companies. Such an amazing slash in dead-weight is possible through the use of the light, strong Alloys of Alcoa Aluminum.

In this 2-page advertisement we show 4 actual examples of cars, built by The J. G. Brill Company, employing Alcoa Aluminum:—

On page one we show an example of a production car built on the master-unit principle by The J. G. Brill Company. Cars of this type are operated in Lynchburg, Virginia.

Above (in center) is the Brill 4-Wheel Unit Car using Alcoa Aluminum Alloys, applied to the standardized design of the Third Avenue Railways, New York.

Above (lower left) is the Brill Electric Coach; the ultra modern version of the old trackless trolley, using Alcoa Aluminum and its Alloys for practically all metal parts.

Above (lower right). An Alcoa Aluminum Brill Master Unit Car. Quiet operation, together with a large decrease in power consumption, and more rapid acceleration, are brought about by building these cars of Alcoa Aluminum and its Alloys.

Our nearest office will gladly send a representative who is thoroughly familiar with the use of Alcoa Aluminum in transportation. He will tell you what has been done, and what is possible and practical for you to do. ALUMINUM COMPANY of AMERICA; 2463 Oliver Building, PITTSBURGH, PA. Offices in 19 Principal American Cities.

ALCOA ALUMINUM

Digitized by ALCOA ALUMINUM
Microsoft®



Thousands of daily traffic thumps actually IMPROVE floors paved with Carey Elastite Asphalt Plank.



Toughness ... underfoot!

A flooring that *knits* and *heals* its bruises

Unique surfacing which steadily *improves* under the grind of heavy traffic—Carey Elastite Asphalt Plank. Dense, tough, indifferent to weather—can't corrugate or crawl. For "L" platforms and runways, for overhead and interurban grade

crossings, for car and repair shop flooring—the perfect, preformed traffic surface.

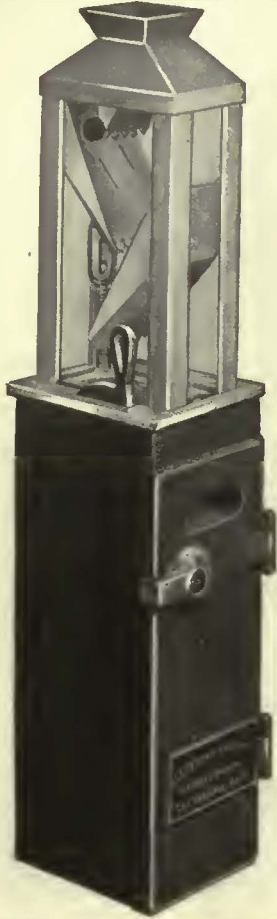
Everywhere electric traffic engineers are investigating it, recommending it, using it. Write and ask us for full information.

Philip **Carey**
Products

Spy Run Bridge, Ft. Wayne, Indiana, smooth-surfaced with Carey Elastite Asphalt Plank. Notice also that the rails are cushioned with Carey Elastite System of Track Insulation.



THE PHILIP CAREY COMPANY > > Electric Railways Department
Lockland, CINCINNATI, OHIO



Collection of Zone Fares with the aid of **CLEVELAND FARE BOXES**

The new **MACDONALD VERTICAL MACHINE** makes practical the collection of zone fares, with the aid of Fare Boxes.

The new device provides for trip records, traffic data and an accurate check on fares deposited.

Let us tell you more about this zone check issuing machine, its application to Cleveland Fare Boxes, how their combined use makes the collection of zone fares fast, safe and simple.

The Cleveland Fare Box Co.

4900 Lexington Ave., Cleveland, Ohio

Canadian Cleveland Fare Box Co. Ltd., Preston, Ont.

Change Carriers, "4-Way" Padlocks, Tokens, Coin Auditing Machines

PANTASOTE

TRADE MARK

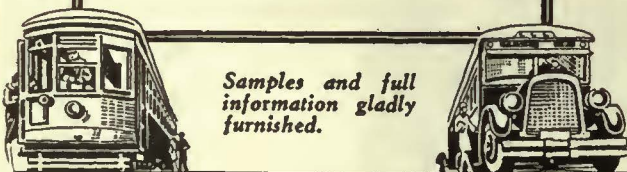
—the car curtain and upholstery material that pays back its cost by many added years of service. Since 1897 there has been no substitute for Pantasote.

AGASOTE

TRADE MARK

—the only panel board made in one piece. It is homogeneous and waterproof. Will not separate, warp or blister.

*Standard
for electric railway cars
and motor buses*



*Samples and full
information gladly
furnished.*

The PANTASOTE COMPANY, Inc.
250 Park Avenue
NEW YORK

TOLEDO TORCHES

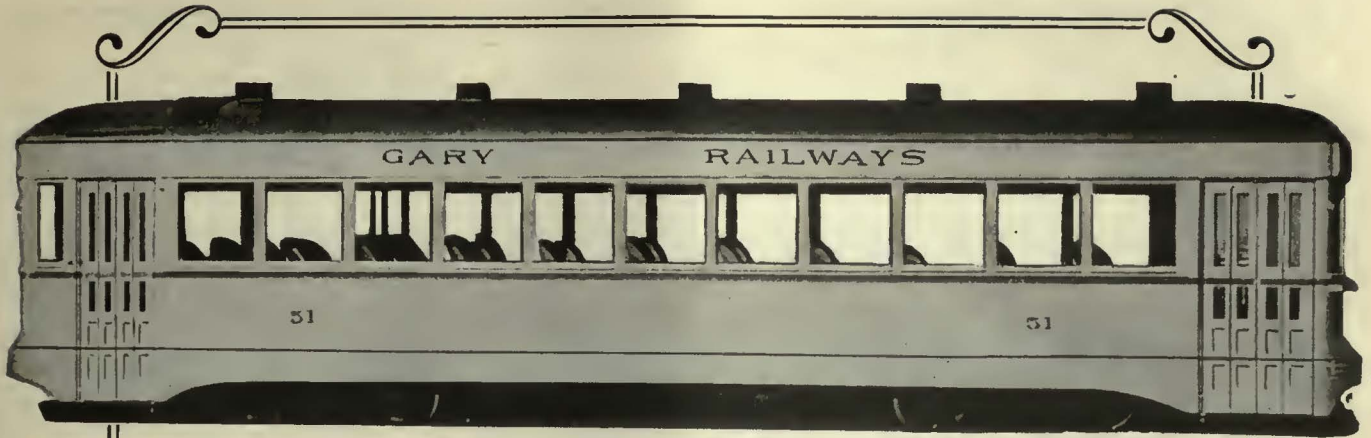


Weather
won't dim them
Traffic
won't upset them
Trucks
won't break them
Thieves
won't take them

—and our patented Economy Burner saves 50% in fuel cost—eliminates wick consumption. Look for our name on each TOLEDO Torch.

Insist on the genuine TOLEDO Torch — your dealer can supply you.

The Toledo Pressed Steel Co.
Toledo, Ohio



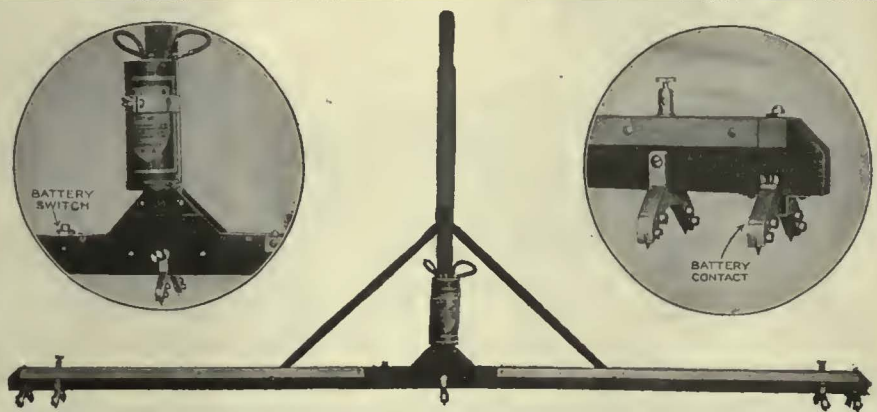
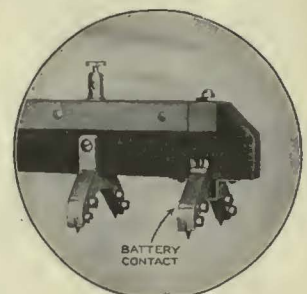
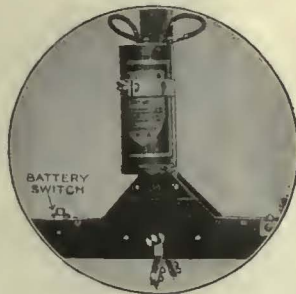
One of the Latest Type
Lightweight-One-Man
Interurban Cars

built by

CUMMINGS CAR AND COACH CO.

111 West Monroe St., Chicago, Ill.

The New
ROLLER-SMITH
Type BBT
Bond Tester and
Contact Bar



the most important development in bond testing in years

THE new R-S Type BBT Bond Tester is intended for use where the current in the rail is comparatively feeble or where such current is absent, as on new construction or at the ends of trolley lines where no cars are running beyond the point where tests are being made.

THE R-S Type BBT Bond Tester has over several times the sensitivity of the most sensitive bond tester heretofore made. *It can be success-*

fully used with the current from a single No. 6 dry cell. This dry cell and the battery switch and contacts are clearly shown in the illustration above.

EVERY man who is any way interested in bond testing should know all about this new instrument. If you will fill in and forward the coupon below a copy of new Bulletin No. G-200 will be sent you promptly. Or, better still, get in touch with the R-S office nearest you. There is one in every principal city.

"Over thirty-five years experience is back of Roller-Smith"

ROLLER-SMITH COMPANY
Electrical Measuring and Protective Apparatus



Main Office 2128 Woolworth Bldg., N. Y.
Works: Bethlehem, Penna.

Offices in Principal Cities in United States and Canada. Representatives in Australia, Cuba, Japan and Philippine Islands.

ROLLER-SMITH CO.,
2128 Woolworth Bldg., New York City, N. Y.
Please send new Bulletin G-200.

Name

Company

City State

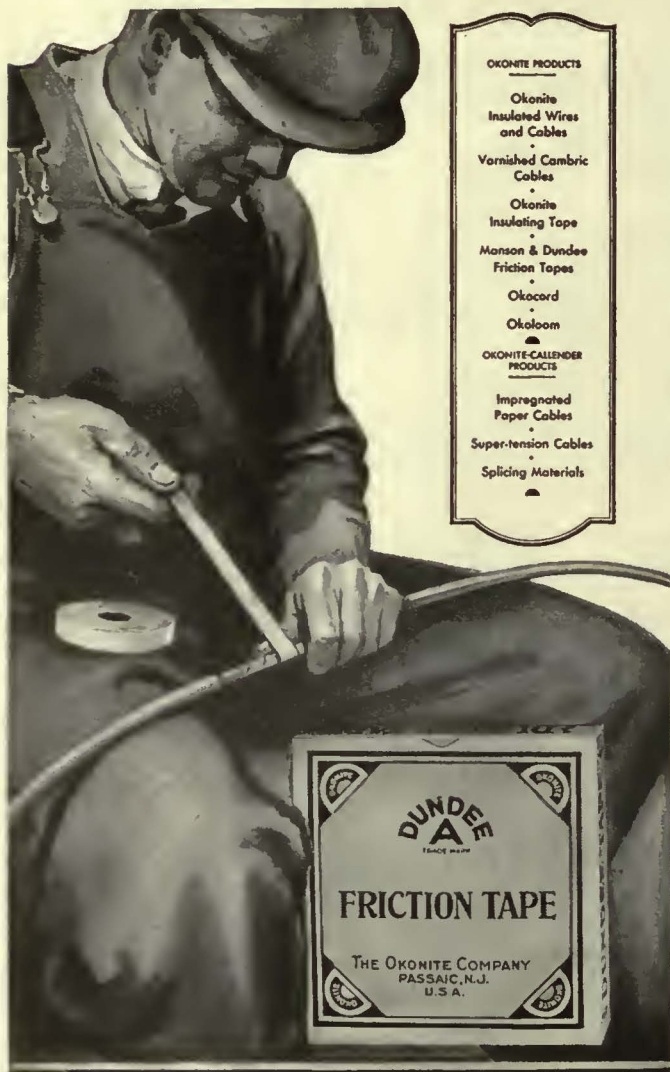
Position

A Tape That Workmen Like To Use

Workmen like DUNDEE "A" because it sticks in any kind of weather and because its edges are clean and don't fray.

Primarily, however, DUNDEE "A" is popular because it is a true friction tape. The adhesive compound is calendered into and through the fabric under heavy pressure. This gives a perfect bond between fabric and adhesive, making a more reliable product than tapes which are made by merely spreading the adhesive onto the cloth.

For all friction tape uses where low price is a factor, specify "DUNDEE 'A'" and get the most for the money.



- OKONITE PRODUCTS
- Okonite Insulated Wires and Cables
 - Varnished Cambric Cables
 - Okonite Insulating Tape
 - Monson & Dundee Friction Tapes
 - Okocord
 - Okoloom
- OKONITE-CALLENDER PRODUCTS
- Impregnated Paper Cables
 - Super-tension Cables
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THE OKONITE COMPANY

Founded 1878

THE OKONITE-CALLENDER CABLE COMPANY, INC.

Factories: Passaic, N. J. Paterson, N. J.



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- Canadian Representatives: Engineering Materials, Limited, Montreal
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The 2000 Type



Bus Heater

Increased heating efficiency, simplified assembly, absolute insulation from body, easy installation and low cost are the features of the new 2000 type Heater. Supplement B-4 mailed on request, contains a complete description.

The Nichols-Lintern Co.
7960 Lorain Ave., Cleveland, Ohio



The Electric Railway Field at your finger-tips

Contents Include:

Names and addresses of the Electric Railway Companies in the United States, Canada and the West Indies, arranged geographically by Post Office address. Names and addresses of officials and principal department heads. Names of subsidiary bus companies. Location of repair shops and power plants. Mileage of the road. Gage of track. Number and kind of cars used. Number of buses operated. Number of garages and capacity. Rates of fare. Transmission and Trolley voltages. Capacity of substations. Index of electric railway company officials, giving company connections.

for \$10.00!

McGraw-Hill Catalog and Directory Company, Inc.
177 Tenth Avenue at 36th Street, New York, N. Y.

F-ERJ



STRUCTURAL STEEL

FABRICATED
STEEL
STRUCTURES
for every purpose



Progress Picture, Power Station

Fabricated Structural Steel by **AMERICAN BRIDGE COMPANY**
Subsidiary of United States Steel Corporation

Manufacturers of **STEEL STRUCTURES**
of all classes, particularly

BRIDGES and BUILDINGS, Roof Trusses, Columns, Girders, Towers and Poles, etc.

General Office: 71 BROADWAY, NEW YORK, N. Y.

Contracting Offices in Principal Cities

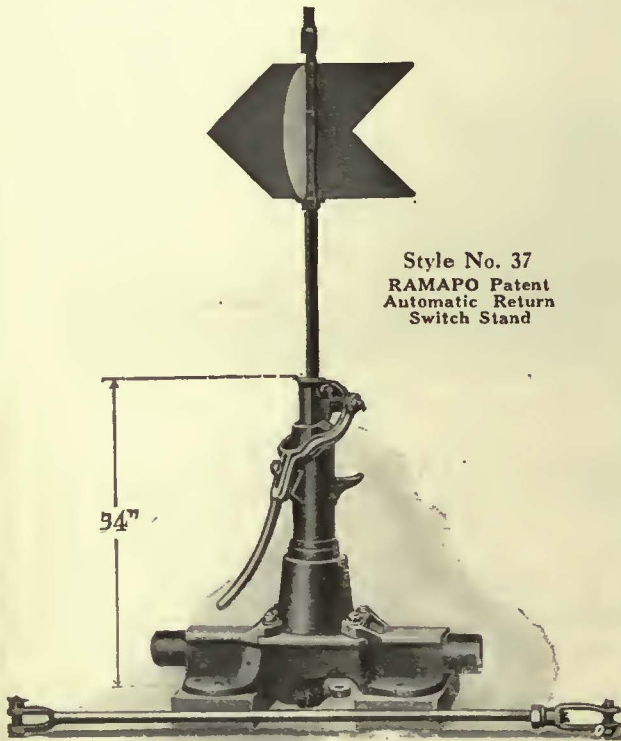
Wherever Rails Cross



THE BUDA COMPANY

Harvey (Chicago
Suburb) Illinois

And The Target Follows The Points

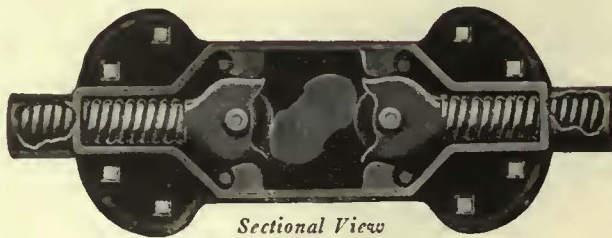


Style No. 37
RAMAPO Patent
Automatic Return
Switch Stand

This Ramapo Patent Automatic Return Switch Stand is for use in passing sidings or wherever it is desired that the switch, after being run through, shall be returned automatically to its original position. The sectional view below shows the mechanism.

Note, particularly, that the target always indicates the position of the switch points.

The Racor Retarding Dash Pot is a very desirable adjunct to such installations.



Sectional View
Showing Mechanism in
Automatic Operation

Behind Racor Service stand nine plants specializing in the manufacture and distribution of railroad track turnout and crossing equipment, including Manganese Work for heavy traffic.

RAMAPO AJAX CORPORATION

RACOR PACIFIC FROG AND SWITCH COMPANY, Los Angeles - Seattle
CANADIAN RAMAPO IRON WORKS, LIMITED, Niagara Falls, Ontario

General Offices - 230 PARK AVENUE, NEW YORK
SALES OFFICES AT WORKS, AND
McCORMICK BUILDING, CHICAGO
METROPOLITAN BANK BLDG. WASHINGTON
BUILDERS EXCHANGE BLDG. ST. PAUL

Nine Racor Works

Hillburn, New York, Niagara Falls, N.Y., Chicago, Illinois, East St. Louis, Ill., Superior, Wis., Pueblo, Col., Los Angeles, Cal., Seattle, Wash., Niagara Falls, Ont.

- what* accounting records a public utility requires;
- why* they are needed;
- how* they may be kept.

Accounting Procedures for Public Utilities

By

WARREN G. BAILEY, M. A.

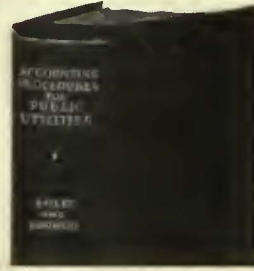
Assistant Director, Business Research Corporation;
Consultant to Public Utility Management and Procedure.

and

D. E. KNOWLES, C. P. A.

Lecturer in Public Utility Accounting Procedures,
School of Commerce, Northwestern University; Industrial Engineer, Business Research Corporation.

442 pages, 5½ x 8, illustrated
\$6.00 postpaid



BASED upon actual accounting procedures and practices of America's most successful utilities, this comprehensive book covers the whole field of utility accounting—from Labor Changes to Dividend Payments.

Scores of practical pointers drawn from first-hand contact tell how to devise, install and operate a complete and accurate accounting system in any utility—large or small. New methods are brought out in full detail. The significant accounting procedures are discussed with respect to the uniform classifications of accounts, prescribed by the National Association of Railway and Utilities Commissioners.

Actual forms and record blanks are shown, clarifying the text and making it immediately usable for the accountant and executive.

Chapter Headings

Introduction—Place of Accounting in Public Utilities—Uniform Accounting for Utility Companies—General Accounting Books—Expense Accounting—Timekeeping and Payroll Methods—Distribution of Labor Charges—Departmental Responsibilities in Accounting for Materials—Accounting for Materials and Supplies—Plant Accounting—Current Liabilities—Revenue from Utility Services—Revenue Accounting for Electric, Gas and Water Services—Accounting for Merchandise Sales—Accounting for Revenue of Electric Railways—Customers' Accounting, Multiple Account Ledger Sheet System—Bookkeeping Operations, Bill Stub Plan of Bookkeeping, the Register and Individual Accounts—Accounting for Customers' Payments and Petty Cash—Accounting for Refunds and Adjustments—Auditing Procedure—Budget Procedure—Interpretation of Financial and Operating Statements—Financing Public Utility Construction and Extensions—Accounting for Capital Stock and Dividends—Accounting for Capital Stock Sales.

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McGraw-Hill FREE EXAMINATION COUPON

McGraw-Hill Book Co., Inc., 370 Seventh Avenue, New York.

You may send me for 10 days' free examination a copy of Bailey and Knowles ACCOUNTING PROCEDURES FOR PUBLIC UTILITIES, \$6.00 postpaid. I agree to remit for the book, or return it postpaid within 10 days.

Signed

(Please Print)

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City and State

Official Position

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(Books sent on approval to retail purchasers in U. S. and Canada only.) E. 3-30

THEY'RE NOT ALL ALIKE



Trolley wheels may look alike, they may even seem to be alike in the first few months of service—but it's the test of long time service that counts.

It's the maintenance crews in the shops that get to know

KALAMAZOO

trolley wheels and harps, and they *know!*

They know that Kalamazoo trolley wheels give less trouble, run longer and require less attention. Is it any wonder that Kalamazoo trolley wheels and harps are standard for many properties?

May we send you further information today?

THE STAR BRASS WORKS

KALAMAZOO, MICHIGAN



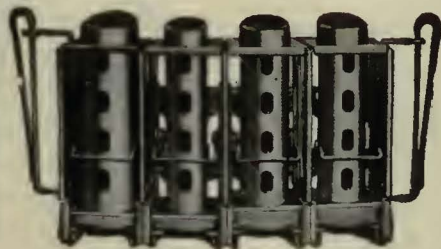
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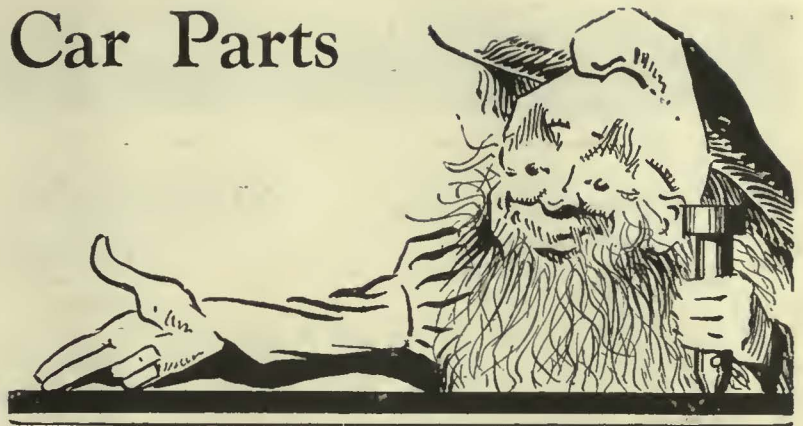
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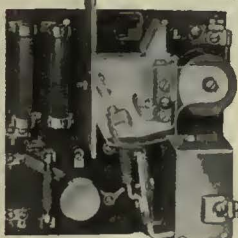


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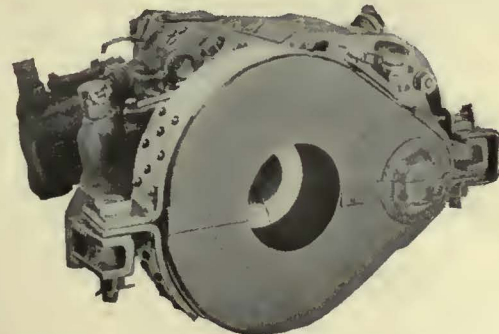
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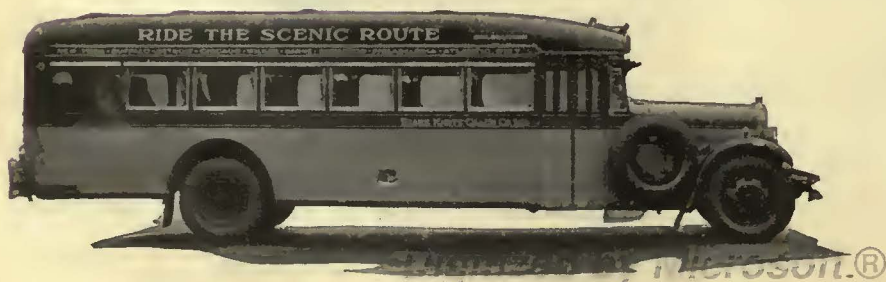


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THIS is the kind of a unit that operators find *attracts business*—the famous Bender Palace Hyway Coach.

The wide commodious interior, made possible through thinner, stronger sides, has an instant rider appeal. All windows raise all the way up—no mechanism to get out of order—no water wells to cause rusting or rotting of body. Stronger windows insure less glass breakage. The large overhead inside luggage galleries are cushion-edged for passenger protection. Head room is ample, allowing for the unexpected overloads. And like all Bender Bodies, constantly improved construction features assure *low maintenance* . . . more time on the road . . . more years of service . . . greater returns on your investment.

THE BENDER BODY COMPANY, W. 62nd and Denison, Cleveland, O.



**BENDER
 BODIES**

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Sacramento Solves a Parking Problem

The twelve Sacramento Cars, built by the American Car Company, are operated on the principal line of the Pacific Gas & Electric system. These cars attract first-class patronage because they offer more than a relief from the parking problem; they are comfortable—safe—well ventilated and lighted.

From the operating point of view, this new equipment is equally satisfactory—light in weight and equipped with time-tested Brill 177-E Trucks which reduce maintenance costs to the minimum.

Here, then, is another link in the chain of evidence that there is no better combination than Brill Cars equipped with Brill Trucks.

The J. G. Brill Company
Philadelphia



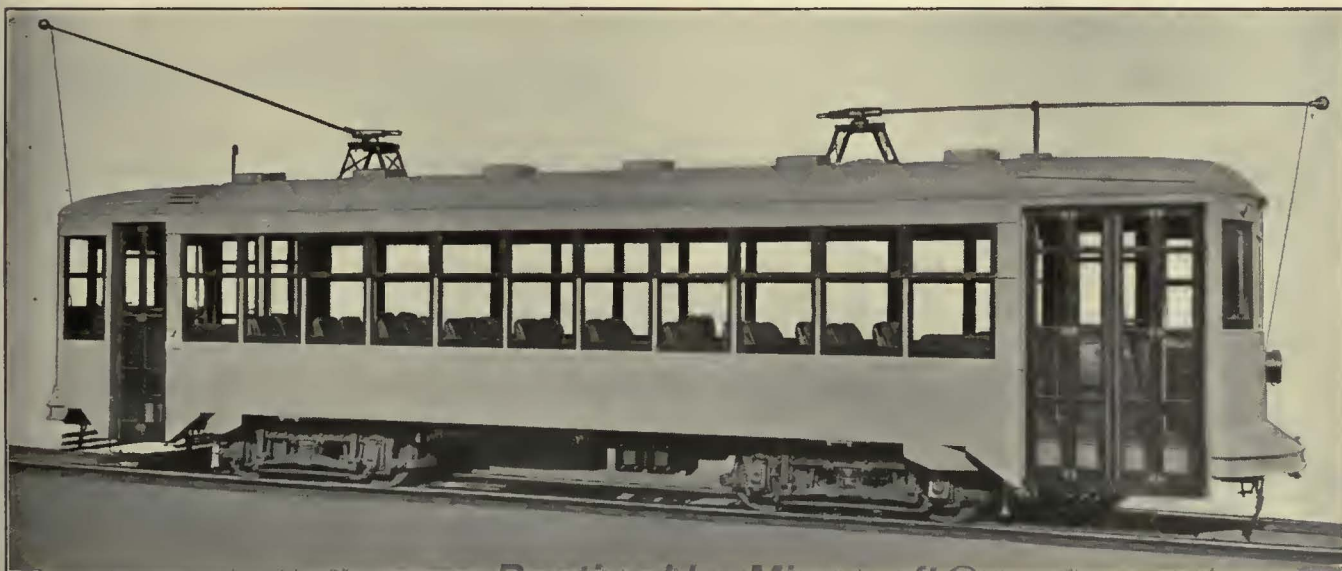
ASSOCIATE PLANTS

American Car Company, St. Louis, Missouri
The G. C. Kuhlman Car Company, Cleveland, Ohio
Wason Manufacturing Company, Springfield, Mass.



Pacific Coast Representative, Rialto Bldg., San Francisco

BRILL MODERN ELECTRIC CARS





Unretouched photograph of one of the three G-E armatures before rewinding. Note the excellent condition of the commutator and bearing surfaces

More than 700,000 miles . . . now ready to start anew

IN describing the performance of three General Electric railway motors, Mr. C. C. Kantner, Master Mechanic of the Western Ohio Railway and Power Corporation, states:

"I just recently removed three armatures that were in good condition and gave us no trouble. As we had obtained an average of 702,232 miles from these armatures, I thought it would be economy to rewind them at this time before placing them back in car. As for the pinions, they have made the same mileage as the armatures."

Now, they have been rejuvenated with new coils, slot insulation, pinions, and other parts—all of General Electric manufacture and of the same quality as the original equipment. There is every reason to expect that armatures so repaired will duplicate their original performance record.

It pays to use General Electric renewal parts. In them you are certain of the same high quality that was built into the parts they are to replace.

330-146

GENERAL  **ELECTRIC**
SALES AND ENGINEERING SERVICE IN PRINCIPAL CITIES

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