

ELECTRIC RAILWAY JOURNAL

Law-Hill Publishing Company, Inc.

FEBRUARY, 1930


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1892


FIRST
Electric Car Heater
Invented and built by
CONSOLIDATED

1902

NEW YORK Elevated Rys. 
Electrified all Cars


CONSOLIDATED

1904

INTERBOROUGH Subway 
Built All Cars Equipped

with **CONSOLIDATED**

1907

CHICAGO Surface Cars 

Rebuilt all cars

CONSOLIDATED

1913-14

PHILADELPHIA
Rapid Transit Co. orders 

39144 **CONSOLIDATED** Heaters
for 1618 Cars

1928

CLEVELAND Railways adopt
CONSOLIDATED Heaters

1929

DL&W Railway orders 12126 ★
3000 volt **CONSOLIDATED** Heaters

NEW YORK Municipal Subway orders ■

8400 **CONSOLIDATED** Heaters

CLEVELAND Railway orders ▲
CONSOLIDATED Heaters
for 2nd 100 Cars



Original equipment of Consolidated Heaters, still in excellent condition.



The largest order for electric car heaters ever placed and the first order for 3000 Volt Heaters



Light Weight Heaters



Electric Heaters and Resistor Heaters

CONSOLIDATED CAR-HEATING COMPANY INC.
NEW YORK ALBANY CHICAGO

RECORDS

CAR HEATERS

PROTECTED COIL | ENCLOSED ELEMENT | DUPLEX RESISTORS

Champion

—in more than name

COMPARATIVE operating tests have proved the superior calibre of Westinghouse "Champion" trolley ears.

These tests show their higher conductivity, uniform thickness of lips, longer life, and greater tensile strength. The "Champion" consists of two parts—the body and the runner. The body is made of a special high strength alloy; the runner, from a flat, tough copper sheet, blanked, punched and shaped.

We suggest that you give the "Champion" a test. Write our nearest district office for some of these ears. You will be convinced of their outstanding qualities.

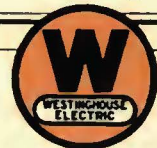
Let the "Champion"
be your next
trolley ear

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

Westinghouse

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Electric Railway Journal

Consolidation of
Street Railway Journal and Electric Railway Review

MORRIS BUCK
Engineering Editor
GEORGE J. MACMURRAY
CLIFFORD A. FAUST
J. W. McCLOY

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

Vol. 74, No. 2

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PAUL WOOTON
Washington
ALEX McCALLUM
London, England

LOUIS F. STOLL
Publishing Director

Next Month

How one electric railway is solving the small city transportation problem

De luxe buses in interurban service—another phase of the subject discussed in this issue

New developments in track construction

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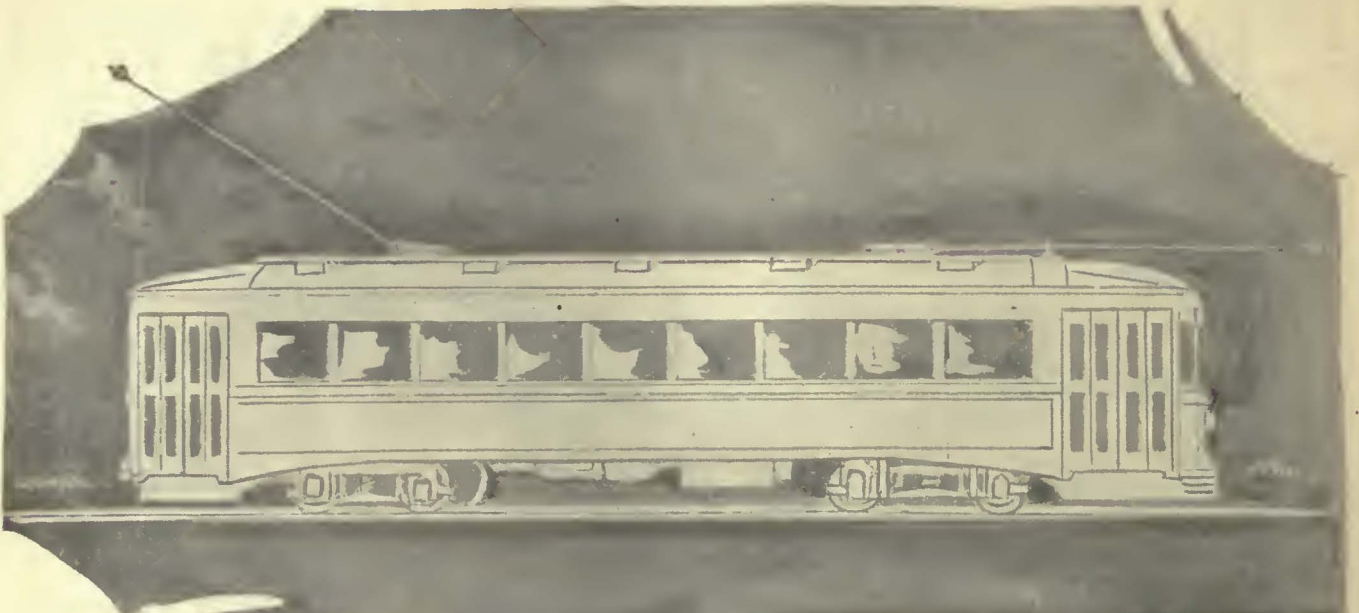
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Increased Revenue

Results from higher schedule speeds

HIGHER schedule speeds may be obtained not only by the use of new and modern cars, but also by properly rehabilitating old equipment, making use of modern development. For instance:—

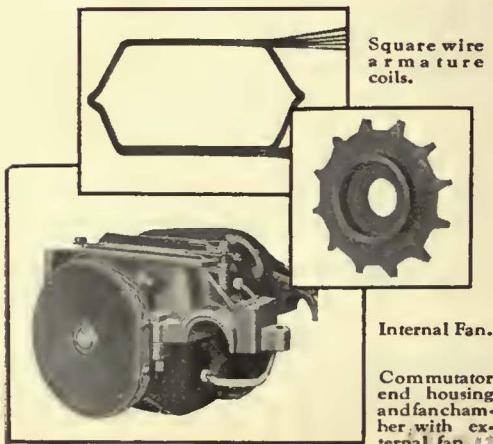
Some ways to increase speed are:

1. Change the gear ratio.
2. Shunt the field.
3. Use fields with fewer turns.

And then, too, increased ratings may be obtained by the use of:

1. Internal and external fans.
2. Square wire armature coils.
3. Class "B" insulation.

Any Westinghouse transportation salesman will be glad to assist you himself or to send an engineer to help you make a study of your requirements in order to help you obtain higher schedule speeds.



Square wire armature coils.

Internal Fan.

Commutator end housing and fan chamber with external fan.

WESTINGHOUSE ELECTRIC & MFG. COMPANY
 EAST PITTSBURGH PENNSYLVANIA
 SALES OFFICES AND SERVICE SHOPS IN ALL
 PRINCIPAL CITIES OF THE UNITED STATES



Westinghouse

SPEEDY

car

movement

*--attracts
new freight
business*



BALDWIN-WESTINGHOUSE electric locomotives are necessary tools in giving the reliable and speedy car movement that attracts new freight business.

The Wisconsin Power and Light Company recently ordered a 50-ton, 600-volt, 400-hp., Baldwin-Westingshouse locomotive. Prompt shipment permitted its being placed in freight and switching service almost at once over the 15-mile run between Sheboygan and Plymouth connecting with trunk line railroads.

Seventy-five of these standard 50-ton Baldwin-Westingshouse electric locomotives are in successful service throughout the United States.

A recent survey of freight haulage business on typical electric railway properties indicates a 50 per cent increase in gross freight receipts between the years 1920 and 1928. The excellent performance of Baldwin-Westingshouse locomotives was a contributing factor to these favorable business records.

Address either company or call our nearest office for full particulars about standard Baldwin-Westingshouse electric locomotives.

Have you seriously considered the freight possibilities of your property?

The Baldwin Locomotive Works
Philadelphia, Pa.

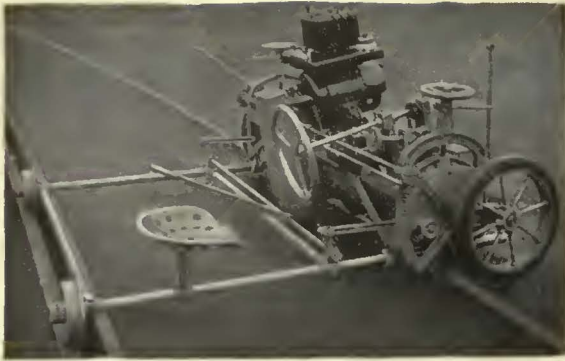
Westingshouse Electric & Manufacturing Co.
East Pittsburgh, Pa.



1930

Baldwin-Westingshouse

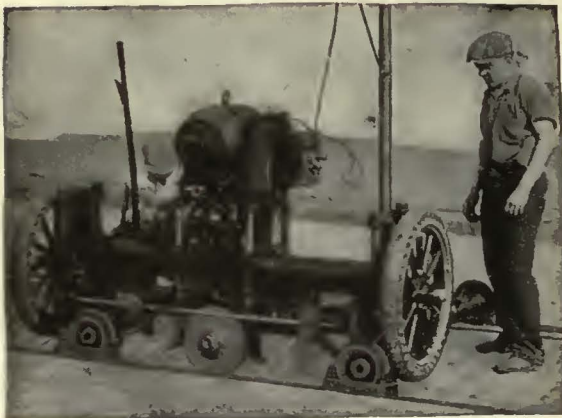
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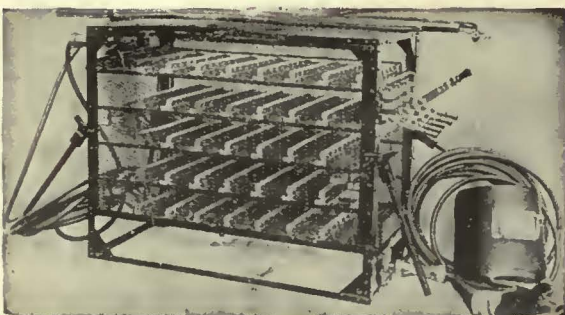
Improved Atlas Rail Grinder



Eureka Radial Rail Grinder



Imperial Track Grinder



Ajax Electric Arc Welder

Is road
to rule—
or rail?

Billions for better roads. How much for better rail?

Every dollar for better roads helps automobile compete with rail.

Every dollar for better track helps rail compete with automobile.

Nobody wants to ride rough road or rough rail.

Smooth your rail and keep it smooth with the equipment you see here.

Railway Trackwork Co.

3132-48 East Thompson Street, Philadelphia

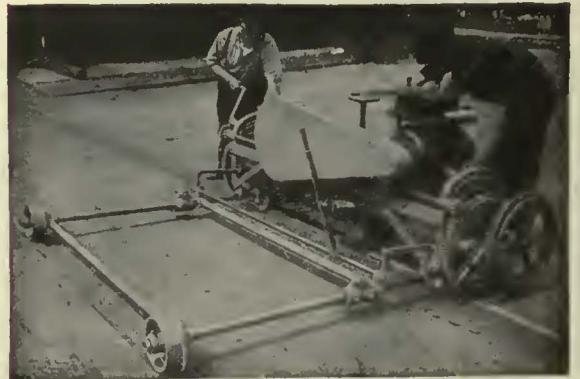
AGENTS

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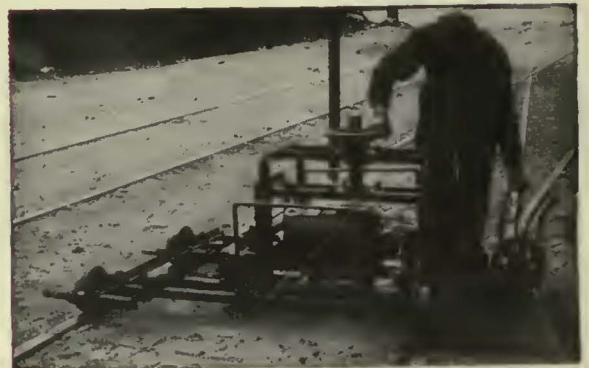
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Reciprocating Track Grinder



Vulcan Rail Grinder



Midget Rail Grinder



RTW Curve Oller

Cut Your Pole Replacement Budget \$73.52 for Each Worn Out Pole

Renewing Steel Poles at Ground Line With O-B Pole Sleeves Gives Old Poles Double the Life of New Poles, at a Total Cost of \$12.98 Each

HOW many of your steel poles were replaced last year? How many of them were corroded only at the ground line? Multiply this last number by \$73.52, and the result is the actual saving you would have realized had you *renewed* these poles with O-B Pole Sleeves.

This fact has been proved by the experience of electric railway properties in practically every large city in America, where O-B Pole Sleeves are saving thousands of dollars annually.

This is how it works out. A new 30-ft. pole (7-inch) costs about \$61.50. Freight, haulage, unloading and installation labor costs are at least \$25.00. So, every new 7-inch pole costs approximately \$86.50 to install.

But, by *renewing* the old pole with an O-B Pole Sleeve, the cost is only about one-seventh that of a new pole installed, and the added life is double that of a new pole. Here is the cost—

1 7-in. Pole Sleeve . . .	\$10.50
Labor: 2 men @ .60 per hour . . .	1.20
Foreman @ .80 per hour80
Cement, sand, gravel and paint48
Total Renewing Cost	\$12.98

Your saving on each pole renewed is \$73.52

Unless you are now using O-B Pole Sleeves, you are "passing up" one of the most outstanding money-saving opportunities in system maintenance today. Furnished in five sizes, for 5-in. to 10-in. poles.

Ohio Brass Company, Mansfield, Ohio
Canadian Ohio Brass Co., Limited
Niagara Falls, Canada
1188L

Ohio Brass Co.

NEW YORK PITTSBURGH PHILADELPHIA BOSTON CHICAGO CLEVELAND SAN FRANCISCO ST. LOUIS ATLANTA LOS ANGELES DALLAS

PORCELAIN
 INSULATORS
 LINE MATERIALS
 RAIL BONDS
 CAR EQUIPMENT
 MINING
 MATERIALS
 VALVES



1

View showing pole to be renewed, with ground dug away to determine corrosion.



2

Slipping the O-B Pole Sleeve into position on the pole. Note ease of installation.



3

The O-B Pole Sleeve in position ready for sealing with Portland Cement.



4

Pouring the cement. The entire space between pole and sleeve is filled.



5

Shaping the cement cap over top of O B Pole Sleeve to shed water and moisture.



6

Cementing the base. Side-walk poles are cemented flush with pavement.

O-B Rail Bonds are Designed Particularly For You

THE Ohio Brass Company manufactures many designs of rail bonds. These bonds have been designed to provide for every practical application need, and to employ all recognized methods of welding.

The advantage to the industry of such a diversified line is apparent. The first advantage is that the choice of an O-B rail bond is not confined to a certain type of bond, for there is an O-B bond of a design suited to each particular requirement. A second advantage is the completeness of the line, for regardless of the method of welding employed, O-B rail bonds are available in many types for any specific type of welding equipment.

There are preferences as to the methods of welding employed. However, bonds designed for any particular method, take into consideration the full advantages as well as the shortcomings of each method, so that the best results possible are assured under the particular circumstances.

O-B rail bond designs are not the result of theory, but have been developed by engineering study in the field. Refinements offered in O-B rail bonds have been incorporated because this field observation pointed out the need for such refinements. So, regardless of the method of welding employed, whether it be by oxy-acetylene gas welding, or electric arc welding, employing either steel, copper or carbon electrode, the best results will be obtained by the selection of an O-B rail bond, designed to provide the utmost in efficiency, economy and long life for the method employed.

Ohio Brass Company, Mansfield, Ohio
 Canadian Ohio Brass Co., Limited
 Niagara Falls, Canada
 1187B

Ohio Brass Co.



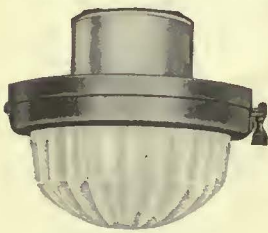
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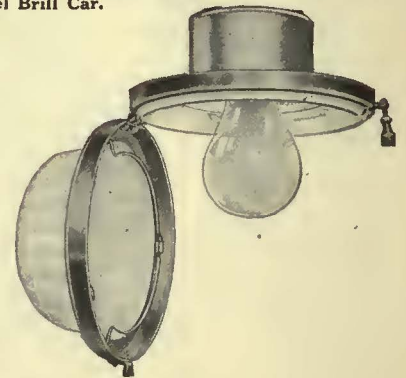
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 LINE MATERIALS
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 CAR EQUIPMENT
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 MATERIALS
 VALVES



Installation of Type T-twenty-in-series lighting fixtures in a new model Brill Car.



Reducing car lighting to a science

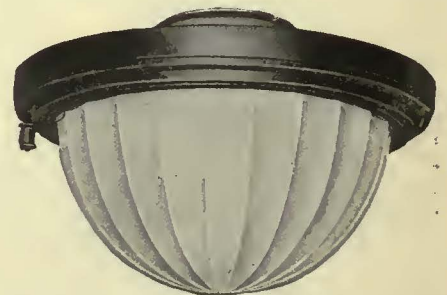
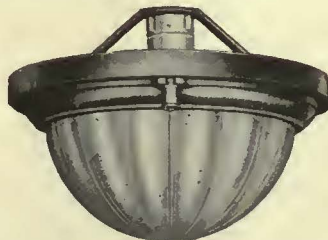


Safety Dome Lighting Fixtures provide numerous advantages over older methods of car illumination, requiring less current consumption, more perfect diffusion of light and the elimination of eye strain. And by using larger lamp units they have the advantages of longer lamp life, simplified wiring and less theft.

Aside from this, they provide much more attractive interiors by the inviting and artistic effect they produce.

Above is illustrated two views of the type T fixtures and also a typical installation. These units are used in the new twenty-in-series lighting system, which also utilizes the cutout type C lamp.

Many types of dome type lighting fixtures are illustrated in our No. 7 catalog and in special data sheets which will be sent to you upon request.



Write for Special Data Sheets

ELECTRIC SERVICE SUPPLIES CO.

MANUFACTURER OF RAILWAY, POWER AND INDUSTRIAL ELECTRICAL MATERIAL

Home office and manufacturing plant located at 17th and Cambrin Streets, Philadelphia, Pa.; District offices are located at 111 North Canal Street, Chicago, Ill., and 50 Church Street, New York City.



Branches—Bessemer Bldg., Pittsburgh; 33 Broad Street, Boston; General Motors Bldg., Detroit; 316 N. Washington Ave., Scranton; Canadian Agents—Lyman Tube & Supply Company, Ltd., Montreal, Toronto, Vancouver.

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NP adds to its list of
door control mechanism—

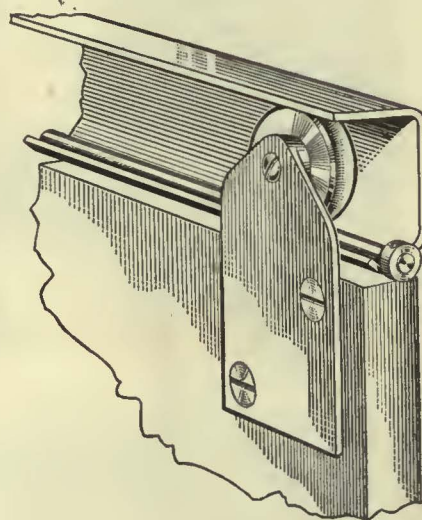
An Indestructible Track for sliding doors

THIS door track is provided with a renewable wearing surface, that rotates as the doors operate. This results in a wearing surface, four times the area provided by any other type track.

And the wearing surface can be easily replaced.

Applicable to either
new or old cars.

Ask for Bulletin
No. 25-A.



NATIONAL PNEUMATIC COMPANY


Executive Office: Graybar Building, New York

General Works: Rahway, New Jersey

McCormick Building
CHICAGO

1010 Colonial Building
PHILADELPHIA

Manufactured for Canada by
Railway & Power Engineering Corp. Ltd.
TORONTO

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There's Only One Solution

To induce more people to use the trolleys instead of their own motor cars, the trolleys must go faster than they now do and they must be more comfortable. The best minds in the industry recognize that the competition of the private automobile is based on its superior speed and comfort.

Schedules can be somewhat accelerated by better pick-up, better brakes, faster loading and unloading, but before trolleys can compete in speed with automobiles, the automobile traffic must be reduced. It can be reduced only by improving trolley service so effectively that people will ride the trolleys in preference to using their motor cars.

The initial step is to make the trolleys comfortable. The installation of comfortable seats, seats that equal or excel the comfort of automobile seats, is the first requisite. A number of trolley companies have installed Hale & Kilburn chairs with profitable results. They have increased their passenger traffic because of the improved comfort of their cars.

We shall be glad to supply facts and figures regarding this interesting subject.

HALE & KILBURN SEATS

"A BETTER SEAT FOR EVERY TYPE OF MODERN TRANSPORTATION"

HALE & KILBURN CO.

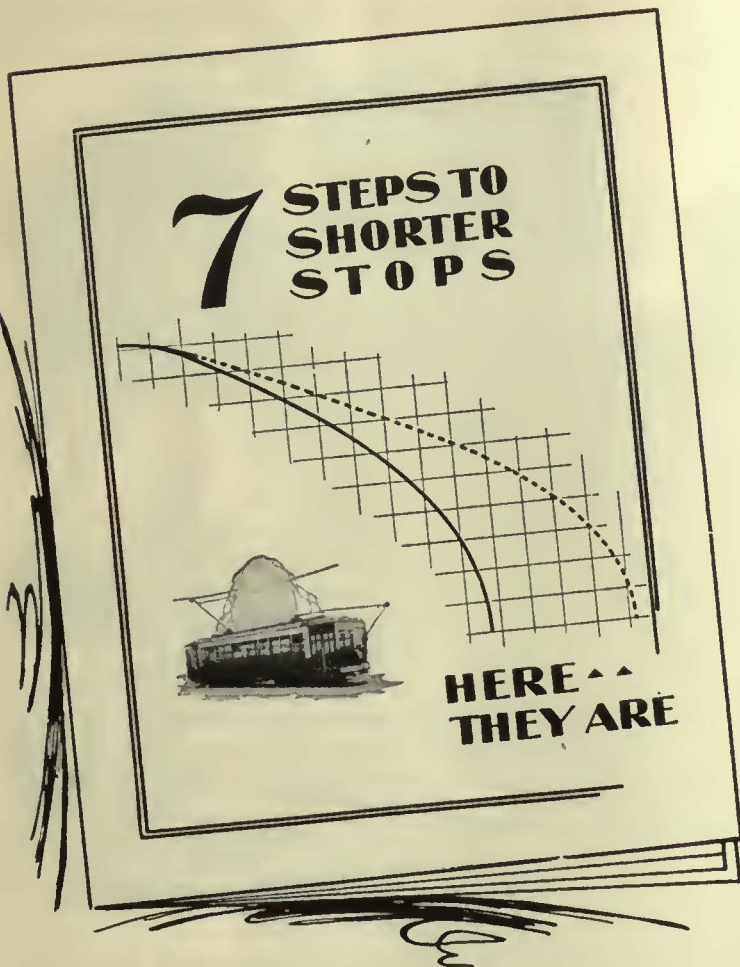
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	H. M. Euler, 146 N. Sixth St., Portland, Oregon.



[This Hale & Kilburn No. 392-A deep cushioned leather covered reversible seat is the one used by the Market Street Railway in San Francisco. **]**





Do
you have
your copy?

YOU have, no doubt, been following our series of advertisements dealing with the seven factors that influence stopping distance. . . . The interest manifested in this series by street railway men throughout the country has indicated an eagerness for better brake performance. . . . These advertisements have now been reprinted in booklet form for ready reference and connected study by those interested. If you have not already received a copy, write for one now. Ask for Publication 9073.

Remember, also, that our engineers are always available for assistance in solving your braking problems.

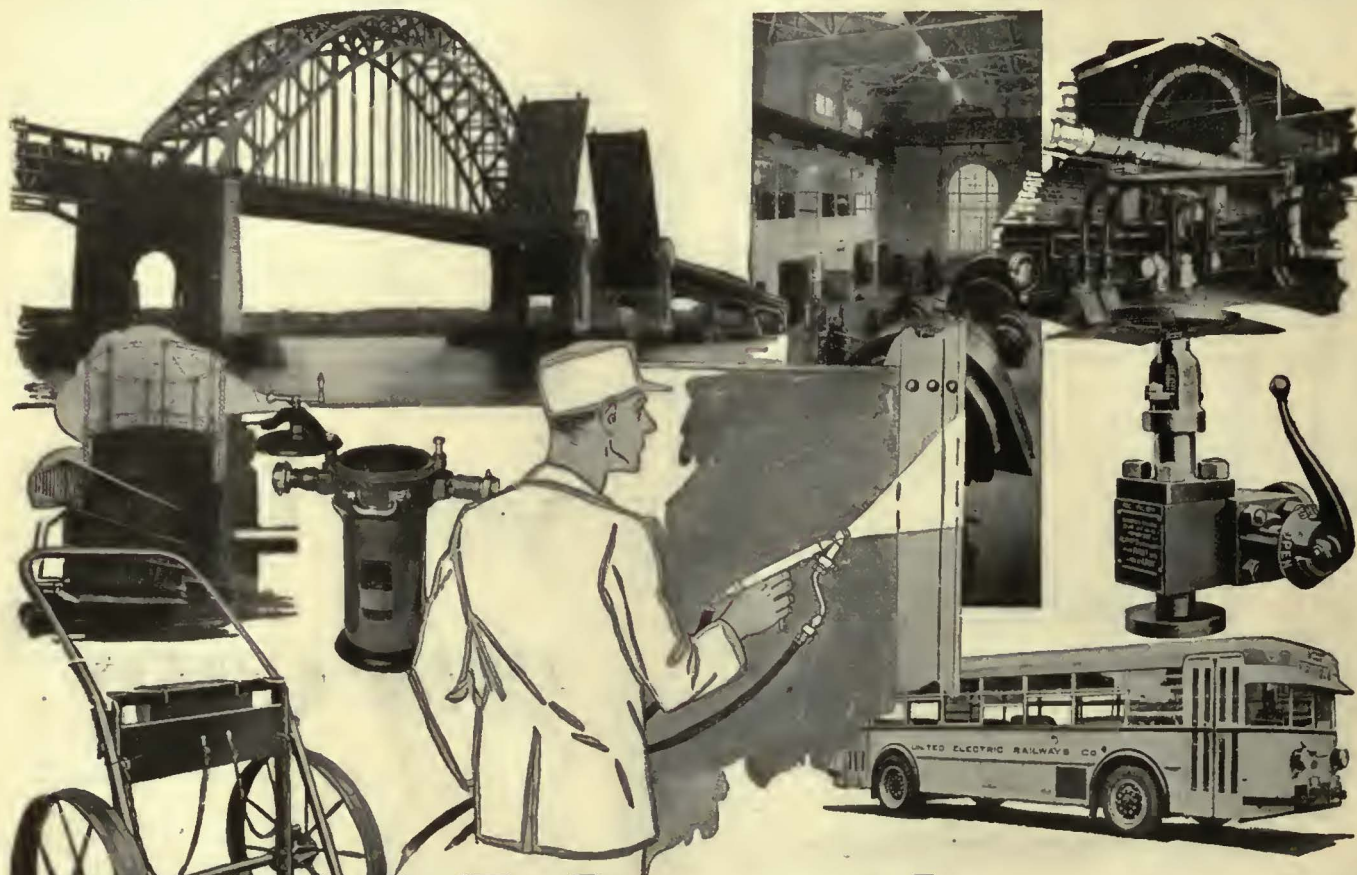
WESTINGHOUSE TRACTION BRAKE CO.

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WILMERDING, PA.

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ANOTHER TRIUMPH OF GENERAL ELECTRIC RESEARCH!



G-E Glyptal Lacquers

REG. U.S. PAT. OFF.

INDUSTRY'S LIQUID ARMOR

ALL SIZES

Half-pint cans to 52-gal. drums.

COLORS

Red	No. 1201
Clear	" 1202
Blue	" 1206
Black	" 1209
Brown	" 1210
Green	" 1211
Aluminum	" 1212
Gray	" 1214
Gray	" 1217

G-E Glyptal Lacquers are *more than paint*. They protect and seal—tanks, pipe lines, motors . . . machinery, structural steel . . . the list is endless, in every industry.

Long-run cost is less because they need no primer, no sizer . . . one glossy coat does the work of two.

Their tough, flexible film prevents rust, withstands heat, alkalis, weak acids, salt spray, mineral oils. And it *lasts*.

Applied with spray-gun, brush or dip-tank these lacquers dry dust-free in 30 minutes! Save time and labor.

G-E Glyptal Lacquers *modernize* industrial painting. Let them modernize *yours*—beginning NOW!

G-E Merchandise Distributors everywhere can tell you about G-E Glyptal Lacquers—or write Section M-812, Merchandise Department, General Electric Co., Bridgeport, Conn.

(Join us in the General Electric Hour. Saturday at 9 p.m. Eastern Standard Time, N.B.C. Network).

GENERAL ELECTRIC

GLYPTAL LACQUERS



SKILL +

G-E Arc Welding Accessories



Hand Shield—Light-weight fiber with removable clear glass over welder's glass.



Helmet—Most comfortable, giving eyes best protection.



Clamp-Type Electrode Holder—Holds any size electrode accurately.



Screw-Type Electrode Holder—A twist of the handle opens and closes it.

Scratch Brush—A durable scale and oxide cleaner.

Spring-Rod Electrode Holder—New Electrode can be instantly inserted.

Arc Welding Cable—Its extreme flexibility allows for full freedom of operator manipulation.



Weld Gauge—Eleven leaves measure welds, angles, thicknesses.

= GOOD WORK, FAST!

Good eye . . . steady hand . . . experience . . . *welding technique*—they're priceless. Don't handicap them. The right welding accessories help them turn out good work fastest.

General Electric offers accessories that *aid* welders. They are the result of practical experiments. They are adapted to inside or outside use.

Receive the most from your welders' efforts by furnishing them with quality accessories.

G-E Merchandise Distributors everywhere have G-E Arc Welding Accessories in stock—or write Section M-812, Merchandise Department, General Electric Company, Bridgeport, Conn.

GENERAL ELECTRIC

ARC WELDING ACCESSORIES



MODERN EQUIPMENT WINS PUBLIC PATRONAGE



The Gary Railways Company improved local service with this type of modern light-weight car, G-E equipped

For interurban operation, also, Gary Railways Company uses modern cars with G-E equipment



GARY WELCOMES NEW CARS

BUSINESS men and city officials joined the throng that welcomed new street cars into service between Gary and Crown Point, Ind. Like scores of other cities, Gary is helping people to realize more and more that the railway industry is keeping up with the times—that modern equipment offers speedy, comfortable transportation.

The Gary Railways Company operates a total of 72 street cars, of which 14 are used in interurban service. All are equipped with G-E motors, G-E control, and G-E air brakes. General Electric Company, Schenectady, New York. Sales offices in principal cities.

JOIN US IN THE GENERAL
ELECTRIC HOUR, BROADCAST
EVERY SATURDAY AT 9 P.M.,
E.S.T. ON A NATION-WIDE
N.B.C. NETWORK



**GENERAL
ELECTRIC**



15 Trolley Buses for Salt Lake City *G-E Equipped*

THE trolley bus is fast becoming an important part of the transportation system in Salt Lake City. Such advantages as maneuverability, smooth, quick acceleration, speed on grades, low operating cost, and decreased paving charges have led to a recent decision of the Utah Light and Traction Company to provide fifteen additional units.

The new Salt Lake City trolley buses will be equipped with General Electric motors and foot-operated PCM control,* with electric braking feature.

*PCM control, a recent General Electric contribution to the railway industry, provides automatically smoother and faster acceleration. For complete information, communicate with the nearest G-E sales office.



A motion-picture film showing trolley buses in operation is available. Address the G-E office nearest you



330-136

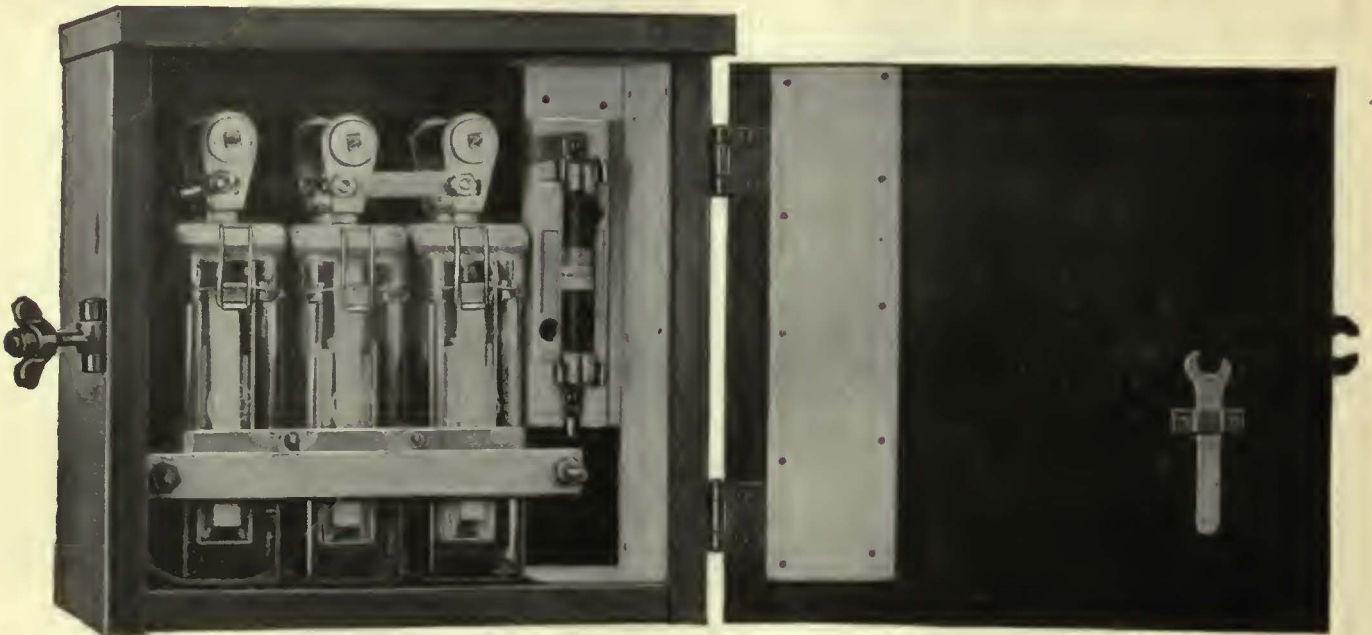
JOIN US IN THE GENERAL ELECTRIC HOUR, BROADCAST EVERY SATURDAY AT 9 P.M., E.S.T. ON A NATION-WIDE N.B.C. NETWORK

GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y., SALES OFFICES IN PRINCIPAL CITIES

Designed by THORNTON

THE NEW G-E ALUMINUM ARRESTER



3 Times Approved at Baltimore

IN each of three successive years—1927 to 1929—the United Railways and Electric Company of Baltimore, Md., has purchased 250 G-E aluminum lightning arresters. This company operates 1131 passenger cars and 149 service cars.

The unqualified approval of the G-E aluminum arrester at Baltimore dates back to 1910, when 1000 units were purchased. These were in continuous service until

1926, when a much improved type was announced by General Electric. Since then, the improved design and better performance of the new arrester have resulted in the gradual replacement of the original units.

For complete information, address the G-E sales office nearest you or General Electric Company, Schenectady, N. Y.

Join us in the General Electric hour, broadcast every Saturday at 9 p.m., E.S.T. on a nation-wide N.B.C. network

GENERAL  **ELECTRIC** 330-147

SALES AND ENGINEERING SERVICE IN PRINCIPAL CITIES

Electric Railway Journal

Consolidation of
Street Railway Journal and Electric Railway Review
A McGraw-Hill Publication—Established 1884

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

Volume 74

New York, February, 1930

Number 2

Supreme Court Strikes Off Shackles of Inadequate Rates

GOOD reason for expecting improvement in the financial condition of the electric railway industry is found in the recent decision of the United States Supreme Court in the rate case of the United Railways & Electric Company of Baltimore. The court definitely established two important principles of rate making and reaffirmed a third which it had previously laid down. It held that the electric railway company was entitled to a return of $7\frac{1}{2}$ to 8 per cent on its present fair value. It ruled that depreciation should be set up on the basis of "expenditures equal to the cost of the worn-out equipment at the time of replacement; and this, for all practical purposes, means present value." Moreover, the decision suggests, although it does not definitely state, that present reproduction cost must be considered the most important factor in determining valuation for rate-making purposes.

Encouraging, indeed, is the ruling that a return of $7\frac{1}{2}$ to 8 per cent is not excessive. Since the industry in general has had to pay interest at this rate or more when it has gone into the market for new money, it cannot fairly be denied permission to earn that rate of return. Few state regulatory bodies, however, have been willing to grant rates sufficient to accomplish this purpose. It is noteworthy that only two members of the Court, Justices Brandeis and Holmes, took exception to this part of the decision and that their objections were directed rather at the rate base than at the rate itself.

Concerning the proper basis upon which to calculate depreciation, wide differences of opinion have long existed. On the one hand it is said that the purpose of setting up depreciation is to permit the replacement of worn-out physical property. The natural corollary of this is that replacement cost should be the basis of calculation. On the other hand it is claimed that the object should be merely to restore to the treasury the money originally spent; from which it follows that original cost rather than replacement cost should be the basis of calculation. When the latter plan is adopted the extra cost of the new property required to replace that which has been worn out must be met by borrowing additional money and thereby increasing the capital investment.

Provided that the earnings are high enough to permit borrowing, it does not make a great deal of practical difference which method is followed. In one instance the company must earn a larger sum for depreciation, while in the other, the depreciation allowance is smaller, but there is also required a certain sum for interest on the additional investment. The relation between these amounts depends on the difference between the original and the replacement cost and the length of the useful life

of the property. Since the general level of prices is upward rather than downward, the original cost method of calculating depreciation will result in a steadily increasing investment and a steadily increasing burden of interest charges.

To what extent the opinion of the court may be taken as an indorsement of the reproduction cost theory of valuation is not entirely clear. This point was not at issue and the decision merely asserts that "it is the settled rule of this court that the rate base is present value." Judging from the previous rulings of the court in the Indianapolis Water Company case and the St. Louis & O'Fallon Railroad case it may be inferred that reproduction cost is to be considered a major element in determining value. This view is strengthened by the vigorous dissent of Justices Brandeis and Holmes, who are recognized believers in the prudent investment theory of valuation. The language of the decision, however, leaves this phase of the matter open to argument.

Prompt improvement of the financial condition of the railway in Baltimore may be expected to result from the decision. Ultimately it is likely to have far-reaching effects in fare cases now pending in other cities. At this time when the need for modernization of the electric railway equipment has received wide recognition, the decision of the court is particularly timely and opens the door to a new and better era for the local transportation industry.

Improved Fire Record Brings Lower Insurance Rate

FOR many years the fire record of the electric railways was not one in which the industry could take much pride. More recently, however, a marked improvement has occurred. Several factors have contributed to this improvement. Present-day structures and equipment are not so inflammable as those of an earlier period. Greater care is devoted to storage of materials. A larger measure of attention is paid to periodic inspections. More efficient methods of fire detection have been developed, as well as automatic equipment for fire extinguishing. All this has resulted in a material decrease in the number of fires in electric railway carhouses and shops, and a decrease in the seriousness of the fires that have occurred.

This achievement has been the more noteworthy when compared with the steadily rising fire losses for the country as a whole. In recognition of this, new fire insurance rate schedules for electric railways have been granted in 42 states, and tentatively adopted in three others. For this accomplishment a large measure of credit goes to the committee on insurance of the American Electric Railway Association. It is now up to the

railways themselves to take advantage of the opportunities that have been offered to them. If they do, substantial savings will be effected. There is every reason to expect that improvement in the fare record will be continued, in which event it may be anticipated that still further reductions will be made in the rate schedule.

Luxury Becomes a Necessity

DE LUXE buses in urban service have proved their ability to earn profits. That they have done so independently and not at the sacrifice of revenue from city-type operations is a fact of major significance. The attractive equipment and the fast, direct service which is typical of the majority of these lines has appealed to a new kind of rider. This is clearly shown by a survey of numerous properties published elsewhere in this issue. Almost without exception, the de luxe lines now in operation, charging fares considerably above those for street car service, are routed so as to connect the downtown business, shopping and theater districts of the city with one or more exclusive residential sections. The business man has found this service convenient for his trips to and from the office and as comfortable as traveling in his own private automobile. During the mid-day hours the women enjoy an attractive vehicle for their shopping trips.

Some of these lines have opened new territory that would not support or permit street cars, but the majority of them are furnishing a selective additional service through communities already well served by city lines. The higher fares, 25 cents in the majority of instances, make it possible for the operating company to render faster and more luxurious service, yet at the same time offer economies to the motorist who has been in the habit of using his automobile for commuting. It has been estimated that a person cannot drive his car into town, park it and return home at a cost less than \$1 per day. At half the cost he can use the buses and not have the worry of driving or parking. Traffic conditions, parking restrictions and the cost of short-time storage in a garage are all working for the benefit of the de luxe bus and are more than indirectly responsible for the expansion of this class of service.

Further evidence of the future of the de luxe bus is found in the statistics of recent bus purchases. There were more buses of this type bought by the electric railways last year than in any previous year. Approximately 400 more de luxe buses were purchased in 1929 than in 1928, while there was an increase of only 23 in city-type buses. Undoubtedly there is a definite luxury trend in bus operations, and the electric railways are strengthening their systems both from an operating and economic standpoint by expanding their service along this line.

Value of Elevated Railways Proved Anew

ALTHOUGH occasional clamor is heard in favor of the removal of elevated railways from city streets, evidence continues to accumulate that they still have a real place in providing transportation in large communities. An apt illustration of this is furnished by comparison of the service now being given by the elevated railway lines in New York City and the service which a new elevated motor highway now under construction along the Hudson

River waterfront is expected to render. The cost of this undertaking probably will exceed \$18,000,000, and its carrying capacity has been estimated at approximately 100,000 persons per day. A few blocks away an elevated railway is at present carrying more than 250,000 persons per day. A subway could do no more. Yet the city, while spending vast sums for the construction of the new elevated highway, is proposing at the same time to tear down its elevated railways.

An argument often advanced is that the present elevated railway structures are unsightly. In this respect the elevated highway promises little improvement. Already a forest of ugly steel columns has sprung up in the center of West Street interfering to a considerable extent with surface traffic. Of course, there is much to be said in favor of the new project. By providing a by-pass route without grade crossings between lower Manhattan and the uptown residential districts it will undoubtedly afford some relief to the city's congested streets. But the real measure of usefulness of a transportation facility is the number of people accommodated. From this standpoint the elevated railways are far more valuable than the new highway.

In Manhattan, unfortunately, the elevated railways stand low in public esteem. Stations of corrugated iron designed and built in an era when jigsaw work was the ultimate in ornamentation cannot fail to shock the esthetic tastes of the present-day Gothamite. Nor can rolling stock of the pre-Spanish war period hold forth much in the way of rider appeal. But stations can be made artistic, and modern cars, less noisy and more comfortable than those now in use on the "L" in Manhattan, are obtainable.

That the prejudice against elevated structures in New York is being carried to an extreme is evidenced by the fact that this very useful and relatively inexpensive form of transit is being to a large extent ignored in plans for the future. Into the far reaches of Brooklyn and Queens, amid scenes almost pastoral, subway routes are being planned at enormous expense to handle anticipated development that is at best many years away. Chicago, more wisely, provides in her new city plan for some 70 miles of elevated lines to serve the more remote suburbs. Before deciding that the day of the elevated railway has passed, New York would do well to study carefully the facts and figures of the situation.

Scientific Accident Analysis Brings Practical Results

SAFETY has as its ultimate goal the prevention of all accidents. In industry, however, it has been necessary to interpret it in relative terms because the ideal seems impossible of attainment. Since it is inevitable that some accidents should occur, their cost must be estimated year by year and allowed for in the budget as a more or less constant element of operating expense.

As a result of this treatment of the situation from the financial point of view, accident prevention work frequently degenerates into a part of the regular routine, and efforts to better conditions become perfunctory. Preaching accident prevention by emphasizing to the men the cost to the company is not effective, particularly if the operator believes he is doing the best he can. Trying to place the blame for the accident on someone other than the operator is not profitable, for it does not

reduce the pain of the victim or the grief of his friends, nor does it save the expense involved. But that sometimes represents the scope of accident prevention work. In refreshing contrast to this is the attitude of the winners of the latest Anthony N. Brady Memorial Safety Award, as evidenced by the briefs submitted in the competition and abstracted in this issue.

The program of research in accident prevention outlined by the Boston Elevated Railway, which won the Brady medal in the class of large properties, is particularly noteworthy. Not satisfied with the ordinary methods, the management had a searching analysis made to determine, so far as possible, all the causes of accidents in order that they might be dealt with intelligently and eliminated wherever possible. A program was put before the organization in such a manner that all co-operated in working it out effectively. After only one year the results have been remarkable. They have proved the soundness of the methods used. The good operators have remained good and the poor ones have become much better. There has been a marked reduction in the number and in the severity of accidents.

While the methods which are so successful in Boston may appear elaborate for some of the smaller properties, there is nothing that cannot be used with suitable modification. In fact, the smaller size of a property should make the use of similar methods simpler and should produce results more quickly. The other winners of the Brady awards did use methods which, while not developed so scientifically as those used in Boston, followed along similar lines in many respects. Intensive and continuous efforts made it possible to improve the already good records they had achieved in past years.

Putting Noise on the Defensive

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. Unnecessary blowing of factory whistles has been banned. Even the ringing of church bells is looked upon with disfavor in some cities. The noisy motor truck, a consistent offender, has occasioned so much caustic comment that in many places it has become the subject of police regulation. Drilling and blasting for building foundations are today subjects of criticism. Riveting, that symbol of progress, is under suspicion, for now electricity welds building frames in silence. Contractors have become apologetic about the noise they feel compelled to make.

With all this campaign against unnecessary noise it is inevitable that unfavorable attention should be directed to noisy street cars. Many people probably believe that the noise of street car operation cannot be eliminated. Few indeed realize the progress that is being made along this line. 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. New cars are being built that are far less noisy than those of the older types. Even the old cars can be made far less noisy than some of them now are. A monkey wrench and a screwdriver will work wonders in tightening up the loose bolts and screws. Loose or broken parts that rattle and squeak can be attached securely or replaced. Noisy air compressors, the curse of many cars, can be repaired or new ones installed that do not make a racket every time the car stops.

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.

Since noise is an indication of inefficiency, it follows that the noisy car is being subjected to strains that are heading it for the repair shop sooner than necessary. 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.

Use of One-Man Car Upheld

FINDINGS of the special master in the suit in equity of the Shreveport Railways vs. City of Shreveport to enjoin enforcement of an ordinance requiring two men on every street car are not only of importance to the company in question, but also carry a message affecting the entire industry. In no uncertain language it is pointed out that a municipality's right under its police powers to interfere in matters of this kind exists only when necessary to the safety and convenience of the public. The court states that from the evidence the modern one-man car with safety devices has been shown to be safer than its predecessor, the two-man car. Furthermore, the evidence shows that speed has been increased and that companies have been able to operate more service, that wages have been increased, and that operators have become more efficient and better satisfied when the change from two-man to one-man cars has been made. Moreover, the court found that since 1917 no public service commission has refused to permit the operation of one-man cars, and since 1924 no commission has limited the right to use one-man cars subject to any particular conditions. Under these circumstances the refusal of the city to permit the use of one-man cars of the latest type was held to be arbitrary, and equivalent to a taking of the railway's property without due process of law.

Aside from the specific matter of safety of one-man operation, the court made several significant statements. The evidence showed that a choice had to be made between reducing railway operating expenses through the instrumentality of the one-man car, and the ultimate bankruptcy of the company and the loss of electric railway service to the city of Shreveport. The court was unwilling that the city should lose its railway. It appraised the situation correctly when it said that street cars, for the present at least, appear to be an essential means of transportation for a large portion of the population, particularly those not able to own automobiles, and the loss of such service without an equally cheap substitute would be a serious handicap to a growing community.

While the fight against the one-man car has largely died out, this decision makes the position of the courts more definite than it ever has been. In addition, it challenges the right of the municipal authorities to exert their police power in matters which do not affect the safety and convenience of the public.

NOTABLE ACHIEVEMENTS IN

Accident Prevention

Win Brady Awards for Boston, Tampa and Tide Water Companies

WINNERS of the Brady safety medals have recently been announced by the American Electric Railway Association. There are three divisions in the contest, according to the amount of service rendered. In Class A, including electric railway organizations operating more than 5,000,000 vehicle miles, the award, consisting of a gold medal, was made to the Boston Elevated Railway, with honorable mention to the Louisville Railway. The Class B award, a silver medal, for those companies operating more than 1,000,000 but not over 5,000,000 vehicle miles, went to the Tampa Electric Company, with honorable mention to the El Paso Electric Company. In Class C, for smaller properties, the bronze medal was awarded to the Tide Water Power Company of Wilmington, N. C.

The awards are a memorial to the late Anthony N. Brady, and are presented each year for the best records of safety in operation and health promotion made by electric railways. The selection of the winners was made by a joint committee of the American Museum of Safety and the American Electric Railway Association, consisting of Lewis Gawtry, president the Bank for Savings, chairman; Col. A. B. Barber, manager transportation and communication department U. S. Chamber of Commerce; James H. McGraw, chairman of the board McGraw-Hill Publishing Company, Inc., and Charles Gordon, managing director American Electric Railway Association.

Accident Analysis Successful in Boston

BY FAR the most impressive accomplishment of the Boston Elevated Railway in its safety work has been its study of the human factor in accidents. Since it was recognized that accidents may be caused by some human failings, primarily of a psychological nature, the railway engaged the Personnel Research Federation of New York to survey the situation. As a result it was found that half of the accidents happen to less than a third of the operators. In one sample of 200 men of ample experience and maturity, one-half the accidents happened to only one-fifth of the motormen. This difference in proneness to accidents holds even when the

Marked improvement shown in 1928 safety records as compared with previous years. Honorable mention made of Louisville Railway and El Paso Electric Company

question of blame is eliminated. A further study indicated that men who pay the most attention to operating efficiently, as evidenced by the percentage of coasting obtained, are also the men who have the least accidents. It was found that the 100 men with the lowest coasting records had 364 accidents and 73 delinquencies, while the 100 men with the high coasting record had 313 accidents and 46 delinquencies. A further study of delinquencies of bus operators developed that, apart from fare irregularities, among the low-accident men there was an average of 9.7 delinquencies which were made by 65 per cent of the men; whereas among the high-accident men; there were 16.8 average delinquencies made by 89 per cent of the men.

A study of the men over 50 years of age showed that 21 men with abnormal blood pressure had a total of 136 accidents, or $6\frac{1}{2}$ per man; those with normal blood pressure, numbering 38, had 110 total accidents, or an average of 3 per man. The length of service was found to have a very distinct relation to the number of accidents, the older men having far less accidents than the younger ones; second, the largest number of accidents and the largest proportion of men having a large number of accidents are in the group with less than one year of experience.

Summing up, it was found that there are four classes of men who may be regarded as more than ordinarily prone to accidents: (1) those who do not operate economically, as shown by low coasting record; (2) those whose record of delinquencies is long; (3) older men with abnormal blood pressure, and (4) younger men with very limited experience.

Following this survey the records of car operators and motormen were studied individually. They were divided into two classes: (1) high-accident men, i.e., those with five or more collisions during 1927; (2) low-accident men, i.e., those with fewer than five collisions during 1927. It was found that out of 2,300 operators, approximately 20 per cent, or 472, were high-



In Boston, traffic lanes are marked prominently at congested intersections

accident men, and the remaining 1,828 were low. The 1,828 low men were regarded for the time being as satisfactory operators, and were left under the usual influences inducing safety.

The high-accident men were then studied and handled individually. Two things were noted about these men: (1) the man who tends to have many slight accidents, which are themselves relatively unimportant, is also the man who tends eventually to have serious accidents; (2) the man who has many accidents in one year is also the man who is likely to have accidents every year. Accident proneness may, therefore, be regarded as something in the nature of a disease, which has to be diagnosed and treated. The first step in treating a man is finding out why he has accidents.

Instructors were then brought into conference, relative to the 472 operators who were on the high-accident list. They rode on the cars with these operators, making



Many safety measures are in use in the Boston shops. This view shows the advantage of depressed pits with leg holes for inspection and repair work on trucks and motors

observations as to their habits. Then the habits of the operator, his record, personality, and physical condition were all considered together in an attempt to arrive at conclusions regarding the cause of his accidents, and in relation to the possibility of the effectiveness of individual action, the main thought being that the man should be cured of his accident tendencies if possible.

The method chiefly depended on to produce a reduction in accidents was instruction on the job by the especially trained instructors. While instruction was mainly relied on, two other methods were used: (1) where the accident record of a man indicated that he did not realize his responsibility, he was interviewed by the



Some 291,000 cars or trains passed over this electric switch in 1928 without a derailment

safety supervisor and division superintendent; (2) where the cause of accident was ill health, the men were physically examined and told what was the matter with them, and advised to go to their own physicians for treatment.

Since the habits in question were generally of long standing and a change would require some time, it was necessary to arrange follow-up work. Each inspector was required to see each of his operators on the job, the frequency depending on the seriousness of the case. When it became apparent that although a man might do his job well during the hours the instructor was with him, he might not do it at all well during the other 47 hours of the week, the entire street supervisory force was enlisted. Their hours and duties were rearranged so that they could include a great measure of personal supervision of high-accident operators.

A selected group of instructors and supervisors was consolidated into a group of safety inspectors, working directly under the safety supervisor. Districts were allotted to these inspectors, according to the routes and districts where the accident hazards were greatest. Sample studies of accidents and times of accidents were made. It was then made the duty of the inspectors to acquaint the high-accident men with all the information they had regarding the accident hazards of the district.

Other activities of the transportation department con-



Sand is spread on slippery streets where buses of the Boston Elevated run, and it protects general vehicle traffic as well

cerning accidents have included conferences with the division superintendent regarding the method of handling men, co-operation of the dispatchers and carhouse starters, particularly with respect to warning operators when weather conditions were unfavorable, or when men were placed on new routes, and keeping a careful check of punctuality. These men have also been encouraged to inspect cars and see that the equipment is on hand and the car in perfect running order.

Results that have been obtained have proved the soundness of these methods. During the year 1928 the collision accidents involving surface cars were reduced from 7,197 to 5,923. This reduction came about by concentration of efforts of high-accident men. Figures show that the 472 high-accident men in 1927 averaged 7.1 accidents per man, or a total of 3,327 accidents. During 1928, 312 of these men averaged 2.1 accidents per man, or a total of 663; 160 averaged 7.1 accidents per man, or 1,136 total accidents. The accidents for this group were therefore 1,799 altogether. Contrasted with this the 1,828 low-accident men in 1927 averaged 2.1 accidents per man, a total of 3,870 accidents. During 1928, 1,693 of these men averaged two accidents per man, or 3,386 accidents; while the remaining 135 averaged 5.8 accidents per man, or 738 accidents, making a total of 4,124 accidents for this group. Thus it will be seen that while there was a 46 per cent reduction in the accidents of the men in the first group, a number of the men of the second group had a larger number of accidents in 1928 than 1927. The discovery, after the first year's investigation, that a few of the men placed in the low-accident group could not be classed as constantly low-accident men was an unforeseen but valuable result of the investigation. With the additional knowledge obtained, the system of training has been rounded out to include provisions for special treatment of this new group.

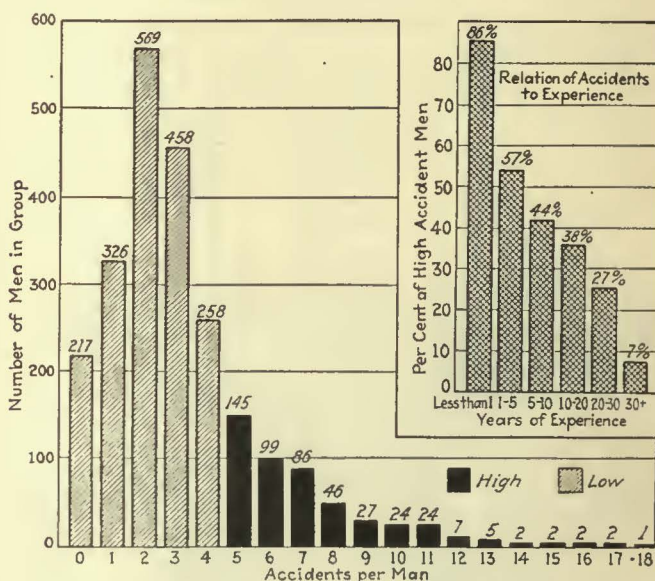
Accident location studies have been made on a different basis from that usually employed. For instance, on a particular route a check-up showed that the inbound collisions were all with the front left corner of the car, while outbound collisions were with the right front corner. The reasons for this were investigated, and the instructors and men were told how they should operate in view of the condition. This cut the accidents on the line to one-third of the former number. In another

instance, instructors were overheard telling the men how much extra care was necessary at a certain corner, where studies showed that there had been no accidents for more than a year.

Investigation showed that the times of the accidents as well as the locations should be taken into account. In one place it was found that inspectors had been on duty sixteen hours a day during the previous winter to look after traffic conditions, but during the evening rush the inspector was required to go to a cross-over 1,000 ft. away. Study revealed that 80 per cent of the accidents at this point occurred during the evening rush hour. Placing a man there from four to six in the afternoon resulted in cleaning up the bad spot, and the sixteen hours of unnecessary supervision was eliminated. In another place, the prevailing type of accident in the summer required twenty-hour supervision, while a study of winter conditions showed that 75 per cent of the accidents occurred during only five hours of the day. The superintendent found that he could arrange for five hours supervision, and did so, reducing accidents on the route from nineteen to nine a month.

At the beginning of 1928, the inspection school and the employment office of the railway were consolidated as the division of employment and training. Inspectors teach the new employees as well as the older ones. Preparing for an interview with a man, the superintendent decides that it would be better to have this man's instruction followed up on the card. The regular instructor arrives with him and gives him instruction when necessary. Eighty high-accident men have been taken out on special cars in street operation by the division inspectors. These men have been re-instructed for from one to three days, and special attention has been given to any faults in operation or habits which increase accident hazards.

The work of 1928 showed that when every possible expedient had been tried to cure men of their accident proneness, some were not successfully handled. In order to discover the reasons for their accident proneness a psychology laboratory was set up and these men put



Accident proneness is confined to relatively few men. This record from Boston shows that 1,828 low-accident men had 3,870 collisions, or an average of 2.1 per man, while 472 high-accident men had 3,327 collisions, or 7 per man. The small chart shows distinctly that caution comes with experience, most of the high-accident men being young in the service

through tests to secure further information about their mental make-up. After observations it was found that several psychological factors are more or less constant as contributing causes of accidents: (1) the degree of adaptability of the operator to various types of equipment; (2) his quickness of reaction to sound and light; (3) powers of concentration over a period; (4) judgment of speed and distance.

From these tests it was determined that operators should be divided into three classes: (1) first-rate operators, 73.6 per cent of all, who never have more than a few accidents; (2) those who for one reason or another do not ordinarily operate in a safe manner, unless special methods of instruction are adopted, but who always would be classed as high, comprising 20.5 per cent of the total; (3) those who are likely to be either in the high-accident or low-accident class in any year, forming 6.6 per cent of the men. In this third class fall those who are qualified in all classes of service and who change from one type to another, and those whose health, family circumstances, etc., either improve or become worse in any year.

The function of the safety organization, then, has been three-fold: (1) to reduce the number of high-accident men; (2) to follow up the men whose manner of operation has improved and crystallize their improved habits; (3) to prevent unnecessary shifts of those men who, due to change of operation, will have a tendency to come into the high-accident class.

SAFETY AN INTEGRAL PART OF MANAGEMENT

Two fundamental principles determined the policy of the Boston Elevated Railway in its safety work during 1928, according to the company's presentation. First, safety is an integral part of management and not simply something to be taken care of by a special department charged with the administration of safety features only. Second, all specific safety efforts must be preceded by and based upon thorough research and investigation into past accidents and their causes.

In order to interest the public in accident prevention, there has been close co-operation with the Massachusetts Safety Council, officials of the railway being on the executive board of that organization. During 1928 the general manager of the railway was president of the council.

Particular attention has been taken to interest the children in safety. A special motorcycle officer detailed to make observations at the opening and closing of schools found that the children from certain streets did not have due respect for their own safety, so that he visited the schools in question, talked with the teachers, and in some cases talked directly with the children of the class. Another result was the formation of a junior safety council in the schools; the co-operation of local service clubs was secured; the Kiwanis Club donated white safety belts to the boys for use while on duty as safety patrols.

In connection with its physical plant, the company has done much to make the track safe for operation. In addition a derailment committee visits the scene of the trouble whenever a derailment or a split switch occurs. The evidence obtained is weighed and a decision is reached as to the probable cause. As a result, in comparison with 243 derailments in 1927, costing in claims \$15,130, there were only 208 derailments in 1928, costing in claims \$11,548.

In order to prevent collisions with cars turning, clearance lines have been painted on the pavement. On one of the recently opened highways, known as the Northern Artery, the hazards to passengers have been eliminated by moving the safety zones from the highway and placing center loading areas between the tracks. These center loading areas allow passengers to keep away from the vehicular traffic, which is not halted while passengers are boarding and alighting.

Particular attention has been paid to the equipment to keep it at all times in safe operating condition. The older buses which were purchased by the company in 1922 and in several years thereafter have been replaced by modern buses of steel construction which have much greater strength to withstand shocks in collisions. The street cars have also been maintained better, and there is an improved reliability of the cars from the accident standpoint. In cars, both for surface and rapid transit lines, safety features have been installed. Much new testing equipment has been installed in the shops to insure that the cars are in safe operating condition. Changes have been made in the rapid transit stations to enhance the safety of passengers. Safeguards have been placed at approaches to drawbridges to prevent cars from running off the track at such points.

Due to the extensive use of automobiles in winter, as well as during the open months, changes in the snow removal program have been made so that a width of at least 14 ft. in the roadway adjoining the tracks is cleared, as well as the area over the tracks themselves. Using these measures, the street surface is free from snow in practically the entire width, for the whole winter. The railway also keeps open 140 miles of highway, over which its buses operate.

Tampa Beters Safety Record

SAFETY work in Tampa, which brought the Tampa Electric Company the Brady Award for 1927, had even better results in 1928. In the latter year there was a total of 820 car and bus accidents, as compared with 1,175 occurring in 1927, 2,843 in 1926 and 3,070 in 1925. This represents an improvement in 1928 over 1927 of 30 per cent, over 1926 of 71 per cent, and over 1925 of 73 per cent. From the comparative record of acci-



At the South Florida Fair the Tampa Electric Company had an exhibit which included a moving picture booth at which safety pictures were shown

dents, it appears that of the years 1914 to 1928 inclusive, the smallest number of accidents occurred in 1928. Also, during 1928 a far greater number of miles was operated per accident than was operated at any time during this fifteen-year period. The figures indicate an improvement in miles operated per accident during 1928 over 1927 of 35 per cent, over 1926 of 184 per cent, and over 1925 of 264 per cent.

The reduction in collisions with vehicles is particularly notable. In 1925 there were 2,597 such collisions, in 1926 there were 2,458 collisions, in 1927 1,021 collisions, and in 1928 only 691. These figures indicate an improvement for 1928 over 1925 of 280 per cent in miles operated per collision with a motor vehicle. The automobile registration in the two years was approximately the same. The latter year also shows a substantial reduction in other classes of accidents as compared with the three previous years.

The total expense of settlement of suits, judgments and claims was \$9,940 in 1928, as compared with \$35,135 in 1927, and approximately the same amount in each of the two preceding years. The total accident costs have been reduced from \$56,290 in 1925, \$62,182 in 1926 and \$57,237 in 1927, to \$25,236 in 1928. This is a reduction of approximately 60 per cent. The cost of accidents per vehicle-mile for the four years was 1.45 cents in 1926, 1.31 cents in 1926, 1.49 cents in 1927 and 0.65 cents in 1928. With an accident reserve accumulation of \$60,000 at the end of 1928, it has been possible to reduce the accrual basis from 5 per cent to 3 per cent of the revenue from transportation. This record of reduction in accident costs has been obtained with a reduction in the cost of safety work from \$5,448 in 1927 to \$4,799 in 1928.

Safety work has been carried on by the Tampa Electric Company for many years. In a summary of the presentation for the Brady Award last year made in *ELECTRIC RAILWAY JOURNAL* for Jan. 26, 1929, page 161, were listed the several plans used up to the end of 1927. The program has been continued during the past year.

During 1928 blinker stop signs were installed at street intersections of the most important through thoroughfares. Clearance lines at curves are now painted on the street surface in yellow instead of white, which was the same color as that used by the city in marking street intersections, parking places, etc. It is believed that this change prevents confusion with other lines painted on the pavements.

In connection with the annual South Florida Fair, the company, in its exhibit in 1928, showed the front end of a street car. Inside it motion pictures and lantern slides were displayed on a screen. Two short films were run, along with slogans. It is estimated that between 18,000 and 20,000 people saw the exhibit during the ten-day period of the exposition.

Beginning with 1928, a new contest among the trainmen was begun. This plan has as its reward a monthly prize of \$5 to each man of the car or bus line which operates the greatest number of miles per accident. The extra men are also divided into groups, and the members of the winning group are likewise given a prize of \$5 each. This contest has proved very successful, and tends to keep interest aroused where it has perhaps lagged a little during the four-month bonus contests which were described in the article last year. Under the rules of the contest, all accidents are counted, whether chargeable or

non-chargeable. In the case of unreported accidents, a regular man is disqualified from participating in any earnings of the line for that monthly period in which the unreported accident occurred.

Whenever a line makes a poor showing in the line contest for two months in succession, class meetings are held for the men from that line, in which every phase of the operation is discussed, together with the possible accident hazards, in order to ascertain if possible the reason for the line's poor showing. These classes have been found very beneficial and have always resulted in improvement for the lines that have been making a poor showing.

In the work of the shops, one of the most noteworthy accomplishments for safety during 1928 was the adoption of the system of keeping all cars and buses on the same run daily. It is believed that when a man is entirely familiar with his car by the daily use of it, he naturally will handle it with a greater degree of safety. This system has also helped in reducing car defects, and improving the reliability of the service.

Tide Water Power Company Extends Safety Measures

DESPITE continually increasing congestion on streets and highways the Tide Water Power Company of Wilmington, N.C., maintained the excellent record during 1928 that it had established in winning the Brady Award in its class in the two preceding years. This company always has laid great stress on resuscitation of persons suffering from electric shock or suffocation in drowning. It was a pioneer in adopting the Schaeffer prone pressure method and has extended its service to neighboring industries and the general public. The company owns and operates a large bathing pavilion at Wrightsville Beach and maintains lifeguards for the protection of the public. It also has shown during the bathing season a one-reel picture, "Artificial Respiration," every eighth evening. Reports have come back from many southern states illustrating the peculiar effectiveness of this method of visual instruction.

The company also co-operates with the safety departments of the railroads and industries located in the city as well as with the local Y.M.C.A. In the company's employee school for vocational training and safe practices, the employees of other companies are welcome to receive instruction without charge.

Particular attention is directed toward all locations where accidents are likely to occur. Where the view of the track is obstructed special precautions are taken. Where a hedge is permitted to obscure the view at a crossing a continuous agitation for its trimming or removal will begin, and will be continued until the risk is eliminated or abated. Signs are placed at important points along the lines of the company giving full directions as to speed and control of the cars. It is believed that this has enabled employees to make better than average time with little if any extra hazard.

The company bettered its record of accidents from 46 in 1927 to 45 in 1928. There have been no fatalities on the properties for four years. Expressed in proportion to gross revenue the cost of accidents was 1.366 per cent for the year 1928. The claim department operations

and miscellaneous expense were 0.537 per cent of the 1928 gross earnings.

In 1928 the bonus system for rewarding trainmen and bus drivers for safe operation met with great success. Of the 34 regular operators 15, or 44 per cent, held perfect safety records. Of the average number of 48 total operators, 43 received some reward for safe operation. The plan provides for the payment of \$1 to each operator for each no-accident month. In the event that he has an accident he loses all of the accumulated bonus for the year to date, but can start over the next month. There is an additional bonus of \$1 for each no-accident quarter, and \$5 extra for a perfect year, making a possible total actual bonus of \$21. The cost of this system was \$522 in 1928, or less than 1 per cent of the payroll.

Louisville Men Have New Attitude on Safety

WHILE safety work on the Louisville Railway during 1928 followed along the same lines as in the past two years, there has been a change in the attitude of the men since the safety program was inaugurated in 1921. At present they are making efforts to operate safely because they have a conviction that safe operation for its own sake is distinctly worth while.

Among mechanical improvements which contribute to safety, the most important during 1928 was the elimination of a grade crossing over which three of the heaviest street car lines operate. Safety of operation has been increased by a change in the color with which the street cars are painted, the present scheme comprising a lemon yellow for the car body with a broad stripe of apple green running around the body and a cross of apple green on the front and rear dashes. Four safety zones have been installed at the principal loading points on Jefferson Street. Air gongs have been substituted on cars operating on important lines for single-tap foot-operated gongs. Treadle doors at the rear of cars on one of the one-man car lines have been installed. Improved destination signs have made it easier for passengers to distinguish routes and have minimized the hazard due to their standing in the street to see if the car approaching is the desired one. Improved springs and locking devices have been installed in electrically operated switches to prevent splitting of switches and subsequent derailment.

Despite an increase in the number of car-miles run from 12,140,867 in 1927 to 12,365,167 car-miles in 1928, the cost of repairs due to accidents was reduced from \$7,262, to \$6,045.

Comparison of 1928 statistics with those for 1927 shows that the latter year in nearly all respects was the safer. The total charges to the injuries and damages account were reduced from \$201,112 to \$162,186. The average number of miles operated per chargeable accident went up from 13,326 in 1927 to 17,440 in 1928. In this connection it must be remembered that 1928 was the eighth year of intensive safety effort on the property and comparatively little improvement was looked for.

Indicative of the change of attitude of the employees toward safety is the fact that, of 24 safety rallies held at different carhouses during the year, 22 were arranged by the platform men themselves. Posters and charts



In Louisville a dinner is given each month to the carhouses where 25,000 miles or more are run without an accident. The progress of each carhouse is shown by pins on charts posted on bulletin boards

in the carhouses are found of the utmost value in keeping the enthusiasm for safety of its employees constantly stimulated. One of these shows the average miles operated per accident from 1910 to date. Another is a blueprint which shows the complete safety record of all of the employees. Still another chart is a blueprint showing the standing of each carhouse in the company's monthly accident contest.

During the year a postgraduate course for trainmen was inaugurated. This supplements the training of new employees and makes the old employee who takes it a more efficient street railway man. There also has been increased attendance by employees of the company at the Louisville Safety Council's industrial school.

The good will of the company has been enhanced by speeding up the street car service. This was accomplished late in 1927 and early in 1928. In 1927 the company operated 12,140,867 car-miles in 1,433,271 car-hours; in 1928 it operated 12,365,167 car-miles in 1,416,690 car-hours. This was accomplished with the increase in car-miles per accident and decrease in total cost mentioned elsewhere. Besides this general improvement in speed, an express service was inaugurated on one of the company's main lines during the year. For four miles in the center of the main route the street cars make no stops at streets other than transfer points, local service being given by buses.

El Paso System Increases Zero Accident Days

DURING the year 1928 the El Paso Electric Company bettered its record for any previous year, having a total of 435 accidents as compared with 445 in 1927, and 452 in 1926. This compares with 1,767 in 1921, the earliest year for which statistics were presented. Accidents were at the rate of 1.42 per 10,000

car-miles, and 2.35 per 100,000 passengers carried. The figures for 1928 represent an improvement of approximately 8 per cent in the factor of safety over the medal winning year, 1926. Reviewing results for the past eight years, the company's presentation states that accidents per 100,000 passengers carried and per 10,000 car-miles operated have been reduced more than 75 per cent.

During 1928 earnings were increased to the extent of \$12,752, and expense was reduced by \$18,614, through accurately fitting service to conditions. The company operated 233,452 car-miles less and hauled 76,516 passengers more in 1928 than during the previous year. Faster schedules offset lengthened headways and readjustments were followed by a further reduction of the number of street car and bus accidents.

For years it has been the practice of this company to set an accident bogey. By the beginning of 1928 so much progress had been made towards the goal of accidentless transportation that no bogey was set and the men were simply urged to do their best to "beat last year's accident record." This they did, lowering the record for 1927 by ten accidents.

That the efforts towards the reduction of accidents have been appreciated in the city of El Paso is evidenced by the many expressions of good will included in the report. The results did not follow a spurt or any series of spasmodic efforts during which spectacular improvements were shown. On the contrary, progress along safety lines was shown by regularly bettering the established accident record year after year, notwithstanding that these records have already been recognized as among the best.

Warning signs, the exercise of tact and courtesy, and extra precautions taken to prevent accidents have played

an important part in the program. Careful inspections have been made, special instructors have taught student operators and a joint committee on investigating accidents has been active. Operators are continually on the alert and report all unsafe conditions. Various safety devices have been adopted, quite a few of which were developed by the men in the ranks.

Outstanding benefits have been secured through the company's honor roll and gold star merit system. A day off with pay once each month is the privilege of operators on the honor roll, and this has led to greatly increased efficiency and improved safety. The safety banquets which are held periodically have increased the interest of the men in accident prevention work, and the numerous safety contests conducted have resulted in materially lowering the number and seriousness of accidents.

One of the outstanding features of the safety contest was the establishment of a record for zero days, or days on which no accidents occurred. The company had a total of 117 such days in 1928. This means that the street cars and buses were operated about a third of the total number of days in the year without an accident of any kind. The goal which the company has set is to operate seven consecutive days without an accident. There were eight days in June, 1928, in which only one accident occurred, and in the last eleven days of December eight were operated without an accident. All the employees are now determined to make the seven consecutive days without an accident a reality. The result has been to stimulate a renewed interest in safety among all employees, which has materially lessened the number and seriousness of accidents in which the street cars and buses are involved.

Lower Insurance Rates In Effect

NEW fire insurance rate schedules for electric railways are now in effect in 42 states, according to the announcement made at a meeting of the committee on insurance of the A.E.R.A., held at Baltimore Jan. 10. In three other states the new schedule has been tentatively adopted and test applications are being made. In three

additional states the schedule has not been filed because of litigation; and in one state there are no traction lines rated.

Changes in this new schedule as compared with that previously in effect are as follows:

The base rate "A" for incombustible buildings has been reduced 50 per cent.

The base rate "B" on other structures has been reduced 16 $\frac{2}{3}$ per cent.

More favorable treatment has been accorded buildings of superior construction (rated under base rate "A") and deficiency charges for such buildings have been lowered in numerous instances.

Occupancy charges for motor buses (items 31 t,u) have been lowered 25 per cent and 20 per cent respectively, with all occupancy charges reduced 50 per cent when in incombustible buildings.

Watchman deficiency charge has been reduced 50 per cent when base rate "A" is used.

External protection charges are reduced one-half when base rate "A" is used.

Deductions have been introduced for semi-steel cars. A 33 $\frac{1}{3}$ per cent reduction has been allowed in the base rate for rolling stock (1) on tracks and (2) in yards.

Charges covering defective wiring and heaters for cars on tracks have been reduced 50 per cent under stated conditions.

Fire Insurance Rate Schedule—Revision of May, 1929

In Use

Maine	North Carolina	Arkansas
New Hampshire	South Carolina	Nebraska
Vermont	Georgia	Oklahoma
Massachusetts	Florida	Texas
Connecticut	Alabama	Wyoming
Rhode Island	Mississippi	Colorado
New York	Louisiana	New Mexico
New Jersey	Ohio	Montana
Pennsylvania	Tennessee	Utah
Delaware	Indiana	Arizona
Maryland	Wisconsin	Washington
Dist. of Columbia	Illinois	Oregon
Virginia	Minnesota	California
West Virginia	Iowa	Nevada

Michigan } Tentatively adopted. Test applications
 North Dakota } being made.
 South Dakota }

NOTE—Missouri }
 Kansas } Because of litigation, schedule not filed.
 Kentucky }

Idaho—No traction lines rated.

Baltimore Rate Decision

Sanctions Larger

Earnings

United States Supreme Court approves $7\frac{1}{2}$ to 8 per cent return on present fair value. Similar basis held to be proper for setting up depreciation

PRINCIPLES which may have a far-reaching effect upon the electric railways and the entire utility industry in this country were laid down in the recent decision of the United States Supreme Court in the rate case of the United Railways & Electric Company of Baltimore. Not only did the court sustain the primary contention of the company that a return of 7.44 per cent was no more than fair and reasonable but it went further and declared that a return of $7\frac{1}{2}$ to 8 per cent is not unreasonable or excessive. Concerning depreciation, the second point at issue, the court stated specifically: "This naturally calls for expenditures equal to the cost of the worn-out equipment at the time of replacement; and this for all practical purposes means present value." The position previously taken by the court, that reproduction cost must be considered in determining valuation, was reaffirmed, but the wording of the decision was not specific and definite on this subject.

More than two years have elapsed since the first step was taken in the long series which led ultimately to the victory of the company in the nation's highest court. In August, 1927, the company applied to the Maryland Public Service Commission for an increase in fare from $7\frac{1}{2}$ cents to 10 cents.

The old 5-cent fare remained in effect in Baltimore until 1918, when this rate was increased to 6 cents. In the following year it was raised to 7 cents with two tokens for 13 cents. On Jan. 1, 1920, the token rate was withdrawn, and the fare became 7 cents straight. This rate continued until 1924, when the company was authorized to increase it to 8 cents with two tokens for 15 cents. Even this failed to yield a fair return on the investment and the company therefore requested permission to charge a 10-cent flat fare.

In response to this application the commission in February, 1928, ruled that the company could charge a cash fare of 9 cents, with three tokens for 25 cents. At that time the commission fixed the depreciation charge at

There is much evidence in the record to the effect that in order to induce the investment of capital in the enterprise or to enable the company to compete successfully in the market for money to finance its operations, a net return upon the valuation fixed by the commission should be not far from 8 per cent.

—From decision of U. S. Supreme Court.

\$883,544, basing it on original cost. The company took the case to the Circuit Court, which in May held the rates granted by the commission were confiscatory and that depreciation should be based on present value. The commission then filed an appeal and the case went to the Court of Appeals of Maryland.

The Court of Appeals reversed the Circuit Court and upheld the contention of the commission that a fare calculated to yield a return of approximately 6.26 per cent is adequate. In the matter of depreciation, however, the Court of Appeals upheld the lower court and overruled the contention of the commission that depreciation should be figured on the basis of original cost. Both sides then appealed to the United States Supreme Court, the company in order to secure a rate of return higher than 6.26 per cent and the commission in order to win its point that depreciation should be calculated on original cost.

The decision of the United States Supreme Court, announced on Jan. 6, 1930, sustained the decision of the Maryland Court of Appeals that depreciation should be calculated on present value, but reversed the latter's ruling that 6.26 per cent constitutes an adequate return. In discussing this subject the Supreme Court stated:

"The commission fixed a rate of fare permitting the company to earn a return of 6.26 per cent on this valuation; and . . . the case resolves itself into the simple

question whether that return is so inadequate as to result in a deprivation of property in violation of the due process of law clause of the Fourteenth Amendment. In answering that question, the fundamental principle to be observed is that the property of a public utility, although devoted to the public service and impressed with a public interest, is still private property; and neither the corpus of that property nor the use thereof constitutionally can be taken for a compulsory price which falls below the measure of just compensation. One is confiscation no less than the other.

"What is a fair return within this principle cannot be settled by invoking decisions of this Court made years ago based upon conditions radically different from those which prevail today. The problem is one to be tested primarily by present-day conditions. Annual returns upon capital and enterprise, like wages of employees, cost of maintenance and related expenses, have materially

increased the country over. This is common knowledge. A rate of return upon capital invested in street railway lines and other public utilities which might have been proper a few years ago no longer furnishes a safe criterion either for the present or the future. Nor can a rule be laid down which will apply uniformly to all sorts of utilities.

What may be a fair return for one may be inadequate for another, depending upon circumstances, locality and risk. The general rule recently has been stated in *Bluefield Co. vs. Pub. Serv. Comm.*, 262 U. S. 679, 692-695:

"What annual rate will constitute just compensation depends upon many circumstances and must be determined by the exercise of a fair and enlightened judgment, having regard to all relevant facts. A public utility is entitled to such rates as will permit it to earn a return on the value of the property which it employs for the convenience of the public equal to that generally being made at the same time and in the same general part of the country on investments in other business undertakings which are attended by corresponding risks and uncertainties; but it has no constitutional right to profits such as are realized or anticipated in highly profitable enterprises or speculative ventures. The return should be reasonably sufficient to assure confidence in the financial soundness of the utility and should be adequate, under efficient and economical management, to maintain and support its credit and enable it to raise the money necessary for the proper discharge of its public duties. A rate of return may be reasonable at one time and become too high or too low by changes affecting opportunities for investment, the money market and business conditions generally.

"Investors take into account the result of past operations, especially in recent years, when determining the terms upon which they will invest in such an undertaking. Low, uncertain or irregular income makes for low prices for the securities of the utility and higher rates of interest to be demanded by investors. The fact that the company may not insist as a matter of constitutional right that past losses be made up by rates to be applied in the present and future tends to weaken credit, and the fact that the utility is protected against being compelled to serve for confiscatory rates tends to support it. In this case the record shows that the rate of return has been low through a long period up to the time of the inquiry by the commission here involved."

"What will constitute a fair return in a given case is not capable of exact mathematical demonstration. It is a matter more or less of approximation about which conclusions may differ. The court in the discharge of its constitutional duty on the issue of confiscation must determine the amount to the best of its ability in the exercise of a fair, enlightened and independent judgment as to both law and facts."

"There is much evidence in the record to the effect that in order to induce the investment of capital in the enterprise or to enable the company to compete successfully in the market for money to finance its operations, a net return upon the valuation fixed by the commission should be not far from 8 per cent. Since 1920 the company has borrowed from time to time some \$18,000,000, upon which it has been obliged to pay an average rate of interest ranging well over 7 per cent and this has been the experience of street railway lines quite generally. Upon the valuation fixed, with an allowance for depreciation calculated with reference to that valuation, and

upon the then prescribed rates, the company for the years 1920 to 1926, both inclusive, obtained a return of little more than 5 per cent per annum. It is manifest that just compensation for a utility, requiring for efficient public service skillful and prudent management as well as use of the plant, and of which the rates are subject to public regulation, is more than current interest on mere investment. Sound business management requires that after paying all expenses of operation, setting aside the necessary

sums for depreciation, payment of interest and reasonable dividends, there should still remain something to be passed to the surplus account; and a rate of return which does not admit of that being done is not sufficient to assure confidence in the financial soundness of the utility to maintain its credit and enable it to raise money necessary for the proper discharge of its public duties. In this view of the matter, a return of 6.26 per cent is clearly inadequate. In the light of recent decisions of this Court and other federal decisions, it is not certain that rates securing a return of 7½ per cent or even 8 per cent on the value of the property would not be necessary to avoid confiscation. But this we need not decide, since the company itself sought from the commission a rate which it appears would produce a return of about 7.44 per cent, at the same time insisting that such return fell short of being adequate. Upon the present record, we are of opinion that to enforce rates producing less than this would be confiscatory and in violation of the due process clause of the Fourteenth Amendment."

From these views Mr. Justice Brandeis and Mr. Justice Holmes dissented. Their dissent, however, appears to have been based upon a difference of opinion concerning valuation and proper allowance for depreciation rather than upon the belief that a return of 6.26 per cent is adequate. In fact, Justice Brandeis' statement refers to a return of 7.78 per cent upon the figure which he considers to be the fair value of the property.

Concerning the method which should be used in setting up depreciation the language of the decision is explicit. The Court states:

"The allowance for annual depreciation made by the commission was based upon cost. The Court of Appeals held that this was erroneous and that it should have been based upon present value. The court's view of the matter was plainly right. One of the items of expense to be ascertained and deducted is the amount necessary to restore property worn out or impaired, so as continuously to maintain it as nearly as practicable at the same level of efficiency for the public service. The amount set aside periodically for this purpose is the so-called depreciation allowance. Manifestly, this allowance cannot be limited by the original cost, because, if values have advanced, the allowance is not sufficient to maintain the level of efficiency. The utility 'is entitled to see that from earnings the value of the property invested is kept unimpaired, so that at the end of any given term of years the original investment remains as it was at the beginning.' . . . This naturally calls for expenditures equal to the cost of the worn-out equipment at the time of replacement; and this, for all practical purposes, means present value. It is the settled rule of this Court that the rate base is present value, and it would be wholly illogical to adopt a

It is manifest that just compensation for a utility, requiring for efficient public service skillful and prudent management as well as use of the plant, and whose rates are subject to public regulation, is more than current interest on mere investment.

—From decision of U. S. Supreme Court.

different rule for depreciation. As the Supreme Court of Michigan, in *Utilities Commission vs. Telephone Co.*, 228 Mich. 658, 666, has aptly said: 'If the rate base is present fair value, then the depreciation base as to depreciable property is the same thing. There is no principle to sustain a holding that a utility may earn on the present fair value of its property devoted to public service, but that it must accept and the public must pay depreciation on book cost or investment cost regardless of present fair value. We repeat, the purpose of permitting a depreciation charge is to compensate the utility for property consumed in service, and the duty of the commission, guided by experience in rate making, is to spread this charge fairly over the years of the life of the property.'

From this opinion Justices Brandeis and Holmes again dissent and also Mr. Justice Stone in a separate opinion. Their objections appear to be based on general disagreement with the reproduction cost theory of valuation, and present value as the basis for depreciation allowance.

In the matter of valuation the language of the decision is open to some difference in interpretation. The statement is made that "it is the settled rule of this court that the rate base is present value." In the opinion of

It is the settled rule of this Court that the rate base is present value, and it would be wholly illogical to adopt a different rule for depreciation.

—From decision of U. S. Supreme Court.

lawyers representing the United Railways & Electric Company, this is a reaffirmation of the stand taken by the Court in the *St. Louis & O'Fallon Railroad* case when it upset the valuation of the Interstate Commerce Commission because sufficient consideration had not been given to the matter of reproduction cost. It appears also to refer back to the *Indianapolis Water Company* case wherein the Supreme Court held "if the tendency or trend of prices is not definitely upward or downward and it does not appear probable that there will be a substantial change of prices, then the present value of lands plus the present cost of constructing the plant, less depreciation, if any, is a fair measure of the value of the physical elements of the property."

The exact procedure for putting into effect the decision of the United States Supreme Court remains in doubt at this time. It appears probable that the United States Court will transmit its rulings to the Maryland Court of Appeals and thence to the Circuit Court, resulting in the issuance of a permanent injunction to restrain the Public Service Commission from interference with the collection of a 10-cent flat fare by the United Railways & Electric Company of Baltimore.

Engineering Executive Committee Receives Committee Reports

SEVERAL subjects of importance were taken up at the regular meeting of the executive committee of the American Electric Railway Engineering Association held in New York on Jan. 9, 1930.

Reports were received from the standing committee in charge of the several divisions of association work, and it appeared evident from them that every effort is being made to speed the reports this year to have them ready in time for the annual convention to be held in June.

On account of the withdrawal of the New York State Railways from the American Electric Railway Association, F. McVittie tendered his resignation from the Engineering executive committee. His resignation was accepted with regret. To fill the vacancy thus created Walter Bryan, superintendent of power, St. Louis Public Service Company, was nominated and unanimously elected. It was provided, however, that the remaining members of the executive committee be advanced in positions, since Mr. McVittie was a ranking member at the time of his resignation.

Resolutions were presented and adopted on the death of G. W. Palmer, Jr., who was the only honorary member ever elected by the executive committee of the Engineering Association.

A number of matters pertaining to the American Standards Association were taken up. Having completed this assignment the committee on special track work was discharged. C. W. Squier was appointed as the association's representative on the committee on machine pins. On the subject of hacksaw blades the proposed standardization prepared by E. P. Goucher was adopted for submission to the American Standards Association. On account of the proposed change in the method of testing steel and malleable iron pipe unions of standard weight, this subject also was referred back to Mr. Goucher. New designs of axles which were proposed

were withheld from the Manual pending a discussion with the American Railway Association.

Considerable discussion developed relative to the program of the annual convention to be held in San Francisco next June. According to the plan adopted by the American Association, sessions of the Engineering Association will be held Monday and Wednesday afternoons and Thursday morning. As to the division of time among various subjects, the matter was left to the committee on convention program, of which F. H. Miller is chairman.

Discussion developed as to whether the subjects of motor buses and wood preservation should be reorganized as separate divisions of the Engineering Association, instead of special assignments under the rolling stock and way and structures divisions, respectively. This was referred to a committee consisting of A. T. Clark, chairman; P. V. C. See, and E. M. T. Ryder.

Revisions of the constitution and by-laws and the rules and regulations for committees were adopted at the last convention and referred to a committee on editing consisting of R. C. Cram and C. R. Harte. A report of the committee on editing was presented by Mr. Cram. The proposals were principally changes in wording to clarify the meaning and to insure uniformity. They were tentatively approved by the executive committee for printing in proof form and submission to the membership for approval.

Members present at the meeting included President W. W. Wysor, Vice-presidents L. D. Bale and C. H. Jones, Secretary-treasurer G. C. Hecker, E. M. T. Ryder, H. H. George and A. T. Clark. T. H. Nicholl, C. S. Stackpole, L. C. Winship and R. C. Cram, representing committees, A. W. Baker of headquarters staff and Morris Buck of ELECTRIC RAILWAY JOURNAL also were present.

NEW ALBANY CAR

Includes Many

DIFFERENCES of many kinds from conventional designs are found in the new car which has been operating for some little time on the lines of the United Traction Company, Albany, N. Y. The outstanding features are the extensive use of aluminum and its alloys in the body construction, and the driving motors and type of control.

Particular care has been taken to make the car interior attractive. The miscellaneous parts of the electrical equipment, such as the control devices and switches, have been grouped and placed in a cabinet in each vestibule, with a convenient table top which not only conceals the equipment but provides a place for the operator to lay his transfers, punch and other paraphernalia.

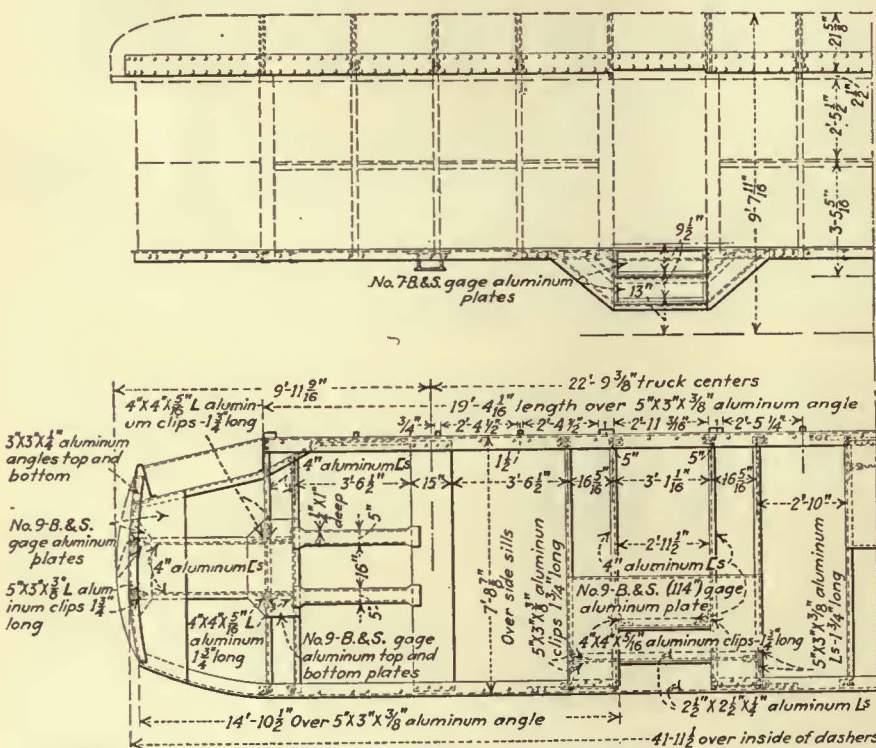
Tests made have shown that the service performance of the car is also somewhat unusual. The free running speed is 32 m.p.h., which is attained with a rate of acceleration on the control points of 3.5 m.p.h.p.s. Stops with the service brake are at the rate of 2.5 m.p.h.p.s., but when emergency braking is used, combining both air and magnetic devices, the rate obtained may be as high as 6 m.p.h.p.s.

In order to obtain minimum weight, aluminum and its alloys have been used extensively in the car body and framing, many parts being made entirely of such materials. In the following discussion, where aluminum is referred to it is understood that the term includes not only pure aluminum, but the various alloys of the metal which have been brought out by the Aluminum Company

of America and which have been designated by it as suitable for the part in question.

The side sills are formed of 3x5x $\frac{3}{8}$ -in. aluminum angles, extending in one continuous piece from front body corner posts to center exits and from center exits to rear vestibule corner posts on both sides of the car. The cross sills are formed of 4-in. aluminum channels. These are fastened to the underside of the side sill angle. The body end sills are formed of two 4-in. aluminum channels spaced on 10 $\frac{5}{16}$ -in. centers, fastened to the body side sills with top and bottom center gusset plates riveted to the end sills and platform center sills.

The center exits are reinforced with additional longitudinal sills and plates, forming a step well. A 4-in. aluminum channel is placed at the junction between the floor plate and the top step well. This runs the full length of the center exit and is connected by angle clips to the body cross sill and riveted to the floor plate. The center exits each have a floor cover plate of No. 9 gage aluminum, flanged on the inside, and extending from within 4 $\frac{1}{2}$ in. of the center line of the car to the side sills and between the main body cross sills on the two sides of the center exit. The step hangers, risers and tread plates are formed of No. 7 gage aluminum flanged at the ends.



Aluminum is used extensively in the framing of the Albany car. Rolled, extruded and cast sections of various alloys are employed

General Dimensions of the Albany Car

	Ft.	In.
Length over all	42	8 $\frac{1}{2}$
Length over dashers	41	11 $\frac{1}{2}$
Length over body	32	11 $\frac{1}{2}$
Length of platforms	4	5 $\frac{1}{2}$
Bumper projection		4 $\frac{1}{2}$
Truck centers	22	9 $\frac{3}{8}$
Wheelbase of truck	5	4
Wheel diameter		26
Post centers		30
Vestibule door openings between posts	4	0 $\frac{1}{2}$
Side exit door openings, between posts	2	11 $\frac{1}{2}$
Width over all	8	2 $\frac{1}{2}$
Width over side sills	7	8 $\frac{1}{2}$
Width over vestibule corner posts	7	0
Width of aisle		22
Width of seats		35
Height, rail to top of trolley boards	9	11 $\frac{1}{16}$
Height, rail to under side of sill		27 $\frac{1}{2}$
Height, rail to bottom of apron		23 $\frac{1}{2}$
Height, floor to beading	6	9 $\frac{1}{2}$
Height, rail to first step, end door		17
Height, first step to platform, end door		15
Height, rail to first step, center exit		13
Height, first step to second step, center exit		9 $\frac{1}{2}$
Height, second step to car floor, center exit		9 $\frac{1}{2}$
Seating capacity	44	

Innovations

The open side of the platform is supported by a built-up knee, formed of No. 7 gage aluminum plate pressed to shape. The top and bottom edges of these knees are reinforced by a 2x2x $\frac{1}{4}$ -in. steel angle riveted to them. The knees are further braced with a No. 7 gage aluminum hanger plate, flanged on the inside edge for connecting to the knee and then around the outside of the side sill angle.

The center sills at the front and rear ends of the car extend through the body end sill to the buffer sills, and are formed of 4-in. aluminum channels, connected with angle clips. The body end sills are further braced with two $\frac{1}{4}$ -in. pressed 5-in. aluminum channels laid flatways and extending from the end sill to the body bolsters being bolted to them. The closed side of the platform is formed by a continuation of the side sill angles. The platform ends at each end of the car are reinforced with No. 9 gage aluminum nosing plates for the full width of the car and some 20 in. deep.

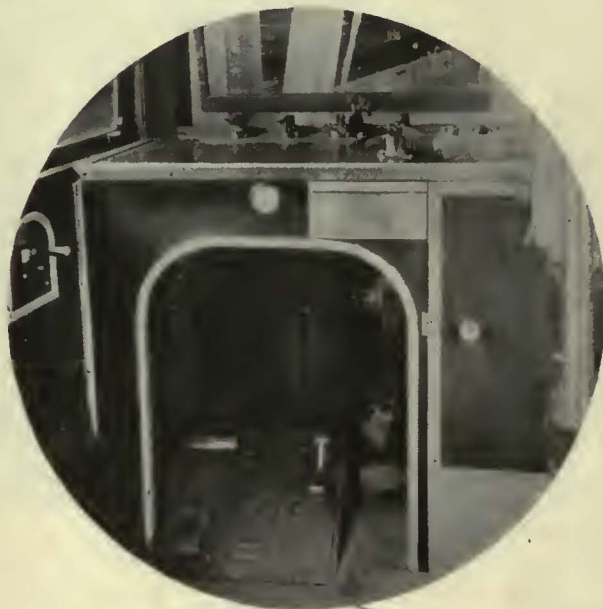
BODY FRAMING IS OF ALUMINUM

The body framing also is of aluminum construction. The material includes cast, rolled and extruded sections, heat treated. The side posts are of extruded "U" shaped sections extending from side sill to side plate,

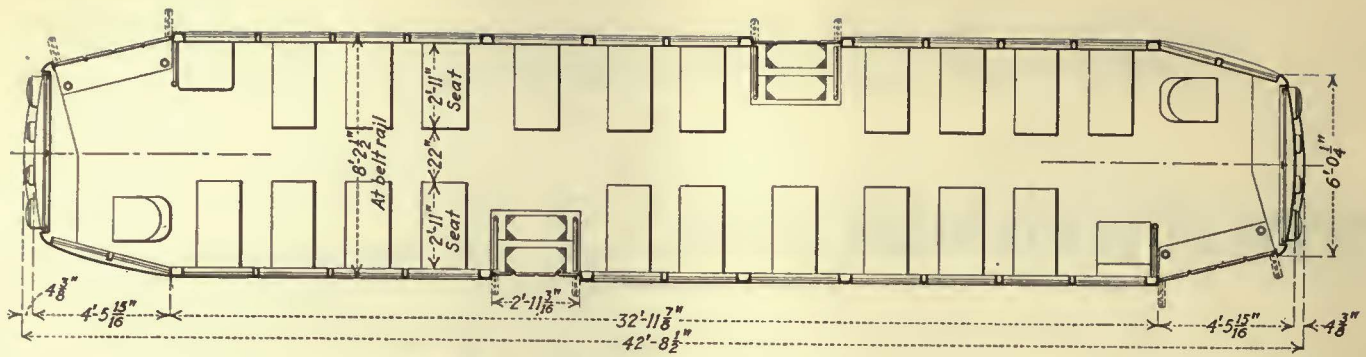
bolted and clipped to the side sills. The truss braces between each pair of side posts are of built-up construction, consisting of an aluminum belt rail or sash-rest casting, a body side plate casting and a No. 14 gage, heat-treated aluminum flanged plate riveted to the side sill angle. These individual truss frames form the side body construction and extend from body pier posts to center exit pier posts on both sides of the car. On the closed side of the vestibule cast aluminum belt rails are used, bolted to the corner vestibule posts and body pier posts. These castings have lugs which permit steel diagonal bracing to be used. The side body girder plates and letterboards are of 18 gage aluminum plates held in place by aluminum moldings bolted to the side posts.

The body side posts are fastened to the roof carlins by cast aluminum shoes bolted to them, forming a continuous member from sill to sill. The side posts are finished on the inside of the car by extruded aluminum pilasters.

The main controller is placed beneath the car floor, the master control being actuated by the left foot. The right foot governs the reverser and the air brake. Only auxiliary devices have to be controlled by hand.



Foot-operated control and extensive use of aluminum in the framing are features of this new car for the United Traction Company of Albany, N. Y.



The Albany car is designed to permit of easy entrance and exit.

The body corner piers and exit door piers are finished of pressed sheet aluminum pilasters.

The roof is of the arch type with vestibule hoods at each end. A channel shape extruded aluminum carlin is located at each side window and door post, and the ends of these carlins are fastened to the side plate bracing and window posts by cast aluminum brackets. The body roof is sheathed with $\frac{5}{8}$ -in. Haskelite the full width of the roof, and in five window-length sections. The hoods are sheathed with $\frac{5}{8}$ -in. Agasote cast in two pieces. The outside of the roof is covered with canvas.

The center vestibule posts extend from the buffer sill to belt rail and are of extruded heat-treated aluminum, being tied to the corner posts by diagonals of $2 \times \frac{1}{4}$ -in. flat steel bar braces. The inside finish of the vestibule below the windows is formed by the aluminum equipment cabinet, while the side vestibule finish is of No. 18 gage aluminum plate. A sign box of cast aluminum is built into the vestibule hood.

The headlining is No. 18 gage aluminum sheet curved to the contour of the roof, jointed on the carlins and covered with aluminum moldings. The advertising card racks are made of No. 18 gage aluminum, forming an ex-

ension to the headlining sheets. The edges are covered with aluminum moldings grooved to take standard car cards the full length of the car body.

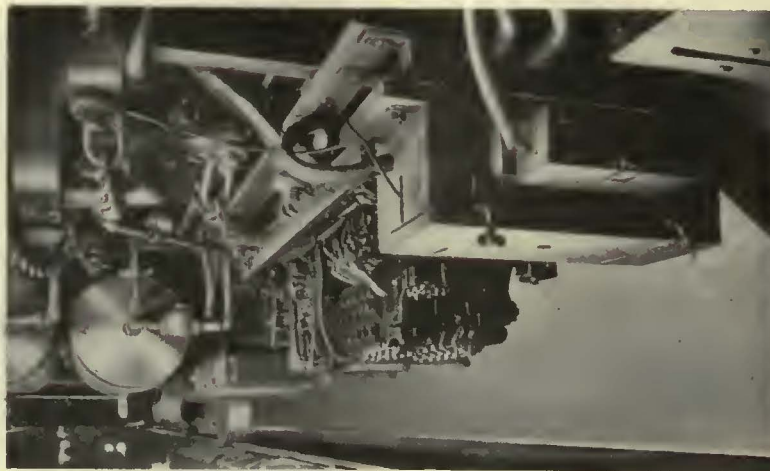
The doors are made of cherry. Post cappings, pier cover plates and moldings are of aluminum. The wainscoting below the windows consists of aluminum plate.

The window stooling is an extension of the cast aluminum truss brace finished with cherry capping.

Besides the main framing, aluminum is used in a number of details on the car. Spacer rings for the head lamps and housing rings for the marker lights are made of aluminum, as is the sander reservoir.

The seats are of the walk-over type, with a welt divided back. The chair for the motorman is of the bucket type and is adjustable vertically and longitudinally. The seats are upholstered in brown Spanish leather.

The car body is mounted on Cincinnati passenger type arch bar trucks, with spring pedestal cantilever type journal boxes and combination rubber cushions and semi-elliptical spring bolster suspension. The trucks are designed to operate on curves with a minimum radius of 30 ft. The wheelbase is 5 ft. 4 in., and the wheel diameter is 26 in.



The controller, reverser, resistors and other equipment are placed under the car convenient for inspection from the pit or the side

General Specifications of Equipment of the Albany Car

Type of unit.....One man, motor, passenger, city double-end, double truck	Door mechanism....Consolidated Car Heating Co., with treadles at center doors	Motors.....Four, GE-265, inside hung
Number of seats.....44	Fare boxes.....Johnson, electrically operated	Painting scheme.....Red and cream
Builder of car body, Cincinnati Car Corp., Cincinnati, Ohio	Finish.....Ripolin	Roof material.....Haskelite; Agasote in hoods
Weight.....32,000 lb.	Floor covering.....Flexolith, $\frac{1}{2}$ in.	Safety car devices.....Safety Car Devices Co.
Body.....Aluminum	Gears and pinions.....General Electric, heat-treated	Sash.....Curtain Supply Co., brass
Roof.....Arch	Glass.....Protex, $\frac{1}{2}$ in. for vestibule DSA for body	Seats.....Hale & Kilburn Walkover
Doors.....Folding, center and end	Hand brakes.....Cincinnati Car Corp.	Seat spacing.....30 in.
Air brakes.....General Electric, foot-operated	Gongs.....Crewson pneumatic	Seating material.....Brown Spanish leather
Axles.....Special	Hand straps.....Leather, white sanitary grips	Slack adjusters.....Turn buckles
Car signal system...Consolidated buzzer and single stroke bells	Heat insulating material.....Cork	Stanchions and rails.....Monel metal pipe
Compressors.....General Electric CP-27B	Heaters.....20 inclosed, 500 watts, thermostatic control	Steps.....Stationary
Conduit.....Flexible duct	Headlights.....Golden Glow	Stop lights.....Keystons
Control.....General Electric PCM	Headlining.....Aluminum, 18 gage	Step treads.....Kase safety
Couplers.....Railway standard drawbar	Interior trim.....Nickel-plated, satin finish	Trolley catchers.....Earll
Destination signs.....Hunter, end and side	Journal bearings.....Hyatt roller	Trolley base.....Ohio Brass Co.
	Journal boxes.....3 x 6 in.	Trucks.....Cincinnati arch bar
	Lamp fixtures.....Standard, 20 in series	Ventilators.....Railway Utility Co., New Era
		Wheels.....Steel, 26 in. diameter
		Window sash.....Curtain Supply Co., brass

Power for driving the car is obtained from four GE-265 motors, one on each axle. These motors are rated at 35 hp. each and make it possible to maintain a high schedule speed. The motors are of the standard, self-ventilated type, geared for a free running speed of 32 m.p.h. at 550 volts. The gear ratio is 68:15.

Arrangements have been made for foot operation of the G.E. Type PCM control. In practice it has been found that this control has all the flexibility of the hand-operated Type K. The operator can choose practically any speed he desires by stopping on the resistance notches. This may be done by the movement of his foot on the control pedal. Since the brake is controlled with the other foot both hands are free for making change, punching transfers and similar purposes, thus reducing the duration of the stops.

The control was developed to meet the requirements of street railways for faster acceleration without discomfort to the passengers. In general, this improvement has been obtained by increasing the number of resistance steps permitting small increments of accelerating current with a comparatively short time interval on each step and for the total operation. In normal service accelerations as high as 3.5 m.p.h.p.s. are secured. There are nine steps in series and nine in parallel on the main controller. The action is automatic, the master controller having three points, known as switching, series, and parallel. When the operator presses his foot down to the full parallel position the control notches up under the direction of an accelerating relay.

The line breaker, contactors and all of the main control equipment are in a box underneath the car, while the foot-operated master controller is recessed into the toe board. The main contacts are locked in the off position

when the reverse lever is removed, just as in the usual hand controller. Normally the acceleration of the car is controlled by the pedal, and, in addition, there is a pilot valve operated by the heel plate which cuts off power in an emergency and applies both air and magnetic brakes.

The air brakes are of the straight air type with an emergency feature. The usual hand valve is replaced by a foot-operated control valve of the automatic lap type. The novel feature of this valve is that when the pedal is put in any braking position and held there, a definite pressure will be built up and maintained in the brake cylinder without moving the pedal back to a lap position. In other words, the amount of pressure built up depends on the distance the pedal is depressed. There is also a lock so that the pedal may be placed in the full service position and held there, as when the operator is changing ends.

Supplementary braking is obtained by the magnetic track brakes. These consist of four electromagnets mounted between the wheels of each truck. Normally they clear the rail head but they can be lowered on the

head and magnetized at the will of the operator. The magnets are energized directly from the trolley and are controlled through the intermediary of pneumatic valves. The retardation obtained by these brakes is thus independent of the motors and control. It does not in any way reduce the effectiveness of the air brakes.

In an emergency both the air and magnetic brakes function together, such a combination allowing for very fast braking without the sacrifice of flexibility or ease of operation. Although the full braking effort is not needed at every stop the operator takes greater advantage of his high accelerating rate when he knows that he can follow more closely behind traffic and get a high rate of retardation if needed.

A bell ringer, a sander and the magnetic track brake are each operated by individual hand valves. The supply of air to these valves is automatically cut off when the pedal is locked so that a passenger on the rear platform cannot tamper with them. Compressed air for operating the control and the auxiliaries is furnished by a CP-27, 15-cu.ft. compressor, suspended beneath the car.

Two circuits, each consisting of twenty lamps in series, furnish illumination for the car interior and for the headlight, destination signs and markers. The lighting fixtures are of the dome type with provision for short-circuiting a defective lamp. A novel feature is that when the motor reverser is turned in changing ends the headlight and other indication lamps are reversed without further attention from the operator.

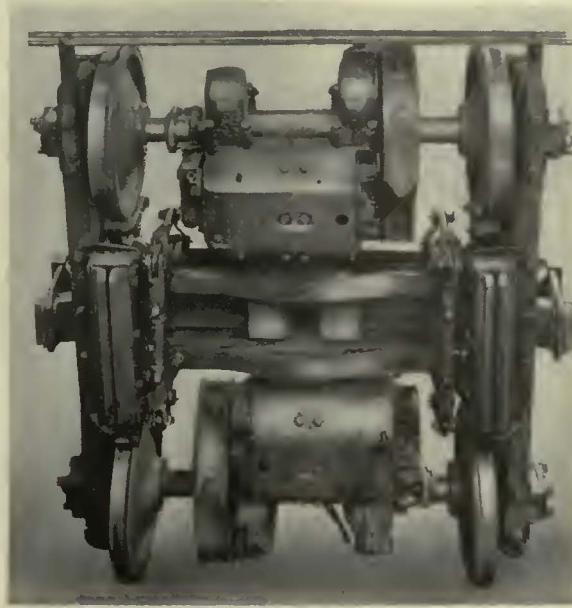
Straight pneumatic control is used for the door at the motorman's platform, while the center door is handled with automatic treadle control. A four-position rotary valve enables the motorman to select the door-opening combination

that he desires. A signal lamp in front of the motorman indicates whether the center door is closed. The door engines are of the direct stroke differential type mounted above the door. Each engine operates a two-leaf door.

The signal buzzer is operated by a pull switch and a cord running down each side of the car. In addition there is a single stroke bell with a push button near the center door so that the passenger can signal the motorman.

There is a conventional stop light on each end of the car, and in addition red lamps are placed over each door connected in the same circuit with the stop light. By this means automobile drivers as well as persons inside of the car, are warned that a stop is about to be made.

The development of this new type of car was initiated by the United Traction Company of Albany, N. Y., which furnished unusual assistance and co-operation to the manufacturers in suggestions and practical demonstrations in operation. The car and trucks were built by the Cincinnati Car Corporation and the electrical equipment was furnished by the General Electric Company.



Under side of the truck, showing the method of mounting the motors and wheel brakes. The double bars between the wheels are the shoes of the magnetic track brakes which may be pulled against the rails independently of the air brakes

CORRECT TIMING OF

Essential in Traffic Regulation

PART ONE

THE utility of any traffic signal system depends upon the accuracy with which the system is adjusted or timed to fit the traffic requirements. An examination of the characteristics of traffic flow shows that there are certain demands which should be satisfied in so far as the fluidity and safety of traffic movement is concerned. These may be set forth as follows:

Signals should be timed (1) so as to prevent or reduce to a minimum the accumulation of traffic in any block or series of blocks; (2) in accordance with the relative volume of traffic flow per lane at each intersection; (3) so as to permit in so far as possible the flow of traffic at the speed which is normal for the area traversed; (4) so as to vary with the traffic speed and with the volume throughout the traffic day; (5) so as to prevent, or reduce to a minimum, the simultaneous flow of conflicting streams of traffic, for both vehicular and vehicular with pedestrian movements.

All of these requirements, with the exception of the third, are or may be present at even the simplest type of signal installation—the isolated, independently controlled intersection. Therefore, the problems which arise on an individual intersection must be solved before the problems of a traffic control system can be taken up.

ESTABLISHING THE RATIO OF TIMES

With respect to any one stream of traffic which flows into a signalized intersection the function of the controlling signal is to *allow* or to *prohibit* the flow of that traffic stream. The relative amounts of time which the signal gives to the controlled stream of traffic to go and to stop form a ratio of time division. Several factors influence the selection of a ratio of time division. The amount of traffic flow in each direction is certainly basic in establishing this ratio. The width of roadway or the number of lanes in which traffic flows is likewise important. The character of the traffic, the nature of the movement and the channelization of flow are factors to be considered.

In this discussion, a simple right-angle intersection is taken for sake of simplicity. Assume all things are equal except the width of the intersecting roadways.

Ignoring clearance periods the proper ratio of movement time for flow of traffic on one street at the intersection with another varies inversely as the roadway widths of the intersecting streets expressed in pairs of traffic lanes. A simple method of application of this

principle is to reduce all traffic streams to vehicles per lane on each roadway and then treat all roadways alike.

Let us next assume all things equal except the volume of traffic flow. In this instance the ratio of time divisions varies directly as the traffic flow.

Where complex intersections are dealt with, roadway widths of unequal numbers of lanes can be treated as described above. That is, the traffic flow on all roadways is reduced to vehicles per lane and hence all roadways are reduced to equal terms and treated equally. The division of the cycle then varies directly as the flow per lane. Each artery is then given its part of the available time and is described by its flow per lane divided by the sum of all the other arteries' flow per lane. The available time is ordinarily described as the time of each cycle less the clearance periods. These are discussed later.

The art of traffic engineering has not as yet developed to a point where it is possible to determine accurately the effect on the ratio of time division of such things as the character of traffic flow and the nature of the traffic movement.

The clearance or caution period which is usually indicated either by an amber or by a red light is one of the most important items in the make-up of the complete cycle. As the name of the *clearance* period implies, its primary purpose is to clear the intersection of vehicles and pedestrians that have been moving in one direction at an intersection *in time so as to prevent conflict*. This may mean that the intersection is entirely clear before cross-flow is released, or in any case that the cross-streams are released only after a *sufficient length of time after the clearing stream has been stopped so as to prevent conflict*. While the clearance period is largely a safety measure, it is designed to produce both smooth and safe operation.

In analyzing these requirements of the clearance period, it is seen that the length of the clearance time is expressed by speeds, distances and stopping times. The length of time required to stop a vehicle is significant in establishing the clearance period. If a stream of traffic which is flowing through an intersection is to be stopped, a sufficient warning time must be given because of the "inertia" effect. That is to say, a moving vehicle cannot be stopped instantly. As a minimum time, then, the clearance period should be long enough so as to permit stopping the vehicles which have been moving. At 20 m.p.h., a speed now accepted for traffic movement in nearly every urban center, a vehicle with adequate

SIGNALS

By

Theodore M. Matson

Chief Engineer City-Wide Traffic Committee
Kansas City, Mo.

Factors influencing the time ratio and length of cycle at a single intersection are discussed in this article. Timing for signal systems covering a number of intersections will be discussed in a future article

$$T = \frac{0.682}{V} (W + D)$$

At complicated intersections there exists frequently a length of free path from the place the cross-flow vehicles are stopped to the point where these vehicles would conflict with the clearing stream; therefore a deduction can be made from the above clearance time.

If d = length of free path in feet to clearing stream
 v = average speed of the accelerating cross-flow in miles per hour

and t = amount of time to be deducted

$$t = \frac{0.682}{v} d$$

and the clearance time becomes

$$T = \frac{0.682}{V} (W + D) - \frac{0.682}{v} d$$

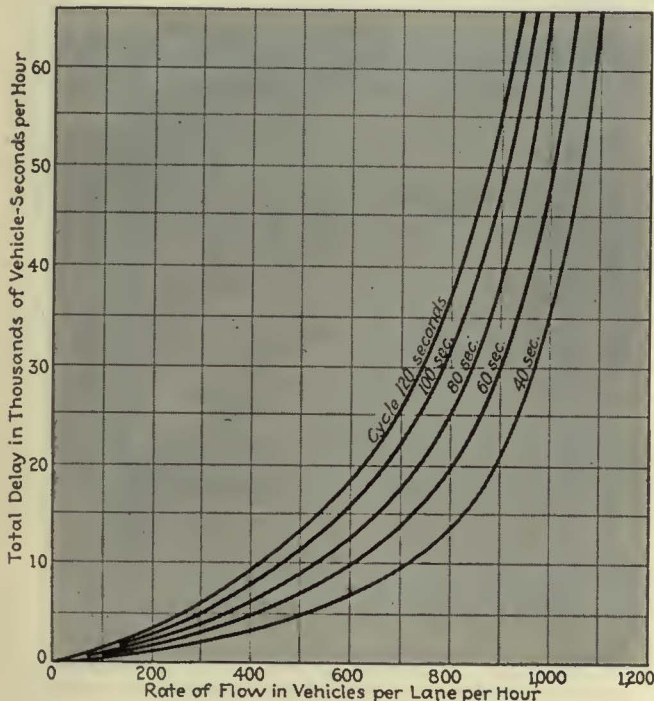
The above equations apply to vehicles only. Usually, however, the pedestrians are requested to obey signals and in these cases a sufficient length of time must be set aside for clearing the pedestrian streams out of danger from released cross-flow vehicles. It is readily seen that, due to the slow movement of pedestrians, the clearance period demanded by them will usually be larger than required by vehicles.

Consider the movement of pedestrians at an intersection across the street in the direction, with respect to the center, which is counter-clockwise. The most severe condition results when this group of pedestrians will have left the curb at an instant prior to the beginning of the clearing period and will be directly in front of the cross-flow vehicles waiting release at the end of the caution period. If no safety zones or isles are provided in the roadway and no parking lanes exist, the distance which these pedestrians must clear during the caution period is the width of the roadway, and, the average walking speed being about 5 ft. per second, the time required would be about one-fifth of this distance expressed in feet. Of course, if safety isles or other places exist in the roadway over which there is no vehicular movement the distance to be cleared is accordingly reduced.

The cycle length to be determined must include the various components which have been discussed heretofore. The total length of the cycle must be adequate to care properly for each of these components. In choosing a length of cycle for an isolated or independent signal installation there is no factor on which to base the cycle length, as is the case in a signal system where the length of cycle must be based on the correlated flow of traffic. The standards set forth in the recommendation of the American Engineering Council, however, set the limits of cycle lengths between 40 seconds and 80 seconds as good practice.

It may be proved mathematically that in any cycle the total delay equals the number of vehicles stopped times half the sum of the delays to the first vehicle and the last vehicle.

The total hourly delay experienced by one lane of



Short signal cycles cause less delay than long cycles

brakes can be stopped safely in a distance of 50 ft. and a time of 3.4 seconds. Any vehicle which is closer to the stop line of a signalized intersection than 50 ft. at the instant the caution period begins, would proceed across the intersection. (It is noteworthy that this distance is usually less than the width of the intersection.)

At a simple right-angle intersection the minimum time required for a vehicle to clear the intersecting street may be determined as follows:

Let W = Intersecting street width in feet
 V = Speed of clearing vehicle in miles per hour

T' = Clearance time in seconds.

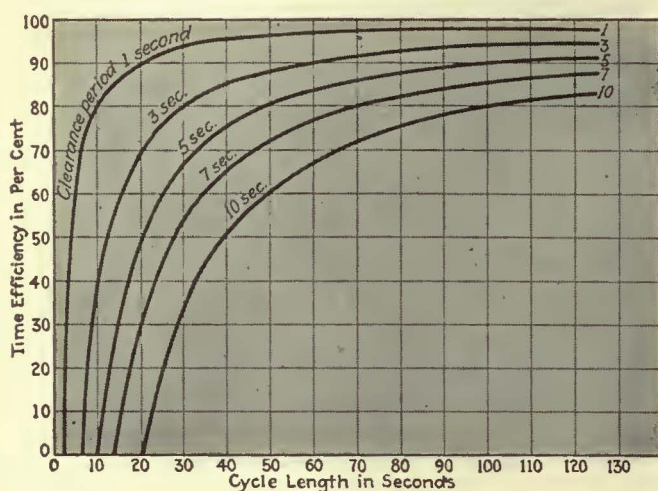
$$\begin{aligned} \text{Then } T' &= \frac{W}{\left(\frac{5280 V}{3600}\right)} = \frac{3600 W}{5280 V} \\ &= \frac{0.682 W}{V} \end{aligned}$$

If the clearing vehicle is 50 ft. or less from the intersection when the signal is thrown and is traveling at 20 m.p.h. it will require additional time. In general if D is the minimum safe stopping distance the maximum clearance time required by a vehicle is

traffic is, of course, equal to the cyclic delay multiplied by the number of cycles per hour. What this amounts to under various conditions is shown in the following table in which the time spacing of departures is assumed to be three seconds:

Delay in Vehicle Seconds Per Hour Per Lane					
Vehicles per Hour	Cycle Length in Seconds				
	40	60	80	100	120
200	1,170	1,980	2,565	3,095	3,780
400	3,420	4,950	6,440	7,925	9,450
600	6,940	9,900	12,915	15,890	18,900
800	13,780	19,800	25,820	31,810	37,800
1,000	36,200	49,500	64,450	79,500	94,500

The time savings of shorter cycles on this basis are evident from the chart on page 83. Of course, the increments in total delay for any cycle length become proportionately heavy for high densities. It will be noted that, making these assumptions, when the rate of flow reaches 1,200 per hour the total delay experienced by any stoppage to the traffic streams is infinite.



Time efficiency with respect to cycle length and clearance

In connection with the choice of cycle lengths it is of interest to note the effect of clearance periods on the useful time that a signal can deliver for various cycle lengths.

Let E = Efficiency or per cent time given to passing additional traffic

C = Cycle length

P = Clearance period

If P is the same for both directions

$$E = \frac{C - 2P}{C}$$

That is, the per cent efficiency of available traffic flow time is equivalent to the total time minus the losses, divided by the total time. This is shown graphically on the chart on this page.

Now, if a part of the traffic wave is temporarily stopped, the first part of the green period, when vehicles pass at capacity spacing, is more valuable than the latter part.

Since the caution period comes at the end of the green period, the subtraction of a few seconds from the green period, which are given over to the caution period, does not materially affect the efficiency of the operation. This is true where traffic is temporarily stopped before the green light shows. However, for continuous movement of the traffic waves, all parts of the green period are equivalent in terms of vehicles.

A.E.R.A. Executive Committee Holds Cleveland Meeting

COINCIDENT with the Annual Meeting of the Central Electric Railway Association, a meeting of the executive committee of the American Electric Railway Association was held at Cleveland on Jan. 24. J. H. Hanna, first vice-president, presided in the absence of President Shoup. Plans for the 49th annual convention of the American Electric Railway Association, to be held at San Francisco, June 23-26, were outlined by Charles Gordon, managing director, and W. V. Hill, manager California Electric Railway Association. Labert St. Clair told of the preparation of publicity material for the convention.

Brief comments on the status of the interstate bus bill and Interstate Commerce Commission railroad consolidation plan were made by Dr. Thomas Conway, speaking for the committee on national relations. Reports were received also from the policy, membership, finance and manufacturers advisory committees. W. E. Wood, chairman publications advisory committee, outlined a plan by which it is proposed to increase the circulation of the association's magazine *Aera* and place it in the hands of a larger number of men in a supervisory capacity in the industry. After considerable discussion of various phases of this project it received the unanimous indorsement of the executive committee.

Preceding the meeting the members of the executive committee were the guests of Col. Joseph Alexander, president Cleveland Railway, at a luncheon at the Union Club. It was decided to hold the next meeting on March 21 at association headquarters, New York.

Anti-Freeze Liquid Changed

FREQUENT trouble has been experienced during the present winter due to freeze-ups in the air brake equipment on cars equipped with anti-freezers. This trouble first made its appearance the latter part of last winter and became more acute this year. The cause of the trouble has been traced to the alcohol used. From the chief chemist of the Prohibition Department, it has been learned that U. S. Formula No. 5, which is generally used in automobile radiators, was modified about two years ago, one of the modifications consisting of adding a small percentage of aldehyd, which has a high boiling point. This makes Formula No. 5 a good anti-freeze solution for automobile radiators but has just the opposite effect in preventing freeze-ups in the air brake system of electric railway cars. For that reason it is recommended that U. S. Formula No. 1 should be used to prevent freeze-ups in air brake systems. In so doing it is necessary to clean the anti-freezers thoroughly, so as to insure that all the aldehyd is removed.

Second Contest Period Starts

BEGINNING Feb. 1, the second period of the ELECTRIC RAILWAY JOURNAL Maintenance Contest will extend until April 30. Rules were published in the issue of November, 1929. Contributions will be welcomed from anyone in the industry. Watch for announcement next month of the prize winners for the first period.



Train on the Jefferson Avenue line approaching a station. The safety zones are covered with awnings and are well protected

Detroit Express Service

Gains Popularity

By

CLIFFORD A. FAUST

Assistant Editor *Electric Railway Journal*

WHEN the Department of Street Railways, Detroit, inaugurated express street car service on Jefferson Avenue in September of 1927, using small buses for local service, the plan was looked on rather as an experiment. There were numerous skeptics who predicted a short life for the plan. But in spite of such prognostications, the express service became popular immediately after its introduction and became more so as the months passed.

The best evidence of the success of the Jefferson line was the adoption of a similar plan on Grand River Avenue on Aug. 19, 1928. Like the original installation, this line met with public favor at the very outset and attracted an increasing number of patrons as the people became acquainted with the system. In some measure the immediate acceptance of the Grand River express service was due to the education of the public by the Jefferson line, but by and large, it was occasioned by the higher speed and shorter running time.

Figures from the beginning of the service to the end of 1929 show clearly that the Jefferson Avenue line has

Public well pleased with express street car service after 28 months of experience on one line and 17 months on a second. Passengers and revenue increase steadily on both lines. Fewer stops and higher speeds facilitate movement of all traffic

enjoyed a very large increase in patronage and that the Grand River line also has built up its riding, in spite of the inauguration of a paralleling high-speed, de luxe bus route. Passenger revenue, as well, has shown corresponding increases on both lines. Measured by these two barometers, patronage and revenue, express service is a successful innovation in Detroit.

Moreover, there is an intangible factor which is reflected in these figures and which is extremely important from the standpoint of the Department of Street Railways. It is the good will obtained by offering an improved service. Aside from the evidence of good will appearing in the operating results, the management has received hundreds of letters, praising the new system and commending the railway for making the change. It is significant that many motorists have stated that they are

leaving their automobiles at home and riding the high-speed trolley lines to get to their places of employment more quickly and more pleasantly. Letters received from regular patrons have also praised the express service from the standpoint of saving time and making a more comfortable ride. Many expressed real pride in riding the lines because they can get to work in less time than neighbors driving automobiles.

OTHER BENEFITS OF SYSTEM

In addition to the important results of more passengers and revenue, and an increased amount of good will, the express service has brought about several others.

consumption in kilowatt-hours per car-mile to be 2.65 and 2.43 in the express zone, as compared with 6.03 in the downtown loop and 4.08 in the local zone. These savings are very important, since the line is one of the heaviest traveled in the city.

It has been proved in Detroit that higher speeds of both street cars and buses are attended by fewer accidents. In an accompanying illustration are shown curves for average street car speed and number of accidents over a period of more than one year. As will be seen, the accidents decrease as the speed increases, and vice versa. Greater safety on the express lines may be attributed largely to the fewer loading areas in the street and the



On Jefferson Avenue express stops originally numbered six each way and averaged one every 0.83 mile. A few added more recently have decreased the spacing slightly. On Grand River Avenue there were originally eleven inbound and twelve outbound stops. Since the discontinuance of local bus service a few more stops have been added

Among these are lower operating expenses, a higher degree of safety, an increase in the street capacity, a speeding of all forms of traffic, and an improvement of public relations, largely by pleasing the motorists and truck drivers.

Operating expenses have been lowered principally through the saving of cars, operators and power. On the Jefferson Avenue line five cars are saved on the base schedule and twelve on the peak. On the Grand River line three cars are saved on the base and ten on the peak. On the individual cars and trains in express service there also is a large saving in energy over full local service because of the elimination of many stops. As shown in the accompanying chart two single cars on the Jefferson line average 2.15 and 2.07 kw.-hr. per car-mile in the express zone, but consumed 4.31 kw.-hr. in the downtown loop and 3.30 kw.-hr. in the local zone. Tests with two trains of a motor car and trailer each showed the energy

greater protection of those at the express stops. Automobiles running through insufficiently guarded loading areas are responsible for a great number of accidents each year, so that elimination of stops is bound to reduce the accidents. The type of safety zones used at the express stops is shown in one of the views reproduced.

On Jefferson Avenue the local transfer buses are permitted to enter the safety zones, but no other vehicles. Passengers at points between the express stops are picked up at the curb, eliminating another hazard.

CONDITIONS AFFECTING AUXILIARY COACH SERVICE

Combination express street car and local bus service is still given on the Jefferson Avenue line, but not on the Grand River Avenue line. Coach service was given for a time on the Grand River route, but suspended when it was found that only a few passengers availed themselves of the transfer privilege. Coincident with their

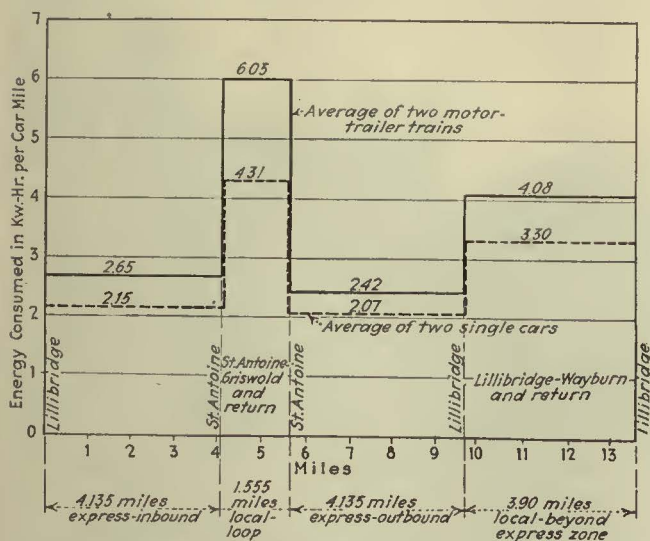
Table I—Revenue, Passengers and Speed of Jefferson Line, October, 1927, to December, 1929

1927	Rail			Coach		
	Revenue in Dollars	Revenue Passengers	Average Speed in M.P.H. including layovers including operation in local zones	Revenue in Dollars	Revenue Passengers	Average Speed in M.P.H.
October.....	63,460	1,033,179	12.15	14,343	236,992
November.....	61,890	1,016,204	12.02	16,064	264,504
December.....	66,005	1,083,147	11.00	19,069	313,752
1928						
January.....	75,476	1,226,947	11.38	19,776	324,933
February.....	73,378	1,193,822	11.53	19,753	324,826	9.88
March.....	82,057	1,339,562	11.79	21,888	359,703
April.....	75,371	1,231,195	11.69	20,908	339,942	9.97
May.....	79,491	1,298,317	11.55	21,354	346,666	9.90
June.....	78,082	1,270,205	11.58	21,470	349,285	9.96
July.....	77,783	1,266,440	11.32	20,467	332,000	9.87
August.....	76,218	1,240,785	11.38	20,641	334,272	9.85
September.....	74,415	1,213,655	11.70	18,452	299,299	9.84
October.....	78,491	1,281,090	11.92	21,269	345,624	9.85
November.....	79,798	1,304,573	11.86	20,137	326,497	9.94
December.....	79,116	1,298,538	12.05	20,258	329,539	9.97
1929						
January.....	87,525	1,424,854	11.78	20,090	325,503	9.86
February.....	82,369	1,343,854	11.78	19,302	313,340	9.97
March.....	89,945	1,470,583	11.84	21,191	344,407	9.99
April.....	88,738	1,448,790	11.94	20,647	335,121	10.07
May.....	91,760	1,495,638	12.02	20,469	332,311	10.13
June.....	89,848	1,463,887	11.99	16,234	263,838	10.20
July.....	88,214	1,435,875	12.24	15,512	251,355	10.24
August.....	86,642	1,410,938	12.21	15,719	255,098	10.31
September.....	80,830	1,318,053	12.31	14,453	234,312	10.37
October.....	81,244	1,330,803	12.14	15,728	255,237	10.33
November.....	75,011	1,230,436	12.34	14,314	232,924	10.31
December.....	84,572	1,383,021	11.68	14,908	242,970	10.16

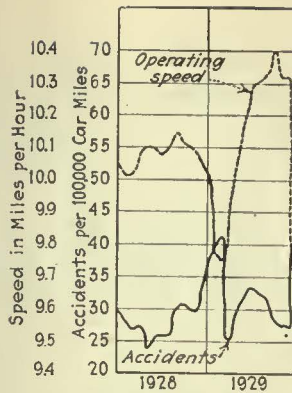
removal a few more stops were added to the street car line. From the very outset of the Jefferson Avenue line there were fewer transfers from local buses to express street cars and cars to buses than the company had expected. Patrons residing within a reasonable distance of the central business district preferred to remain on the local buses rather than make one or two changes. It also was discovered that people would walk a longer distance to an express street car stop rather than bother with taking a transfer bus. The service is maintained by the local buses on Jefferson Avenue now for those who do wish to make the changes and for those who prefer to ride the entire distance by bus.

PASSENGERS HAVE INCREASED STEADILY

In Table I are given the revenue, passengers and average speed of the Jefferson line for the months of October, 1927, to December, 1929, inclusive. Study



Comparison showing average energy consumed in kilowatt-hours per car-mile by two single cars and two trains of a motor car and trailer each on Jefferson line. Note the much lower consumption in the express zone



Accidents decrease as the speed of street cars increases in Detroit, and vice versa, according to the above curves

of this table shows that with the exception of one month — November, 1929 — both revenue and passengers have increased over the corresponding month of the previous year.

On the Grand River line both revenue and passengers for the street cars have increased, the month of November, 1929, being the only one to show a decrease over the corresponding month in the previous year. Revenue was built up from \$102,313 in September, 1928, to \$114,969 in December, 1929. Revenue passengers for the corresponding month totaled 1,672,508 and 1,879,760. Coach operation on Grand River Avenue for the period of a little more than five months showed an increase for the first three months and a sharp falling off for the last two. These figures are given in Table II.

Division of revenue and passengers for a typical day early in 1929 on the Jefferson express line is made in Table III. For both railway and coach operation the greatest amount of revenue was collected in cash fares, tickets accounting for a greater portion of the remaining revenue. The ratio of the total railway revenue to coach revenue was approximately 4 to 1. However, the mileage of the street cars was less than 2½ times that of the coaches. Receipts per vehicle-mile for the cars were \$0.404 and \$0.256 for the coaches; passengers per

Table II—Revenue, Passengers and Speed of Grand River Line, September, 1928, to December, 1929

1927	Rail			Coach		
	Revenue in Dollars	Revenue Passengers	Average Speed in M.P.H.	Revenue in Dollars	Revenue Passengers	Average Speed in M.P.H.
September.....	102,313	1,672,508	11.22	4,912	80,084	9.20
October.....	113,491	1,854,708	10.77	8,073	130,269	9.76
November.....	116,203	1,905,170	10.95	10,051	155,206	10.18
December.....	112,580	1,844,354	10.98	9,336	149,684	10.06
1929						
January.....	117,193	1,912,535	10.76	5,557	87,862	9.93
February.....	115,274	1,882,987	10.64			
March.....	125,247	2,045,846	10.87			
April.....	118,637	1,936,012	10.94			
May.....	118,104	1,926,714	11.10			
June.....	110,419	1,799,182	11.23			
July.....	103,421	1,682,727	11.45			
August.....	102,934	1,675,313	11.83			
September.....	104,014	1,696,441	11.63			
October.....	114,500	1,872,743	11.50			
November.....	107,583	1,760,567	11.53			
December.....	114,969	1,879,760	10.85			

Table III—Analysis of Jefferson Express Line on a Typical Day, March 1, 1929

Revenue:	Railway	Coach
Cash.....	\$1,588	\$477
Tickets.....	1,392	320
Transfers.....	155	50
Total.....	\$3,135	\$847
Mileage:		
Mileage.....	7,763	3,302
Receipts per vehicle-mile.....	\$0.404	\$0.256
Passengers per vehicle-mile.....	9.489	5.440
Passengers:		
6-cent passengers.....	26,461	7,788
Ticket passengers.....	25,056	5,762
10-cent passengers.....	94
Jefferson line transfers.....	1,098	1,476
Other transfers.....	21,046	2,842
Total.....	73,661	17,962

Table IV—Detailed Analysis of Grand River Express Operation—Daily Averages of Data for the Weeks from August 20-24 to November 26-30, 1928

Daily Averages For Street Cars	Aug. 20-24	Aug. 27-31	Sept. 4-7	Sept. 10-14	Sept. 17-21	Sept. 24-28	Oct. 1-5	Oct. 8-12	Oct. 15-19	Oct. 22-26	Oct. 29-Nov. 2	Nov. 5-9	Nov. 12-16	Nov. 19-23	Nov. 26-30
Car-miles.....	9,806	9,944	10,545	10,632	10,832	11,200	11,202	11,202	11,201	11,337	13,286	13,479	13,910	13,617	14,055
Total revenue.....	\$3,404	\$3,509	\$3,865	\$3,626	\$3,803	\$3,943	\$3,884	\$3,799	\$3,797	\$4,007	\$4,195	\$4,099	\$4,106	\$4,054	\$4,245
Total operating expenses....	\$2,999	\$3,064	\$3,178	\$3,097	\$3,005	\$3,198	\$3,208	\$3,263	\$3,309	\$3,365	\$3,823	\$3,775	\$3,809	\$3,671	\$3,828
Net revenue.....	\$405	\$445	\$687	\$529	\$798	\$745	\$676	\$536	\$488	\$642	\$372	\$324	\$297	\$383	\$417
Revenue per car-mile, dollars.....	\$0.3471	\$0.3529	\$0.3665	\$0.3411	\$0.3511	\$0.3521	\$0.3467	\$0.3391	\$0.3384	\$0.3535	\$0.3158	\$0.3041	\$0.2952	\$0.2978	\$0.3002
Revenue passengers.....	55,485	57,272	63,250	59,253	62,196	64,445	63,458	61,950	62,204	65,420	68,525	67,240	67,349	66,602	69,455
Transfer passengers.....	23,470	23,659	24,967	24,404	24,752	23,962	24,618	24,638	24,045	25,319	25,165	26,855	26,348	25,756	26,043
Total passengers.....	78,955	80,931	88,217	83,657	86,948	88,407	88,076	86,588	86,249	90,739	93,690	94,095	93,697	92,358	95,498
Speed in miles per hour.....	11.22	11.43	11.69	11.79	11.88	11.98	1.182	11.41	11.25	11.23	10.78	11.22	11.65	11.63	11.62
Combined Car and Coach															
Net revenue—cars.....	\$405	\$445	\$687	\$529	\$798	\$745	\$676	\$536	\$488	\$642	\$372	\$324	\$297	\$383	\$417
Net revenue—coaches.....	*\$406	*\$197	*\$154	*\$89	*\$75	*\$85	*\$80	*\$77	*\$92	*\$77	*\$122	*\$109	*\$117	*\$70	*\$76
Net revenue cars and coaches.....	*\$1	\$248	\$533	\$440	\$723	\$660	\$596	\$459	\$396	\$565	\$250	\$215	\$180	\$313	\$341

*Deficit.

vehicle-mile were 9.489 for the cars and 5.44 for the coaches. Of the 73,661 total railway passengers, 26,461 paid 6-cent fares, 25,056 tendered tickets, 1,098 transferred from Jefferson Avenue coaches and 21,046 transferred from other lines. Of the 17,962 coach passengers, 7,788 paid 6-cent fares, 94 paid 10-cent fares, 5,762 used tickets, 1,476 transferred from the express cars and 2,842 transferred from other lines.

A detailed analysis of the Grand River express operation for the weeks from Aug. 20-24 to Nov. 26-30, 1928, is given in Table IV.

On the Jefferson Avenue line the speed before express operation was started was 12.45 m.p.h.; the speed in the express zone is now 18.4 m.p.h. The running time, which formerly was 20.5 minutes through the express zone of 4.15 miles, has been reduced to 13.5 minutes. On the Grand River line the average speed was increased from 12.15 m.p.h. to 17.36 m.p.h. The running time has been reduced on the section which originally was express, from 32 minutes to 25 minutes. In Table V the

Table V—Running Time and Average Speed of the Jefferson Line, as Operated, on a Typical Day in 1928

	Westbound				Eastbound			
	Local Zone 1.89 Miles	Express Zone 4.15 Miles	Total for Both Zones 6.04 Miles	Downtown Loop 1.55 Miles	Express Zone 4.15 Miles	Local Zone 1.89 Miles	Total for Both Zones 6.04 Miles	Round Trip from Easterly Terminus 13.63 Miles
5:00 a.m.-8:30 a.m. time in min. and sec.	10:54	14:15	25:09	13:48	13:20	9:32	22:52	61:49
Speed in m.p.h.....	10.39	17.47	14.41	6.74	18.68	11.90	15.83	13.22
8:00 a.m.-3:30 p.m. time	9:34	12:38	22:12	15:00	13:26	8:50	22:16	59:28
Speed.....	11.86	19.70	16.31	6.20	18.53	12.83	16.26	13.75
3:30 p.m.-6:00 p.m. time	11:35	13:57	25:32	16:07	14:27	9:44	24:11	65:50
Speed.....	9.79	17.87	14.18	5.78	17.24	11.64	14.98	12.42
5:00 a.m.-6:00 p.m. time	10:29	13:39	24:08	14:43	13:35	9:11	22:46	61:37
Speed.....	10.82	18.24	15.01	6.32	18.33	12.34	15.91	13.28

running times and average speeds of the Jefferson line for three periods of a typical day in 1928 are given. The speeds are calculated for the outlying local zone, the express zone, the downtown loop and the round trip. It shows an average speed of 18.24 m.p.h. through the express zone, westbound, 18.33 m.p.h. through the express zone, eastbound, and 13.28 m.p.h. for the entire round trip, for the period from 5 a.m. to 6 p.m.



On Jefferson Avenue the local transfer buses run inside the safety zones at express stops. Between these stations they stop at the curb

More Business

and How to Get It

Ways of securing additional traffic were theme of annual meeting of Central Electric Railway Association held at Cleveland Jan. 23-24. Other topics of interest were technique of freight handling and employee training

RECOGNITION of the importance of freight business as a source of revenue for the interurbans was a notable feature of the annual meeting of the Central Electric Railway Association, held at Cleveland, Ohio, Jan. 23 and 24. One entire session was devoted to a discussion of means of developing this type of business. Development of passenger business was touched upon by speakers at other sessions.

"Were it not for the freight traffic now carried by the interurbans, and the promising outlook for the continued development of freight business, the future of the interurban industry would indeed be problematical," said William L. Butler, executive vice-president Cincinnati & Lake Erie Railroad. "Success in holding and developing freight business depends upon our ability to give overnight delivery to an ever-widening territory, and upon the enterprise and ingenuity in supplementing our rail service to provide the same or greater convenience, reliability and cheapness of service for prospective shippers as is afforded by our principal competitor, the motor truck, or by the steam railroads."

The speaker also made a point of the necessity of developing an entirely new technique of freight service by the electric railways if they are to hold a position in the transportation industry midway between the steam railway and the motor truck. "Not only must we move freight more quickly, but we must modernize our facilities and operations to move it more economically," said Mr. Butler.

"Much depends upon the development of a closer contact between the company and the shipper," declared H. A. Nicholl, general manager Union Traction Company of Indiana. He expressed the opinion that a great deal can be accomplished in this direction by cutting down the loss and damage of shipments and by effecting quicker settlements where losses are sustained. "Companies are to some extent going into the pick-up and delivery business," stated Mr. Nicholl, and he urged a further extension of this activity, calling his hearer's attention to the clear-cut recommendation of their own committee on the subject made at a previous meeting.

"Don't let your interurban suffer," advised C. L. Van Aucken, editor *Electric Traction*, in a paper on "Interurban Development." "Either kill it or cure it." Citing numerous examples of what had been done in the C.E.R.A. territory the speaker affirmed his faith in the belief that in the majority of cases, if energetic methods are employed, a cure can be effected.

That too many railways have plowed along the same old furrow until it has become a rut was the opinion expressed by Hudson Biery, Cincinnati Street Railway, whose paper on "City Transportation Development" was read by Paul Wilson. "Many of us are trying to render adequate service rather than attractive service," he stated. In discussing the matter of advertising the speaker advised that it should start with a limited program and expand gradually, but, once started, the program should never be allowed to die out entirely.

The program was concluded by a showing of stereopticon slides illustrating methods of handling freight in the C.E.R.A. territory. The showing of the pictures was accompanied by a discussion of the subject by J. K. Coberly, traffic manager of the Columbus, Marion & Delaware Railway.

Fundamental factors affecting the present situation and the future of the electric railway industry were discussed at the opening session. Following a brief address of welcome made by John D. Marshall, Mayor of Cleveland, L. M. Brown, president of the association, presented an encouraging picture of what the future will hold for the industry if it takes advantage of its opportunities. An abstract of his remarks appears elsewhere in this issue.

Charles Gordon, managing director of the American Electric Railway Association, pointed out the necessity of approaching our work with the aim of solving the community transportation problem rather than merely trying to operate electric cars. Since the earliest day when electricity was first used as a source of power, it has never yet been relegated to a secondary position in any field and it is not likely, according to Mr. Gordon, that electricity will suffer defeat in the field of local transportation.

Movement of people, not movement of vehicles, is the ultimate objective, he said. One four-track rapid transit line will carry as many people as 25 express highways. One double-track street car line will carry four times as many people as an express highway. More than 200 years ago, the streets of London were congested because too many people used private transportation vehicles. That was the origin of the first public transportation service. To return now to the use of private vehicles would be a step backward. Intelligent development of public transportation facilities is the only possible solution of the problem.

How public transportation service is being given in Grand Rapids was the subject of a paper by L. J. De

Lamarter, general manager Grand Rapids Railroad, which in the absence of Mr. De Lamarter was read by J. W. Knecht. It was brought out in this paper that modern cars in Grand Rapids have not only decreased operating cost but also attracted new riding.

Selling methods were discussed by E. S. Jordan, Jordan Motor Car Company, who spoke at the morning session on the second day of the meeting. "The great American novel, when it is written, will be written around the story of transportation and communication," he said. "It is a dramatic, romantic business in which we are engaged." The speaker pointed out that civilization is based upon the lowest cost per ton-mile of transportation, and cited numerous examples in the history of transportation to prove his theory.

In a comprehensive and instructive paper on "The Conference Method and Its Use in the Training of Employees," E. G. Cox, director of service improvement, Chicago, North Shore & Milwaukee Railroad, told of the development of the conference training methods with particular reference to the manner in which it was applied on the property which he represented. Dividing his paper into four general parts he discussed, in turn, what the conference method is, why it is used, how it operates, and what it accomplishes.

"Contrary to the accepted thoughts of a few years

ago," said the speaker, "the important period of training the employees does not end with the close of the probation period. The vestibule instruction of a new man; although highly important, is not now regarded as the beginning and the end of the training period. Rather the training process goes on and on as long as the service of the employee, and the longer it goes on the more difficult it is likely to become."

The meeting was closed with the report of a number of committees, followed by the election of officers. Officers for the coming year will be:

President, L. G. Tighe, assistant general manager Northern Ohio Power & Light Company, Akron, Ohio.

First Vice-President, F. H. Wilson, president and general manager Cleveland Southwestern Railway & Light Company, Cleveland, Ohio.

Second Vice-President, R. R. Smith, receiver Chicago, South Bend & Northern Indiana Railway, South Bend, Ind.

Secretary-Treasurer, L. E. Earlywine, Central Electric Railway Association, 308 Traction Terminal Building, Indianapolis, Ind.

Henry Bucher, general manager Indiana Service Corporation, Fort Wayne, Ind., was elected to the executive committee to replace C. T. Delore, president Indianapolis & Southeastern Railroad, Indianapolis, Ind.

The Dodo Became Extinct Because It Ceased Developing*

By L. M. BROWN

*Vice-President Interstate Public Service Company
President Central Electric Railway Association*

SOME people would have us believe that electric railway men are in the same class as the dodo bird. The dodo bird is extinct and today there are those who voice the opinion that we are rapidly approaching extinction and it is only a matter of time until we will be hunting jobs in other lines of business. While it is unquestionably true that the number of electric railways is gradually diminishing, this does not necessarily mean the general breakdown of such transportation as a means of handling urban and interurban traffic. Rather do we see in the gradually diminishing mileage of electric railway lines a possible solution to the difficulties that admittedly beset our path.

Perhaps there is some justification in likening those lines that fail to the once proud and plumed dodo bird. The dodo became extinct because it quit growing and developing with the changing times. Rather than follow the example of the other birds that tried hard to meet new climatic and food conditions, it allowed its feathers to droop and it sulked. The results were just those which might have been foreseen. But the fact that the dodo bird died out had little or no connection with development of other birds which found themselves facing the same conditions. The latter are still doing business and raising large and prosperous families.

The trends in our industry today are twofold. First, there is consolidation into logical, contiguous and larger systems, and second there is a gradual elimination of those lines foredoomed to failure long ago when they were constructed from "nowhere to nowhere" with no stopover privileges. These latter lines had the seed of their failure in their inception, for they were built quite largely in what may be termed a "boom" period, when the idea held sway that any kind of a line would pay if it could only be built.

The process of elimination of these lines is a healthy and normal situation. We do not despair of a tree when we prune its weaker branches, but on the contrary are more optimistic as to its ultimate success. It is thus that we see the gradual elimination of various lines an omen for good rather than otherwise and we take increased courage for the future.

To be successful we dare not stand still. Many of the major units in our territory are definitely committed to a policy of con-

solidation, admittedly in an effort to place various lines that are now financially unsuccessful upon a successful basis. With unified management and operation backed by adequate finances the public will benefit by improved service.

It is evident that the freight business must contribute an increased proportion of interurban line revenue. For these lines to prosper they must increase this business, and particularly the carload business. To do this successfully will require improved terminal facilities, industrial sidings, elimination of short radius curves, building around some cities and towns, and other improvements in roadway and equipment for faster and more economical operation.

To meet the growing demand for fast, comfortable and convenient passenger service on both city and interurban lines, large sums of money have been and are now being spent to rehabilitate a number of properties in this territory. Modern, light-weight, easily running, noiseless cars for one-man operation, with comfortable seats and attractive appointments, and the speeding up of the service improves the morale of the public and employees and tends to increase the riding habit. In some of the larger cities serious consideration is being given to underground rapid transit or other forms of rapid transit lines on private right-of-way; to the operation of de luxe motor coach service in appropriate territory at possibly higher rates; and to the taking over of taxicab service. Some of these plans are as yet in the experimental stage and it is too early to know just what the final results may mean, but the efforts now being put forth certainly make the outlook for the industry much more encouraging.

Let us not be discouraged by a seeming apathy and lack of appreciation on the part of the public. Service and conveniences are frequently unappreciated until they are lost, or drastic events bring them to the attention of those who use them. The public may, occasionally, find something new in which it will become interested for a time, but experience will, in time, force that same public back to the patronage of a business based upon sound economic principles.

Our task is to adapt the type of transportation we represent to a civilization that is constantly increasing in wealth and in complexity. The opportunity is before us. The public needs and should have modern, efficient electrical transportation. It is within our province to supply that need, and if we do so our efforts will be appropriately rewarded.

*Abstract of an address made at the annual meeting of the Central Electric Railway Association, Cleveland, Ohio, Jan. 23-24.



Opportunities for Profits in De Luxe Bus Operation

THAT the de luxe bus attracts new riders, produces additional income without a sacrifice on the part of city-type operations and is a type of vehicle capable of gaining favor on routes through many highly restricted residential districts of a city, has been definitely proved by the experience of a number of leading electric railways.

Co-ordination of street car and trolley-fare bus services has progressed steadily during the past decade, with the result that many companies have definitely strengthened their operating and economic structures. However, there is an additional definite field for the de luxe bus and the faster, more exclusive features it affords. This field is not limited exclusively to the development of new sections, but often is to be found along or parallel to existing city routes. Although one of the major values of the de luxe bus is the part it has played in securing franchises through districts where formerly any suggestion of public conveyance met with wholesale opposition, it has been equally well applied to established arteries of mass transportation.

Operating practices in Pittsburgh and Detroit contrast

Survey of urban de luxe bus operations by more than a dozen railways shows that exclusive, higher fare service attracts new riders, principally from the automobile and not gained at the expense of the street car and city-type bus

By

J. R. STAUFFER

Assistant Editor *Electric Railway Journal*

these applications very clearly. In Pittsburgh, six 25-cent fare de luxe coach routes originate in the heart of the downtown business district, extend along improved motor boulevards and serve, on their outbound extremities, the most exclusive residential sections of the city or suburbs. In Detroit, four 10-cent minimum-fare parlor coach lines have been established and successfully operated on four main thoroughfares, served throughout their length by street cars or city-type buses at lower fares. In both cities pa-

tronage has been built up from those persons who rarely used the regular service, but were attracted by the new, distinctive vehicles and the advantages of the service they rendered.

"De luxe," the word itself and its application to bus equipment and the type of service rendered, is unquestionably a relative term and any general definition must be the result of past and present practices. Those companies that are utilizing the de luxe bus have almost unanimously had one objective in establishing such service, namely, a form of transportation to bridge the gap between the street car and the higher priced means of

Comparative Study of Fourteen DeLuxe Bus Routes

Company	Line	One Way Mileage	Equipment Used	Territory Served	Other Forms of Transportation in Territory Served	Fare	Fare on Street Car or City-Type Bus	Headways, Minutes		Speed, M. p. h.	Speed of City-Type Service	Standees
								Peak	Base			
Pittsburgh Railways Pittsburgh, Pa.	Wilksburg	7.57	Twin Coaches 35 passenger	Business district of Pittsburgh and residential sections	Street car and trains	25c. 9 tickets \$2.00	3tokens 25c.	4	10	13.80	10.09	Yes
	Highland Park	7.47	Yellow Coaches 19 passenger	Pittsburgh and East Liberty business and residential districts	Street car	25c. 9 tickets \$2.00	3tokens 75c.	7	15	14.00	10.23	Yes
	East Liberty	5.12	Yellow Coaches 29 passenger	Pittsburgh and East Liberty business and residential districts	Street car and trains	25c. 9 tickets \$2.00	3tokens 25c.	4	7	13.90	10.2	Yes
	Squirrel Hill	5.72	Yellow Coaches 19 passenger	Downtown Pittsburgh and exclusive residential section	Street car	25c. 9 tickets \$2.00	3tokens 25c.	5	10	15.60	11.13	Yes
	Mt. Lebanon	6.92	Yellow Coaches 21 passenger	Downtown Pittsburgh and residential districts	Street car	25c. 9 tickets \$2.00	3tokens 25c.	5	12	18.00	11.85	Yes
	Bellevue	6.55	Yellow Coaches 19 passenger	Downtown Pittsburgh and residential districts	Street car and trains	25c. 9 tickets \$2.00	3tokens 25c.	8	15	17.10	11.22	Yes
Dept. of Street Railways Detroit, Mich.	Grand River	12.18	44 Cadillacs 16 passenger	Business and residential districts	Express street car	10c. minimum (zones)	6c.	1½	3	14.10	11.43	No
	Jefferson	6.80	13 Dodges 15 passenger	Business, industrial and residential districts	Express, street car and city-type bus	10c. minimum (zones)	6c.	4	3	14.82	Exp. street car 14.82 bus 12.60	No
	Mack	9.07	13 Dodges 15 passenger	Business and residential districts	Express, street car and city-type bus	10c. minimum (zones)	6c.	4	10	15.46	11.18	No
	Woodward	8.08	81 Dodges 15 passenger	Business and residential districts	Street car	10c. minimum (zones)	6c.	1	2	14.36	10.39	No
Capital Traction Co. Washington, D. C.	Chevy Chase	8.00	16 Yellow Coaches 29 passenger type converted to 71 passenger capacity	Government administration, business and residential districts	Street car	25c.	6tokens 40c.	3 to 7	20	13.00	9.00	No
Cleveland Railway Cleveland, Ohio	Airport Express	12.85	4 cylinder Whites	Downtown Cleveland through residential district to airport	Street car and city-type bus	15c. to 25c. (zones)	Street car, 7c. Bus 10c.	30	60	17.00	15.00	Yes
	Heights Express	7.92	9 Yellow Coaches 29 passenger	Downtown Cleveland to exclusive Cleveland Heights	Street car and city-type bus	25c.	Street car, 7c. Bus 10c.	5	30	17.00	15.00	No
United Railways & Electric Co. Baltimore, Md.	Roland Park	6.25	7 Whites 25 passenger	Business District of Baltimore and residential sections of Roland Park, Guilford and Homeland	Street car and city type bus	25c.	4tokens 35c.	10	20	13.20	10.40	No

travel such as is afforded by the private automobile or taxicab. It was evident that it would be folly to establish lines of a superior type of service at equal or little higher fares than those being charged on the street car, because any patronage would be gained at the expense of the city type service. A new rider had to be found and the logical place was in that group of people who had previously left the street car for the automobile. It has generally been found that de luxe bus routes equipped with the most modern type of vehicles do appeal to a class willing to pay a higher fare for a service which is fast, comfortable and convenient.

Bus operations in Pittsburgh are unique in contrast with the general practices carried on by the other electric railways throughout the country. There is not one trolley-fare bus in regular use on a system of 592 miles of track. This is due, first, to the general topography of the territory served by the Pittsburgh Railways and, second, to the fact that this whole territory is adequately served by the street car. Consequently when the subject of bus operation presented itself the question of the type of

service to be installed had to be considered from three angles: Should buses be substituted for street cars on a number of lines? Should co-ordinated service at trolley fare be established in direct competition with the street car? Should an additional higher fare service be placed on selected routes throughout the city? The latter course seemed the only logical one for the Pittsburgh property, and as a result the Pittsburgh Motor Coach Company now operates six de luxe coach lines at a 25-cent fare. In addition there are four zone routes at 25-cent minimum fare with additional 5-cent zones between Pittsburgh and Charleroi, Pittsburgh and Castle Shannon, Pittsburgh and Oakmont, and a line known as Frankstown Road. There is still a third type of service, namely, two routes at 10-cent minimum fare with 5-cent additional zones. These routes extend between Charleroi and California and Charleroi and Donora, Pa.

A careful analysis of the cost of travel in Pittsburgh was made. It was found that one could travel on the street car for approximately ½ cent per mile, could drive his privately owned automobile for about 10 cents per mile, or could use

A second article showing the use of the de luxe bus in interurban and interstate service will appear in a later issue.

the taxicab at approximately 20 cents per mile. It became evident that any means of transportation costing the rider about 3 cents a mile should be profitable, principally because the riders would not come from those who patronize the street car, and for 3 cents a mile a service of quality could be rendered to appeal to the rider who had left the street car previously for the automobile. A charge of 25 cents was made and has proved satisfactory for the lines established. Most of the riding on the Pittsburgh lines is one way, although on the new Wilksburg route there is now some two-way business. Nearly all passengers are carried for a greater part of the run. There is no short-haul traffic.

The Pittsburgh Railways began its operation with the larger type of bus, having seating capacities of from 29 to 35 passengers. Experience, however, on routes such as it operates with almost entirely one-way traffic has shown that the smaller type of bus is more satisfactory for this kind of work, and the company's new purchases are of the 21-passenger seating capacity.

DETROIT OPERATION UNIQUE IN EXTENSIVE USE OF SMALLER BUSES

Unlike Pittsburgh, Detroit found its field for de luxe bus operation on four main thoroughfares served throughout their length with street cars and city type buses. Also operating on these routes were hundreds of jitneys carrying on an enormous business in competition with the railway's services. The small type bus was selected to replace jitneys principally because they created an impression of a more individual service than the larger equipment and because shorter headways could be run with fewer empty seats.

The four routes operated on Grand River, Jefferson, Mack and Woodward Avenues now use 161 buses of 15- and 16-passenger capacity of the Dodge and Cadillac manufacture. On the Grand River Line 44 16-passenger eight-cylinder Cadillacs are used to provide selective local service in co-ordination with an express street car route on this avenue. The fare on this line ranges from 10 cents to 30 cents, in 5-cent increments. The fare on the street car is 6 cents. The headways range from 1½ minutes in the peak hours with a base table of three minutes in the non-rush hours.

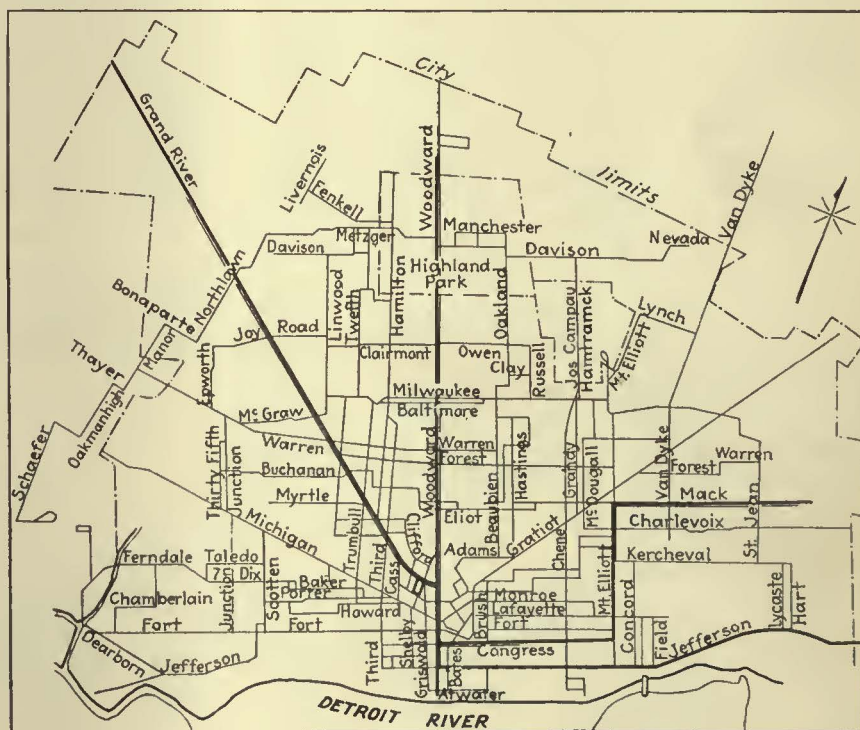
Likewise on Jefferson Avenue the de luxe bus operation has competition by express street car, local city-type bus and competitive bus service. The fares on this line range from 10 cents to 20 cents in 5-cent increments, while the street car and local bus charge 6 cents and the com-



In Pittsburgh de luxe bus terminals are centrally located in downtown business districts

petitive bus 10 cents. This line serves the downtown section of Detroit as well as industrial and residential sections on Jefferson Avenue.

Woodward Avenue, one of the most heavily traveled thoroughfares in Detroit, is served by the Woodward Parlor Coach Line and a street car line. On this line eighty-one 15-passenger Dodges are used and run on one- and two-minute headways throughout the day. Short headways are also maintained by the street cars and yet at times there is apparently not enough service to accommodate the traffic on this avenue. From a revenue standpoint the de luxe bus operation on Woodward Avenue is the most successful. The Mack Avenue Coach Line operates parallel to the Jefferson coach route part of the way, then it turns north into residential districts. This



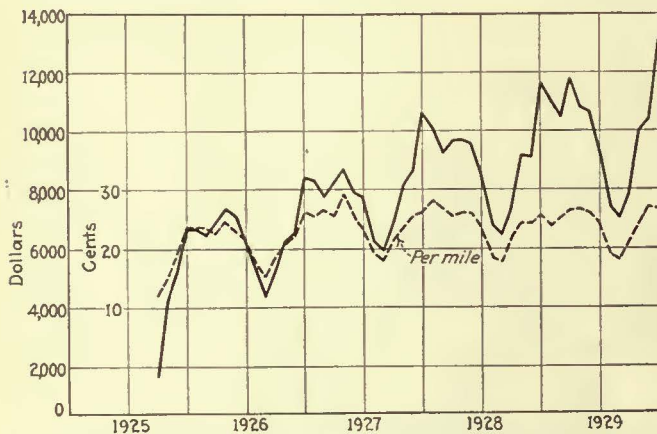
De luxe buses give selective service on four main arteries in Detroit



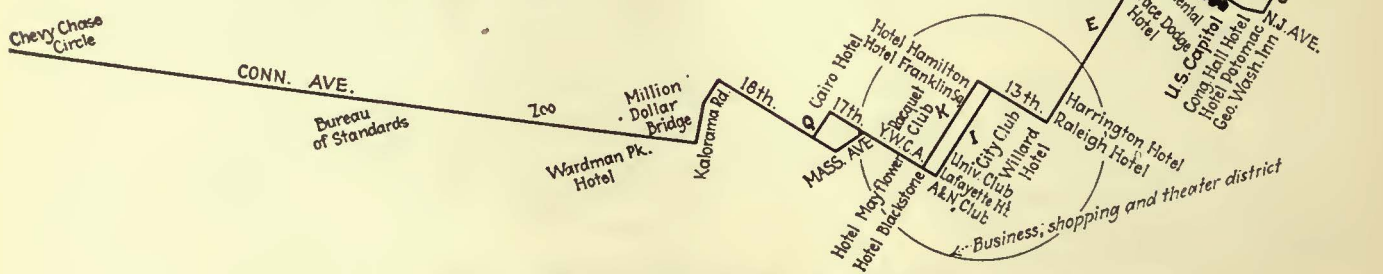
Unusual seating arrangement and smoking compartment feature the Chevy Chase buses

line operates thirteen 15-passenger Dodges at a fare of 10 cents to 25 cents in 5-cent increments. Headways of four minutes in the rush hours and ten minutes in the non-rush hours are scheduled.

The Capital Traction Company Washington D. C., operates three lines with de luxe bus equipment. The original one, the Chevy Chase coach line, was started in September, 1925, and operates from the downtown business section of Washington past the Union Station and Capitol to the outlying district of Chevy Chase. The second line is a sightseeing line purely and operates from the Treasury Building in the center of the city, past the Lincoln Memorial and through Potomac Park. Its operation is not comparable with the others except that the rate of fare and type of equipment used are the same. This line operates only during the summer months and caters principally to tourists. The third line, known as the Cleveland Park Parlor Car Line, was



Gross revenue has been increasing steadily on the Chevy Chase Line. Revenue per mile has remained constant



The Chevy Chase Coach Line in Washington, D. C., serves all phases of the Capital's activities

started in November, 1927, but as it did not prove profitable was abandoned on Sept. 30, 1929, with the exception of one trip in each direction in the morning and afternoon rush hours.

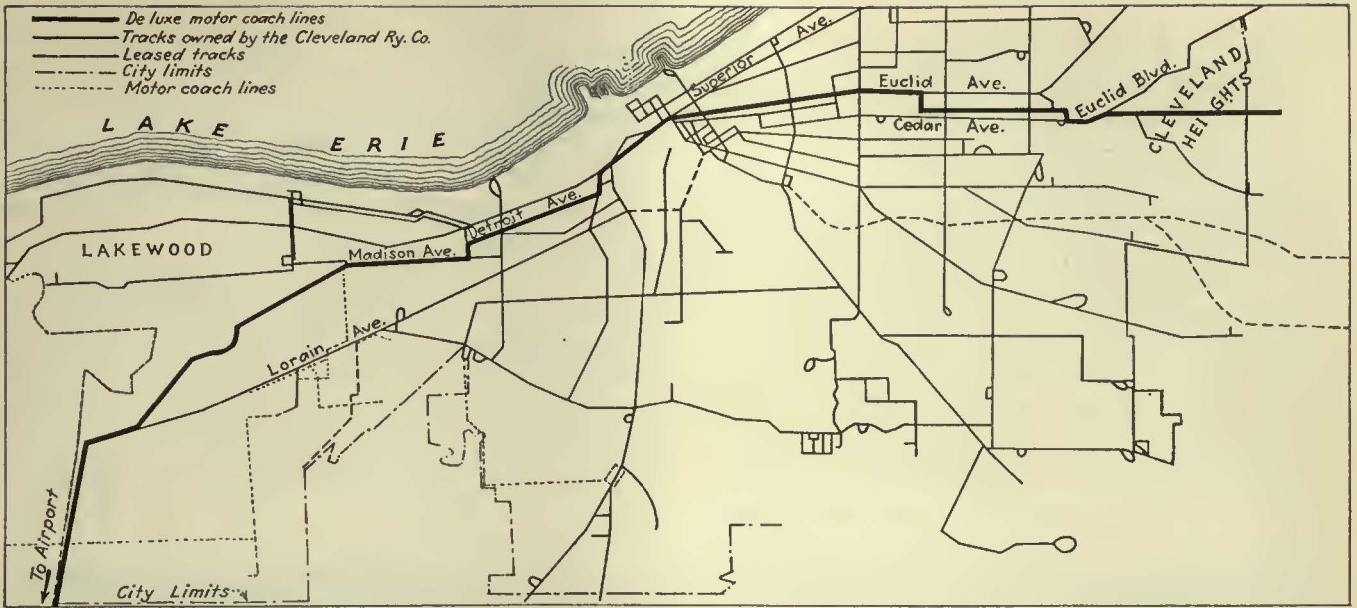
The Chevy Chase Coach Line has been a most successful operation since its beginning. It started operating with four buses on a headway of twenty minutes all day. Traffic has increased continually so that now sixteen coaches are used to run headways of three, four and five minutes in the morning and five, seven and ten minutes in the evening rush hours. An interesting chart showing the gross revenue and revenue per mile of this line, since its beginning, accompanies this survey. This increase in patronage has not been built up at the expense of the street car or city-type bus, but has come from new riders who prefer to leave their automobiles at home and use the high type of service that this line affords. The Chevy Chase Line parallels the street car line along its whole length outside of the city proper, and furnishes service which can be obtained on street cars throughout its length.

A distinctive feature of this line is the unusual seating arrangement of the bus. Twenty-nine-passenger Yellow Coach chassis are used, but individual seats are so placed that only 21 passengers are carried. From an economic standpoint this practice has been questioned, but those in charge of the Chevy Chase Coach Line feel sure that to a great extent this individual seating of their passengers without crowding has been the cause of its success. Another feature is the smoking compartment in the rear, partitioned off from the front of the bus by glass panels.

CLEVELAND RAILWAY OPERATES TWO LINES

Two express de luxe bus routes are operated by the Cleveland Railways in the territory which it serves. The first is known as the Airport Express; the second, the Heights Express. The latter line was only put in operation on Dec. 7, 1929, and is in every sense a full de luxe service between downtown Cleveland and the very highly restricted residential section of Cleveland Heights. The fare on this line is 25 cents. No transfers are given or accepted. Its installation just before the Christmas rush period had distinct advantages, in that a number of people used the line in preference to taking their automobiles into the Christmas traffic jams, became familiar with the type of service and are continuing to use it.

The line carried 380 customers the first day. This increased regularly until it now has over 800 fares a day. At the beginning a fifteen-minute service was provided during the rush hours. It was found necessary to give a ten-minute service during the rush hours on



Cleveland Railway operates two de luxe routes

account of the heavy patronage. During the other hours of the day the service operates on a half-hour schedule. From Dec. 7 to Dec. 31, inclusive, the coaches operated 12,850 miles, carried 15,039 passengers and took in \$3,859, earning approximately 30 cents a mile. The cost of operating is figured at about 27 cents a mile.

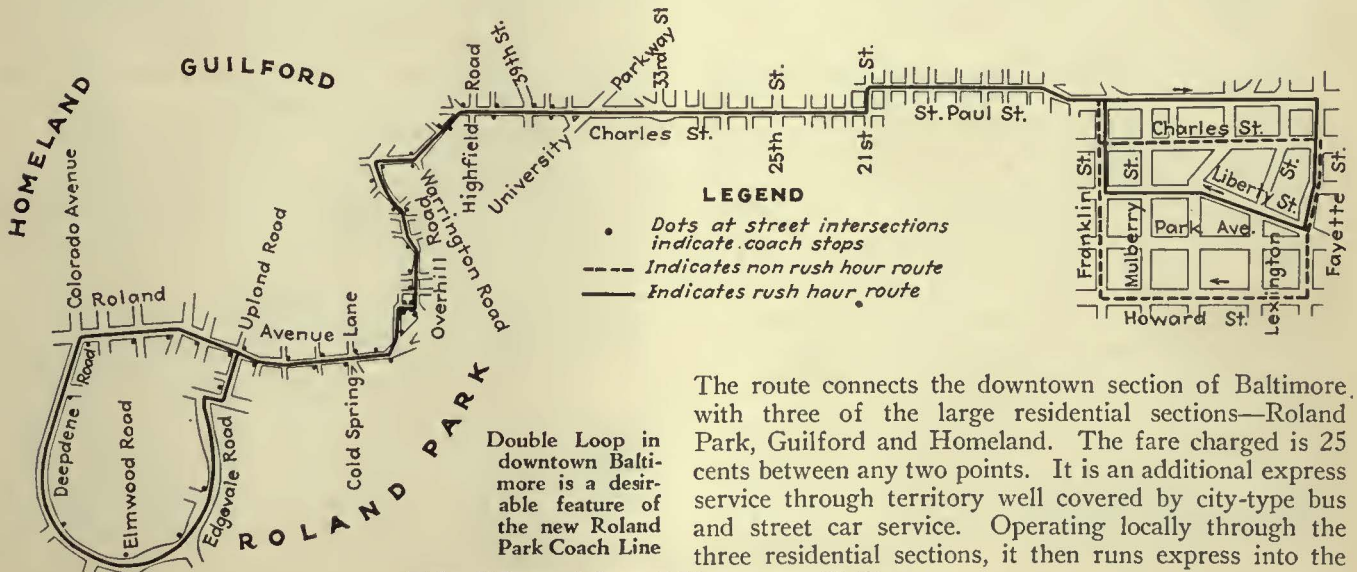
The situation with regard to the Airport Express line is particularly interesting. The route is 12.56 miles in length and runs from the Cleveland Airport to East 22nd Street and Euclid Avenue, operating as an express route through the greater part of the territory. The Berea Bus Line Company operates from Berea, Ohio, to the Public Square over the same route. This interurban line has been in operation for the past six or eight years and has during all that time been doing an interurban business as well as picking up passengers from all points along its route in the city to the Public Square. While this is contrary to the provision of the Collister-Kreuger act of Ohio, it has been permitted by the Cleveland City Council because the Cleveland Railway was not giving adequate service on the same streets.

By resolution of the Cleveland City Council, the Cleveland Railway started operation of the Airport

express route on Aug. 23, 1929. During the air races of the National Aeronautical Association this route paid very well, as many as 100 coaches per day being used. However, after the races business immediately dropped off because of the duplicated service provided by the Berea Bus Line and the Cleveland Railway.

The Cleveland Railway route is too long for the rate of fare charged at the present time, namely 15 cents for the first 10 miles, 20 cents for the next zone of 1 mile, and 25 cents within the second zone of 1½ miles. This route is being continued at the request of the City Council, although the Cleveland Railway has requested permission to abandon it. If the Berea Bus Line were required to rely on the income derived from its interurban operation it would undoubtedly lose money, but the combination makes it a paying proposition. In other words, interurban service alone is a losing proposition, express service on a line of this length is a losing proposition, but the combination of the two results in a profitable operation.

In September, 1929, the United Railways & Electric Company, Baltimore, Md., began operation of its first de luxe bus line known as the Roland Park Coach Line.



The route connects the downtown section of Baltimore with three of the large residential sections—Roland Park, Guilford and Homeland. The fare charged is 25 cents between any two points. It is an additional express service through territory well covered by city-type bus and street car service. Operating locally through the three residential sections, it then runs express into the

center of the city. Up to the present time the line has operated only on weekdays, there being insufficient traffic on Sundays and holidays to justify running the buses.

Before establishing this line a very complete survey of the situation was made in conjunction with the Roland Park Company and various civic committees. Letters were mailed to residences throughout the district asking their opinions on the proposed line. The replies were encouraging and the service was started with a complete schedule calculated to produce a patronage that would build up to the capacity of the coaches instead of with a skeleton service that would grow only as increased patronage demanded. The railway company believed that this would familiarize the users of the bus with its full advantages at once, and would achieve the results of having more people change their riding habits. A very unusual feature in the layout of this route consists of a double loop in the downtown section of Baltimore. The loop used in the rush hour is shorter

tween these two points, as there are street car lines serving the same territory. The type of service is different from the city type of bus service in that Yellow Coach de luxe buses are used on this line, while White, Mack and Reo city-type buses are used on the feeder lines. The fare is 25 cents on the de luxe buses and $7\frac{1}{2}$ to 25 cents on the feeder lines. The speed of this line is approximately 15 m.p.h. as compared to 11 m.p.h. on the street cars.

The Cincinnati Street Railway, Cincinnati, Ohio, on Nov. 21 began operation of a new bus route between the business district of Cincinnati and a new, recently built up high-class subdivision 6 miles from downtown. Four new Mack buses with special 25-passenger bodies are being used. The fare charged is 25 cents. The coaches operate on a 30-minute headway from 7:30 in the morning until 8 p.m., when they go on an hourly headway until midnight.

The lines and type of service so far mentioned have



High class equipment has attracted growing patronage in Baltimore

and includes most of the financial and business section of the city, while in the non-rush hour the loop is enlarged to include the better shopping districts.

OTHER COMPANIES USE DE LUXE BUS EQUIPMENT

The Boston Elevated Railway operates one 25-cent fare de luxe bus route on Beacon Street and through the business section of the city. The line serves territory which also has car service. Patrons have the privilege of free transfers from the de luxe buses to other service and transfer from other service to de luxe buses upon payment of 15 cents additional fare. The carfares in the territory served by the de luxe line are $6\frac{1}{4}$ cents for a local ride and 10 cents with full transfer privilege. The scheduled speed of the de luxe service is 12.3 m.p.h. as compared with 11.1 m.p.h. average for all other bus lines. Stopping places are not arranged for express service on this route. Buses stop to take on or let off passengers at any point. However, the equivalent of express service is operated because practically all of the patrons of the de luxe line reside in the territory served by the outer sections of the line.

The Duluth-Superior Coach Company, a subsidiary of the Duluth Street Railway, besides operating six feeder routes to the street railway lines, also operates one de luxe bus service between the business centers of Duluth and Superior. This route furnishes additional service be-

been strictly selective higher fare lines operated for the purpose of appealing to a new type of rider in a community served by city-type operations of both street cars and buses. Quite distinctive from this type of service is another use for the de luxe bus on certain selected city lines. A number of companies are providing the local public on many of their lines with de luxe motor coaches, not as supplementary service at higher rates of fare. The United Electric Railway, Providence, R. I., operates 69 Twin Coaches and 40 of the latest model six-cylinder Whites on lines operating at regular rates of fare, most of which supplanted street cars. Quite a few of these lines are routed and operated as express service, benefiting the residents of outlying districts near Providence. With this equipment they also operate several special routes, two of which are only operated in the summer months to provide supplementary service between Providence and Crescent Park, and Pawtucket and Crescent Park. Crescent Park is a summer shore resort. Excellent results have been secured, particularly on the latter where the earnings have been very high. Two other special routes between Pawtucket and Pawtucket, and between Olneyville and Pawtucket are operated on Wednesday and Saturday nights to serve a very fine public ballroom in Pawtucket. Twin Coaches are used on these lines, which take a more direct route than the trolley car and operates express all the way.

Monthly and Other Financial Reports

	Operating Revenue \$	Operating Expenses \$	Taxes \$	Gross Income \$	Net Income \$		Operating Revenue \$	Operating Expenses \$	Taxes \$	Gross Income \$	Net Income \$	
Key System Transit Co., Oakland, Cal.							Long Island Railroad, New York, N. Y.					
November, 1929.....	598,437				46,726	November, 1929.....	3,084,453	2,460,962	186,121	436,511	240,568f	
November, 1928.....	588,865				86,505	November, 1928.....	3,194,283	2,299,200	167,515	718,208	528,431f	
12 mo. end. Nov., 1929	6,502,428				888,631	11 mo. end. Nov., 1929	38,215,910	25,323,733	2,844,996	10,029,170	8,227,214f	
12 mo. end. Nov., 1928	6,606,184				623,846	11 mo. end. Nov., 1928	37,404,155	26,027,072	2,560,579	8,797,994	7,119,845f	
Market Street Railway, San Francisco, Cal.							New York, Westchester & Boston Ry., New York, N. Y.					
December, 1929.....	817,254	676,519a		140,735	83,481g	November, 1929.....	202,381	142,855	23,476	36,804	180,499	
December, 1928.....	811,968	719,642a		92,326	31,982g	November, 1928.....	199,677	141,673	20,238	38,167	169,761	
12 mo. end. Dec., 1929	9,590,194	8,041,926a		1,548,268	837,513g	11 mo. end. Nov., 1929	2,312,657	1,427,875	249,380	647,804	1,724,685	
12 mo. end. Dec., 1928	9,754,461	8,327,688a		1,426,773	677,753g	11 mo. end. Nov., 1928	2,185,487	1,469,160	219,725	507,977	1,724,237	
Denver Tramway, Denver, Colo.							Staten Island Rapid Transit Co., New York, N. Y.					
12 mo. end. Dec., 1929	4,214,297	2,902,564	494,201	864,420	351,137	November, 1929.....	216,406	147,545	15,000	53,861	54,954f	
12 mo. end. Dec., 1928				460,960		November, 1928.....	259,344	160,942	10,641	88,402	49,192f	
Jacksonville Traction Co., Jacksonville, Fla.							Third Avenue Railway, New York, N. Y.					
November, 1929.....	92,574	74,447	7,787	9,877		November, 1929.....	1,256,076	969,639	81,656	224,548	40,069d	
November, 1928.....	98,840	81,044	9,004	8,261		November, 1928.....	1,278,000	983,039	85,920	233,686	19,015d	
12 mo. end. Nov., 1929	1,143,880	936,375	106,590	94,740	62,691	5 mo. end. Nov., 1929	6,392,582	4,928,417	443,823	1,123,354	179,835d	
12 mo. end. Nov., 1928	1,210,294	976,864	109,743	117,213	47,604	5 mo. end. Nov., 1928	6,475,397	4,985,680	466,277	1,118,046	133,992d	
Honolulu Rapid Transit Co., Honolulu, T. H.							Third Avenue Railway, New York, N. Y.					
December, 1929.....	88,284	52,125	7,888	28,199	17,869	December, 1929.....	1,729,135	1,527,285		201,850	30,368d	
December, 1928.....	93,890	53,100	13,231	28,653	22,947	December, 1928.....	1,315,791	1,102,341		213,450	21,319d	
12 mo. end. Dec., 1929	1,052,273	608,420	105,832	350,297	213,720	6 mo. end. Dec., 1929	7,671,717	6,447,525		1,224,192	210,204d	
12 mo. end. Dec., 1928	1,076,433	630,341	147,277	312,153	220,077	6 mo. end. Dec., 1928	7,791,188	6,554,300		1,236,888	165,311d	
Chicago Surface Lines, Chicago, Ill.							Philadelphia & Western Railway, Norristown, Pa.					
December, 1929.....	5,272,651	4,074,317a		1,198,334	909,743h	November, 1929.....	80,311	48,624j			31,687	
December, 1928.....	5,334,219	4,188,165a		1,146,053	879,486h	December, 1928.....	80,883	50,148j			30,735	
Boston Elevated Railway, Boston, Mass.							Philadelphia & West Chester Traction Co., Upper Darby, Pa.					
November, 1929.....	2,877,280	1,982,281	138,018	761,223	64,148	11 mo. end. Nov., 1929	1,120,128					
November, 1928.....	2,927,910	2,081,326	145,099	705,169	2,583	11 mo. end. Nov., 1928	1,178,547					
Eastern Massachusetts Street Railway, Boston, Mass.							United Electric Railways, Providence, R. I.					
November, 1929.....	663,198	436,562	19,805	232,687	86,076	November, 1929.....	592,761	475,434	29,244	88,083	37,163	
November, 1928.....	703,317	488,821	27,646	206,191	56,170	November, 1928.....	603,645	481,599	35,376	86,670	38,591	
11 mo. end. Nov., 1929	7,817,586	4,947,492	338,222	2,750,358	870,240	11 mo. end. Nov., 1929	6,636,790	5,330,436	353,544	952,809	392,020	
11 mo. end. Nov., 1928	8,202,869	5,342,139	324,680	2,758,475	864,630	11 mo. end. Nov., 1928	6,837,595	5,473,112	355,807	1,008,676	433,759	
Eastern Massachusetts Street Railway, Boston, Mass.							Texas Electric Railway, Dallas, Texas					
December, 1929.....	761,868	495,262	12,959	264,902	130,462	November, 1929.....	168,197	146,035a		22,162		
December, 1928.....	802,888	548,257	40,079	234,488	128,158	November, 1928.....	176,306	141,546a		34,760		
12 mo. end. Dec., 1929	8,579,454	5,442,755	351,182	3,015,261	1,000,703	11 mo. end. Nov., 1929	1,706,494	1,515,751a		190,743		
12 mo. end. Dec., 1928	9,005,758	5,890,396	364,759	2,992,963	992,789	11 mo. end. Nov., 1928	1,646,095	1,453,234a		192,861		
Boston, Worcester & New York Street Railway, Framingham, Mass.							Galveston-Houston Electric Co., Houston, Texas					
November, 1929.....	59,262	50,057	1,625	8,209	6,739	November, 1929.....	42,237	24,029	2,714	15,492		
November, 1928.....	677,842	550,012	18,148	121,966	105,796	November, 1928.....	49,171	26,294	2,931	19,944		
Department of Street Railways, Detroit, Mich.							Houston Electric Co., Houston, Texas					
December, 1929.....	2,078,954	1,773,879	65,457	248,354	104,434	November, 1929.....	592,018	332,258	31,205	228,748	41,254	
December, 1928.....	2,154,288	1,699,402	62,529	401,039	246,310	12 mo. end. Nov., 1928	649,540	376,764	31,743	241,033	28,472	
12 mo. end. Dec., 1929	26,444,874	21,057,542	750,948	4,754,779	3,103,189	Pacific Northwest Traction Co., Seattle, Wash.						
12 mo. end. Dec., 1928	24,668,175	19,283,497	783,012	4,847,251	2,932,355	November, 1929.....	81,198	60,556	2,896	17,744		
Twin City Rapid Transit Co., Minneapolis, Minn.							Calgary Municipal Railway, Calgary, Alta.					
12 mo. end. Dec., 1929	13,487,976	11,132,357a		2,477,596	1,255,878	11 mo. end. Nov., 1929	937,348	565,473		371,875	38,954	
12 mo. end. Dec., 1928	13,005,353	11,049,401a		2,055,233	833,589	11 mo. end. Nov., 1928					53,322	
Kansas City Public Service Co., Kansas City, Mo.							Edmonton Radial Railway, Edmonton, Alta.					
November, 1929.....	746,136	553,785	41,675	130,674	55,820	November, 1929.....	72,647	45,842		23,348e	1,956	
11 mo. end. Nov., 1929	8,180,254	6,201,134	458,425	1,520,694	670,150	November, 1928.....	59,656	44,492		21,743e	3,418	
Kansas City Public Service Co., Kansas City, Mo.							Lethbridge Municipal Railway, Lethbridge, Alta.					
12 mo. end. Dec., 1929	8,951,616	7,327,003a		1,624,613	698,223	10 mo. end. Oct., 1929	50,298	41,175		9,123	16,731	
Lincoln Traction Co., Lincoln, Neb.							British Columbia Electric Railway, Vancouver, B. C.					
11 mo. end. Nov., 1929	434,267	380,204a		54,063	10,179	November, 1929.....	1,270,922	697,209		573,713		
11 mo. end. Nov., 1928	438,532	354,905a		83,627		November, 1928.....	1,192,080	614,212		577,868		
Fonda, Johnstown & Groversville R.R., Groversville, N. Y.							Regina Municipal Railway, Regina, Sask.					
November, 1929.....	83,615	62,168	4,300	22,985	8,198	11 mo. end. Nov., 1929	383,437	234,931		128,506	18,778	
November, 1928.....	82,028	60,341	5,775	19,043	12,554	11 mo. end. Nov., 1928					218	
11 mo. end. Nov., 1929	930,295	695,675	79,160	271,229	77,372	<i>Italic figures indicate deficit. a Includes taxes. b Net operating revenue. c Before taxes. d After adjustment bond interest. e Includes depreciation. f Net after rents. g Before depreciation and federal tax. h After joint account expenses, federal taxes, and city's 55 per cent. j Includes interest and taxes.</i>						
11 mo. end. Nov., 1928	946,385	681,579	82,110	274,690	74,850	Interborough Rapid Transit Co., New York, N. Y.						
Brooklyn-Manhattan Transit Corporation, New York, N. Y.							Brooklyn & Queens Transit Corporation, New York, N. Y.					
December, 1929.....	5,199,104	3,400,231	303,977	1,565,568	798,552	December, 1929.....	2,002,528	1,545,106	117,519	361,349	236,588	
December, 1928.....	4,135,153	2,567,829	269,935	1,376,947	673,910	December, 1928.....	2,031,999	1,667,806	106,633	280,122	152,553	
6 mo. end. Dec., 1929	30,409,954	20,422,091	1,900,208	8,508,960	3,851,131	6 mo. end. Dec., 1929	11,935,555	9,419,520	682,989	1,961,747	1,212,144	
6 mo. end. Dec., 1928	24,135,352	15,710,731	1,652,835	7,263,345	3,106,142	6 mo. end. Dec., 1928	12,108,324	10,041,706	644,349	1,552,522	778,965	
Brooklyn & Queens Transit Corporation, New York, N. Y.							Hudson & Manhattan R.R., New York, N. Y.					
December, 1929.....	1,112,472	507,424a		605,047	272,289	December, 1929.....	1,101,309	551,173a		550,136	218,098	
December, 1928.....	1,101,309	551,173a		550,136	218,098	12 mo. end. Dec., 1929	12,517,756	6,248,096a		6,269,659	2,247,210	
12 mo. end. Dec., 1929	12,517,756	6,248,096a		6,269,659	2,247,210	12 mo. end. Dec., 1928	12,388,927	6,425,643a		5,963,283	1,941,056	
12 mo. end. Dec., 1928	12,388,927	6,425,643a		5,963,283	1,941,056	Regina Municipal Railway, Regina, Sask.						

Two-Color or Three-Color Signals

NEW YORK, N. Y., Jan. 1, 1930.

To the Editor:

In a recent report issued by the National Committee for Municipal Traffic Ordinances and Regulations, certain proposed standards for the regulation of vehicular traffic were recommended. The more important of these deal with the proposal to employ three-color light signals at locations where a two-color signal might suffice. Since definite positions contrary to these recommendations have been taken by traffic officials of at least two major cities, New York and Los Angeles, the decision seems at least open to question.

It is important to note that this recommendation is predicated upon a tabulation of replies to questionnaires sent by the national committee to some 200 municipalities where traffic control signals are now in operation. The purchases and installation of the traffic control systems in these 200 municipalities as a rule have not been by the official department directing traffic, usually the police department, but in general by the Aldermanic Council or Town Trustees. Ordinarily neither of these two bodies includes traffic control engineers, nor is it versed in the art of traffic control signaling. The bidders proposing to supply traffic control apparatus, with the exception of one or two manufacturers who had undertaken to furnish traffic control signal units as a side line, were persons politically affiliated and in a favorable position to secure a contract. After receiving the award these persons generally established a temporary factory wherein were assembled the signal housings or such other apparatus as could not be purchased in the open market. Obviously these manufacturers preferred to sell three-color light signals upon which the profit was comparatively large.

From the foregoing it may be inferred that, in adopting a tabulation of the replies received in the questionnaires, the national committee has based its recommendation on apparatus supplied by certain manufacturers not making a specialty of producing traffic control signal apparatus, as distinguished from a recommendation based on protracted tests made by competent traffic control engineers to determine the superiority of one or the other signal system.

POLITICS A FACTOR IN SIGNAL EQUIPMENT

Unfortunately, owing to the political onus usually associated with awarding such contracts most of the established and largest manufacturers of signaling systems, who have had long experience in that field, have held aloof from street traffic control. One major city has had the local public service corporation finance, install and maintain the traffic control system at a service charge of \$55 per signal unit per year, thereby relieving the city of all major responsibility. Obviously the position of the national committee precludes making such a recommendation.

With reference to the indications for governing existing traffic, the conditions under which vehicular traffic operates may be classified as follows:

1. Congested traffic lanes: for example, the hub arteries of a major city where traffic ordinarily is so dense that comparatively slow movement occurs.
2. Major traffic lanes: these include the more impor-

tant arteries extending from the congested areas to the outlying districts and adjacent towns, on which vehicles may travel in groups at comparatively high speed.

3. Maladroit intersections: those other than simple right-angled intersections, blind streets, etc.

FOUR GENERAL TYPES OF CONTROL

For the above three conditions of traffic the following systems of signaling may be adopted:

1. Synchronous, where all vehicles traveling in parallel directions proceed for a fixed interval of time, alternately with all remaining stationary for a similar, or differing, period of time.

2. Progressive, where successive blocks show the same signal indication in conformance to the speed-distance factor determined by the rate at which traffic may pass through. Such ideal conditions of block length are rarely found. In this system the driver of a vehicle will always find a green signal at the approach to an intersection providing he has traveled at the prescribed speed. Obviously no yellow signal is required.

3. Speed-distance or co-ordinated, based on the speed-distance factor of each block traversed, long or short. In such a system the driver will always find a green signal as he approaches the intersection, provided he travels at the prescribed speed. This system permits group movement of vehicles. Obviously such a system is ideal and does not require the yellow light.

4. Special control, more generally applied to maladroit intersections, and dealing with conditions too complex to discuss here. With the exception of manual control they can usually be covered by systems 1 or 3.

Let me refer now to the application of systems 1 to 4 to the conditions (a), (b) and (c), previously named.

Condition (a): Congested traffic lanes comprising the hub area of the major cities. The traffic is ordinarily so dense that high-speed group movement of vehicles cannot be obtained. Obviously the more simple two-color (green and red) synchronized system will suffice, being not only more economical and simple to install but more simple to operate and less costly to maintain. Owing to the comparatively low speed the moving vehicles can be stopped within a few feet and no yellow signal is required.

Condition (b): Major traffic lanes extending from congested districts to outlying districts and adjoining towns. As these lanes not only permit a higher speed, but also group movement to obtain maximum capacity, obviously the co-ordinated system should be installed. If the vehicle driver proceeds at the proper speed he will always find a green signal at the approaching intersection. It is therefore obvious that no yellow signal indication is required.

From the foregoing it will be apparent that a maximum flow of traffic may be effected by the use of two-color signal indications only, and that the ideal systems for obtaining maximum traffic do not require a third indication. Furthermore, investigations where the yellow signal is employed indicated that the motorist will speed

the Editor

up his car on yellow in an attempt to beat the red signal which he knows is coming. This appears to be universal at non-policed intersections.

It is also important to note that in the standards adopted by the Railway Signal Association, which have been in effect for many years, the yellow signal, when employed, indicates proceed, prepared to stop at the next signal. Obviously, the meaning established by the Railway Signal Association standard is very different from that conveyed by the recommendations of the national committee, and confusion of standards will occur.

It is also rather unfortunate that the names of one or more of the traffic control engineers, who have had from 30 to 50 years experience with steam railroads, do not appear on the roster of the national committee.

O. A. Ross, C. E.

Railway Crossing Signals Should Be Distinctive

NACHOD & UNITED STATES SIGNAL CO., INC.
LOUISVILLE, KY., Jan. 8, 1930.

To the Editor:

As manufacturers of highway crossing signals for electric railways, we have noted a certain trend which we think merits discussion. One cannot fail to mark how implicitly the traffic signal indications are obeyed by automobilists; and, on the contrary, unfortunately, anyone can recall how many times at a highway crossing signals indicating the approach of a train have been wantonly disregarded by motorists. What more natural than that the railways, solicitous to have their crossing signals obeyed, should set up at their crossings with highways indications that look like or imitate traffic signals, showing green normally to the street, and red when there is a train approaching? We ourselves have sold a number of such highway crossing signals, when so specified by the purchaser, and we note that certain steam roads are installing such indications at their highway crossings.

We think this is essentially wrong, since a traffic signal is a "stop and stay" signal, the indications being periodically reversed; while the highway crossing signal, for which a distinctive indication has been specified by the Signal Division of the A.R.A., is a cautionary signal in the nature of a "stop and proceed" signal. The autoist when confronted with a crossing signal in operation should stop and wait a reasonable time; and then, if no train appears, should drive close enough to the crossing to see for himself, before he crosses. It is manifestly impossible to control a highway crossing signal so that it will always mean that a train will pass the crossing in so many seconds; for the train may be stopping within the warning zone, or it may be shifting over the tracks but not approaching the crossing. This means that the automobilist will be indefinitely held up, or he must

violate a signal which he has been taught to consider as a "stop and stay" signal.

Moreover the railroad, by exhibiting a normal green at the crossing, which is the most unrestricted clear indication possible, invites the autoist to cross on the strength of that indication alone without stopping and without looking. If a normal indication is wanted, yellow, which is cautionary, at least imposes care in crossing. The writer is of the opinion that the traffic signal indications of alternating red and green, with or without the intermediate yellow, should be reserved for traffic signals, and flashing lights or wigwag signals reserved for railroad crossings.

CARL P. NACHOD,
President and Chief Engineer.

Extensive Paving Work Done by San Francisco Municipal Railway

CITY AND COUNTY OF SAN FRANCISCO
DEPARTMENT OF PUBLIC WORKS, MUNICIPAL RAILWAY

Dec. 21, 1929.

To the Editor:

Your survey of paving practices of the railways of the United States, as contained in an article appearing in the ELECTRIC RAILWAY JOURNAL on page 1108 of the December, 1929, issue, has been read by me with considerable interest. Your readers might infer from this article, however, that the Municipal Railway of San Francisco is relieved of all paving charges which the private companies are subject to. For your information, the following statement of the paving charges of the Municipal Railway for the last three years is detailed:

Fiscal Year			
1926—1927	Maintenance.....	\$18,209.69	
	New construction.....	1,907.60	
	Replacements.....	25,578.81	
	Total.....		\$45,696.10
1927—1928	Maintenance.....	\$19,555.45	
	New construction.....	8.00	
	Replacements.....	6,797.99	
	Total.....		26,361.44
1928—1929	Maintenance.....	\$16,667.11	
	New construction.....	102,461.48	
	Replacements.....	9,560.61	
	Total.....		128,689.74
Total July 1, 1926 to June 30, 1929			\$200,746.20

From the above statement it will be seen that over \$200,000 was expended by the Municipal Railway in the last three years for paving, of which nearly one-half was for maintenance and replacements. Considering that the Municipal Railway has approximately 80 miles of single track of railroad to maintain, it will be readily seen that sufficient expenditure has been made to keep the paving in first-class order.

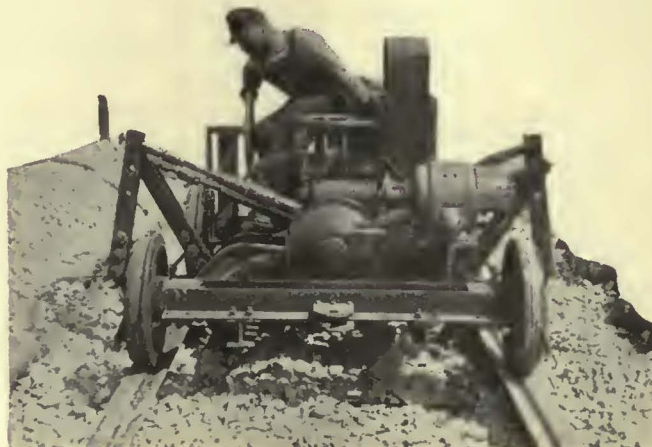
The general impression given to the public by the reading of articles in various railway and other publications is that the Municipal Railway of San Francisco has considerable work performed for it by the city of San Francisco for which no charges are made. This is an entirely erroneous conclusion, as the Municipal Railway pays the city of San Francisco for all work performed for it.

F. BOEKEN,
Superintendent.

International steel Twin
Ties spaced 6 ft. center
to center were laid on a
3-in. layer of broken
stone



Seven-inch grooved girder rail was used with rolled-steel joint plates seam welded



Track was brought to
correct line and grade
by machine tamping

Building Concrete Track with Minimum Interruption of Service



Mixing apparatus mounted on railway trucks was used for grouting

After track in Boston had been brought to line and grade with dry broken stone ballast, voids were filled with cement grout, using a vibrating machine to assure complete penetration

USE of a novel method of construction recently enabled the Boston Elevated Railway to renew its tracks on Huntington Avenue with a minimum interruption of service. Instead of using mixed concrete as is the usual practice, which requires that the track be supported to line and grade by blocking, bracing, etc., this track was brought to line and grade with dry broken stone ballast and the voids filled with cement grout, a vibrating machine being used to assure proper penetration.

In the design of this track structure the total depth is 12 in. At the bottom is a 3-in. layer of broken stone. Good quality, clean, 2-in. trap rock was used for this purpose. International steel Twin Ties spaced 6 ft. center to center were laid on the broken stone. The rail used was 7-in. grooved girder, with rolled steel joint plates, carbon arc seam welded. Another layer of broken stone was then placed, making the total depth 9 in. to the subgrade. Next, the ballast was thoroughly tamped and the track brought to correct line and grade.

After this had been done grout was poured into the

voids. For this purpose a mixture of one part cement, two parts fine bank sand, and water was used. The bank sand was

considered to be preferable to sea sand on account of the presence of a large amount of shell in the latter. Sufficient water was used to make the grout flow easily and penetrate to the bottom of the broken stone.

Penetration was aided by the use of a vibrator. The duration of vibration considered necessary to give complete penetration was four minutes. Tests made by the Massachusetts Institute of Technology of the concrete produced by this method showed that it was strong and of good quality. A 3-in. layer of sheet asphalt was laid on the concrete to constitute the paving surface.

This method of construction is similar in certain respects to that of the Hassam pavement which was at one time widely used in the vicinity of Boston and elsewhere. It is believed by H. M. Steward, superintendent of maintenance, to possess an important advantage in that it permits the use of the track by cars at a much earlier period than is possible where mixed concrete is used. In fact it is believed that cars can safely



Penetration of the grout was assured by use of a revolving vibrator placed longitudinally between the rails

operate over such track as soon as it has been brought to line and grade and during the time the grout is setting.

Interesting evidence of the strength of this design was furnished by an accident which occurred a short time after the completion of the Huntington Avenue job.

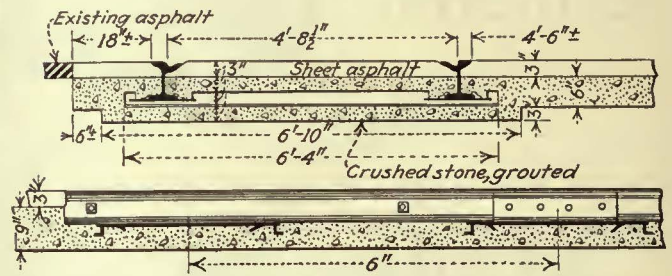
WEIGHT TEST PROVES SOLIDITY OF STRUCTURE

On the night of Dec. 14, a 30-in. high-pressure water main, located about 9 ft. below the surface of the street, burst, and before the water could be turned off a hole approximately 30 ft. long and 25 ft. wide at the top, and about 9 ft. deep, resulted. All of the earth under the in-bound track for a distance of about 30 ft. was removed and the excavation extended across the out-bound track as well for a length of approximately 20 ft.

During the period of excitement, a Boston Consolidated Gas truck, weighing about 5,000 lb., passed over the street which was undermined and fell into the excavation head first. The Boston Elevated wrecking truck was called and in order to take the gas company's truck out of the hole it was necessary for the wrecking truck

to stand on the track which was undermined as described above. The weight of the Boston Elevated wrecking truck is about 12,800 lb. and it was estimated that it lifted one-half the weight of the gas company's truck, or 2,500 lb., so that the total weight on the unsupported track was 15,300 lb.

The tracks were damaged very little as a result of the water break and the removal of the gas company's truck. The in-bound track, being unsupported for a distance of 30 ft., sagged of its own weight slightly. The out-bound track, however, remained to proper surface.



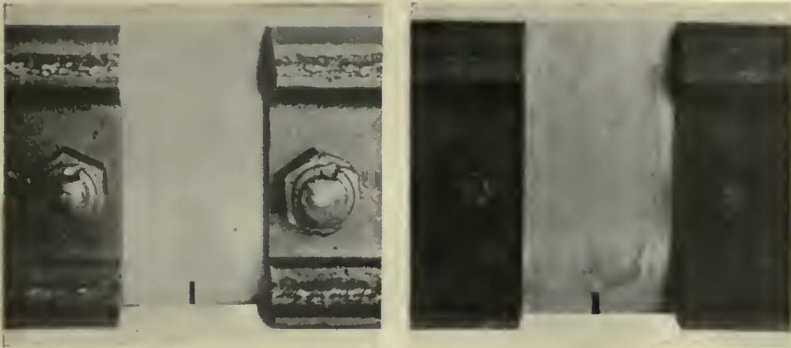
Sectional views of concrete track in Boston built by placing broken stone and grouting the voids

The pavement in the space between the two tracks was broken through in order to facilitate the placing of shoring to support the tracks and to allow the city departments to make the necessary repairs. Had this not been necessary, the concrete and asphalt pavement would have remained intact for the entire track area—that is, the tracks, the dummy and the brows.

When the repairs to the underground structures were made, car service was resumed on both tracks, these tracks being supported by shoring. No further repairs to the tracks were necessary except to replace the pavement. The excavation caused by the water has been filled in, but the shoring supporting the tracks was allowed to remain in place, as the final settlement of the fill will not take place for a considerable period. This occurrence furnished an interesting demonstration of the solidity of a structure of this design.

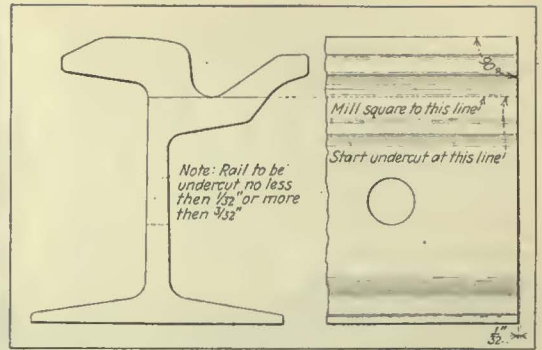


The paving surface consists of a 3-in. layer of sheet asphalt



The standard practice of undercutting rails from head to foot permits a gap to appear as the rail wears which gradually causes cupping

By milling the heads square after the standard undercut is made, there can be no gap and the danger of cupping is minimized



The practice adopted by the Cleveland Railway is to mill the rail head square and undercut from the base of the rail head to the foot of the rail. This is giving very satisfactory results

Double-Milling Rail Heads to Prevent Cupping at Joints

By HOWARD H. GEORGE
Superintendent of Way Cleveland Railway

PROBABLY no part of the track structure has given more trouble than the joint, and it has been the subject of a large amount of study and investigation. The goal toward which railway engineers have been striving has been a joint which would have a life equal to the rail without cupping, but the number which produce such results has been rather small as compared with the total number installed. Assuming that splice bars are of a suitable design, that an adequate seam weld has been provided and that the mechanical assembly of the joint has been properly made, there is only one factor left, which is generally responsible for past failures. That is the flowing of the rail steel into the small gap between the rail ends which soon causes the head of the remaining rail to cup.

For a number of years it was the general practice to specify rail ends to be milled square. In practice, however, it was found that it was impossible to mill these rails exactly square and that sometimes the rail bases of the abutting rail ends made contact before the heads. This, of course, made it impossible to close the gap. To overcome this difficulty the specifications were revised to provide for undercutting all rail ends from head to base, thus insuring initial head to head contact when the joint was first assembled. This has been the practice for several years and is the method now generally followed. Since the rails are undercut for their entire depth, however, as the head wears down there develops an opening between the ends of the rails. As the gap widens, metal from the head of the sending rail flows down into the opening, allowing the car wheel to strike a blow on the receiving rail, the result being the relatively early appearance of rail cupping.

Electric railway engineers have long sought to eliminate, or at least minimize this trouble, resort frequently being had to the use of shims. During the present year, the writer arranged with one of the rail manufacturers to experiment with the double-milling of rail ends as developed in the way committee of the American Electric Railway Engineering Association about four years ago and later patented by E. M. T. Ryder, way engineer of the Third Avenue Railway. The method followed is shown on the accompanying sketch. The rails were first

undercut in accordance with existing standard practice and then the heads were milled square. Each rail was carefully checked at the milling machine by the machine operator and also by the inspector.

Accompanying photographs show clearly the difference in the results obtained, as between the standard undercutting and the square milling of the heads. These joints were made up in the usual way by drifting the rail ends together with $1\frac{1}{8}$ -in. diameter drift pins, reaming the holes and bolting up with $1\frac{1}{8}$ -in. diameter heat-treated bolts. The joints were then seam-welded, using the hand feed method of welding with extra low carbon welding rods. The splice bars have a carbon content between 0.2 and 0.3. They were then machined through, as shown, to expose the conditions in the center of the joint. The practically perfect contact of rail ends throughout the entire depth of the head as well as the perfect contact along the fishing surfaces are felt to constitute ample justification for the additional expenditure of 75 cents per ton involved in the extra milling operation.

Deep Crankcase Pans Prove Advantageous

INCREASING by 2 in. the depth of bus crankcase pans has proved advantageous for the International Railway of Buffalo, N. Y. The oil capacity is increased approximately 77 per cent. This increase in possible oil storage has served to eliminate the mid-day follow-up of buses for the purpose of adding oil to motor crankcases. Buses are getting approximately 28 miles to a quart of oil. Old crankcases held 9 qt. of oil, while the new and deeper crankcase pan holds 16 qt. of oil.



Deeper crankcase eliminates the necessity of replenishing oil supply of the bus at mid-day

One-Man Long Level*

BY R. B. EVANS
Assistant Superintendent of Construction
Cleveland Railway

IN CHECKING the level of the subgrade and the stone track foundation it is often necessary to use a level board longer than ordinary. To facilitate this work, the Cleveland Railway has designed a long level board which can be handled by one man. This board is



Long level board, designed by the Cleveland Railway to be handled by one man

10 ft. long, $1\frac{1}{2}$ in. wide and 4 in. high in the center, tapering to $2\frac{1}{2}$ in. on either end. A strip of sheet metal is fastened to the bottom side to preserve its wearing surface. At the free end of the board is placed a level glass where it is easily seen by the operator. At the same end there is also a graduated metal gaging rod, which can be set to any distance desired, being held in position with a setscrew.

Pavement Straight Edge*

BY P. H. COSTELLO
Paving Inspector Cleveland Railway

GREATLY improved pavement surface and increased production per man have resulted from the use of a "pavement straight edge" made in the Cleveland Railway shops. This new device has also made it unnecessary



When paving with granite blocks the Cleveland Railway uses straight edges to insure level surface

*Submitted in ELECTRIC RAILWAY JOURNAL Prize Contest.

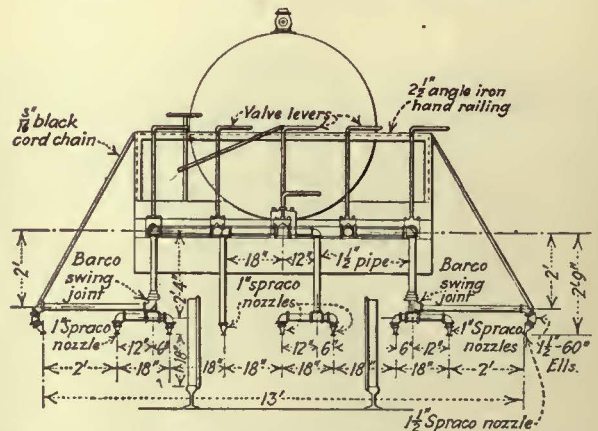
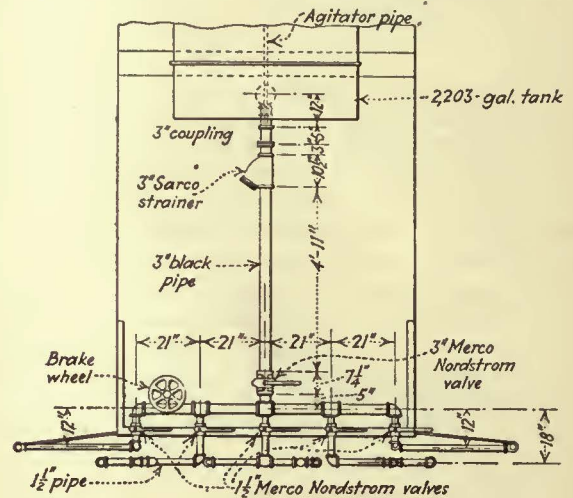
for a workman to follow the pavers to raise or lower inaccurately placed stones. Past experience on the Cleveland Railway indicated that, when laying granite block pavement in the track area, the paver did not always lay the block to a uniform surface. Use of the new "pavement straight edge" has corrected this.

The device consists of a piece of soft wood 5 ft. 6 in. long, 2 in. wide and 3 in. high, well seasoned, and planed on the bottom side, to which is fastened a metal strip to preserve its wearing surface. On top is a hand grip to facilitate handling by the paver.

Spray Equipment Effective for Weed Killing*

BY A. G. PIRKLE
Georgia Power Company, Atlanta, Ga.

FOR removing weeds from between tracks the Georgia Power Company has designed a spray equipment for distributing a weed-killing chemical. This apparatus is erected on a flat car and connected by pipes to a tank carrying the solution. The spray equipment is moved



Weed killing is carried on by means of spray equipment designed by the Georgia Power Company

over the roadbed by a sand car, which is equipped with an air compressor. Compressed air is brought by means of a hose to the tank containing the solution, which is then forced out through nozzles at the desired pressure. The chemical used is non-poisonous and is shipped in a concentrated form which must be diluted by taking 4 gal. of water and 1 gal. of the concentrate. After the solution is made it is agitated about ten minutes by applying

a pressure of 30 lb. of air through a perforated pipe running the full length of the tank, the top of which is left open. At a working pressure of 30 lb. per sq.in., each of seven small nozzles sprays $8\frac{1}{2}$ gal. per minute and each of two large nozzles sprays 24 gal. Thus the total capacity is $107\frac{1}{2}$ gal. per minute. This requires an air compressor which has a capacity of at least 60 cu.ft. of air per minute.

Manufacturer's specifications call for 472 gal. of diluted solution per mile. To discharge that amount, a speed of about 40 m.p.h. is required. While operating, the car is run as near to that speed as can be estimated by the motorman. The spray nozzles are controlled by

individual valves, which makes it possible to apply the chemical only where vegetation exists. When all nozzles are open, the width of the spray is about 15 ft. This method is more economical than the old method of hand weeding. In three days all weeds were killed in a track area of more than 20 miles of single track, thus making it possible to have a clean roadbed during the entire growing season. Concentrated chemical totaling 1,473 gal. was used, which at 38 cents per gallon cost \$567.92. Labor cost for the three days was \$92.94, five men being employed where four could have done the job. The total cost was \$660.86 for 20.08 miles of single track, or \$32.91 per mile.

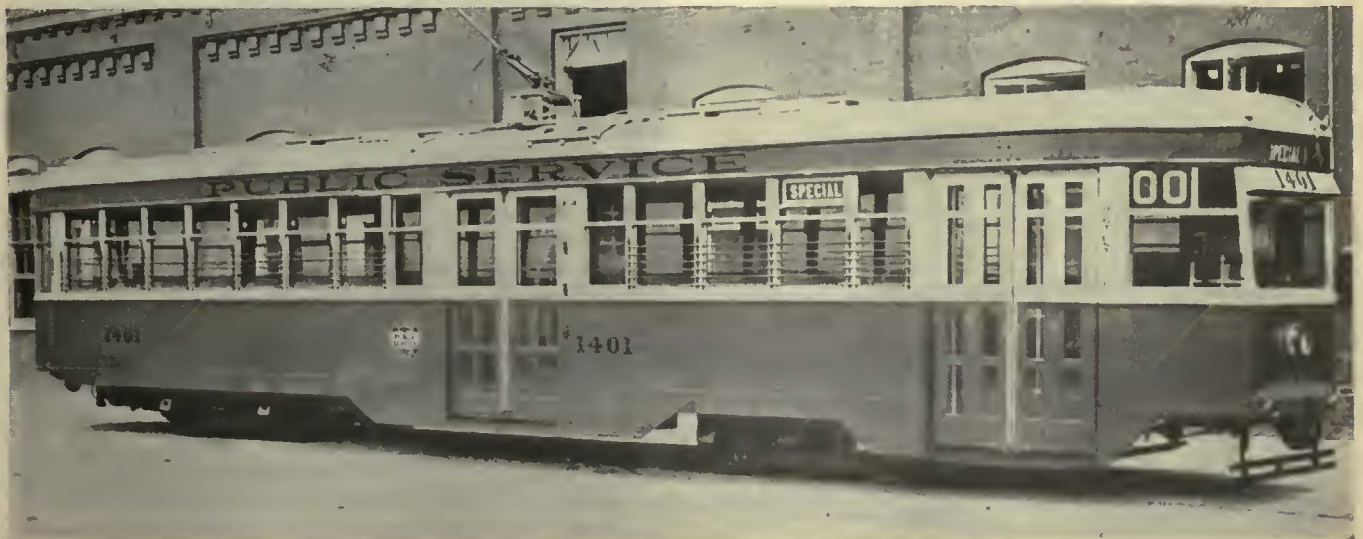
Distinctive Features in Sample Car

Built by St. Louis Public Service Company

IN THE past two or three years a number of experimental and sample cars have been constructed by the electric railways and manufacturers. All of these have embodied new ideas in their design and have contributed to the development of the modern car to suit present-day needs. The latest car to make its appearance is a sample car recently completed for the St. Louis Public Service Company, St. Louis, Mo. Like the others, the St. Louis car has in addition to certain features tried in other cars a number of new ones. Among its interesting features are automatic pedal control, resembling in the arrangement of the pedals that of an automobile, a switch to hold the controller in full series position, a pedal for preventing emergency braking when the hand is released from the dead-man control, a control panel for the buttons and levers operating the gong, sand, doors, emergency braking and heaters, a stanchion arrangement in the front which makes fare collection for the one-man operator easier, extensive use of aluminum throughout the car, equal mounting of equipment underneath the car, a reverser control mounted in a pedestal at the rear, a motor-operated fare box and an attractive appearance, both

exterior and interior. As the car includes those elements of design which the company feels are desirable for standard service on its system, the company plans to use it as a sample when ordering new equipment as needed.

Westinghouse electro-pneumatic control, actuated with line current, is installed in the car. It is the VA variable automatic type, switch-operated. The master control, operated by a pedal, is mounted in a cabinet recessed in the floor. The air brakes, of General Electric design, also are pedal-operated, with a self-lapping valve. The arrangement of the two pedals differs from previous installations in that the pedal for acceleration is on the right and the pedal for braking on the left. This change was made to make the operation of the car more nearly like that of an automobile, and hence more natural for most motormen. Both pedals are depressed with the right foot, so that in both braking and accelerating the action for the right foot is the same as in starting and stopping an automobile. In starting, the brake pedal is released and the accelerator pedal on the right depressed; in stopping the procedure is simply reversed. Of course with no gears to shift and no clutch pedal to operate the left foot remains idle.



A pleasing appearance was obtained by a low roof, a 5-in. skirt below the side sill and streamline painting

Unit switches for the control are mounted in a cabinet at the rear of the motorman, another departure from usual practice. This cabinet extends out from the side of the car making a partition between the motorman's compartment and the remainder of the car. Action of the various control switches is obtained through an air-operated sequence drum. Another innovation is a series control switch which stops the advance of the control when full series position is reached. This is



Front half of the car showing the arrangement of stanchions and the type of seats used

particularly useful for switching and operating at slow speeds through congested downtown districts.

Immediately in front of the operator's seat and over the two pedals is a control panel on which are mounted a brake-locking switch, controls for both the front entrance and center exit doors, a dead-man control button, a handhold, and buttons for operating a gong, releasing sand and controlling a heater circuit.

NEW TYPE OF DEADMAN CONTROL

If the motorman wishes to leave his position at the front of the car he may do so by locking the brakes with a device on the control panel. The dead-man control button is located at a convenient position for the left hand. In a corresponding position on the right is a handhold of the same size and shape for the operator's right hand. If the operator wishes to remove his hand from the dead-man control button he may prevent an emergency braking by depressing a pedal near the floor. The heater circuit is controlled by two buttons so that the heater current can be utilized for throwing track switches. These buttons have absolute control regardless of the thermostat standing.

In addition to the regular reverser at the front of the car there is a second, located in the center of the semi-circular rear end. A Westinghouse drum control switch and a General Electric brake valve are mounted in the enclosed pedestal. To operate the reverser, the cover is simply released and slid up a stanchion to a resting position. An automatic gong in the base of the pedestal is a further help for the operator in backing up his car.

Entrance is gained to the car through double outward-folding doors at the front. By locating stanchions in the front vestibule as shown in an accompanying illustration, it is possible for a large number to board the car, yet all must pass by the fare box in single file. This allows quick loading and positive collection from every passenger. Two half-seats on the left side at the front

allow free passage for the passengers after leaving the fare box. The circulating load principle is employed, the passengers leaving by treadle-operated sliding doors in the center. Fare collection is made with a Johnson fare box, operated with an air motor. It is lighted by a lamp in a specially constructed reflector box with louvre construction, which allows good lighting of the fare box but prevents the light from glowing at the operator or boarding passengers.

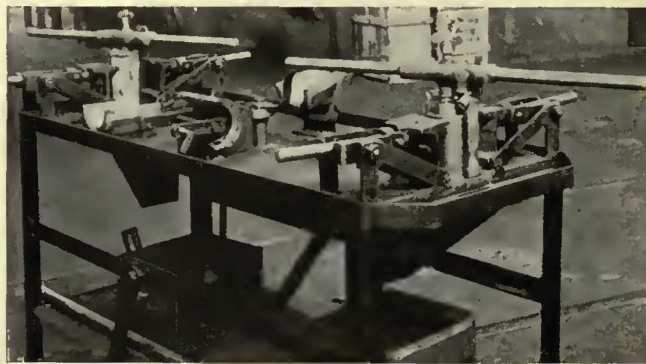
Aluminum was used for practically the entire body. Body bolsters, stanchions, conduits for wiring, posts, letterboard and carlins (one at each post) are all of this metal. Aluminum was used also for all of the ceiling except the circular ends which are of Agasote. Almost all air brake and door control piping is of copper with brass fittings. Air compressors and reservoirs were located under the rear of the car to give a more even distribution of weight between the front and rear trucks. The car has a total weight of 36,180 lb., divided 19,380 lb. for the body, 10,800 lb. for the trucks and 6,000 lb. for the motors.

Careful attention was given to obtaining a pleasing appearance, both exterior and interior. With a narrow letterboard, low roof, streamline painting and a skirt, obtained by extending the side plate 5 in. below the side sill, a racy appearance was obtained. A wide single-piece window, equipped with two vertical-acting window wipers, a dash-lighting headlight and a sun visor, gives a distinctive air to the front. The car exterior is finished in orange and cream, trimmed in red. Its roof is gray and the window guards and lettering are black.

With 26 cross-seats, three single seats and provision for seven passengers in a circular seat at the rear, the car has a total seating capacity of 62.

Repair of Interchangeable Bearings*

BY MAX FEIGENSPAN
Mechanic Hamburg Elevated Railway
Hamburg, Germany



Portable bench for reaming and finishing refined bearings in the Hamburg Elevated Railway shops

FINISHING bearings which have just received a new lining is greatly simplified by the use of a specially constructed portable bench in the shops of the Hamburg Elevated Railway. The bench is provided with four vises, each of which holds the bearing in a different position. This facilitates the finishing of its surface on all sides. After reaming has been completed the bearing can be placed in the center vise in a nearly horizontal position and further finished by hand if this is desirable. Bearings are held in place by adjustable claws.

*Submitted in ELECTRIC RAILWAY JOURNAL Prize Contest.

Causes of Wheel Failure Studied at Havana

BY OTTO GOTTSCHALK
*Engineer Car Equipment Department
Havana Electric Railway*

RECENTLY it came to our attention in Havana that none of our cast-iron chilled car wheels were being removed because of wear on the tread, but rather because of low flanges due to chipping. This called forth an investigation which brought us to the conclusion that the chipping was due to a combination of two conditions: first, flange-bearing switches, mates and frogs; second, method of molding and chilling the wheel.

The Havana Electric Railway operates 600 single-truck cars, all equipped with cast-iron chilled wheels of 30-in. diameter, 2½-in. tread and ⅝-in. flange. In the city the track consists of grooved running rails with numerous sharp curves, switches and crossovers. The crossovers, switches and mates are of the flange-bearing type. Outside the city the track system consists of tee rails, non-flange-bearing switches, frogs and crossovers. Storage tracks in yards are of the same construction.

Our records showed that over a period of six years the average life of wheels was 36,000 miles. This low figure was due to the precautions taken to prevent derailments in operating cars on the tee rail. Wheels with low and chipped flanges were removed for fear of derailment on the tee rail while they could have been operated safely over the grooved rail in the city of Havana.

Various explanations were offered for this chipping. It was suggested that wheels were not properly installed on the axles. Sharp curves, improper alignment of track, rough spots due to rail welding, etc., were also suggested as possible sources of trouble. Probably all of these contributed to some extent. However, we found one of the chief difficulties to be that the bead of metal left on the top of the flange of non-chilled back flanges broke or chipped little by little when passing through crossovers or frogs and more so when passing through switches and mates. The chipping was found to be a detail process up to a certain point; then larger pieces of metal broke off, resulting in a condition that might cause a derailment in operation over tee rail.

To test our theory we placed a number of wheels in service with non-chilled back flanges that had this bead of metal ground off, taking care during the grinding to prevent undue heating which would soften the chill. The average mileage obtained from these wheels was 42,000 miles.

Manufacturers have now developed the chilled-back flange wheel, claiming for it that the change in grain of the metal increases the average mileage per wheel. We believe this to be true, although the change in the grain is not the principal cause. It is rather that the extension of the chill blocks when molding causes the slight bead of metal formerly left on the top of the flange to be left on the outside, so that the contour of the flange at the point of contact with the flange-bearing switches, mates and crossovers is left in a perfect condition, almost as if it had been turned in a lathe.

Despite this improvement we have continued to experience a certain amount of trouble from chipped flanges, and we have come to the conclusion that it is not fair to expect even a perfect flange of a cast-iron chilled wheel, with its brittle metal, to support a car and its passenger



Single-truck cars and sharp curves are typical of electric railway operation in Havana

load when passing through and over flange-bearing switches, mates and crossovers, though the period of such strain is only of momentary duration. The tread of the wheel was designed to carry the load. Men were not intended to walk on their toes. How long could men do this stunt without a breakdown?

If cast-iron wheels give a greater return on the investment than steel wheels, then we must eliminate the flange-bearing switches, mates and crossovers.

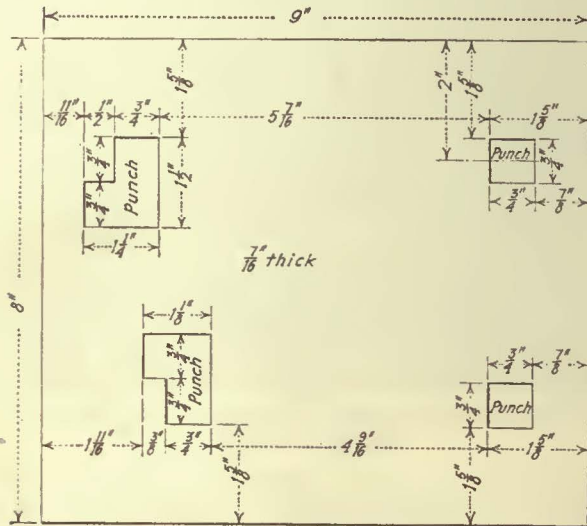
Flexible Rail Joint Tried at Providence

EXPERIMENTS are being made by the United Electric Railways of Providence, R. I., to determine whether or not advantages can be obtained by the use of a welded rail joint differing in principle from those commonly used. The design of this joint, known as the Moisselle joint, provides a round bar which is welded to the rail heads and which has a U-shaped bend opposite the rail ends, making the joint flexible rather than rigid. About a year and a half ago, 175 of these joints were installed on various rail sections including 9-in. girder, 8-in. high T, and 66-lb., 70-lb. and 75-lb. T rail. An inspection a year later showed a few partial failures which were attributed to the use of weld bars which were too small and to defective welding. The record of these joints was considered by H. W. Sanborn, chief engineer, to be good enough, however, to warrant a trial of 50 additional rail joints of the same type. Larger bars were used in the later installation. The features of the joint which particularly appealed to the management were its ease of installation, the absence of necessity for any mechanical fit in the fishing section and the flexibility due to the bend in the bar which is thought to eliminate the blow on the receiving rail and also to provide for expansion and contraction.

Combination Tie Plate for Various Rails*

By W. S. YEATS
Georgia Power Company, Atlanta, Ga.

TO OBTAIN the full life of a creosoted tie it is necessary to protect it from mechanical injury. If rails start to cut in, decay will follow and ties must be removed sooner than if they had been protected. To prevent this type of wear the Georgia Power Company uses tie plates in various sizes to fit the differ-



This tie plate used by the Georgia Power Company fits any rail base from 4 1/2 in. to 6 in.

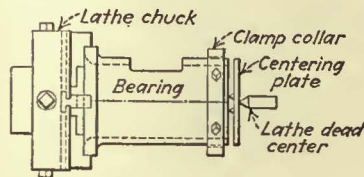
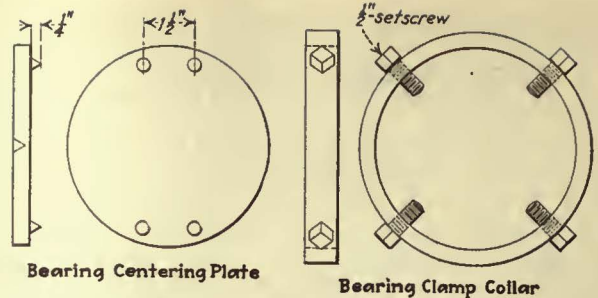
ent rail widths which are found on the property. The tie plate used by the company has simplified the problems of the track foreman because it fits the bases of rail of 4 1/2 in. to 6 in. width by 1/2 in. intervals. Either two or three spikes per plate may be used, and the form of the hole is such that the spikes are backed up by the plate. This tie plate has been used by the Georgia Power Company since 1923, during which time it has been entirely satisfactory.

Axle and Armature Bearing Jig*

By HERBERT SENIOR
Foreman Louisville Railway

FOR turning axle and armature bearings a special jig is used in the shops of the Louisville Railway. This consists of a bearing centering plate and a bearing clamp collar. When starting the operation it is necessary to face the bearing at the split surface, after which the bearing clamp collar is put on to hold the bearing halves together. When this is finished, the bearing is chucked and the tailstock is screwed against the center plate to force the four center pins in the bearing, as shown in the accompanying drawing.

When these operations have been performed the bearing clamp collar is released and is moved back over the



Jig used by Louisville Railway in turning down axle and armature bearings

tailstock. The bearing is then ready for turning with only one setting of the tool.

All reclaimed bearings are welded on the two halves, after which they are spread over a mandrel 3/32 in. larger than standard size and then finished in the jig described. After the bearings have been turned on the outside to the required dimension, the outside of the collar and the inside of the bearing are finished to the required size.

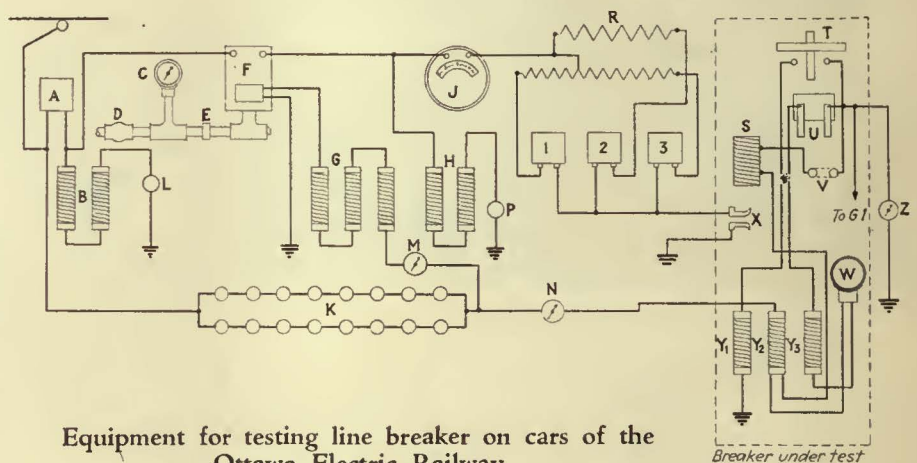
Testing Circuit Breakers in Place*

By R. W. JAMES
Electrical Department Ottawa Electric Railway
Ottawa, Canada

IT HAS been found advantageous on the cars of the Ottawa Electric Railway to set the line switches and circuit breakers at definite points and then to seal them so that they cannot be tampered with, either by car operators or carhouse employees, without the knowledge of the line switch repairman.

To test and calibrate the line switches in place on the car, a testing set has been developed by the electrical department. This is installed in one of the pits in the

*Submitted in ELECTRIC RAILWAY JOURNAL Prize Contest.



- A—Mechanical circuit breaker;
- B—Resistance, 1440 ohms;
- C—Air pressure gage;
- D—Air valve;
- E—Air pipe insulator;
- F—Unit switch, type 806-J-7;
- G—Resistance, 2160 ohms;
- H—Resistance, 1440 ohms;
- J—Ammeter;

- K—Lamp resistance;
- L—Red lamp, 50 volts;
- M—Control switch, 10 amp;
- N—Control switch, 10 amp;
- P—Red lamp, 50 volts;
- Q—Connection to G-1 in controller;
- R—Grd resistor; Type 801-E-4 switch to be set

- S—Operating coil;
- T—Interlock;
- U—Overload fingers;
- V—Carbon contacts;
- W—Holding coil;
- X—Contact tips;
- Y1, Y2, Y3—Resistances, 720 ohms each.
- Z—Control switch, 10 amp.

repair shop. The car on which the breaker has to be tested is run on the pit track and the breaker is connected into the test circuit by means of short leads. Connections of the testing set are shown in the diagram. *A* is a mechanical circuit breaker and *F* a line switch of the 806-J-7 air-operated unit switch type. The rheostat *R*, which consists of two sets of grids, 63 small and 63 large, can be connected in various combinations by the canopy switches 1, 2 and 3, the corresponding currents being indicated on the ammeter *J*. The switch to be tested, which is of the Westinghouse 801-E-4 type, is connected into the circuit as indicated. The magnet valve of switch *F* is energized by current passing through two sets, when switch *M* is closed, each of seven 85-volt lamps in series, shown at *A* in the diagram. The operating coil *S* of the line switch under test is energized through the same set of lamps by closing switch *N*. When the line switch is under test the short-circuiting bar across the carbon contacts *V* is removed, the current goes through holding coil *W*, resistance *Y3*, and the left-hand overload finger *U*. It then follows across the short-

circuiting bar to the corresponding overload finger and then to ground through the *G-1* connection. This allows a test corresponding to the first notch of the controller. On all other notches, holding coil *W* is not needed, because the control circuit is open when there is an overload and cannot be closed again until the controller is put back to the first notch, which permits the current to go to ground through *G-1*.

To test a switch breaker, switch *A* is first closed and air at approximately 70 lb. admitted through valve *D*. The desired combination of resistances is made by closing switches 1, 2 or 3. Control switch *M* is then closed, in turn closing switch *F*. Control *N* can then be closed, actuating the switch under test. To test a switch with the holding coil on the first notch, control switch *Z* is closed, after which it may be opened for testing on two or more speeds.

In this manner a switch can be tested on the car under road conditions. In addition to testing and setting line switches, this set is also useful in detecting various forms of trouble which otherwise would be difficult to locate.

New Products for the Railways' Use

Improved Headlight Resistance

GREATER efficiency of the individual units and easier maintenance are advantages claimed for a new headlight resistance recently placed on the market by the Ohio Brass Company. The units are of the exposed wire type instead of having covered wire, thus

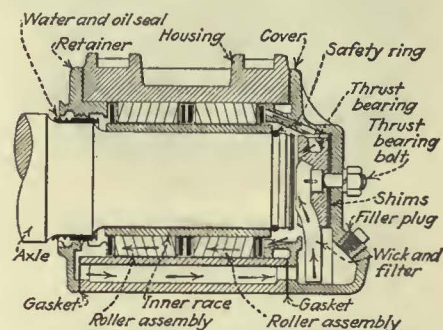
afford maximum opportunity for heat radiation. Ventilation is aided by two baffles mounted on top of the resistance, forming a duct for air circulation.

In order to make up for possible variations in line voltage, a sliding shunt is attached to two adjacent tubes by which the desired amount of current is delivered to the lamp. There are no exposed operating parts in the new resistance, and the cover may be readily removed without danger of losing the holding ratchets, which are securely fastened to the base. In place of the "pig tails" that were formerly used as connections, the new units are joined with brass strips which have completely overcome sagging and the resultant danger of grounded contacts.

Novel Lubricating System for Roller Bearings

SIMPLICITY of construction marks the new Fafnir-Melcher roller bearing for railway journals. A sleeve comprising the inner race, a roller assembly, and an outer housing in which the roller path is integral, are the three main parts. The sleeve, being shrunk or pressed on the axle, furnishes a hard and wear-resisting surface for the operation of the rollers. Alignment and flexibility are provided for in the design of the box. The rollers need take only radial load as all lateral thrust is ab-

sorbed by bronze thrust bearings, which, due to efficient lubrication, have a life equal to any other part of the bearing. The housing or box itself is composed of three parts: the front cover, containing the oil seal grooves and dust guard; the center member, in which is embodied the roller path equalizer seat and the pedestal flanges, and the oil reservoir.



Lubrication system of Fafnir-Melcher bearing—from well through wick to journal, to roller path and back to reservoir



Removable unit headlight resistance is adjustable for voltage variation

permitting a much higher operating temperature. The wire is of nickel-chromium composition which eliminates rust, corrosion or brittleness brought about through long use. The tubes supporting the wires are threaded to eliminate possible shorting of a part of the coil. These tubes are arranged side by side to

A special alloy is used for this center member, and the roller path is heat-treated and ground to a minimum tolerance, thus assuring accurate fits, concentricity, and a wearing surface equal to or better than that of the separate outer race type. An advantage of this construction is the greater wall thickness permitted, which naturally increases the strength of the box, but still remains within A.E.R.A. standard pedestal dimensions.

The assembly consists of two sets

of flexible rollers each contained in a spacer bar cage. The separator bars between each of the rollers permit better lubrication, as well as positive alignment of the individual rollers at all times. A feature of the bearing is the circulating and filtering lubricating system, which provides a constant circulation or flow of from 15 to 30 drops of filtered oil per minute through the bearing. The important element is a wick which draws oil from the reservoir to the axle, from whence by centrifugal action it is carried to the roller path, through the rollers and back to the well again.

Demountable Wheel for Rail Cars

WITH the new Fairmont demountable wheel for rail cars, it is possible, instead of discarding the whole wheel when a tire wears out, simply to remove eight $\frac{5}{8}$ -in. nuts and press on a steel wheel blank or tire, which is bolted to the hub and remains permanently in position on the axle. The bolt circle is $6\frac{3}{8}$ in. instead of the usual 5 in. Stout parkerized lock washers secure the nuts. As the Fairmont hub is not pulled from the



Fairmont demountable wheel of 16-in. rim can be exchanged rapidly if worn out

axle, no time is lost in refitting spoiled insulation. There is no re-gaging and re-aligning of wheels every time a tire wears out.

The bolted hub makes it possible for the car operator to keep his car safe by tightening the nut with an ordinary wrench, if any bolt loosens. With riveted hubs, no tightening is possible, and there is always a temptation for the car operator to continue to use the car until such time as it is more convenient to change the dangerous wheel which has loose hub rivets.

Since but two sizes of rims (16-in. and 20-in.) need be carried, and these fit every hub on the line regardless of axle size or taper, a maximum stock

of 50 tires is ample, where hundreds of complete wheels were formerly stocked. After all cars are once equipped with bolted hubs, a hub stock of one or two of each size is ample, for the tight hubs are subject to practically no wear. Fairmont tires are furnished in both $\frac{1}{4}$ -in. and $\frac{5}{16}$ -in. plate, and nest handily in vertical stacks. A large wheel stock can thus be kept in one small room, and the few reserve hubs can be kept in small bins.

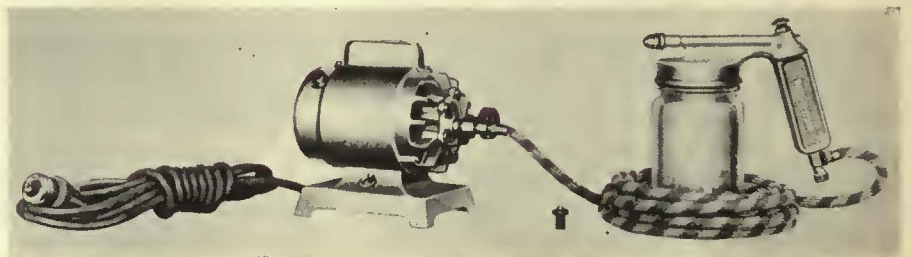
The application of Fairmont hubs, which are furnished in any size and taper of bore, reduces the wheel stock for all cars to two tire sizes (or four items if both $\frac{1}{4}$ -in. and $\frac{5}{16}$ -in. tires are used).

Light-Weight Spray-Painting Outfit

CONVENIENT portable apparatus for light-duty spray painting has recently been put on the market by the De Vilbiss Company. The light weight and compact size of this outfit make it extremely handy. The specially designed air compressor, and $\frac{1}{4}$ -hp. universal electric motor which drives it, weigh only $5\frac{1}{4}$ lb. The spray gun weighs only $1\frac{1}{4}$ lb. and is said not to tire the arm even with long-continued use.

This apparatus has special features which are said to give it large capacity and unusual efficiency. The high air pressure produced by the powerful little motor and the design of the pressure-feed spray gun produce a complete, fine atomization of the material and assure the same good results achieved by big capacity outfits. Easy adjustments of the air cap of the gun enable the operator to atomize perfectly any of the various paints, lacquers or material that may be in use.

Two air caps give a choice of round spray or a full fan spray several inches wide. The pint size glass container has standard Mason jar thread. Ordinary Mason jars can be used for extra containers. The gun body and compressor housing are of high-grade

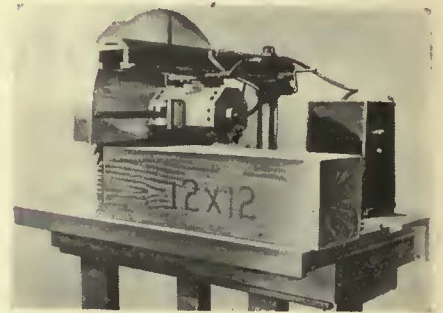


Light-weight spray-painting outfit manufactured by the De Vilbiss Company

aluminum alloy. Nozzle caps, fluid tip, valves and other parts are of brass, nickel-plated and nicely finished. It is designed to plug into any 110-volt electric socket. The complete unit consists of the Type GT spray gun, rotary compressor with switch, 15 ft. of air hose, and connections, 10-ft. extension cord and plug, and brass wire for cleaning.

Heavy-Duty Circular Saw for Track Work

TO FACILITATE the cutting of heavy timber the De Walt Products Corporation of Lancaster, Pennsylvania, has developed a heavy-duty electrically driven circular saw. One man can operate this machine, feeding the saw with a hand ratchet gear feed or by chain feed on the arm of the machine. This arm may be



Heavy-duty cutting machine, Type L, handles timber of 12x12 in.

raised or lowered to depths of cut. Saw blades up to 36 in. are provided to handle 12-in.x20-in. material. The saw blade operates at 1,750 r.p.m. and is direct-driven by motor operated on either alternating or direct current in 220 to 550 volts.

This machine comes in two sizes, Models L and T, the capacity of the L type being 12x12 in. material, while the capacity of the T type is 12x20 in. The larger type is mounted on a metal table equipped with all-steel conveyor rollers for easy handling. The elevating device is operated by a wheel in front of the table which gives rapid elevation and ease in operation.

NEWS of the Industry

LATE NEWS

Detroit, Mich.—Mayor Bowles has requested the Street Railway Commission to make an immediate survey to determine whether rate of fare on the municipal railway should be increased.

Philadelphia, Pa.—In a round-up by the police against illegal parking, begun on Jan. 23, 77 cars were towed to four designated garages, where they were impounded until owners paid \$5 towing charges and \$1 storage fee. Fifty motorists reclaimed their cars by paying a total of \$300. Inspector Wasing was in charge of the war on parking. He led 25 patrolmen and eight towing trucks through the central streets.

Chicago, Ill.—Master in Chancery Mason has again continued the hearing involving a petition by the Chicago Rapid Transit Company for a permanent injunction to restrain the Illinois Commerce Commission from interfering with the straight 10-cent fare. The new date is Feb. 20. The continuance was at the request of representatives of the city.

Baltimore, Md.—Officials of the Baltimore city law department are studying the United States Supreme Court's decision in the United Railways & Electric Company rate case. The city has been more or less of a silent observer recently so far as the United Railways' rate matters have gone.

Dallas, Tex.—The Dallas Railway & Terminal Company increased its surplus reserves by \$109,716 during 1929. This was \$55,912 more than accrued to this fund during 1928. The surplus reserve accumulates only after the company is able to spend or put aside a fixed percentage of its gross revenues in repair, maintenance and depreciation reserves and then pay a 7 per cent return on property value. The gross earnings of 1929 were \$3,319,132 with operating expenses of \$2,329,455.

Washington, D. C.—In the District Supreme Court, Justice Wheat has denied the motion of the Public Service Commission for dismissal of the appeal of the Washington Railway & Electric Company and the Capital Traction Company from the commission's order denying them an increase in fare.

Aberdeen, Wash.—Two cars of the Grays Harbor Railway & Light Company have been repainted in a shade of orange enamel developed after years of experiment to secure a color easily visible in fog or rain but durable under the conditions here. This color, adopted as standard, contains less red than that formerly used. All cars on the system will be repainted as rapidly as possible.

(Late News Continued on Page 112)

Philadelphia Wrought Up Over Transit Tangle

The Suit in Equity Brought by the City Results in Lively Sessions and Sensational Comment—A New Deal Is Likely

EARLY in January hearings were begun before presiding Judge Harry S. McDevitt in Common Pleas Court in Philadelphia in the equity suit brought by City Comptroller Will B. Hadley against the Mitten corporations, not only demanding a complete audit but asking for the end of Mitten Management's control of the transit system. After a few sessions the court observed that things were "going from bad to worse" and the result was that the equity suit hearings were transformed into a series of round-table conferences which, as indicated in *ELECTRIC RAILWAY JOURNAL NEWS* for Jan. 25, may mark the birth of a new transit policy for the city.

Behind closed doors in Judge McDevitt's court room Mayor Mackey, Deputy Comptroller S. Davis Wilson and representatives of the City Council and the Mitten interests decided that four transit experts, one each for the four persons or groups represented, would be designated to formulate recommendations as to the future of the transportation system.

NEW RELATIONSHIP MAY RESULT

The way was thus opened for a re-adjusted relationship of the city and the rapid transit company that may involve the municipal condemnation of the entire transit system, the ousting of the Mitten interests as managers and the appointment of a new managerial organization. Certainly the developments are attracting wide attention, so much so that they have been made the topic of a special article in the *New York Times* by Lawrence Davies. This observer even goes so far as to say that despite denials from one or two of the concerns mentioned in the speculation, suggestions in political and financial quarters that the move for a "re-deal" has the backing of interested banking and public utility corporations eager to gain a foothold in the Philadelphia transportation field have won credence in the last few days.

The early days of the equity suit were spent in the bickering of opposing counsel in revealing intricate phases of the financial relationships among the Philadelphia Rapid Transit Company, Mitten Management, Inc., Mitten Bank, Mitten Bank Securities Corporation and other Mitten interests, including charges that Thomas E. Mitten and his son and successor, Dr. A. A. Mitten, were sole owners of the stock of Mitten Management, Inc., which collected an annual fee of \$1,100,000 for P.R.T. operation;

in adducing from the city's representatives on the P.R.T. board, Joseph S. McCulloch and Ernest T. Trigg, that they knew little of the company's operations, especially as to its financial transactions; and in warnings from the judge that the case must be tried in court and not in the newspapers.

This last admonition followed the release to the newspapers of the city's answer in the suit before Deputy Comptroller Wilson, its chief of counsel, had turned the papers over to the court. After Mitten lawyers had described the answer as "vitriolic, defamatory, malicious and scandalous" Judge McDevitt received Mr. Wilson's apology and ordered him to file an amended paper with the "vitriolic comment" deleted.

Ellis Ames Ballard and associated counsel for the Mitten interests have taken the position that although the late Thomas E. Mitten dominated the transit company's affairs, his domination had brought the P.R.T. operation to "as high a plane of excellence as that attained by any surface street railway in any metropolitan area in the United States, and that the relations existing between the men and management had been brought to a degree of harmony unsurpassed in any other community." They have contended that the regulatory power and jurisdiction over the P.R.T. methods and classification of its accounts rests exclusively with the Public Service Commission.

The hearings have had their amusing incidents as well as the revelations that produced headlines for the Philadelphia papers. Deputy Comptroller Wilson, although not a full-fledged member of the bar, was authorized to prosecute the suit, but was assisted by Assistant City Solicitor John J. Elcock. Mr. Elcock one day protested to Judge McDevitt that Mr. Wilson paid no attention to him. All he had to do was to sit and twiddle his thumbs. The judge bade him find a comfortable seat and cease worrying about his inactivity, for "the public understands the situation."

Former Senator George Wharton Pepper, former Judge James Gay Gordon and other prominent lawyers associated with the Mitten side, have been by turns enraged, exasperated and caustically tolerant of Mr. Wilson's prosecution methods. That these methods have been unorthodox even the critical *Philadelphia Record* has been forced to admit. Of him that paper felt required

(Continued on Page 114)

LATE NEWS

(Continued from Page 111)

New Orleans, La.—For the first time since the beginning of the beautification work on Canal Street, which necessitated the rerouting of cars of the New Orleans Public Service, Inc., six lines using tracks in this street resumed operations there on Jan. 19. The new rerouting is expected to facilitate the movement of traffic in Canal Street, lessen congestion, and speed up the railway service.

New York, N. Y.—The Regional Plan Committee made public on Jan. 25 the detailed studies of its engineering staff on the subject of the Brooklyn and Queens approaches to the projected 38th Street-East River vehicular tunnel. They have an important bearing on the recently announced proposal of the New York and New Jersey tunnel commissions for a highway connection between Long Island and Weehawken, N. J. Several months were required by the engineers for their studies.

Kennebec, Me.—Directors of the Androscoggin & Kennebec Railway deferred payment of the dividend due Dec. 1, 1929, on the company's 6 per cent cumulative preferred stock.

Dayton, Ohio—The Cincinnati & Lake Erie Railroad has formed an honor club for employees of its predecessor companies who have seen continuous service of 25 years or more. At the organization banquet on Jan. 22, 39 employees, eligible for membership, attended. Each of the men was commended by Dr. Thomas Conway, Jr., president of the railroad.

Philadelphia, Pa.—Backers of the project of a competitive taxicab service have appealed to the Superior Court against the ruling of the Public Service Commission assuming to grant a monopoly in this field to Philadelphia Rapid Transit and Mitten Management. The position of the commission in its ruling was that "the time has come when regulated monopoly is the best means of taxicab operation."

Washington, D. C.—The Parker bill, for regulation of buses operating in interstate commerce, was considered in executive session on Jan. 24 by the interstate commerce committee of the House. The committee voted in favor of the provision requiring certificates of public necessity and convenience before any buses are permitted to operate in interstate commerce. It is said that the bill will be reported favorably to the House very soon.

New York, N. Y.—At a meeting of the Board of Estimate on Jan. 24 at which the matter of granting a franchise for a bus line in Brownsville, Brooklyn, to the Eastern Parkway, Brownsville & East New York Transit Relief Association came up, Mayor Walker announced that consideration of the franchise would be deferred until April 25, asserting that the city was not in the mood for granting a franchise to this or any other company until the Legislature had disposed of his bill, now pending, which would provide unified bus transportation.

Geneva, N. Y.—The Public Service Commission has approved the assignment by the Geneva Railway Bus Lines, Inc., to the Colonial Motor Coach Corporation of the certificate granted by the commission to the Geneva company on Jan. 29, 1929. The certificate covers the bus line running from Geneva to Seneca Falls. The commission has also approved an amendment to the certificate calling for operation over other streets than those named in the original consent by the city.

Seattle, Wash.—Salesmanship on the part of trainmen and others that will resell street car and city bus service to those who have been gradually withdrawing their patronage from the Municipal Railway during the last few years, has been demanded by George B. Avery, superintendent of public utilities.

Boston, Mass.—The Boston Elevated Railway is advertising in display space in the daily papers its success as a competitor in the Brady Award contest, in which, in its class, the company was declared to have done most "to conserve the safety and health of the public and its employees," in 1928.

Detroit, Mich.—The Detroit & Port Huron Shore Line Railway, the Rapid Railway and the Port Huron City Electric Railway have been sold at public auction to Roger I. Marquis and Augustus C. Ledyard, representing the bondholders protective association, on their bid of \$300,000. There were no other bids. The sale is subject to confirmation of Judge Charles C. Simmons of the federal court.

Atlanta, Ga.—A new issue of Georgia Power Company \$6 preferred stock was placed on the market Jan. 1. This stock is offered for sale at \$100 per share plus accrued dividends, both for cash and on a partial payment plan. It is cumulative and is redeemable at \$110 per share plus accrued dividend. Employees are being paid a special commission of \$1 per share for selling this stock.

Bloomington, Ill.—The Illinois Power & Light Corporation has formally accepted the new twenty-year franchise with terms practically the same as those of the preceding contract, except that wider latitude is given to the company in the establishment of bus lines to supplant railway lines.

Syracuse, N. Y.—The committee representing the New York State Railways 50-year first consolidated mortgage bonds series "A" and "B" has announced an extension of time for the deposit of the bonds to Feb. 18, 1930. Receivers for the New York State Railways were appointed on Dec. 30, 1929, by the United States District Court for the Northern District of New York and they are now operating the properties.

New Orleans, La.—Records up to Jan. 2 show the bombing of 64 trolley cars of the New Orleans Public Service, Inc., since the strike of union crews last July.

Evansville, Ind.—The Evansville & Ohio Valley Railway, operating a railway to Rockport and Grandview, Ind., and bus lines to Mount Vernon, Ind., Tell City and Cannelton, Ind., and Henderson and Owensboro, Ky., is advertising its business intensively in the Evansville and Owensboro newspapers. According to Ray Millican, general manager, the new year has started well with the company's passenger and freight business showing a nice increase over the corresponding period last year.

St. Louis, Mo.—Murray J. Douglas and L. A. Graeser, former president and secretary, respectively, of the St. Louis local of the Amalgamated Association, as trustees of the Sick Benefit Association of the union are suing the Union Labor Insurance Agency and the Southern Surety Company to reinstate a contract for a sick and accident insurance for members of the union cancelled last October by the Southern Surety as improperly drawn. All claims prior to the cancellation of the contract were paid in full. The court is asked to compel the Southern Surety to pay all the claims that have come up since the cancellation.

Hartford, Conn.—The Connecticut Company discontinued its High Street bus line on Jan. 26 under authority of the Public Utilities Commission, which accepted the declaration of the company that the route was unprofitable. Frequent transportation over alternative routes, the commission believes, compensates for less frequent transportation afforded by the High Street service.

Washington, D. C.—The Washington Railway & Electric Company and the Capital Traction Company on Jan. 21 voiced their objections to Congress to the proposal for their merger sent to the Capitol by the Public Utilities Commission.

Alameda, Cal.—Arrangements have been practically completed between the city and the Key System Transit Company, whereby the Key System will use for trolley support the new electroliers to be installed on Park Street in Alameda between Clement Street and San Jose Avenue. Present plans call for the removal of all Key System trolley poles on this portion of Park Street. Trolley wires will be fastened directly to the electroliers.

Philadelphia, Pa.—The Council's transportation committee has selected Roosevelt boulevard as the route for the construction of a \$30,000,000 high-speed feeder line to the Broad Street Subway. The new subway will extend from Broad Street and Hunting Park Avenue along the boulevard to Pennypack Circle. The committee has also recommended that the Council employ Sol M. Schwab, former city consulting engineer, as a transit expert to advise the legislative body in negotiations with P. R. T. for a new operating arrangement on the North Broad Street Subway. In addition the committee has approved an enabling ordinance appropriating \$7,000,000 for relocating the Market Street Subway's elevated tracks under the Schuylkill River and authorizing the director of transit to advertise for proposals and enter into necessary contracts.

More Than \$5,000 a Day from Third Avenue Buses

Receipts of the Third Avenue Railway, New York, from bus operation are between \$5,000 and \$6,000 a day. These bus receipts are not included in the receipts of the railway system, only the net from bus operation appearing in the income statement. During the past year there were extraordinary expenses due to the installation of new lines and equipment. The buses are being depreciated on the basis of a five-year life which takes care of the equipment notes issued for a larger part of the buses. Under these conditions, the bus operation showed a deficit of \$287,775 for the year. It is believed that in a very short time the bus operation of the system will show profitable present operation with great possibilities for the future. President Huff says:

"The threat of the destruction of trolley lines by bus competition has disappeared. The bus lines now in operation have been laid out in the main to feed and supplement existing trolley lines. It has been a long, tedious process of education both of ourselves and the communities in which we operate in arriving at fair and reasonable conditions of operation. We have had many municipal authorities to deal with in Westchester County, and it has taken time to reach a fair basis for carrying on a business that of necessity has to look somewhat to the future for its rewards."

Adding to Income with Package Service

The Lehigh Valley Transit Company, Allentown, Pa., has instituted a package service upon its Liberty Bell limited cars, which cover the 60 miles between Allentown and Philadelphia. Frequent requests have been made by firms with small parcels requiring quick delivery to Philadelphia and way points, to have the crews perform this service. It has not been a question of money; the requirement was fast delivery. Space was available in the motorman's cabin to transport a considerable number of packages without any inconvenience. The railway, therefore, announced that baggage tickets costing 50 cents could be secured. The packages or parcels are delivered by the sender at any of the baggage rooms along the route. Here they are loaded upon the cars, and dropped off at the various stops requested. Packages must be under 50 lb. in weight and must not exceed 4 cu.ft. in capacity.

More Maneuvering in Chicago

The Chicago City Council's local transportation committee on Jan. 27 unanimously voted an expenditure of \$30,000 from the traction fund for the preparation of actual plans and specifications for a State Street subway. The specifications will be written into an ordinance for the construction of the subway by special assessment, with property owners sharing the cost with the city.

At this same meeting John Maynard Harlan, attorney for an Eastern group seeking a franchise, charged that the

committee of bankers appointed by Samuel Insull does not really exist, that A. W. Harris has never accepted his appointment, and that the committee would have difficulty in showing that it has ever met.

The Aldermen discussed and shelved for three weeks Alderman Guernsey's request that March 15 or April 1 be set as a date on which franchise contenders should submit transit ordinances. This was done because the sub-committee is working on an ordinance draft with the surface and elevated lines. Alderman Guernsey's plan for a subway in solid rock 125 ft. below street level was turned over to the engineers for study.

On Jan. 21 the Chicago City Council's transportation sub-committee submitted a dozen changes which it has made in the new co-ordination ordinance to Attorney Walter L. Fisher, legal representative of Federal Judge James H. Wilkerson. The changes are all technical and tend to strengthen the city's position. If they pass Attorney Fisher, the changes will then be submitted to the local transportation companies and to the citizens' committee.

No Propaganda in Boston Broadcasts

Radio broadcasts started by the Boston Elevated Railway, Boston, Mass., to stimulate patronage and increase good will toward the road have caused Representative Sullivan, of Dorchester, to protest to Governor Allen, asserting the broadcasts were being utilized to urge continuance of public control.

Chairman Harriman of the trustees of the company has replied that the purpose of the broadcasts was simple and direct, namely, to attract more riders to the system. He said in part:

mensurate with the small expenditure and that the effort indicates a management alert to the requirements of present business methods.

"It is not the intention of the trustees now or later to attempt in any way to influence the public mind with respect to the future organization of the Boston Elevated Railway. We intend simply to tell the facts with regard to the service as they are today and explain how the road has been operated under public control."

Mr. Harriman attached a list of electric railways using the radio for advertising purposes and an article from *Aera* explaining its use in this connection.

Ancillary Receivers for New York State Railways

Judge Adler in the United States District Court in Buffalo, N. Y., has appointed William T. Plumb and Benjamin E. Tilton as ancillary receivers for the properties of the New York State Railways following an equity receivership action against the company brought by the General Finance Corporation, Utica. Judge Adler instructed them to continue the lines in operation and submit a detailed report of the condition of the company. The receivership order enjoins all creditor interests from instituting court actions against the receivers on past due claims.

Storm Hits Portland, Me.

Electric railway service at Portland, Me., was hampered severely during the week ended Dec. 21 by the double sleet storm which cut off all incoming power service and threw the lighting, power and railway load upon the Cape steam



Obstacles to Electric Railway Service in Portland

"In recent years the trustees have appropriated moderate sums for advertising to stimulate riding. The radio broadcast is in line with this effort. We believe that the objects sought are all within the scope of legitimate advertising, that the returns will be com-

plant of the Cumberland County Power & Light Company. "At no time was trolley service completely disrupted in Portland," said Fred D. Gordon, vice-president and general manager, a representative of the ELECTRIC RAILWAY JOURNAL.

De Luxe Service in Cleveland Popular

The permit for the 25-cent express motor coach service started by the Cleveland Railway between Cleveland and Cleveland Heights on Dec. 7 has been extended for six months by the Cleveland Heights Council. The original grant was for 30 days. Officers of the Cleveland Railway are pleased with the results, particularly as all the regular customers provided their own transportation to the business district prior to the time the express service was started and thus, in a small way, at least,

the express service is an aid to railway service by helping to reduce traffic congestion.

The express coaches make fast time. The aim is to give every passenger a seat, but during the rush hours this is not always achieved.

The Heights line is the first regular express service the railway has been able to operate in the Cleveland district. Moreover, it is the first local transportation line furnishing service to the Van Sweringen's new union terminal and it provides the only direct service between the Van Sweringen terminal and the Pennsylvania's East 55th Street station.

Philadelphia Wrought Up Over Transit Tangle

(Continued from Page 111)

to say: "Yes, Mr. Wilson is an inflammatory and rather incalculable factor in the transit controversy. He is impulsive, undisciplined, intractable. He ignores the traditions of the game and defies its rules. He is a perpetual insurgent, an implacable guerrilla; a shrill note of discord in the legalistic symphony; a bull in the equity china shop; a burr under the saddle of justice—pick your own metaphor. But he survives and he produces."

Included among the statements of Mr. Wilson which brought down upon his head the censure of the court were in substance the following:

"Control of P.R.T. by Mitten Management was obtained through the alluring offer to P.R.T. employees to give them stock therein through the bonus system. When these stocks aggregated majority control Mitten compelled the employees to turn over P.R.T. stock for securities in his private enterprises, illegally financed by P.R.T. funds. . . . As the plan progressed Mitten Management would have become sole owner of P.R.T. without the investment of one dollar. . . .

"P.R.T. men have never had a fair voice in the management and policies of P.R.T. Their bonus stocks were exchanged for stocks in Mitten enterprises. P.R.T. men became obligated to Mitten Management rather than to the public. . . .

" . . . a gesture of Mitten that he was founding an industrial democracy—of which, however, he was the autocratic and aggrandizing head, in the interest of himself and of the Mitten interests."

In a flaming editorial in which the *Record* asked whether after all Mr. Wilson hadn't performed a public service in showing that "there isn't any Santa Claus behind those Mitten Management whiskers," that paper admitted that "Mr. Wilson deserved his spanking as the Bad Boy of the transit litigation."

That of course is a striking instance of the extent to which the animosities have been carried. The important thing, however, is the constructive side of the picture. The round-table conferences were agreed upon after the deputy comptroller had suggested to the court the city's purchase at par of the outstanding \$30,000,000 of P.R.T. common stock, the \$14,000,000 of preferred stock and the \$25,000,000 of bonded indebtedness, as well as the condemnation of the underlying companies for \$80,000,-

000. This estimate would bring the total price to \$149,000,000.

Mr. Wilson pointed out that elimination of Mitten Management would save a yearly fee of \$1,100,000, and he figured that there would be saved also \$8,000,000 which the company pays annually as underlier rentals and \$2,400,000 in annual dividend requirements. He also declared the \$800,000 paid yearly to P.R.T. officials was excessive.

Judge McDevitt in agreeing to the conference plan called attention to the division of transit system ownership among the city, the P.R.T. and the underlying companies. He said:

"The sooner we face the music and realize that somebody has got to take over all of this—and probably the city—and run it by competent management and executives the better off will all be. Now, if we can solve that problem and put the transit system where it belongs, pay a fair and reasonable price for it, and then permit the city to employ competent persons to operate it, you will be infinitely better off than you are having a contract with P.R.T. and they with Mitten Management and the Mitten Bank Securities Corporation and three or four other companies, where

it is almost as impossible to unscramble them as it was to unscramble the railroads after the war. They have become so intertwined and interwoven now that I cannot put my finger on the line of demarcation in any of the evidence that has already been produced."

As Mr. Davies sees it, to many observers any agreement on terms for possible condemnation of the whole transit system seems far distant. Skepticism is the reigning state of mind. And in the meantime the clamor grows for speedy tunneling under the Schuylkill River in order to lay the West Philadelphia elevated tracks underground in preparation for the Pennsylvania Railroad improvements and for the extension of the city-owned Broad Street subway into the northeast section. In short, transit has become the urgent outstanding problem of the Mackey administration.

COMPANY MAKES SUBWAY OPERATING PROPOSAL

In the interim A. A. Mitten, chairman of the board of the Philadelphia Rapid Transit Company, in an open letter to Edwin R. Cox, president of the City Council, has made the following suggestions as a basis for consideration and discussion of the lease by the city of the Broad Street subway.

1. Up to such date as a new lease should be signed Philadelphia Rapid Transit will bear and absorb without reimbursement from the city the loss which stands today at over \$800,000 and is being reduced at the rate of about \$40,000 per month.

2. Philadelphia Rapid Transit will sign and urge upon the commission for its approval a new lease to run from year to year from the date of its execution which shall contain the following terms:

(a) Philadelphia Rapid Transit as lessee to operate the subway as part of the unified system.

(b) Philadelphia Rapid Transit to pay to the city monthly the net addition to its net revenues arising from Broad Street subway operation for the preceding month as reported by the board of ten, which board should be continued for this purpose.

(c) In computing subway operating expenses the board shall include to cover general and management expenses 2 per cent of subway gross revenues; this because thus far the board has included nothing on this account.

(d) In case for any reason, such as opening of subway extensions, the subway shall cause a loss in P.R.T. net revenue for one or more months, P.R.T. shall not be entitled to any repayment by the city, but such loss shall be made up from the increased revenues from subsequent months and thereafter P.R.T. payments to the city shall be resumed.

(e) Such lease to run from year to year terminable by either party at the end of the first or any later year on three months prior written notice.

Mr. Mitten stated in the letter that loss in addition to rental to P.R.T. for the full fifteen months period of operation of the subway amounted to \$826,603, although for the month of November, as for several other recent months, the subway has proved a slight financial benefit to the whole system.

That progress is being made at the round-table conferences is attested by the announcement made just before this issue of the *JOURNAL* went to press that the committee of four to which reference has been made will comprise Dr. Milo R. Maltbie, for the city comptroller; S. M. Swaab, consulting engineer, for the City Council; W. K. Myers for the P.R.T., and J. A. Emery for the Mayor. They have been instructed: (1) to make a survey of transit facilities; (2) to make a study of transit finances; (3) to make a survey of the underliers; (4) to analyze the city-company operating contract; (5) to recommend methods by which the situation can be worked out, and to estimate the results.

WATCH FOR
**A.E.R.A. Transportation
Committee's
Illustrated Brochure
Covering Three Special Trains**
to the
San Francisco Convention
and
**General Convention
Information**
To be mailed from
Association Headquarters
Feb. 15

Underground Headquarters London's Highest Commercial Structure

The fine new headquarters of the London Underground Railways combine, constructed above St. James's Park Station and crowned with a flood-lighted tower that is one of London's newest and most outstanding landmarks, is now in full use. The exterior of the building takes the form of a huge white Latin cross. It has been made familiar to the London public through the controversy which the Epstein sculptures aroused. The interior has no such sug-

James's subway station and the contiguous railway ran across a portion of the site only a few feet below street level. The foundation of the building in this region had to be straddled over the subway and the framework stanchions based on cross girders some 54 ft. in length, bridging it. The girders themselves rested on group piles at each side of the railroad.

The building is the highest commercial structure in London.



Impressive structure which houses London Underground officers and staff

gestion of towering solidity. The impression is rather one of simplicity, softness, and polished cleanness.

The whole building gives a sense of utility and of a certain austerity without discomfort. It has its own water supply pumped from an artesian well 500 ft. below the ground level to tanks alongside the balconies of the tenth and top floor. Its electricity is drawn from Lot's Road power station of the Underground Company, and transformed to the required voltage in the basement. Here, too, are an automatic telephone exchange and a kitchen for the supply of afternoon tea to the 1,000 occupants of the offices. The business part of the building extends upwards only to the tenth floor, but above that rises the tower with a 60-ft. flagpole above it. This is both a landmark by day and by night. It affords a fine view to those who are privileged to ascend it.

Not being a virgin site, certain inherited difficulties presented themselves in the construction of the building. St.

476 Miles to Be Electrified in Switzerland

The complete list of railway lines in Switzerland to be electrified within the next seven years is as follows:

Line	Length in Kilometers	When to Be Electrified
Neuchatel-Chaux-de-Fonds-Col-des-Roches.....	38	1930-31
Delemont-Basel.....	38	1930-31
Delemont-Delle.....	40	1931-32
Wallisellen - Uster - Rapperswil-Uznach-Ziegelbrücke.....	46	1931-32
Zurich-Affoltern-Zug.....	36	1931-32
Biel-Soneboz-Chaux-de-Fonds..	44	1932-33
Berne-Lucerne.....	84	1932-34
Rorschach-Buchs.....	49	1933-34
Gossau-Sulgen.....	23	1934-35
Neuchatel-les-Verrieres.....	35	1934-35
Soneboz-Moutier.....	25	1935-36
Guibiasco-Locarno.....	18	1935-36

476

Sydney, Australia — Construction of Eastern Suburbs Electric Railway in New South Wales has been postponed owing to shortage of funds for new works.

Paris Subway Fusion Takes Effect

Amalgamation of the Metropolitan and the Nord-Sud railways of Paris gives Paris a unified subway system with more than 200 stations and approximately 70 miles of double track. There has always been a close working agreement between the two lines, with interchange of traffic. From the administrative and operating standpoints, however, useful economies may be expected. It has been reasonably claimed for Paris that, in proportion to its size and population, the city has a more closely-woven network of sub-surface railroads than any other city in the world, there being, roughly speaking, 1 mile of double-track underground railroad to every 42,857 of inhabitants. Yet in many respects comparison between the underground transport system of Paris and similar systems in other large cities cannot be justified, because at present, in the case of the French capital, all of the lines terminate at the city boundary. In the not distant future, however, this condition will be altered, for several lines which extend into the nearer suburbs are scheduled for early construction, and one is even now being built. There is also a larger project, which has been sanctioned by the Prefecture of the Seine, which will carry the lines still further afield, and thus bring Paris into line with large metropolitan centers elsewhere.

Rome, Italy—Rome is at last to have its metropolitan subway system, the decision having been made at a recent meeting of the Superior Council of Public Works. The system will, when completed, consist of three lines, called A, B, and C. Line A's total length will be between 6 and 7 miles. It will cost \$16,500,000. Line B will be 3½ miles long. It will cost about \$8,600,000. Line C will be nearly 5 miles long. It will cost \$13,000,000. The project is particularly opportune at this moment, when it has been already decided to abolish the surface railways from the center of the city. With the abolition of the street cars, a so-called zone of silence is to be created in the center of the city.

Manchester, England—Since bus traffic is eating into the tramway revenue the tramways committee has resolved to curtail the normal tram car building program and to reduce expenditure on tramway tracks. R. Stuart Pilcher, tramway manager, says that the number of tramway passengers during the year ended March 31, 1929, had decreased by more than 5,000,000 compared with the previous year, while the number of bus passengers had increased by about the same amount. Both undertakings are run by the municipality. Mr. Pilcher recommended improvement in the tramway rolling stock, both as to seating and lighting. In a bill which the Manchester Corporation is promoting it seeks authority to run buses beyond the city, to carry freight, to enter into working agreements with other local authorities and with companies in reference to buses, and to substitute trolley vehicles or buses for existing tramways. Some of these powers are covered by the Government's road traffic bill.

\$112,000,000 in Subway Contracts in Year in New York

The New York City Board of Transportation awarded more than \$112,000,000 in rapid transit construction contracts in 1929. Contracts for eleven sections of the new city subway system and for equipment, cars, motors, signals, tracks and stations needed for its operation accounted for \$109,512,644 of this amount. The rest was allocated to work done on the B.-M.T. and I.R.T. systems under their contracts with the city.

About \$140,000,000 worth of contracts will be let during 1930. It is expected that within a short time, with the letting of the contract for the new bridge over the Gowanus Canal, an entire trunk line of the city's new subway system, except for a short link connection to the recapturable B.-M.T. Culver line, will be under construction from Broadway and 215th Street in Manhattan to the ocean front in Coney Island. The Manhattan division is now nearing completion, the spring of 1931 having been set as the date for operation of the line from the Harlem River to Chambers Street.

According to the board the \$5,000,000 car shops, storage and repair yards at 207th Street on the Harlem River water front will be finished before next spring.

Columbia Abandonment Case Before Supreme Court

The United States Supreme Court has consented to pass upon the suit between the state of South Carolina and the Columbia Railway Gas & Electric Company which originated over the suspension of railway operation in Columbia. The Supreme Court of South Carolina held that the franchise linked inseparably the operation of the electric street railway, light and power businesses—all public services—and that the railway service could not be separately abandoned. The company appealed to the Supreme Court from the decision of the state court. In their brief to the court requesting that the appeal be dismissed, the state and the city authorities contend that they have never held that a unit charter requires railway operation at a loss. They contend, however, that the company has not made an honest effort to make the service pay.

More Time Asked to Perfect Omaha Rerouting

Growing dissatisfaction with the rerouting of the Omaha & Council Bluffs Street Railway System as a result of a traffic survey conducted by Ross W. Harris, resulted in a well-attended City Council meeting on Jan. 20, open to the public. Pressure was brought to have the Council at a forthcoming meeting instruct the company to restore the routing in effect before Dec. 8.

President Shannahan requested that 90 days be allowed the company in which to make such changes as it found necessary to improve the new system, and also that the company's request for restricted parking on the main downtown streets during rush hours be granted. His request for the 90 days was denied, but the City Council passed an ordinance ordering only parallel parking on the main downtown thoroughfares during rush hours. This

ordinance is to become operative on Feb. 1. Mr. Shannahan said:

"In our opinion adequate and satisfactory service which will keep the present benefits can never be devised and supplied if changes are imposed upon the system each week. Attempts to give various groups of people exactly what they want, without reference to the rest of the system, will result eventually in no service to anybody."

His position was that if the public was not disposed to permit the company successfully to work out the rerouted system, the only alternative was to return to the old system.

Rearranging Parked Area on Broadway

W. G. Fullen, chairman of the New York Transit Commission, has proposed a plan for remodeling the park plots in Broadway, between Columbus Circle and 120th Street, to provide for inside entrance and exit on Broadway surface cars and elimination of the hazard to passengers presented by vehicular traffic in that thoroughfare. Police stanchions, forming safety zones for use of surface car passengers, have been found to afford inadequate protection. The Transit Commission would cut down the park space in the centre of the roadway, with sidewalks 4½ ft. wide installed on either side. Rearrangement of the doors on the surface cars, which officials of the Third Avenue Railway have agreed to make, will provide entrance and exit facilities on the "off" side. This new arrangement would permit several cars to stop in one block to take on and discharge passengers.

Company Rejects Proposed Jacksonville Franchise

Formal rejection by the Jacksonville Traction Company, Jacksonville, Fla., of the Miller draft of the proposed new franchise has been announced by J. P. Ingle, manager of the company. Mr. Ingle said in part:

"The operations of this company for the year ended Sept. 30, 1929, resulted in a deficit of more than \$60,000 after interest charges on its debt. No dividends have been paid on the preferred stock since 1916 and none on the common stock since 1914. With the first mortgage bonds of the company maturing March 1, 1931, and its present franchise expiring Jan. 15, 1932, and with the present earnings, it will be impossible to provide new money to pay these bonds at maturity or to pay for improvements. Recognizing this situation, the company has sought honestly and earnestly for a new franchise fair to it and to the city.

"The franchise recently prepared by the city attorney is even more burdensome than the present one. Under the proposed terms the company could not survive.

"We desire earnestly to co-operate with you in a fair solution of the situation and will welcome an opportunity to negotiate with you on such a basis. We are convinced, however, that no solution could be reached on any terms even approaching those in the proposed franchise and we therefore feel that an attempt to arrive at a workable franchise from such a base would be of no avail.

"We hope sincerely that you will recognize the justice of our position and order a new draft prepared which will make possible the object we both wish to accomplish, namely, adequate service to the public on a fair basis."

Attractive Transportation Guide to Binghamton

The first issue of the "Triple Cities Transportation Guide," published by the Triple Cities Traction Company, Binghamton, N. Y., has been mailed to more than 40,000 persons and concerns in the community, through the co-operation of the Binghamton Light, Heat & Power Company. In an introductory statement, attention is invited to the fact that the company serves a community of 130,000 population, has 50 miles of trolley tracks, operates buses over routes aggregating 30 miles, and has a universal transfer system which allows patrons to complete their journeys by bus or trolley without additional cost. The guide lists all trolley and bus lines, with their transfer points, and gives time schedules. The last page of the folder carries a half-tone reproduction of a photograph of the first electric car in Binghamton, taken in July, 1886.

Status of Service-at-Cost at Rochester

With the New York State Railways thrown into a receivership, status of the service-at-cost contract between the railways and the city of Rochester is doubtful. The contract would expire on Aug. 1, but under its provisions, in the event of a receivership, it becomes void unless the City Council passes special legislation to retain it. If the contract is declared void, a 5-cent fare automatically goes into effect under a strict interpretation of the terms of the document. Realizing that such a course would be ruinous to the company it is believed that the Council will authorize retention of the present contract until Aug. 1. It is expected that negotiations will be started at once toward drafting a new contract. A deadlock on all municipal legislation in 1930 is threatened, with four regular and four insurgent Republicans, and the Mayor too ill to take part.

No Hope for Seattle to Do Better on Purchase

Councilman Blaine, head of the finance committee of the City Council of Seattle, Wash., who is on a visit to eastern cities, says that, in his opinion, Seattle has virtually no chance at this time of refinancing its municipal railway purchase debt with new bonds longer in life than those issued originally. He declares the two-year moratorium arranged by Mayor Edwards with A. W. Leonard, president of the Puget Sound Power & Light Company, offers the city the only way out of the critical financial situation affecting the railway. During his absence, Mr. Blaine's colleagues have passed an ordinance providing for acceptance of the two years extension of time on the 1930 and 1931 installments offered by Mr. Leonard. They are now considering passage of an alternative bill which would provide for actual retirement of the 1930 installment of \$833,000 with new twenty-year bonds.

Renewal of Toledo Ordinance an Issue

City officials of Toledo, Ohio, are studying the Milner ordinance, under which the Community Traction Company operates, in an effort to prevent any increase in the fare due to the provisions of the ordinance. After the expiration of the first ten years of its operation, the ordinance must be extended or an amortization fund be set up to retire the bonds and preferred stock of the Community Traction Company. Street Railway Commissioner E. L. Graumlich estimated that a fare increase of 1½ cents over the present rates would be necessary to set up the required amortization fund. In the event that the Milner ordinance is extended, this amortization fund will not be necessary immediately. Martin S. Dodd, city law director, said the question of the necessity of submitting this ordinance to the people for renewal is debatable.

Suggestions from Railway President on St. Louis Problems

Stanley Clarke, president of the St. Louis Public Service Company, at a meeting of the Transportation Survey Commission, on Jan. 23 took issue with some of the recommendations made in the reports of R. F. Kelker, Jr., consulting engineer of the commission, relative to traffic improvements. At the suggestion of Mayor Miller, Mr. Clarke will submit a written report in which he will give his own suggestions for improving traffic conditions in the city.

Mr. Clarke expressed the belief that Mr. Kelker was considering the question in terms of vehicles rather than of people. Wider streets and super-highways would serve to bring more vehicles into the congested districts, while the big problem was how to get more people into the business section. This could best be done by making it possible for street cars to move more freely. He said that street cars do not require wide streets if other vehicles are kept out of the way.

Mr. Kelker concluded that subways downtown would not be of much benefit to street car riders, but Mr. Clarke held them of "immeasurable benefit."

In discussing traffic conditions in the business district Mr. Clarke pointed out that 40 per cent of cars on the Olive Street lines frequently are rerouted at Twelfth Boulevard due to congestion east of that thoroughfare.

South Shore Plans New Freight Terminal for South Bend

Another step has been taken by the Chicago, South Shore & South Bend Railroad in its plan to eliminate freight traffic over the city streets in the recent acquisition of an 11½-acre tract in South Bend for the construction of a new freight terminal. The acquisition and development of this property, according to plans of the line, will enable the company to offer shippers prompt and more convenient service, will eliminate the movement of freight over South Bend streets and will open up highly desirable sites for industries.

The company will develop the site as a freight terminal and industrial site with inbound and outbound freight

tracks and houses. All present buildings are to be reconditioned and made suitable for the use of industrial tenants. The property is to be provided with adequate and suitable team tracks, and two large warehouses are to be reconditioned for use as inbound and outbound freight houses.

When the new terminal is completed, the South Shore Line will abandon its present freight terminal on LaSalle Street, and will discontinue the present method of handling less-than-carload freight in tractor-trailers over South Bond Street from the old freight house at Orange and Olive Streets to the LaSalle terminal.

Growth in freight business also has necessitated enlarging the South Shore Line's freight yard at Burnham, Ill. At the present time the yard has a capacity of 110 cars on two tracks. When the added trackage is installed, the yard capacity will be 550 cars. The project includes installation of two new main line tracks on the north side, the use of the present main line tracks for freight service and the addition of a fifth freight track. The yard is used for the classification of empty cars, to facilitate delivery and movement. Work on this project is now 60 per cent completed.

Abandonments in Indiana

Arthur W. Brady, receiver for the Union Traction Company of Indiana, has announced that service on the

One-Man Car Case Won by Shreveport Railways

As noted in ELECTRIC RAILWAY JOURNAL NEWS for Jan. 18, it has been indicated in a report of the District Court of the United States for the Western District of Louisiana, dated Jan. 6, in the suit in equity of the Shreveport Railways vs. City of Shreveport to enjoin the enforcement of an ordinance requiring two men on each street car, that the decree will insure the use of one-man cars: "the type of car which will give the greatest safety and efficiency." The case is important not only in its bearing on the one-man ordinance, but also because the power of the police to enforce a requirement of this kind was questioned. The report was signed by District Judge Ben C. Dawkins. It states in part:

No public service commission in any state now refuses to permit the use of one-man safety cars. Conditions are altogether different from what they were in 1917, when the Supreme Court rendered a decision in the Sullivan case favorable to two-man operation. Then the one-man car was in its experimental stage; now the safety car appears as safe as those operated with two men.

A municipality's right under its police power to interfere in matters of this kind exists only when necessary to the safety and convenience of the public. The philosophy of our institutions warrants reasonable regulations only, and there must be some real justification for the exercise of the power.

Street cars appear to be an essential means of transportation for a large portion of the population of cities and the loss of such service would be a serious handicap to a growing city. On the whole, I believe the refusal to allow the use of one-man cars of the latest type, at least until they can be properly tested, in the light of the proved experience of other cities, is arbitrary and amounts to a taking of the railway's property without due process of law,

Muncie-Union City division will be discontinued on Feb. 8, and on the Anderson-Middletown division, Feb. 28. Authority for abandonment of the two lines was granted on Jan. 23 by Judge Morrow in the Madison County Circuit Court. The Public Service Commission approved the abandonment several months ago. The Muncie-Union City line is 32.6 miles long and the Anderson-Middletown division, 9.6 miles. Mr. Brady said:

"The Muncie-Union City interurban line has been a factor of importance in the social and business life of the communities it serves for a quarter of a century, and it is with regret and reluctance that the decision to terminate has been reached. That determination has been forced by conditions beyond the control of the company. In addition to the losses caused all railway lines by the constantly increasing use of automobiles, this division has suffered acutely from the abandonment of the old Union City-Dayton line, with which for many years it interchanged a considerable volume of business. The large deficits due to these causes it has proved impossible to overcome through fare revisions, improved service or other means."

Mr. Brady expressed appreciation for the efforts recently made by business men in communities along the line to canvass their towns for enough freight traffic to put the line on a profitable basis and thus forestall abandonment of the service.

results in confiscation, and the enforcement of the ordinances complained of will be enjoined.

The comments of Judge Dawkins were preceded by a lengthy report of a master. Among his findings, included in the report, are:

That the city ordinances existed and would be enforced as alleged, unless the court intervenes; that the net return upon the present value of the railway was approximately 0.0243 per cent; that the property was economically managed; that operating expense, exclusive of depreciation and taxes, was 0.2323 cent per car-mile, as compared to 0.271 cent for 24 similar companies; that no dividends have been paid since 1923; that one-man operation will effect a saving of \$93,922 a year in wages, and that it would not be necessary to discharge any employees in making the change.

That, from the evidentiary facts, the one-man car, a modern safety car equipped with all the automatic safety devices, has been shown by a clear preponderance of the testimony to be safer than its predecessor, the two-man car.

That the speed and schedules of street car systems have been increased under one-man operation, that companies are able to operate more cars, that wages have been increased, and that operators become more efficient and better satisfied.

That since 1917 no public service commission has refused to permit the operation of one-man cars, and since 1924, no commission has limited the right to use one-man cars subject to any particular conditions.

The court reserved to the defendants the right to apply for a modification of the decree should the conditions warrant.

The case for the company was most ably presented by W. H. Armbricht of Armbricht, Hand & Twitty, Mobile, Ala., and A. B. Freyer of Wis., Randolph, Rendell & Freyer, Shreveport, La.

Southern Equipment Men

Analyze Maintenance Practices

NO TYPE of equipment escaped analysis at the meeting of the Electric Railway Association of Equipment Men, Southern Properties, held at Birmingham, Ala., on Jan. 27, 28 and 29. All were covered in the papers presented, either from the standpoint of their maintenance or their application. Papers on maintenance subjects covered armature room tests, car lubrication and inspection. Other papers covered a variety of subjects, including the new Pittsburgh car.

Practically all of the second day was devoted to the discussion of the association's questionnaire. A total of 53 live questions were entered and each provoked many valuable ideas.

Every detail of Pittsburgh's new aluminum car was given by D. H. Bell, engineer of equipment Pittsburgh Railways, in the first paper presented. In introducing his subject Mr. Bell said:

"There undoubtedly exists in the electric railway industry today the economic need for a new vehicle to supersede the present street car. The need is paramount on account of the increasing competition of the private automobile and the motor coach. Whether this new vehicle will operate on the rails or rubber tires is at present impossible to determine because of the many variable factors. There are, however, certain fundamental characteristics which any new vehicle should embody if it hopes to find its place and be adopted by the electric railways."

An article describing the Pittsburgh car appeared in the JOURNAL for July, 1929.

Q. W. Hershey, supervisor of maintenance sales Westinghouse Electric & Manufacturing Company, in his talk on co-operation between operator and manufacturer, declared that "Probably no other businesses in the world are so intimately interdependent as are the electrical equipment manufacturer and the operator utilizing this equipment in public service."

According to Perkins Prewitt managing director Birmingham Safety Council "everything material wears out, and the only way to prevent accidents from equipment failures is to set a high standard of maintenance and accompany this character of work with frequent inspections."

Some of the tests more commonly used in the armature room and the merits of each were outlined by R. S. Beers, General Electric Company.

"Car Lubrication" was the subject of a paper prepared by A. T. Clark, superintendent of rolling stock and shops United Railways & Electric Company, Baltimore. Summarizing the results of more than three years of use of a new lubrication, Mr. Clark stated:

"Power consumption has been reduced and during the winter months shows only a slight increase over the summer months, improved lubrication as borne out by tests has resulted, cars drift and coast as never before due to better lubrication and greater air-brake piston travel, and the total cost of oils, wool waste and bearings on the car-mile basis is lower today than it was in 1926, notwithstanding the use today of higher cost oil and all wool waste."

"The urban transportation industry is confronted with a form of competition which came into being gradually and insidiously but which today is tremendously effective. I refer to the private automobile." With this introduction the paper on motor bus transportation, prepared by C. S. Sale, president of the American Car & Foundry Motors Company, and presented by L. H. Hyneman, launched into an analysis of recent bus developments. Mr. Sale referred to the difficulties surrounding rail operation in cities of from 50,000 to 75,000 inhabitants, and added that buses in many cases would reduce operating expenses and build up riding. The speaker also discussed the use of trackless trolleys for certain lines.

That close inspection, other than reducing maintenance cost, is nothing more or less than a necessary part of meeting the ever present public demand for better service was the key thought expressed by J. J. Vaughan, master mechanic Memphis Street Railway, in a paper on inspection.

"A New Era in Street Car Mechanics

and Operation" was the subject of a paper by N. R. Brownier, railway engineer Timken-Detroit Axle Company, presented by H. J. Lidkea. "There has been much conversation on the subject of modernization in rolling stock," Mr. Brownier stated, "but too often this led only to a revision in paint schemes, floor coverings or seat styles, while improvements in the mechanics were invariably neglected." Mr. Brownier outlined in detail the development of the new Timken-Detroit worm-drive truck and the features of the truck designed to reduce noise, lower maintenance cost, increase efficiency, reduce the unsprung weight, increase braking rates and improve the performance.

In discussing the possibilities of the electric coach, Walter S. Rainville, equipment engineer, New Orleans Public Service, Inc., said:

"We feel that its future is assured because it is speedy, safe, comfortable, dependable, economical and modern in every respect. It is improbable that the electric coach will displace the street car for handling mass transportation on heavy lines, but there are lines on which travel is light, where the coach can be substituted profitably. It should also find application in extensions to existing lines where additional track would involve heavy first costs.

Officers were re-elected at the opening of the third day. They are: A. Taurman, president; W. H. McAloney, vice-president, and L. O. Eiffert, secretary-treasurer.

Conspectus of Indexes for January, 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*	Jan., 1930 7.85	Dec., 1929 7.78	Jan., 1929 7.71	Jan., 1930 7.85	Jan., 1925 7.24
1913 = 4.84					
Electric Railway Materials*	Jan., 1930 144.4	Dec., 1929 144.9	Jan., 1929 145.3	Dec., 1926 159.2	Feb., 1928 139.5
1913 = 100					
Electric Railway Wages*	Jan., 1930 231.3	Dec., 1929 231.1	Jan., 1929 229.9	Jan., 1930 231.3	Jan., 1925 221.0
1913 = 100					
Electric Ry. Construction Cost	Jan., 1930 204.5	Dec., 1929 205.1	Jan., 1929 204.5	Nov., 1928 205.7	July, 1929 199.0
Am. Elec. Ry. Assn. 1913 = 100					
General Construction Cost	Jan., 1930 209.0	Dec., 1929 209.5	Jan., 1929 209.4	Jan., 1927 211.5	Nov., 1927 202.0
Eng'g News-Record 1913 = 100					
Wholesale Commodities	Dec., 1929 94.2	Nov., 1929 94.4	Dec., 1928 96.7	Nov., 1925 104.5	Apr., 1927 93.7
U. S. Bur. Labor Stat. 1926 = 100					
Wholesale Commodities	Jan., 1930 11.68	Dec., 1929 12.24	Jan., 1929 12.96	Dec., 1925 14.41	Jan., 1930 11.68
Bradstreet 1913 = 9.21					
Retail Food	Dec., 1929 158.0	Nov., 1929 159.7	Dec., 1928 155.8	Nov., 1925 167.1	Apr., 1925 150.8
U. S. Bur. Labor Stat. 1913 = 100					
Cost of Living	Dec., 1929 162.0	Nov., 1929 163.3	Dec., 1928 162.1	Nov., 1925 171.8	Apr., 1929 159.3
Nat. Ind. Conf. Board 1914 = 100					
Industrial Activity	Dec., 1929 116.4	Nov., 1929 122.9	Dec., 1928 127.3	Feb., 1929 140.4	Aug., 1925 94.3
Elec. World, kw.-hr. 1923-25 = 100					
Bank Clearings	Dec., 1929 98.6	Nov., 1929 111.2	Dec., 1928 106.6	Oct., 1929 111.8	Nov., 1926 94.0
Outside N. Y. City 1926 = 100					
Business Failures	Dec., 1929 1827	Nov., 1929 1536	Dec., 1928 1673	July, 1929 1581	Sept., 1928 1348
Number	68.33	53.86	47.04	102.09	23.13
Liabilities, Millions of Dollars					

*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.

PERSONAL MENTION

L. G. Tighe, Assistant General Manager at Akron, Heads C. E. R. A.

Lawrence G. Tighe was elected president of the Central Electric Railway Association at a meeting held in Cleveland on Jan. 24. He is a director and assistant general manager of the Northern Ohio Power & Light Company, Akron, Ohio, with which he has been connected since 1916. He went from the Consumers Power Company in Michigan to Akron as general superintendent of production and distribution of the light and power division of the company. At that time the system in Akron was in a run-down condition. The equipment was not in good shape



L. G. Tighe

and the service was decidedly unsatisfactory. Mr. Tighe made a careful survey of the situation, and worked out methods whereby the system was gradually brought up to its present state of efficiency. In recognition of that work, he was made assistant general manager of the company in January, 1925.

Mr. Tighe was elected to the board of directors of the company at Akron in 1929 to take the place of Charles Currie, who died a short time before. Since his elevation to the position of assistant general manager, he has taken over the major part of the details connected with the operation of both the light and power division and the transportation division of the company.

The new president of the Central Electric Railway Association was born in Saratoga Springs, N. Y., on Oct. 10, 1886. He attended school in Schenectady but during the summer months he lived on his grandfather's farm near Saratoga. There he harbored the notion that he would like to become a real farmer. A few years in school aroused his interest in electricity with a consequent subjugation of the impulse to farm it. When he finished school, he secured employment in the works of the General Electric Company at Schenectady. He stuck to the business and studied nights. In a few years the company sent him to its branch in Detroit where he remained several years and was then promoted to a position in the Jackson, Mich., plant. He remained with the General Electric

Company until 1913 when he became connected with the Consumers Power Company in Jackson, controlled by Hodenpyl, Hardy & Company.

Mr. Tighe is nothing if not persistent. He has never put the farm idea completely out of his mind. So far, however, the nearest he has come to his original desire to become a farmer is to become the owner of some three acres of land just outside the city limits of Akron. There he has his home. He is very much interested in making this country place attractive and is a grower of flowers and shrubs. His chief recreational diversion is golf. He is a member of the Elks, Fairlawn Golf, City and Kiwanis clubs. He is fond of music and has a reasonably good voice. He is known as a "bear for work" and is happiest when he is engrossed in analysing a knotty problem.

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F. H. Dohany on Detroit Commission

Additional changes are announced in the personnel of the Detroit Street Railway Commission, charged with the responsibility of operating Detroit's municipal street railway and bus lines. John J. Gorman has resigned from the commission and Frank H. Dohany has been appointed by Mayor Bowles to succeed him. Two months ago G. Ogden Ellis resigned as president of the commission. Commissioner John J. Barlum succeeded him in that post. It is expected that Frank Couzens, successor on the board to Mr. Ellis, will be made vice-president of that body.

Mr. Gorman was appointed during the administration of John W. Smith. In a formal letter to the Mayor, Mr. Gorman said that he wished to give up his commission last fall, but at the time Mr. Barlum, now president of the body, urged him to remain until the new Mayor took office. When he accepted the appointment 2½ years ago Mr. Gorman had just retired from active business and, having no immediate plans, welcomed the opportunity of rendering a public service. However, in the past year his mortgage banking business has grown to such proportions that it now requires all his time and attention. It will be recalled that last fall he presented a definite plan for the creation of a crosstown elevated highway over the right-of-way of the railroads.

In addition to conducting an active law practice, Mr. Dohany, the new member of the commission, is a director of the American State Bank, a director and vice-president of the American Fort Street Company and president of the Southington Woods Company. He was born in Southfield, Oakland County, 55 years ago. He acquired his education at the state normal school at Ypsilanti and the Detroit College of Law. He was admitted to the bar in 1895.

G. W. Jones in Important Post in Brooklyn

George W. Jones, who has been vice-president of the Brooklyn & Queens Transit Corporation since July 1, 1929, and who, prior to that time, was vice-president and treasurer of the Brooklyn City Railroad, was appointed vice-president also of the Brooklyn-Manhattan Transit Corporation, the New York Rapid Transit Corporation and the Williamsburgh Power Plant Corporation, on Jan. 1, 1930. As indicated briefly in the *ELECTRIC RAILWAY JOURNAL* previously Mr. Jones will have charge of all contracts for materials and supplies for the four companies and will have direct charge of the purchasing department.

Mr. Jones is a veteran of the Spanish-American War and after the war was connected with the Department of the Interior of the Insular Government of Porto Rico for nine years. This department had charge of all public utilities, public lands, public buildings, public roads and the telegraph system.



G. W. Jones

During his last two years on the island, Mr. Jones was assistant commissioner of the interior for Porto Rico.

After returning to the United States, Mr. Jones was a member of the staff of the J. G. White Company for several years. Subsequently he joined the engineering firm of Sanderson & Porter. When the Brooklyn City Railroad resumed independent operation on Oct. 19, 1919, Mr. Jones was elected treasurer and five years later was also made vice-president. On July 1, 1929, he became vice-president of the Brooklyn & Queens Transit Corporation at the consolidation of the various B.-M.T. surface operating companies and the Brooklyn City Railroad into the Brooklyn & Queens Transit Corporation.

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Added Responsibility for H. W. Godfrey With P.R.T.

H. W. Godfrey, superintendent of instruction of the Surface Lines of the Philadelphia Rapid Transit Company, Philadelphia, Pa., has been appointed acting superintendent of instruction of the surface lines, buses and cabs, reporting to R. F. Tyson, vice-president.

F. G. Suria has been appointed assistant superintendent of instruction. The following chief instructors will be continued: J. W. Hall, chief instructor for the surface lines. F. Humphreys, chief instructor for the buses, S. Edwards, chief instructor for the cabs.

Miss Caroline Hein Secretary in Cincinnati

Miss Caroline Hein has been elected secretary of the Cincinnati Street Railway, Cincinnati, Ohio, to succeed Joseph Nicholson, who died on Nov. 19, 1929. Miss Hein started her railway career in December, 1917, as secretary to Walter A. Draper when he was vice-president of the Cincinnati Traction Company. A few years later she was made assistant secretary of that company and of the Ohio Traction Company.

When the Cincinnati Street Railway took over the operation of the street cars in Cincinnati in November, 1925, Miss Hein was retained as assistant secretary of the reorganized operating company. She served in that position up to her present promotion. She also acted as librarian for the railway and has established one of the best industrial libraries in Cincinnati.

F. P. Royce Retires from Stone & Webster

Frederick P. Royce is retiring as a vice-president of Stone & Webster, Inc., Boston. For the past two years Mr. Royce has devoted his time and attention to executive matters, financial problems and special studies for Stone & Webster, Inc. During 1919, in connection with Stone & Webster activities in the railway situation in New York, he acted as general manager for the receiver of the Brooklyn Rapid Transit Company, since succeeded by the Brooklyn-Manhattan Transit Corporation, and assisted in examining the situation on the Interborough Rapid Transit Company and advising about it. On Jan. 1, 1920, he became a partner in Stone & Webster in general charge of the securities division and for a year or more continued in advisory work in connection with the railway situation in New York. When Stone & Webster was incorporated, July 1, 1920, Mr. Royce became vice-president and continued in charge of the securities division until the firm of Stone & Webster & Blodgett was incorporated in January, 1927.

Mr. Royce became associated with Stone & Webster in 1909, acting first as division manager in the Management Association in charge of some of the New England companies, and shortly afterwards as vice-president of the management division, continuing with the New England companies, also the Minneapolis company, the two Houghton companies, and Paducah. He was also actively engaged in the development of new business.

Howard L. Rogers and Frederick S. Pratt also are retiring as vice-presidents of Stone & Webster, Inc.

C. M. Shelter Heads Stark Electric

Curtis M. Shelter, Canton, Ohio, general counsel for the Suburban Light & Power Company and the Utilities Service Corporation, has been elected president of the Stark Electric Railroad. Mr. Shelter succeeds W. E. Davis, who has retired from the directorate of the company. Other officers are Everett W. Sweezy, vice-president; C. E. Sperow, vice-president and general manager; O.

K. Ayers, treasurer and assistant general manager and W. H. Grimes, secretary and auditor. At the same time the appointment of Mr. Ayers as district manager for the Alliance division of the Suburban Light & Power Company was made public. He succeeds C. A. Thomas, chief engineer, who will devote his entire time to engineering work.

The Stark Electric Railroad, a branch of the Utilities Service Corporation, operates between Canton and Salem, a distance of 35 miles. Headquarters are in Alliance.

J. C. Newman Way Engineer at Richmond

J. C. Newman was transferred from Norfolk to Richmond on Jan. 1, as engineer of maintenance of way for the Virginia Electric & Power Company. Mr. Newman has been in charge of track maintenance on the Norfolk properties for several years.



J. C. Newman

Before coming to Virginia, he was engaged for three years by the Public Service Commission of New York, being in charge of track alignment and grades on the construction of rapid transit lines in New York City.

He is a native Kentuckian and was graduated from the University of Kentucky. After finishing school, he was with an oil company in Illinois for a short while and later was engaged on special work design for the Lorain Steel Company at Johnstown, Pa.

W. A. Robertson Appointed to Fort Worth

W. A. Robertson, general superintendent of the Jacksonville Traction Company, Jacksonville, Fla., has been made general superintendent of the Northern Texas Traction Company at Fort Worth, Tex. Mr. Robertson went to Jacksonville 5 years ago from Beaumont, Tex., where he was superintendent of railways for the Eastern Texas Electric Company. Prior to his work in Beaumont, he was superintendent of transportation for the Galveston-Houston Electric Company, operating an interurban between Galveston and Houston. Eight years before becoming connected with the interurban, he was employed by the Houston Electric Company, in various capacities. He has been connected with companies operated by Stone & Webster, Inc., for nearly twenty years.

Messrs. Burch and McWethy Consulting Engineers

Edward P. Burch, for many years a consulting engineer of Minneapolis, and Harold E. McWethy, for the past three years valuation engineer of the Twin City Rapid Transit Company of Minneapolis, have become associated as consultants and analysts with offices in the Foshay Tower in Minneapolis.

Mr. Burch has been engaged for more than 30 years as consultant for many railways, railroads, and power companies, on operation, valuation and consolidation questions, and in rate cases, at Minneapolis, Seattle and Everett, Detroit, and Cleveland. He is a director of the Minneapolis, Northfield & Southern Railway, and the receiver of the Minneapolis, Anoka & Cuyuna Range Railway. His book, "Electric Traction for Railway Trains," has been used as a text and reference work in many universities.

Mr. McWethy has had a broad experience in public utility valuation and statistical research. Following his graduation from the University of Wisconsin Engineering College in 1909, he spent two years as an apprentice with the Westinghouse Electric & Manufacturing Company. The next nine years he served as valuation engineer and case investigator for the Railroad Commission of Wisconsin. Then followed two years of public utility valuation work in Nashville, Philadelphia, and in the state of Mississippi, and four years as street railway engineer of the Minnesota Railroad and Warehouse Commission before he became valuation engineer for the Twin City properties.

Henry Bucher in Charge of Midland Properties

Announcement has been made by Robert M. Feustel, executive head of the Midland United Company, that the operation of the railway properties in Indiana controlled by that company would be co-ordinated under Henry Bucher, Fort Wayne, as general railway executive. The company operates power, light, railway and gas utilities in northern Indiana, particularly in the eastern section of the state.

Mr. Bucher has been railway manager of the Indiana Service Corporation for the last six years. He also had been manager of the Fort Wayne division of the Indiana Service Corporation. Mr. Bucher's office will be in Indianapolis. The position of division manager will be filled by H. E. Vordermark, who has been treasurer of the Indiana Service Corporation for many years and who for the last few years also has been vice-president.

If the petition of the Insull-controlled Central Indiana Power Company for a merger with the Terre Haute, Indianapolis & Eastern Traction Company and the Terre Haute Traction & Light Company should be approved by the Indiana Public Service Commission, the direction of all the railways would be under the divisional management of Mr. Bucher.

The Midland Company, an Insull holding company operating extensive properties in Indiana, also has made bids with bondholders for the purchase of control of the Union Traction Company of Indiana, now in receivership.

E. K. Miles in Charge in Syracuse

Earl K. Miles has mounted the business ladder from motorman to general manager of the Syracuse lines of the New York State Railways, to which post he was named on Dec. 23, at the same time that B. E. Tilton, vice-president and general manager of the system, was elected president of the company. Mr. Miles attended school at Adams and later at Albany Business College. His first real job was as a motorman in Syracuse. In 1916 he left the railway to become a mail clerk. On Jan. 1, 1919, he returned to the railway. The second step upward came in June, 1922, when he was appointed division superintendent of the Tallman division. Three years later he was made assistant to the general superintendent and shortly thereafter was made superintendent of transportation.

Jim Malone Assistant to A. D. McWhorter in Memphis

Jim Malone—no one in Memphis would think of calling him anything else—has been appointed assistant to A. D. McWhorter in directing transportation of the Memphis Street Railway, Memphis, Tenn. This step is a distinct promotion for Jim, and comes in acknowledgment of his capable work during the period that he has been associated with the office of Mr. McWhorter.

Mr. McWhorter says that Jim knows every angle of street railway transportation by experience. He also emphasized Jim's dependability at doing every job, large or small, committed to him. As general superintendent Mr. McWhorter has charge of two other departments besides transportation. Jim's duties, however, are as assistant to the transportation department.

Jim became connected with the company on Feb. 13, 1921, as traffic checker in the schedule department and has worked there in different capacities since that time. After completing a course in the Memphis Law School at night, he passed his bar examinations in June, 1929.

This fall when instructors for the men were being chosen to conduct educational classes, Jim was selected as one of them and in this work he has demonstrated his faithfulness and ability.

B. F. Braheney Elected Vice-President

Bernard F. Braheney, elected vice-president in charge of accounting of the Byllesby Engineering Management Corporation, Chicago, Ill., has been with the Byllesby organization since 1910. He started as a clerk in the auditing department of the Northern States Power Company at Stillwater, Minn. During the latter part of 1910 and 1911 he served as bookkeeper of the South St. Paul office and the White Bear, Minn., office of the Northern States Power Company. In 1912 he was paymaster of the Appalachian Power Company at Bluefield, W. Va., and later in the year was bookkeeper of the Louisville Gas & Electric Company.

In 1913 Mr. Braheney was made accountant of the Minneapolis General Electric Company in the Northern States Power Company system, and in 1915 he became

traveling auditor of the company. In 1915 he was appointed assistant general auditor of the Northern States Power Company, which position he held until 1920 when he was made assistant general auditor of the Byllesby Engineering & Management Corporation with headquarters in Chicago. Since 1923 he has been general auditor of the company.

F. K. Baker in Important State Post in West

Fred K. Baker, Everett, Wash., is the newly appointed head of the Department of Public Works for the state of Washington. This body regulates bus transportation as well as motor freight in that state, grants all certificates, passes on transfers and extensions, and makes rulings which have an important bearing on the industry. Mr. Baker has served since last August as supervisor of transportation, but late in December gave up that post, and upon the resignation of Judge Denney, who was then director, Mr. Baker was appointed to that post.

Charles F. Scott Awarded the Edison Medal

The Edison Medal of the American Institute of Electrical Engineers has been awarded to Prof. Charles F. Scott, New Haven, Conn., "for his contributions to the science and art of polyphase transmission of electrical energy."

The Edison Medal was founded by associates and friends of Thomas A. Edison, and is awarded annually for "meritorious achievement in electrical science, electrical engineering, or the electrical arts," by a committee consisting of 24 members of the American Institute of Electrical Engineers.

Charles F. Scott is professor of electrical engineering at Yale University. He was born at Athens, Ohio, on Sept. 19, 1864. He was educated at Ohio University in Athens, the Ohio State University, Columbus, from which he graduated in 1885, and Johns Hopkins University, where he engaged in graduate study for more than a year.

H. O. Crews in New Post

Halbert O. Crews, for seven years director of public relations for the Chicago Surface Lines, was recently appointed public administrator for Cook County by Governor Emmerson. He was sworn in on Jan. 24 and at once assumed charge of the office. Before his association with the Chicago Surface Lines, Mr. Crews was managing editor of a paper in Springfield, Ill. He was also at one time superintendent of departmental reports under Governor Lowden of Illinois.

W. W. Weddle Terre Haute Roadmaster

W. W. Weddle, formerly assistant roadmaster of the Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind., was promoted on Jan. 7 to the position of roadmaster. He succeeded John O'Laughlin, deceased. Mr. Weddle started work with the Terre Haute, Indianapolis & Eastern Traction Company as a section

laborer in 1907. He was made foreman in 1912, supervisor in 1921 and assistant roadmaster in 1924.

L. H. Seagrave Chairman of United States Electric Power

Louis H. Seagrave, chairman of the board of the United States Electric Power Corporation, has been elected chairman of the board of the Standard Power & Light Corporation, which will control the Standard Gas & Electric Company. Victor Emanuel, president of United States Electric Power, has been elected president of Standard Power & Light. John J. O'Brien continues as president of Standard Gas & Electric. No changes will be made in the officers of the latter company, whose stockholders also have approved the reorganization plan announced at the end of last year.

J. I. Foster in New Memphis Post

J. I. Foster, for several years superintendent of transportation with the Memphis Street Railway, Memphis, Tenn., has been appointed to direct the work of the welfare department, just established to provide a means by which the company may manifest its interest in the welfare of all employees.

Mr. Foster knows more employees probably than any other official of the organization. He has given much of his time in the past to visiting the homes where sickness or distress have come.

The company management considers the work so important and his own fitness for it so apt, that his transfer to it is to be regarded in the light of a promotion.

Mr. Foster began his railway career in Chattanooga in 1883. In 1900 when the Memphis company desired to secure an active, dependable man to assist the general superintendent, Mr. Foster was recommended, and he came to Memphis at that time as the assistant to Frank Smith.

R. B. Stearns Massachusetts Northeastern Receiver

Federal Judge Brewster has appointed Robert B. Stearns of Boston receiver for the Massachusetts Northeastern Street Railway, Haverhill, Mass., operating more than 100 miles of electric railway. He was bonded for \$35,000. Mr. Stearns was formerly vice-president, general manager and treasurer of the Eastern Massachusetts Street Railway, from which he withdrew as an officer in January, 1929, after more than ten years of service with the company.

E. A. Mitchell, formerly in charge of taxicab inspection in the Public Utilities Department, has been appointed senior street railway inspector, and assistant to George B. Avery, superintendent of public utilities, Seattle, Wash.

W. L. O'Brien has been appointed superintendent of transportation and traffic of the Rochester, Lockport & Buffalo Railway, Rochester, N. Y., succeeding A. Blaine Miles, resigned. R. W. Travisee has been appointed assistant superintendent of transportation and traffic, succeeding W. L. O'Brien, promoted.

OBITUARY

A. T. Spencer

Albert T. Spencer, general superintendent of construction and maintenance, Montreal Tramways, died at his home on Jan. 26. He had been ill about two months.

Probably the best-known way engineer in Canada, Mr. Spencer had made a reputation for himself that was international. He had held his position in Montreal since December, 1926, having come to it from the post of assistant to the general manager of the Toronto Transportation Commission. In May, 1921, he had accepted the important position of engineer of way of the Toronto Transportation Commission in anticipation of the extensive program of track rehabilitation which began when the commission took over the street railway lines of Toronto the following September. Under his direction about



A. T. Spencer

200 miles of track was rebuilt according to the most modern standards, and considerable new track was laid. The work was done in a surprisingly short time, largely because Mr. Spencer made use of the latest types of construction machinery and resorted to many novel methods.

Following the completion of the rehabilitation program, Mr. Spencer was made assistant to the general manager of the Toronto Transportation Commission in May, 1924, continuing in that position until his return to Montreal at the end of 1926.

Mr. Spencer's engineering career began in 1900 with the Dominion Coal Company at Glace Bay, N. S., where he was engaged in general construction, mining and railway work. He was field engineer with the Canadian Pacific Railway from 1903 to 1905, and until 1906 was chief of party. In 1906 he entered the employ of the Montreal Street Railway as engineer of survey, location and construction of certain projected suburban electric lines. Following the completion of this assignment he began regular work on the staff of the company and its successor, the Montreal Tramways, serving as assistant engineer in charge of maintenance of way. He left Montreal in January, 1921, to go with the Hydro-Electric Power Commission of Ontario as assistant engineer in the railway department. There he remained until his connection with the Toronto

Transportation Commission later in the same year.

For many years Mr. Spencer was active in the American Electric Railway Engineering Association. At the time of his death he was a member of the standing committee on way and structures and of the committee on nominations. He did much research on the use of special steels in trackwork and on methods of hardening rail. He was an associate member of the Engineering Institute of Canada, a member of the Association of Professional Engineers of Quebec, a member of the Association of Professional Engineers of Ontario and a member of the American Society for Municipal Improvements.

Maurice A. Welsh

Maurice A. Welsh, superintendent and traffic manager of the Waterloo, Cedar Falls & Northern Railway, Waterloo, Iowa, died at the Chicago Memorial Hospital, Chicago, Ill., on Jan. 18.

Mr. Welsh's railroad service combined hard work and outstanding ability in a very unusual degree. To his originality he coupled force and energy, being persistent to translate his ideas into action. His ability to make and retain the friendship of all who knew him was evidence of his sincerity, good faith and unflinching geniality. He was unswervingly loyal to his railroad and to his superiors. He was fair to the public and never too busy to give intelligent and sympathetic consideration to every complaint. Above all, he tempered justice to his associates with real friendliness, so that he held the respect of all who worked under him.

Mr. Welsh was born at Iron River, Mich., on March 4, 1887. He entered the service of the Illinois Central Railroad in 1903 as special agent, in which capacity he was employed until early in 1910, when he resigned to enter the Police Department of the city of Waterloo. In 1911 he accepted the position of special agent with the Waterloo, Cedar Falls & Northern Railway. On March 1, 1917, he was promoted to be superintendent with jurisdiction over the operating and claims departments, and on Dec. 20, 1922, his jurisdiction was extended to the traffic department with the title of superintendent and traffic manager.

H. C. Higgins

Henry C. Higgins, who helped to build many electric railways in Iowa, Wisconsin and Illinois in his six decades of activity as a public utilities engineer, died on Jan. 22 in Centralia, Ill., where he had resided for the past 23 years. Mr. Higgins began his career as a contractor on the Baltimore & Ohio Railroad's western lines at the age of 21 years, but afterward confined himself to the utility field. His last important executive positions were as manager of the Sterling, Dixon & Eastern Electric Railway and manager of the Lee County Lighting Company at Dixon, Ill. He was part owner and an executive of these companies from the time of their inception until July, 1907, when he retired from active business.

Julius Theobald

Julius Theobald, general manager of the Springfield Railway, Springfield, Ohio, died at his home in that city on Jan. 15, following an illness of three months. Mr. Theobald was born in Columbus 54 years ago. He attended high school there and later went to Ohio State University from which he was graduated. He entered the utility field after finishing his college work, and his ability as a leader and executive was soon recognized. After a series of promotions he accepted a position as superintendent of the Atlantic City Electric Light Company. Two years ago he went to Springfield to become general manager of the Springfield Railway.

James A. Duffy

James A. Duffy, superintendent of equipment for the Monongahela-West Penn Public Service Company, Fairmont, W. Va., for ten years, died on Jan. 1. Mr. Duffy was born at West Newton, Pa., 57 years ago. In his early manhood he moved with his family to Pittsburgh and there he was located for many years. He was employed with the Duquesne Traction Company and the Fifth Avenue Traction Company in Pittsburgh, later with the Pittsburgh Railways. From Pittsburgh Mr. Duffy went to Havana, Cuba, with the Greenwood Engineering Company, and was for some time engaged there in construction work as chief engineer, and he was also with the Havana Electric Railway in Cuba. On his return to Pittsburgh from Cuba, Mr. Duffy became master mechanic with the Pittsburgh Railways. He was also master mechanic of the Penn-Ohio System for seven years.

John O'Laughlin

John O'Laughlin, roadmaster for the Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind., died on Jan. 2. Mr. O'Laughlin was 75 years old. He started in railroad work as a water boy. He helped to build the present lines of the Erie Railroad in New York State and was with the Erie for many years. Following this he served on the Ann Arbor Railroad for some time, but in 1912 joined the Terre Haute, Indianapolis & Eastern Traction Company as roadmaster. He had been a member of the Roadmasters and Maintenance of Way Association of America since 1887.

Charles A. Lux, a founder of the Rochester, Syracuse & Eastern Railway, Syracuse, N. Y., died in that city on Jan. 22. He was 70 years old. With William P. Gannon, Mr. Lux organized the electric railway, which began operation in 1905. He also helped build other interurban lines in central New York. Later he entered the water power field. His holdings on the Salmon River were sold to the Niagara, Lockport & Ontario Power Corporation.

John B. Leighton, who served as claims adjuster for the San Francisco Municipal Railway System, San Francisco, Cal., from 1913 to 1926, died in that city Jan. 20 at the age of 73. Mr. Leighton was a pioneer street railway man of San Francisco. He served for many years as secretary of the old Presidio & Ferries Railroad, which in 1913 was absorbed by the Municipal System.

INDUSTRY MARKET AND TRADE NEWS

Heavy Stocks of Materials Necessary to Insure Uninterrupted Service

In order to maintain continuous and uninterrupted service on its street railway and motor bus lines which serve the greater part of Connecticut, the Connecticut Company is obliged to carry in stock in its car-houses and other storage facilities, more than 10,000 different parts and items of equipment and a number of different kinds of each. To keep this stock on hand at all times requires a continuous investment of more than \$1,000,000, but the amount is necessary if the effects of wear and tear on equipment are to be offset by rapid repairs and replacements.

Chief among the items of stock carried are rails, ties, poles and trolley wire, about 100,000 ties being required each year for renewal to insure safety and riding comfort.

In the course of a year the company has to replace some 7,500 panes of car window glass, while the preservation of the appearance of its rolling equipment requires the use of about 10,000 gal. of paint and varnish. About 17,000 lb. of heavy grease and 20,000 gal. of oil are needed for lubrication. The number of electric lights burnt out and replaced on the company's equipment during a year would care for the renewals of 4,500 families, while the trolley pole rope would have furnished each family with a clothes line and each could be furnished with a new broom from the stock of the latter required in cleaning the cars.

To Hasten Work on New Subway

The Board of Transportation of the city of New York will hold a public hearing on Feb. 10 on the proposed new Second Avenue trunk-line subway route linking new rapid transit lines in the easterly part of the Bronx with another new rapid transit network in Brooklyn and Queens. The hearing will be one of a series to be held between Feb. 6 and March 19 in the board's offices at 250 Hudson Street on the 100 miles of proposed new subway routes included in the \$800,000,000 project announced on Sept. 16 as the second stage of the city's subway construction program.

The Board of Transportation plans to submit definite routes to the Board of Estimate for approval this summer and expects to award about \$25,000,000 in construction contracts by fall so that work may be started during 1930. The routes as outlined in the tentative program announced on Sept. 16 call for 294 miles of track and the bare construction cost, exclusive of financing charges, equipment, power and other items, is estimated at \$438,000,000.

British Get Part of Buenos Aires Subway Car Order

Ira W. McConnell, first vice-president of Dwight P. Robinson & Company, Inc., New York, says that not all the equipment of the Buenos Aires subway will be of British manufacture. Mr. McConnell said: "We placed an order with a British firm

for 56 cars. The reason for placing the order abroad lay in the fact that we were able to obtain the cars for 15 per cent less from British manufacturers. The entire order amounts to approximately \$1,000,000. The special equipment, or most of it, is being purchased from firms in the United States.

"United States trade is maintaining its own in Argentina and home manufacturers who can prove the merit of their product are showing gains. Where there is a decided difference in price, of course, the purchasers buy abroad."

Smaller Capacities Feature Recent Bus Orders

Conspicuous among bus deliveries made during the past few weeks have been the number of units of from 18- to 23-passenger capacity, numbers of which are being ordered for de luxe and semi-de luxe service on city and intercity routes. The United Traction Company, of Albany, N. Y., has added three White Model 65 buses to its already extensive fleet, while the Denver Tramway Com-

Use of Aluminum Alloys Reduces Weight of New Cars of British Columbia Electric Railway

Additional details of the fifteen trolley cars recently delivered to the British Columbia Electric Railway by the Canadian Car & Foundry Company for service in Vancouver are now available. The cars, which are of the one-man two-man, single-end, double-truck type, embody certain features of structure and design which are rather unusual. Underframes consist of pressed-steel shapes and rolled-steel sections, with built-up body bolster, consisting of open hearth steel plates and cast-steel fillers. Sideframes consist of rolled-steel 3-in. by 2-in. angle side sills, tee bar posts, rolled-steel belt rails, rolled-steel angle side plates, grade 17 Duralumin side girders, with the same grade of material for letter boards.

Floors consist of two thicknesses—lower floor $\frac{3}{4}$ in. thick and top floor of $\frac{1}{2}$ -in. maple, with mats laid at standing spaces. Between the floors is laid a hot waterproof composition to deaden sound. Floors are screwed and nailed to stringers which are bolted to steel members in underframe. Roofs are of plain arch design, reinforced by rolled-steel carlines and steel frame bulkheads at each body end. Roof boards are tongue and groove, covered with cotton duck, laid in white lead. Trucks are of the latest design of the Canadian Car & Foundry Company, built for standard gage, with wheelbase of 5 ft. 4 in. They are equipped with a graduated spring system, said to make for easy riding qualities, and are built with particular attention to the elimination of noise. Complete weight of body and trucks is given as 39,000 lb., and the builder estimates a saving of 1,200 lb. through the use of Duralumin. Additional details of the equipment of these cars were supplied in the Annual Statistical Number of *ELECTRIC RAILWAY JOURNAL*, issued January, 1930, page 63.



Rear section of Vancouver cars is equipped with upholstered forward-facing seats, while forward section, with longitudinal seats, provides ample standing capacity

When used for two-man operation both forward doors are used for entrance, with the center and rear doors, which are provided with treadles, for exits. The section of the car forward of the center door is used as a loading reservoir, the passengers paying only as they pass to the rear to take the cross seats or to leave the car. When used for one-man operation the forward section of the forward door, nearest the operator, is used for an entrance, the other section of the forward door, as well as the center and rear doors, being used for exit. If desired, the center door can be locked, in which case the rear door and the second section of the forward door would be used as exits.



Side elevation of cars recently delivered to the British Columbia Electric Railway, showing unusual arrangement of exit doors

pany and the Pittsburgh Motor Coach Company have taken one and two, respectively, of this type. Among buses of larger type to be noted in recent deliveries are five White Model 54 buses to the Omaha & Council Bluffs Street Railway, for co-ordinated service in connection with its rerouted street railway service, two buses of the same type for the Baltimore Coach Company, and one for the Cumberland & Westernport Transit Company, of Frostburg, Md. This same company has also taken delivery of a Type Z 39-passenger Yellow coach. Los Angeles Railway has received three White Model 54 buses and one Model 54A from the same manufacturer. Two White buses of large capacity have recently been placed in service by a subsidiary of the Grays Harbor Railway & Light Company between the cities of Hoquiam and Aberdeen, Wash.

Recent deliveries by the Mack-International Motor Truck Corporation include one Mack Model BB four-cylinder 177-in. chassis to the Peoples Motor Coach Company, of Indianapolis; two Model BC six-cylinder 33-passenger city type buses to the Hamburg Railway, Hamburg, N. Y.; and five Model BC six-cylinder 20-passenger buses to the Durham Public Service Company, of Durham, N. C.

American Car & Foundries Motor Company has delivered two A.C.F. 23-passenger street car type coaches to the Stockton Electric Railway, Stockton, Cal., and four all-steel 40-passenger gas-electric metropolitan type coaches to the Boston Elevated Railway. General Motors Truck Company reports delivery of one Type W city-service bus to the Erie Railway, Erie, Pa.; three Type Z 29-passenger buses to the Louisville Railway; two Type W city-service buses to the Oklahoma Railway, Oklahoma City; five Type W observation coaches to the Milwaukee Electric Railway & Light Company; and nine Type Z buses to Public Service Co-ordinated Transport.

Linde Oxygen Plant for Portland, Ore.

The Linde Air Products Company announces the opening of an oxygen plant at 60 Knott Street, Portland, Ore.

This plant, which started operations on Nov. 19, 1929, is located on a private siding on the Oregon Washington Railroad.

A. D. Davis is superintendent of the plant and D. F. Fox, whose headquarters are at 114 Sansome Street, San Francisco, Cal., is district superintendent.

R. G. Daggett, with headquarters at the same address, is division superintendent.

Brooklyn Surface Lines to Be Rerouted

Plans to reroute surface lines in downtown Brooklyn at a cost of approximately \$100,000 were announced recently by William S. Menden, president of the Brooklyn-Manhattan Transit Corporation, at a luncheon of the Downtown Brooklyn Association, at which transportation leaders and representative business men met to discuss the downtown district's transportation and traffic needs.

Mr. Menden said that work on the installation of new curves and switches would begin immediately. He said that the B.-M.T. proposed to make the expenditure of \$100,000 to try out a scheme which might simplify the operation of surface cars in downtown Brooklyn by eliminating crossings and left-hand turns.

Merger in Electric and Hand Lift Truck Field

A recent development of definite interest and importance to the materials handling equipment field is the linking together, in ownership and management, of Barrett-Cravens Company with Walker Vehicle Company, Chicago, and

Automatic Transportation Company, Inc., Buffalo.

Walker Vehicle Company is an In-sull company, being a subsidiary of Commonwealth Edison Company. It has purchased the capital stock of Barrett-Cravens Company, manufacturer of lift trucks, lift-truck platforms, portable elevators and structural steel storage racks.

The Automatic company is the pioneer manufacturer of electric industrial trucks and tractors, while Walker Vehicle Company is one of the oldest motor truck manufacturers, having been in business since 1903. It manufactures a full line of electric trucks for street use.

Taft-Peirce Manufacturing Company, Woonsocket, R. I., has appointed Hal W. Reynolds direct factory representative in the Cleveland territory. Mr. Reynolds is experienced in the small tool and gage field. His headquarters will be at 1724 St. Clair Avenue, Cleveland, at which address he will carry a representative stock of Taft-Peirce products which include gages, tool room specialties, magnetic chucks and reamers. The territory embraced by the Cleveland office includes the northern half of Ohio.

FitzJohn Manufacturing Company, Muskegon, Mich., maker of motor coach bodies, in completing its business for 1929 enjoyed an increase in sales of approximately 17 per cent over 1928 and one of the largest years in volume of business in the history of the company. Anticipating a further increase in 1930, the company has completed an 18,000-sq-ft. addition to its plant, bringing the total area for operating purposes to 74,000 sq.ft. In addition to business enjoyed during past years, in 1929 contact was made with the White and the Studebaker organizations and standard bodies, suitable for mounting on their various chassis, are now being manufactured.

Hyatt Roller Bearing Company, Newark, N. J., announces the appointment of H. K. Porter as general sales manager. He succeeds H. O. K. Meister, promoted to be assistant general manager of the Hyatt Company. During the past fourteen years Mr. Porter has held various positions on the Hyatt sales staff. He was assistant general sales manager prior to his new assignment.

Eccles & Davies Machinery Company, Los Angeles, Cal., has been appointed sole California distributor for the sale of Krupp Widia Metal, an exceptionally tough high-speed steel. Stocks will be carried at Los Angeles for prompt service to patrons.

Wagner Electric Corporation, St. Louis, Mo., announces the appointment of Major Elam as branch manager of the Minneapolis territory. Before the war he was power engineer of the Central Illinois Light Company of Peoria, Ill., and immediately after discharge from the army he again assumed that post. He joined the Wagner Electric Corporation in 1927 as a salesman in the St. Louis territory, from which position he was transferred to the Minneapolis office as branch manager.

ELECTRIC RAILWAY MATERIAL PRICES—FEBRUARY 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.	5.60
Tin, Straits, cents per lb.	38.75
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.	\$4.55
Somerset mine run, f.o.b. mines, net ton.	1.70
Pittsburgh mine run, Pittsburgh, net ton.	1.55
Franklin, Ill., screenings, f.o.b. mines.	1.45
Central, Ill., screenings, f.o.b. mines.	1.95
Kansas screenings, Kansas City.	1.40
Track Materials—Pittsburgh	
Standard steel rails, gross ton.	\$43.00
Railroad spikes, drive $\frac{1}{4}$ in. and larger, cents per lb.	2.80
Tie plates (flat type), cents per lb.	2.15
Angla 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.	\$2.35
Sheet iron (24 gage), cents per lb.	2.70
Sheet iron, galvanized (24 gage), cents per lb.	3.35
Galvanized barbed wire, cents per lb.	3.00
Galvanized wire, ordinary, cents per lb.	3.00
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.	0.59
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.
Wood block paving 3 $\frac{1}{2}$ x 16 lb. treatment, N. Y., per sq.yd., f.o.b.	2.70
Paving brick 3 $\frac{1}{2}$ x 8 $\frac{1}{2}$ x 4, N. Y., per 1,000 in carload lots, f.o.b.	50.00
Paving brick 3 x 8 $\frac{1}{2}$ x 4, N. Y., per 1,000 in carload lots, f.o.b.	45.00
Crushed stone, $\frac{1}{2}$ -in., carload lots, N. Y., per cu.yd., delivered.	3.40
Cement, Chicago, in carload lots, without bags, f.o.b.	1.85
Gravel, $\frac{1}{2}$ -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.	14.00
Light copper, cents per lb.	11.75
Heavy yellow brass, cents per lb.	7.75
Zinc, old scrap, cents per lb.	3.00
Lead, cents per lb. (heavy).	4.00
Steel car axles, Chicago, net ton.	\$16.00
Cast iron car wheels, Chicago, gross ton.	14.00
Rails (short), Chicago, gross ton.	18.75
Rails (relaying), Chicago, gross ton (65 lb. and heavier).	28.50
Machine turnings, Chicago, gross ton.	8.00



1.

Light
Weight
(72 lb.)

2.

Never Clog with
Chain.

3.

Minimum Platform Space
Required.

4.

Lowest Maintenance and Long Life.

5.

Maximum Power (3000 lb. braking pressure).

National Brake Company, Inc.

890 Ellicott Square

General Sales Office:

Buffalo, N. Y.

The Ellicott Co., 50 Church St., New York

Canadian Representative:

Lyman Tube & Supply Co., Ltd., Montreal, Can.

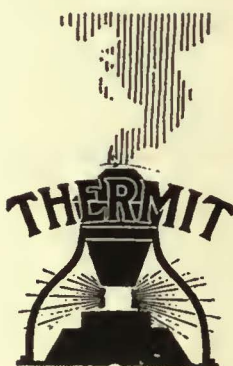
PEACOCK STAFFLESS BRAKES

A New Seneca Street



THE NEW WYE IS A GARDEN SPOT

Seneca street is finished. Completion of repaving now provides a new structure for practically every inch of the way from Main street to the city line. Three years ago IRC took the first step in actual rehabilitation of Seneca street by reconstructing its tracks and paving from the Buffalo river to city line. Last year additional work was done in the stretch from Smith street to the Larkin viaduct, and this year I R C has completed its work by reconstructing the stretch from Peabody to Bailey and the stretch from Main to Michigan.



This leaflet is one of a series of "personal messages" from President Yungbluth of the International Railway Company to the car-riders.

IRC of Buffalo, N. Y., tells its patrons . . .

"The rails instead of being joined at the end mechanically by means of a plate and bolts are *Thermit-welded*, providing practically a continuous rail structure from one end of the line to the other.

This construction makes *car riding remarkably smooth, comfortable and speedy.*"

NOTE: The italics are ours.

METAL & THERMIT

PITTSBURGH

CHICAGO

BOSTON


120 BROADWAY



WHY does the street railway management in Buffalo go out of its way to put this story before the car-riders? To advertise Thermit? Not a chance! It's to advertise *smooth, comfortable and speedy* transportation. That's all! The management in Buffalo has found Thermit Welding a means to an end—an end of rail joint troubles.

Rails become smooth, continuous ribbons of steel when Thermit welded. Joints are virtually eliminated. There are no gaps for wheels to jump. There are no rough spots to cause noise or vibration. Paving once laid need not be disturbed during the entire life of the rail itself.

Thermit Welds being pure homogeneous steel have the same electrical conductivity as the rail. Consequently no rail bonds are used when Thermit Welds are installed.

 Springtime is trackwork time !

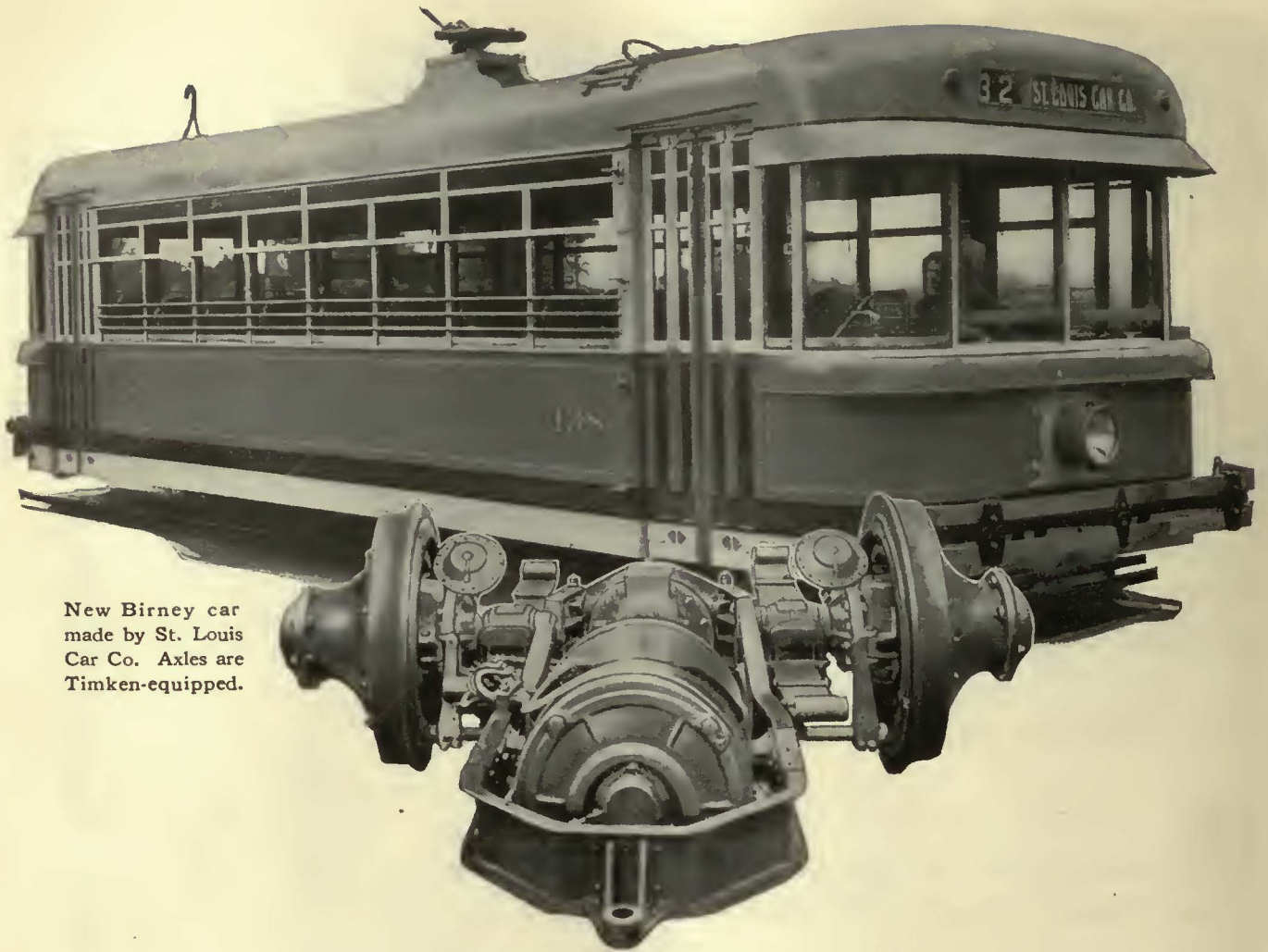
Not only in Buffalo, but in many other cities in the U.S. and Canada, reconstruction and repair programs involving Thermit Welding—are now being prepared. Include Thermit Welding in your "estimates." Information and cost data on request.

CORPORATION

NEW YORK, N.Y.

SOUTH SAN FRANCISCO

TORONTO



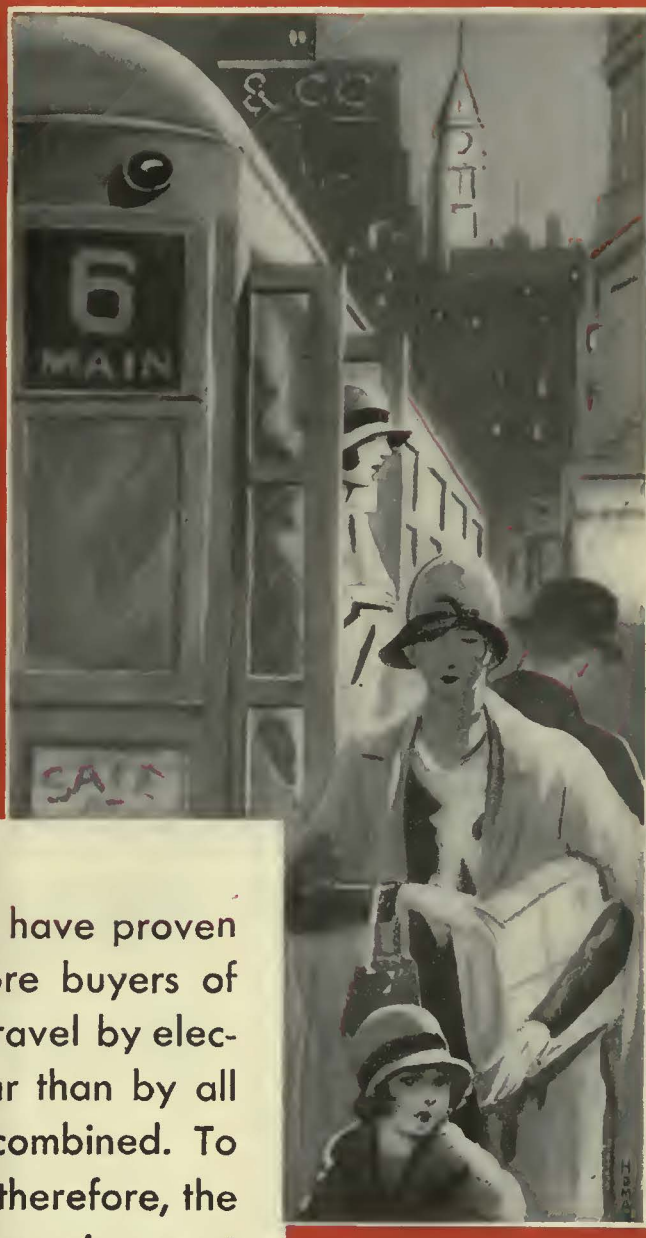
New Birney car
made by St. Louis
Car Co. Axles are
Timken-equipped.

Timken-equipped Journals Mean Increased Revenue

The final gesture in mechanical refinement is made with Timken Bearings. It is a fact, demonstrated in every division of the revenue transportation field, that sharp reductions in operating costs are brought about by the highly anti-friction performance of Timken Bearings under all loadings including thrust. Power consumption for starting, and charges for lubrication, maintenance, and depreciation are decreased because Timken Bearings supply load-carrying advantages in car journals never before attained in an anti-friction bearing. Every need for enduring economy in bearings is supplied by Timken tapered construction, Timken *POSITIVELY ALIGNED ROLLS* and Timken-made steel—wherever wheels and shafts turn.

THE TIMKEN ROLLER BEARING COMPANY
C A N T O N , O H I O

TIMKEN *Tapered Roller* BEARINGS



Careful counts have proven that many more buyers of merchandise travel by electric railway car than by all other means combined. To the merchant, therefore, the electric railway car is a most important vehicle. It is even a more important vehicle if it carries the merchant's message to the people. Through Collier Service Car Cards, the merchant urges the buyers to the stores and indirectly to use the vehicle which carries most of them.

**"CAR CARD
ADVERTISING**

**ALMOST
EVERYWHERE"**

BARRON G. COLLIER INC., CANDLER BLDG., N. Y. C.



Where Safety and Appearance Dominate

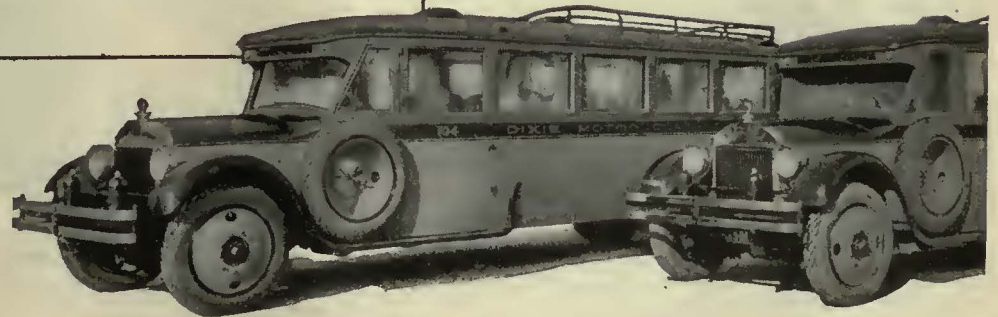
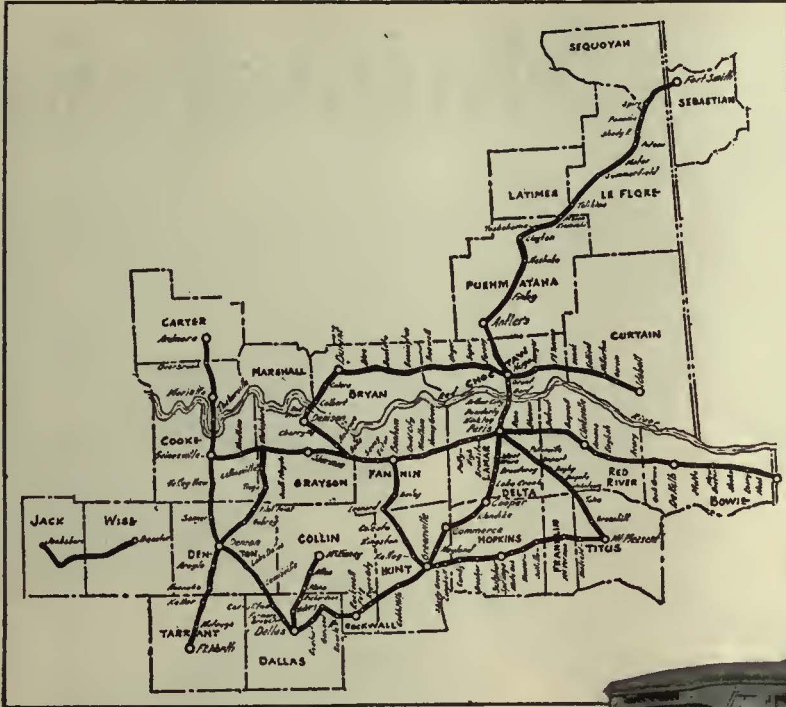
IN the heart of a busy city, where safety must be maintained at its maximum, there is nothing so important in the selection of electric line poles as the certainty of their strength and endurance. Another important factor, of course, is their appearance.

Both of these requirements are embodied in the tubular steel pole and reach their maximum effectiveness in NATIONAL Poles, because of their great strength and reliability under severe conditions of service and their clean cut, neat appearance which adds to rather than detracts from the built-up surroundings.

Wherever the factors of safety and appearance dominate, it will pay you to specify NATIONAL Poles. Made by the largest manufacturer of Tubular Products in the world, with facilities for meeting a wide range of specifications in pole construction. Ask for Bulletin No. 14—Tubular Steel Poles.

For additional protection against atmospheric corrosion use NATIONAL Copper-Steel Line Poles. Steel containing a small percentage of copper makes it more resistant to corrosion caused by alternate wet and dry conditions. The fact that tubular poles are constantly exposed to such conditions, makes the use of copper-steel particularly desirable for this purpose. Ask for Bulletin No. 11—Copper-Steel Pipe.

NATIONAL TUBE COMPANY, Pittsburgh, Pa.
Subsidiary of United States Steel Corporation



OVER 10,000 MILES PER DAY ON GOODYEARS

On the roads of Texas, Oklahoma and Arkansas, the 100 coaches of Dixie Motor Coach Corporation travel 10,780 miles per day —on Goodyear Tires.

There's a test of tire performance! Endurance, traction, long mileage soon prove themselves in such operations.

More motor coach fleets are equipped with Goodyear Tires than with any other kind. That's mighty strong evidence that it will pay you to get in touch with a Goodyear Truck Tire Service Station Dealer—and find out what his tires can do for you.

*On your new
coaches specify
Goodyears*



Maintaining



Temperatures of twenty degrees below zero—snow-covered, wind-driven roads—yet schedules must be maintained.

The Wisconsin Northern Transportation Company does it—maintaining a year round service between Duluth, Minnesota and Eau Claire, Wisconsin, 130,000 bus miles a year.

Scientific lubrication with Cities Service petroleum products, plus the use of powerful, clean burning Cities Service gasoline, makes economic operation possible even under these adverse conditions.

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

CITIES SERVICE COMPANY

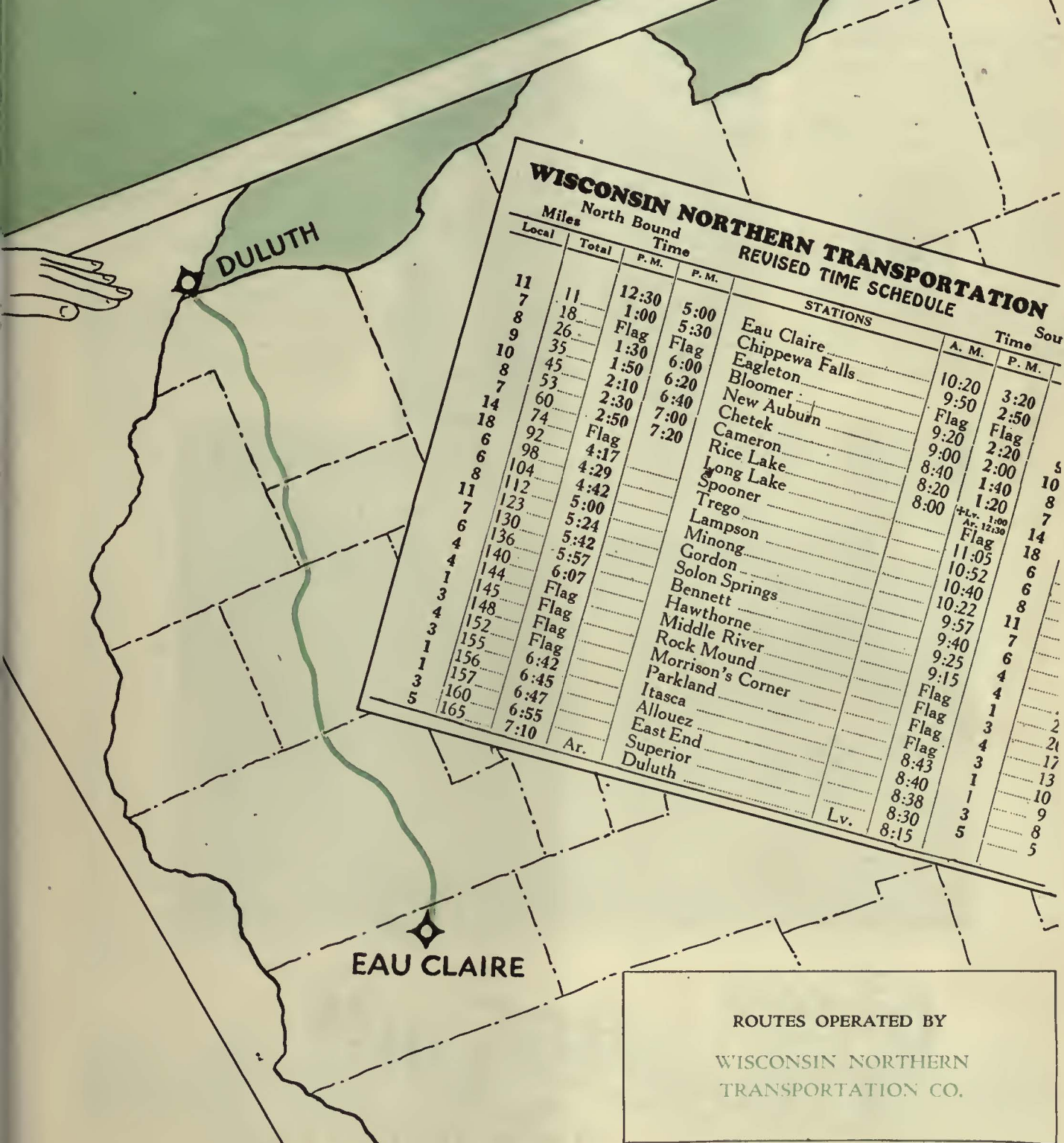
60 Wall Street

New York City



Digitized by Microsoft®

schedules in zero weather



WISCONSIN NORTHERN TRANSPORTATION REVISED TIME SCHEDULE

Local	Miles	North Bound		South Bound	
		Total	Time	Time	Time
			P. M.	P. M.	A. M.
11	11		12:30		
7	18		1:00	5:00	
8	26		Flag	5:30	
9	35		1:30	Flag	
10	45		1:50	6:00	
8	53		2:10	6:20	
7	60		2:30	6:40	
14	74		2:50	7:00	
18	92		Flag	7:20	
6	98		4:17		
6	104		4:29		
8	112		4:42		
11	123		5:00		
7	130		5:24		
6	136		5:42		
4	140		5:57		
4	144		6:07		
1	145		Flag		
4	148		Flag		
3	152		Flag		
3	155		Flag		
1	156		6:42		
1	157		6:45		
3	160		6:47		
5	165		6:55		
		Ar.	7:10		

STATIONS	Time	
	A. M.	P. M.
Eau Claire		
Chippewa Falls		
Eagleton		
Bloomer	10:20	3:20
New Auburn	9:50	2:50
Chetek	Flag	Flag
Cameron	9:20	Flag
Rice Lake	9:00	2:00
Long Lake	8:40	1:40
Spooner	8:20	1:20
Trego	8:00	1:00
Lampson	Ar. 12:30	Flag
Minong	Flag	14
Gordon	11:05	18
Solon Springs	10:52	6
Bennett	10:40	6
Hawthorne	10:22	8
Middle River	9:57	11
Rock Mound	9:40	7
Morrison's Corner	9:25	6
Parkland	9:15	4
Itasca	Flag	4
Allouez	Flag	1
East End	Flag	3
Superior	Flag	4
Duluth	8:43	3
	8:40	1
	8:38	1
	8:30	3
	8:15	5

ROUTES OPERATED BY
WISCONSIN NORTHERN
TRANSPORTATION CO.

from ATLANTA...

a study of traction advance

THE photograph shows an interesting example of the Georgia Power Company's extensive track reconstruction work in 1929. Mitchell Street, Atlanta—2,250 feet of track.

The type of construction built by Mr. C. A. Smith, Superintendent of Roadways: Concrete beams under rails; Dayton ties bent so as to require minimum amount of concrete, spaced 3 ft. center to center of ties (see photo); 80-lb. A.S.C.E. rail . . . and, of course, a stress-absorbing cushion between the rails and the concrete paving—the Carey



Elastite System of Track Insulation, standard A, B and D sections.

A guaranty of quicker, better, smoother service and lower maintenance cost. Of course, you will want full information on this modern traction improvement. Write.

AN interesting view of the construction work of the Georgia Power Company Street Railway, on Mitchell Street, Atlanta. Note particularly the application of Carey Elastite System of Track Insulation.



Carey Elastite
TRADE MARK REG. U.S. PATENT OFFICE
SYSTEM OF TRACK INSULATION





CHANGE-OVERS WITH GOODYEAR TYPE "K" RIMS easy, rapid way to greater profits

CUT down change-overs with Goodyear Type "K" rims offer you a quick increase in profits for your trucks.

Nothing complicated—you simply cut down your old solid-equipped wheels and weld on single or dual Type "K" felloes. You get better service from your trucks; your drivers like the new power. Your repair bills are smaller, and your lay-ups shorter.

Mr. E. W. Wiedebusch, President, Builders Supplies & Fuel Co., Wheeling, W. Va., takes time enthusiastically to write: "Most pleased with this installation and results obtained. We have been able to get into places that were before im-

possible. Our repair bills have been smaller, and with our drivers and every one connected with our trucking department so much better satisfied, we have secured considerable new business."

Type "K" Rims are trim, clean, cool running.



You can take any tire off in three minutes or less. They are safe because they stay on the tire until your repair boss says the word—then off with least loss of time.

Leading truck and bus manufacturers and users everywhere emphatically endorse Type "K" Rims. Write today to Goodyear, Akron, Ohio, or Los Angeles, California, for complete information.

"The Man who changes the tires likes Goodyear Type 'K' Rims"



TYPE "K" TRUCK AND BUS RIM EQUIPMENT



New!

*... an important development
in varnished cambric tape*

SEAMLESS bias varnished cloth at the price of sewn bias! That's what a specially developed base cloth has made possible.

Price no longer need compel you to waste time and insulation in cutting out sewn seams. This new seamless bias comes in long, continuous lengths, without sewn joints. It has greater dielectric and mechanical strength than the sewn bias.

Whether it be for wrapping cable joints, for winding coils, or for any similar insulating need, you will find this new seamless bias tape ideal. It's made in either black or yellow finish, in tape form or in rolls approximately 36" wide.

Send for a sample.

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.

Empire Oiled Insulations: Super-Micanite, and Micanite bonded mica insulation; Mica Insulating Varnishes; Compounds, Cements, Friction and Rubber Tapes are products of the Mica Insulator Company.



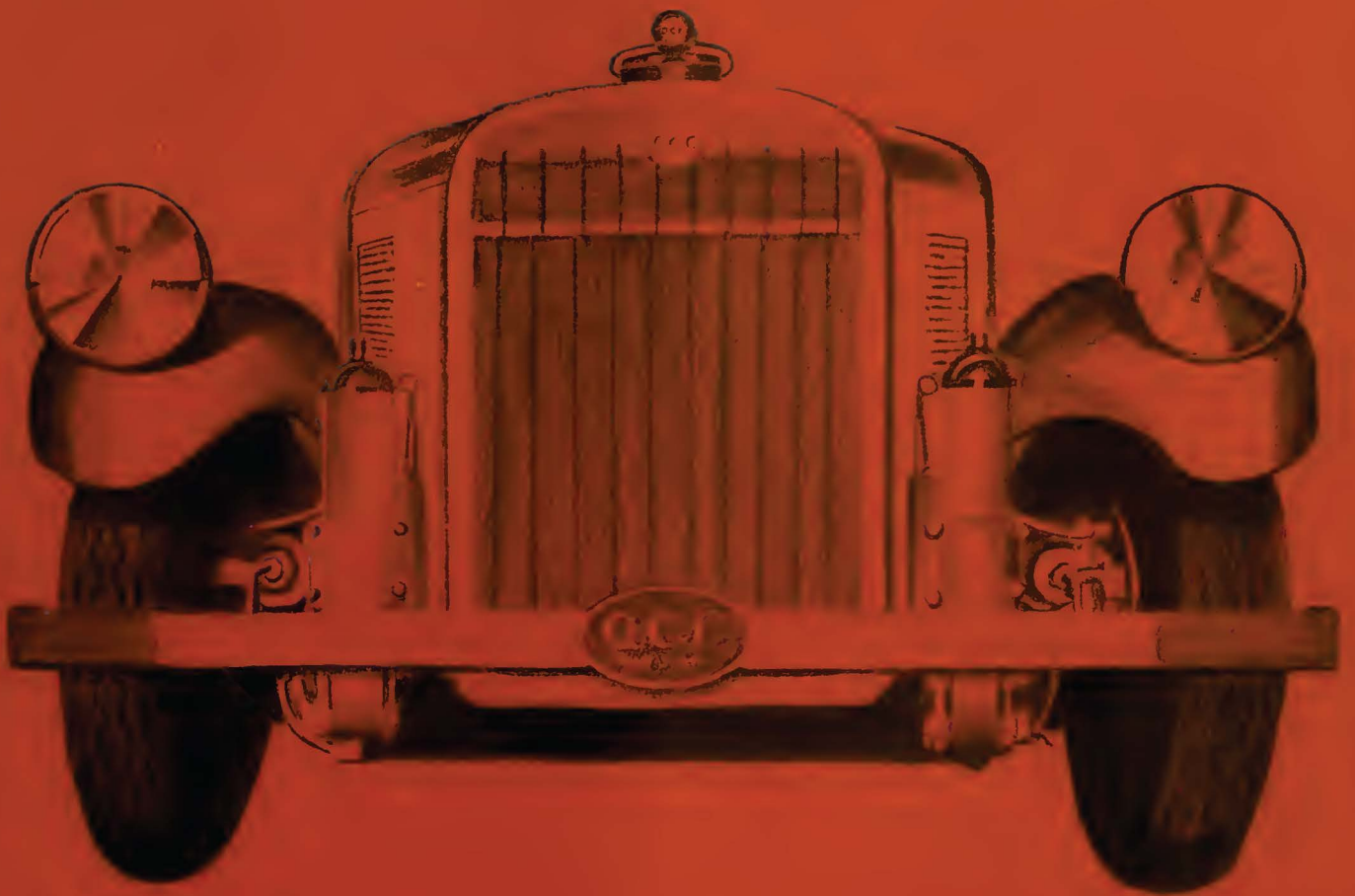
Electrical INSULATION



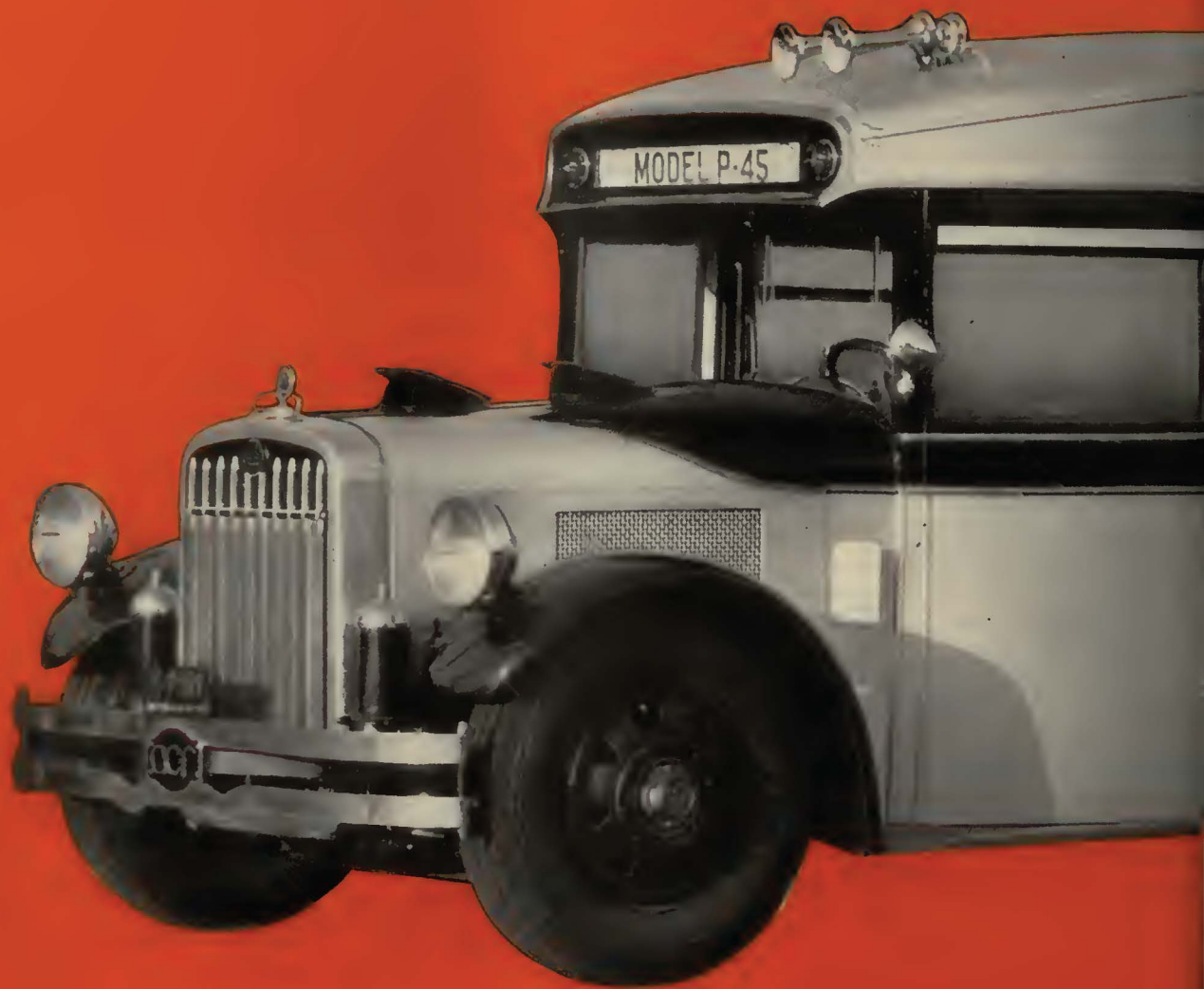
MICA INSULATION

OILED CLOTH INSULATION

a.c.f.



ANNOUNCING—*new* large capacity coaches
—so powerful and flexible that they set the pace in
present day traffic; with powerful engines that *keep*
high speed schedules regardless of hills. Designed and
built by A. C. F.



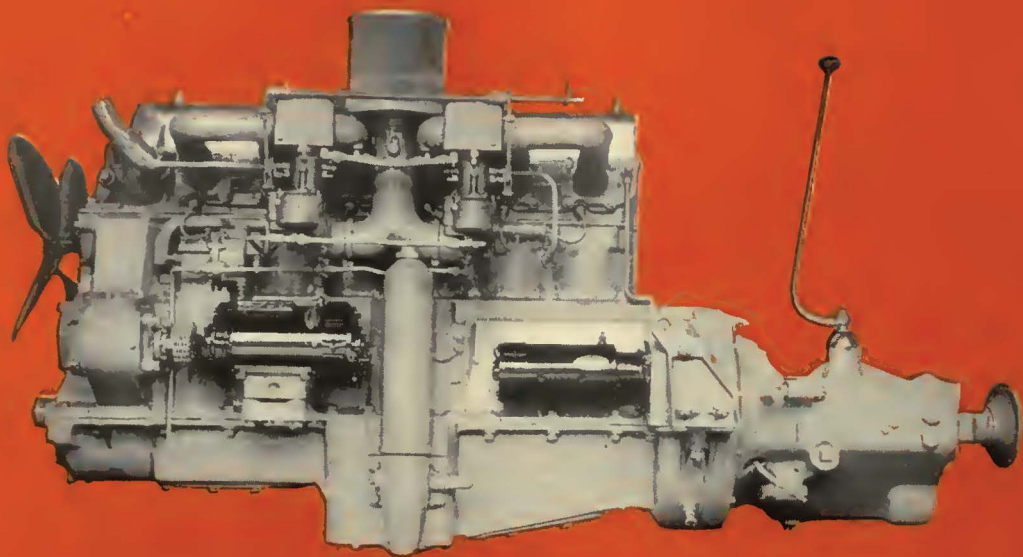
Q. C. F. offers a series of large capacity passenger coaches that are *new*—
new to Q. C. F. and new to the industry. They are not simply revamped and
modernized editions of models that have already existed. With no compromises,
Q. C. F. has brought its long experience and tremendous resources to the task
of building coaches that exactly fit the needs of modern bus transportation and
schedules . . . In appearance, the bodies of these new coaches are practically the

Designed by Marshall



same. But one chassis is designed to meet normal requirements with a 120 h. p. Hall-Scott engine, and the other is powered with a 175 h. p. Hall-Scott for unusual operating conditions where great power or sustained high speed are required. In this way the operator may obtain the same rider-appeal and exceptional operating qualities of the truly modern coach, with the horsepower his requirements call for.

University of Minnesota



Consider these revolutionary features and specifications:

Parlor Car seating capacity: Up to 37 passengers; auxiliary seats for more. 261" wheelbase where necessary . . . Headroom: 76 inches. Inside width between liner panels: 88¾ inches. Removable lift type sash on metal guides—all windows opening all the way; each pair of seats is provided with an individual window . . . Inside metal baggage racks lined with carpet (ceiling above protected) extend full length of coach . . . Inside finish: metal panelling, including ceiling, to harmonize with color scheme selected.

The location of the transmission provides unusually roomy entrance space. Transmission, drive-line and rear axles are designed specially for coaches of this series. Chassis engineered to allow adequate "roll" without stress on springs, shackles or chassis.

Three speed transmission, possible only by flexibility of new fully balanced engine. Full floating axle with bevel gear and pinion drive; Hotchkiss drive; largest and strongest axle used in any bus.

Both the 120 h. p. and 175 h. p. Hall-Scott engines are so advanced in their performances that both actual road performance and laboratory test curves show them to be from one to two years ahead of the industry. They retain all the fundamentals that have established Hall-Scott engines in the transportation field, but their refinements admit them into an entirely new class.

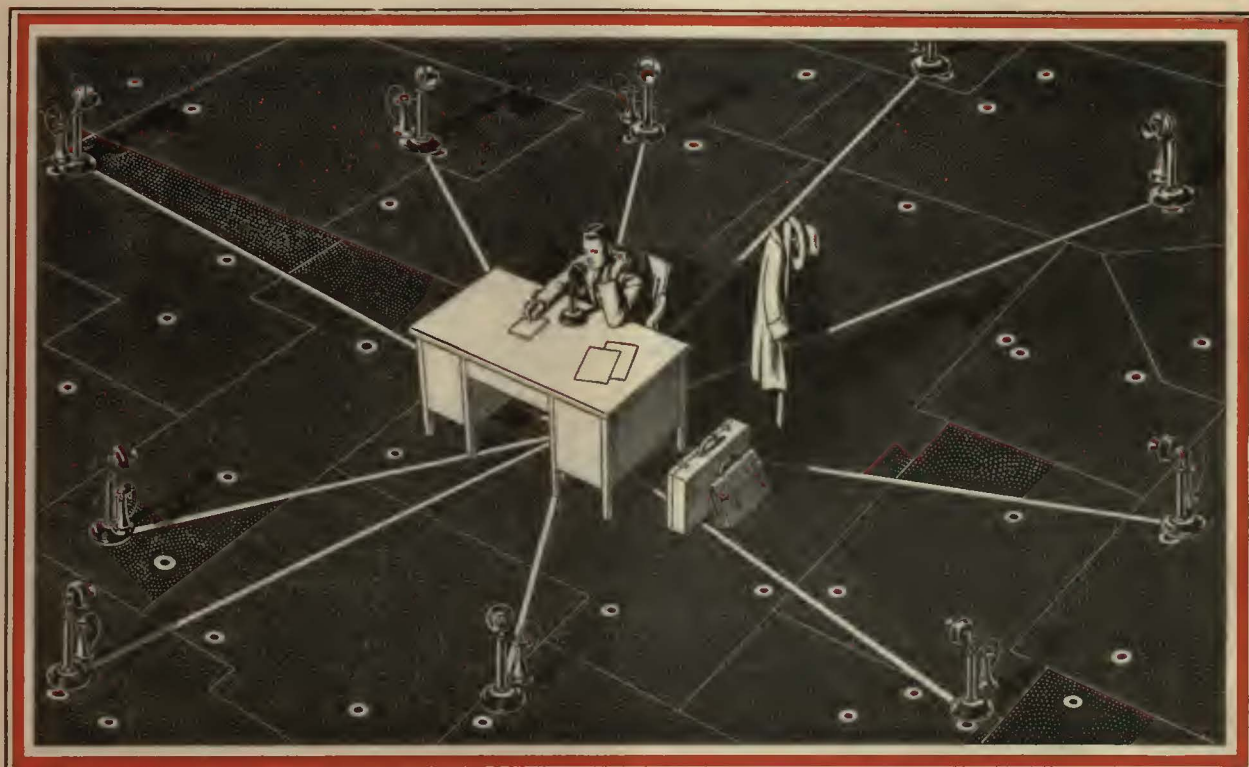
Features such as fully counterbalanced seven bearing crankshafts, with vibration dampener, dual carburetion, dual ignition, entirely new carburetion and manifolding, all contribute to this new superlative performance.

AMERICAN CAR AND FOUNDRY MOTORS COMPANY
30 CHURCH STREET . . . NEW YORK CITY



Engineered by Hall-Scott

They Cover their Territory twice as often by Telephoning from Key Towns



A MANUFACTURING company, marketing its product nationally, was faced with serious competition. Its salesmen could visit customers only at intervals of several months. They could give little time to developing new prospects. Regional mills and other competitors were making deep inroads into its business.

A Key Town Plan of telephoning was presented to this company and adopted. Its use enables the salesmen to cover their territory at least twice as often, at proportionately lower cost.

The Key Town Plan is used by many business firms to meet modern conditions. Under this method, the representative goes to the key cities in person. From these he conducts his business in the surrounding area by telephone, buying and selling goods,

building good-will, answering questions, adjusting complaints, quoting prices or specifications.

In this way he can cover territory far more quickly. Many business men alternate personal visits with telephone calls, visiting certain cities on one trip and telephoning nearby ones, and reversing the procedure the next.

There is now in effect a further reduction in various long distance rates, saving telephone users of the United States more than \$5,000,000 a year. This is the fourth reduction within little more than three years. It is part of the fundamental policy of the Bell System, which is to provide the best possible telephone service at the least cost to the public. Out of town calls are *Quick . . . Easy . . . More economical than ever.*



Look to DeVilbiss for The Exhausting Equipment Your Particular Operation Demands



COMPLETE SPRAY OUTFITS FOR EVERY PURPOSE

Spray guns of various types and sizes.
Pressure feed paint tanks and containers.
Spray booths, exhaust fans, and approved lighting fixtures.
Air compressing equipment.
Air transformers and accessories.
Air and fluid hose and connections.
Complete outfits from the smallest hand-operated units to the largest industrial installations.

HERE is the one place where all the varied industries and operations engaged in spray-painting and spray-finishing find exhausting equipment designed, built, sold and installed with true specialization.

DeVilbiss has provided exhausting equipment for every different spray-painting and spray-finishing task carried on in the world today. DeVilbiss creates exhausting equipment and spray booths for many operations whose needs cannot be adequately served by existing equipment. Whatever may be your need from the finishing of railway cars and buses to the spray-decorating of art objects, DeVilbiss brings a vast experience and a complete understanding to your exhausting problem, and DeVilbiss economically provides exactly suitable exhausting equipment.

It costs you nothing and may save you much to see us first.

DeVilbiss
Spray-PAINTING FINISHING System

THE DEVILBISS COMPANY , 272 PHILLIPS AVENUE , 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



A Comfortable, Sanitary and Modern Seat!

HERE is a seat which maintenance engineers will appreciate. Its close-woven cane webbing back and cushion are easy to keep clean. The genuine leather facing on the cushion reinforces the seat at the greatest point of wear. In addition, the individual backs and deep, spring cushions are shaped to allow proper posture and leg freedom. Mechanism rails are set in and the frame of the chair is made of selected Northern hard-grained ash, further strengthened by malleable iron braces. Write to the nearest Heywood-Wakefield sales office for complete details of the 327-M Special and other popular bus and electric railway seats in our line.



If you have not received a copy of our new Bus Seat Catalogue, write for it.

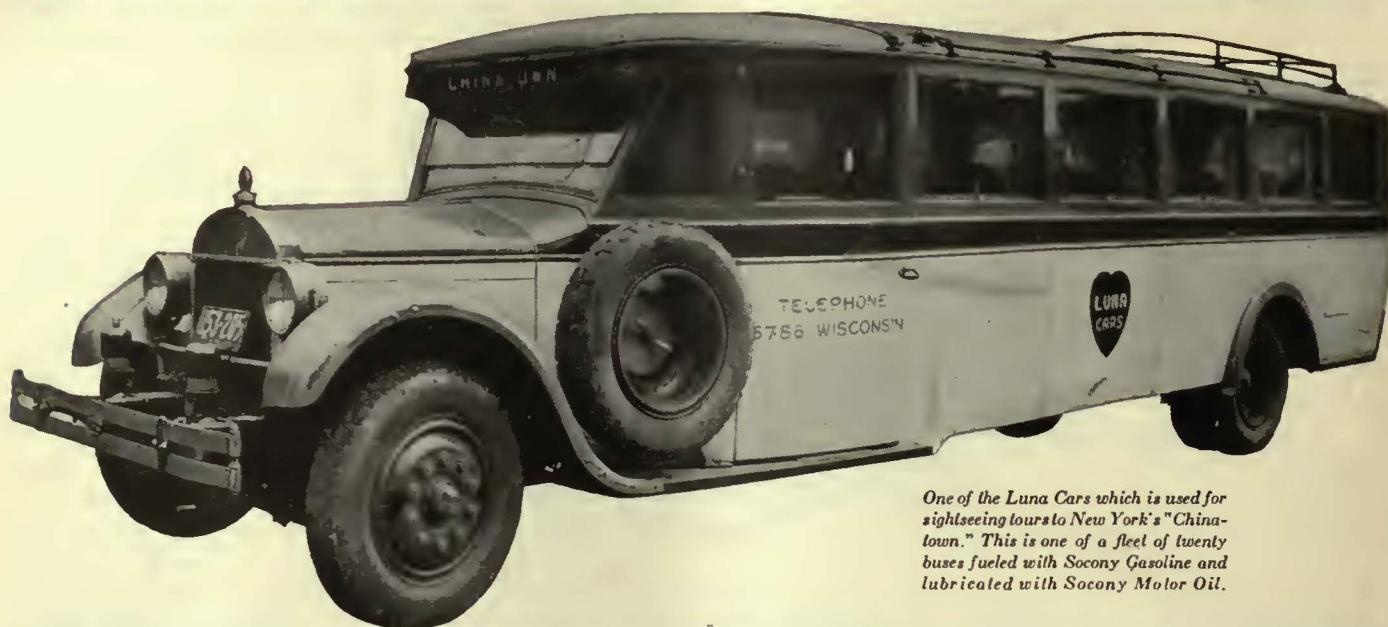
HEYWOOD - WAKEFIELD COMPANY

BOSTON, MASSACHUSETTS

516 West 34th St., New York City
J. R. Hayward, Liberty Trust Bldg., Roanoke, Va.
H. G. Cook, Hobart Bldg., San Francisco, Calif.

439 Railway Exchange Bldg., Chicago, Ill.
A. W. Arlin, Delta Bldg., Los Angeles, Calif.
The G. F. Cotter Supply Co., Houston, Texas

The Railway and Power Engineering Corporation
133 Eastern Ave., Toronto; Montreal; Winnipeg, Canada



One of the Luna Cars which is used for sightseeing tours to New York's "Chinatown." This is one of a fleet of twenty buses fueled with Socony Gasoline and lubricated with Socony Motor Oil.


Socony Lubrication *Is Bus Life Insurance*

WHEN you buy Socony lubricants, you are buying life insurance for your equipment. By providing correct lubrication, Socony products actually increase the life of the unit parts of your buses and contribute to better operating efficiency. In addition, Socony lubricants make possible longer working periods without lay-ups for repairs.

Socony lubricants have satisfied the exacting requirements of many bus operators in New York and New England—among them the operators of the Luna Cars mentioned above. Let our representative tell you what these oils will do for you.

SOCONY

MOTOR OIL AIRCRAFT OIL
(Winter Grade)

GASOLINE · SPECIAL GASOLINE *plus*  ETHYL

STANDARD OIL COMPANY OF NEW YORK

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.

NEED a
complicated layout?
••OR a
switch tongue
lock-box?



• • •
WRITE TO

LORAIN

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 Inset Construction,
Chrome Nickel Steel Inset
Construction and Built-up
Construction of all
heights and weights of rail.*

It should be particularly gratifying to know that, from the most minor piece of track equipment to the most complicated type of construction, you can look to one manufacturer for prompt, efficient, satisfactory service.

LORAIN'S experience and leadership in track-work development date all the way from horse-car days to its present modern, complete line of standard and special equipment. The service you can expect from LORAIN is more than the mere supplying of materials; it includes an appreciation of, and a helpful solution to, your every trackwork problem.

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

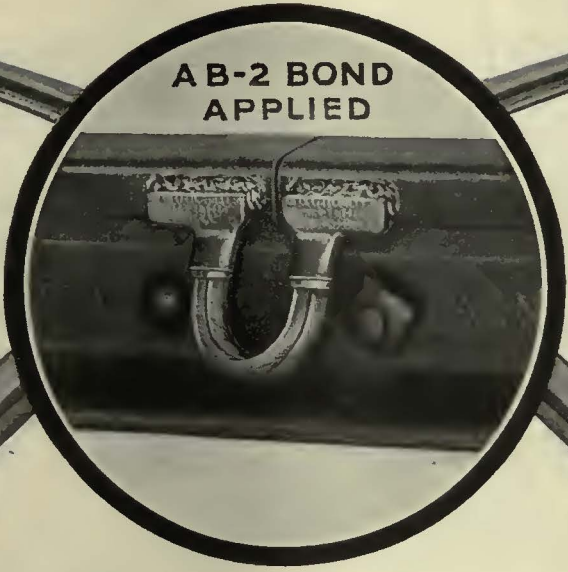
CARNEGIE STEEL COMPANY
CYCLONE FENCE COMPANY
FEDERAL SHIPBUILDING AND DRY DOCK COMPANY

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

Lorain Sales Offices—ATLANTA CHICAGO CLEVELAND DALLAS NEW YORK PHILADELPHIA PITTSBURGH



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

Dependable Service

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

Remodeling a CITY'S STREETS

with

UNION METAL POLES



A typical "street of the past". Note the obsolete cluster-type lighting standards and the trolley poles extending down the center of the street.

The same street resurfaced and modernized with on installation of Union Metal all-purpose poles.



NARROW thoroughfares, cluttered with a variety of posts and poles, fail to measure up to the standards of the modern City Beautiful.

When Union Metal Fluted Steel Poles are installed, streets take on a new, fresh, neat appearance. Unlike ordinary poles, they add to, rather than detract from the beauty of the street. They are, in themselves, pleasing to the eye.

These poles are strong enough to carry ALL necessary electrical equipment . . . trolley span wires, feeder

lines, lighting units, distribution lines, traffic signals and street signs. Consequently the number of poles along the street may be reduced as much as 75%. The curb-line forest vanishes.

Embodied in Union Metal Poles are construction principles which make them strong, light and long lived. They can be installed at a low cost. Upkeep expense is nominal. And during the many, many years they are in service, Union Metal Poles are consistent builders of good will for their owners.

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

General Electric Supply Corp.

Graybar Electric Company, Inc.

Offices in all principal cities



UNION METAL



DISTRIBUTION AND TRANSMISSION POLES

THE NEW
Mack

**6-CYLINDER BUS
MODEL B C**

**A T L A S T . . . A N
“INTERMEDIATE SIX”
—ON ROUTES WHERE
FOUR AND LIGHT-SIX
CYLINDER BUSES
ARE OVERWORKED
AND BIG SIXES UNDER-
WORKED AT HIGH OP-
ERATING COSTS...THIS
BUS CREATES PROFITS.**

This latest addition to the line of Mack Buses is the much needed "intermediate six" for city or interstate service.

It will handle profitably and comfortably up to 33 seated passengers (and an equal number of standees) without overtaxing its power.

Its outside and inside appearance and finish, with all steel base, wide service doors, roomy aisles and luxurious seats, need no selling to men who know Mack standards.



THE NEW *Mack* 6-CYCLE

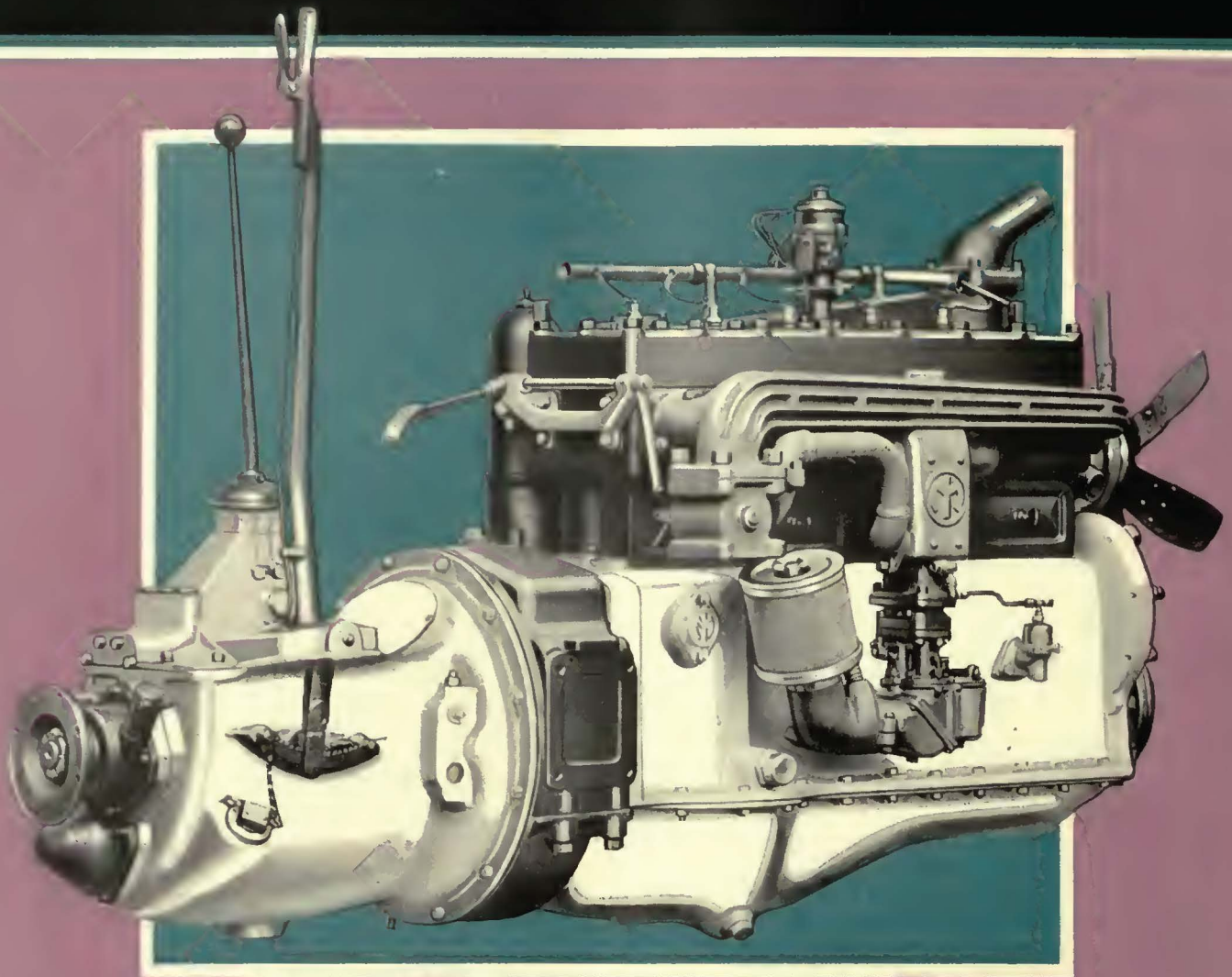
The outstanding features of this Mack BC Bus are the power and flexibility of the exceedingly compact 100 h.p. six-cylinder engine:

- the large drop-forged, case-hardened crankshaft with 7 main bearings 3" in diameter
- the silent, super-strong Mack Hypoid Bevel Gear final drive for high-speed service
- with full floating shafts in a one piece, drop forged chrome nickel steel banjo type axle.

In short, in *capacity*, in *power*, in *speed* and in construction to "stand the gaff," Mack Model BC is exactly the bus long desired to fill a definite need in the field today.



IDER BUS MODEL BC 33 SEATED PASSENGERS

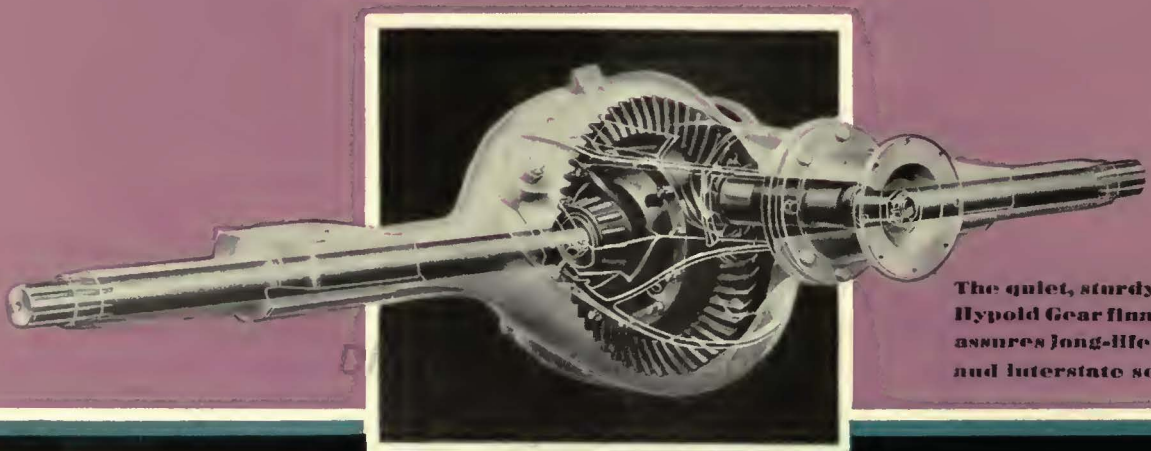


Model BC 100 h. p. six-cylinder Engine. Exclusive cold circulation type thermostatic cooling system which prevents overheating and overcooling.

A few of the Mack BC Bus users:

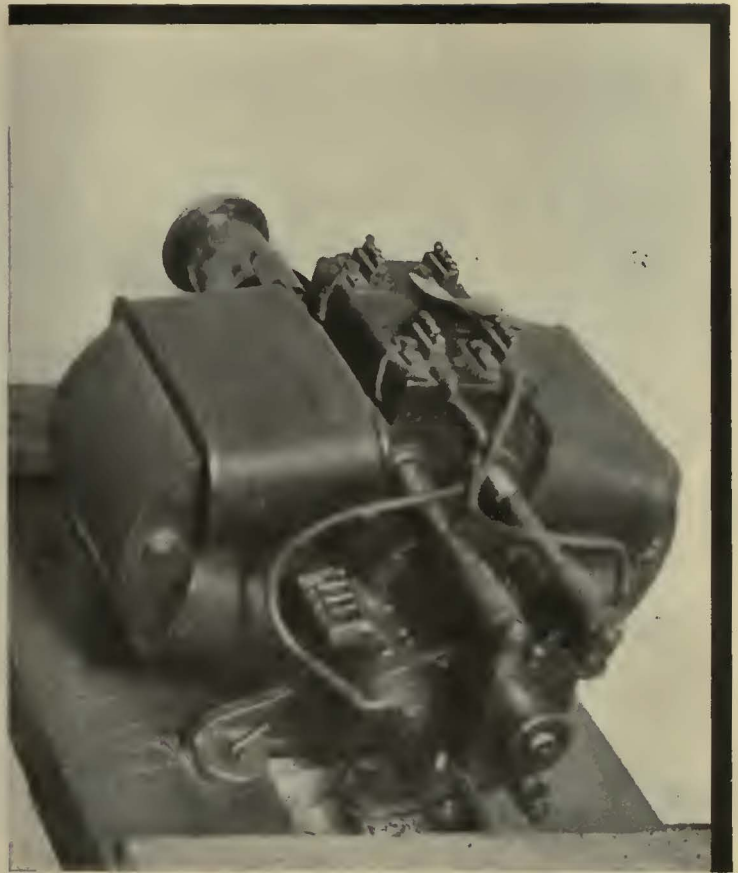
Albany Transit Co.	Albany, N. Y.	Hamburg Railway Co.	Buffalo, N. Y.
Allentown & Reading Transit Co.	Reading, Pa.	Howard Bus Line, Inc.	Columbus, Ga.
Atlantic Stages, Inc. . .	Philadelphia, Pa.	Montreal Tramways . .	Montreal, Canada
Cincinnati Street Rail- way Co.	Cincinnati, Ohio	Queen City Coach Co.	Charlotte, N. C.
C. J. Drimal	Baltimore, Md.	St. Joseph Railway, Light, Heat & Power Company	St. Joseph, Mo.
Durham Public Ser- vice Co.	Durham, N. C.	Tri-City Railway Co. . .	Davenport, Iowa
Georgia-Florida Motor Lines	Atlanta, Ga.	Charles Vollmer	Amsterdam, N. Y.
		Nathan Zeskind	Baltimore, Md.

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



The quiet, sturdy Mack Hypoid Gear final drive assures long-life in city and interstate service.

**you wouldn't
know
the old boy
now!**



Above: PERRETT, 1/2-horse-power, 110-volt D. C. motor



At left: MODERN, 1/2-horse-power, 110-volt, commutating type A. C. motor

WHEN electricity was young, the 1/2-horse-power Perrett motor pictured above was considered the latest in small motor design. It was one of the first ones built with a laminated field core. It was equipped with a row of pencil carbon brushes. Today this same motor has become obsolete. In its place we have the commutating type A.C. motor which bears but slight resemblance to its forebear. As brush manufacturers, National Carbon Company, Inc., has kept pace with this progress made by modern engineering.

The fractional horse-power motor of today, which plays such an important part, both in industry and in the home, would not have been possible without the laminated field which was a feature of the early Perrett motor. Of equal importance in this development has been the advance in brush manufacture. The exacting demands placed upon these little

motors require a brush of superior commutating characteristics and long life, free from abrasive action and quiet in operation. These needs have been met by our engineers in the Research Laboratories of National Carbon Company, Inc.

National Pyramid Brushes are manufactured under careful supervision and scientific control. They are maintaining the reputation for satisfactory performance established and held through the years of rapid development in the electrical industry.

NATIONAL CARBON COMPANY, INC.

Unit of Union Carbide **UCC** and Carbon Corporation

Carbon Sales Division



Cleveland, Ohio

Branch Offices and Factories

New York Pittsburgh Chicago Birmingham San Francisco

Here's What You Get —and more

Hundreds of Hyattized cars in operation on street railways and interurban lines throughout the country are proving the practicability of Hyatt Roller Bearings for journal box service.

With friction free Hyatts replacing plain brass journals, jerky starting and stopping is eliminated and substituted with smooth, quiet, joltless riding . . . the kind of riding comfort passengers enjoy.



From the standpoint of application, operation, dependability and greater riding comfort, Hyattized journal boxes have so many advantages in their favor that they are fast becoming the standard railway anti-friction bearing.



But Hyatt advantages don't stop there . . . operating economies, too, are provided. Hyattized journal boxes are reducing maintenance, saving power, and helping to keep the cars out of the repair shops.

Repeat orders from property after property is the best indication that Hyatts are making good. That Hyatt journal boxes conform to A. E. R. A. standards is another point in favor of their wide-spread use.

HYATT ROLLER BEARING COMPANY
NEWARK DETROIT CHICAGO PITTSBURGH OAKLAND

HYATT

ROLLER BEARINGS

Digitized by M  PRODUCT OF GENERAL MOTORS 



One of the Buses of the Higgins Transit Co. which operates between Grand Rapids, Hastings, Kalamazoo, and Battle Creek, Michigan.



“We are about to enter
our 5th Year on
Goodrich 100%,”

SAYS E. C. HIGGINS, *President*, HIGGINS TRANSIT COMPANY

MR. E. C. HIGGINS, President of the Higgins Transit Co., Hastings, Michigan, expresses a typical attitude toward Goodrich.

“Our entire fleet is equipped with Goodrich Tires.

“We are about to enter our fifth year on Goodrich; our fifth year, by the way, of very complete satisfaction, both in our dealings with Goodrich and in the consistent mileage which we have received from our tires.

“We believe you will be happy to know our true feelings. We are certainly strong for Goodrich Bus Tires, and you may rest assured that as we add to our fleet, Goodrich will be the tire equipment.”



Goodrich Distributors enable you to keep a check on “pay loads” and overloads by means of the Loadometer which indicates the weight on each wheel.



*Seven 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.”

The B. F. Goodrich Rubber Co., Established 1870, Akron, Ohio. Pacific Goodrich Rubber Co., Los Angeles, Calif. In Canada: Canadian Goodrich Co., Kitchener, Ontario.



Goodrich **HEAVY DUTY** **Silvertowns**

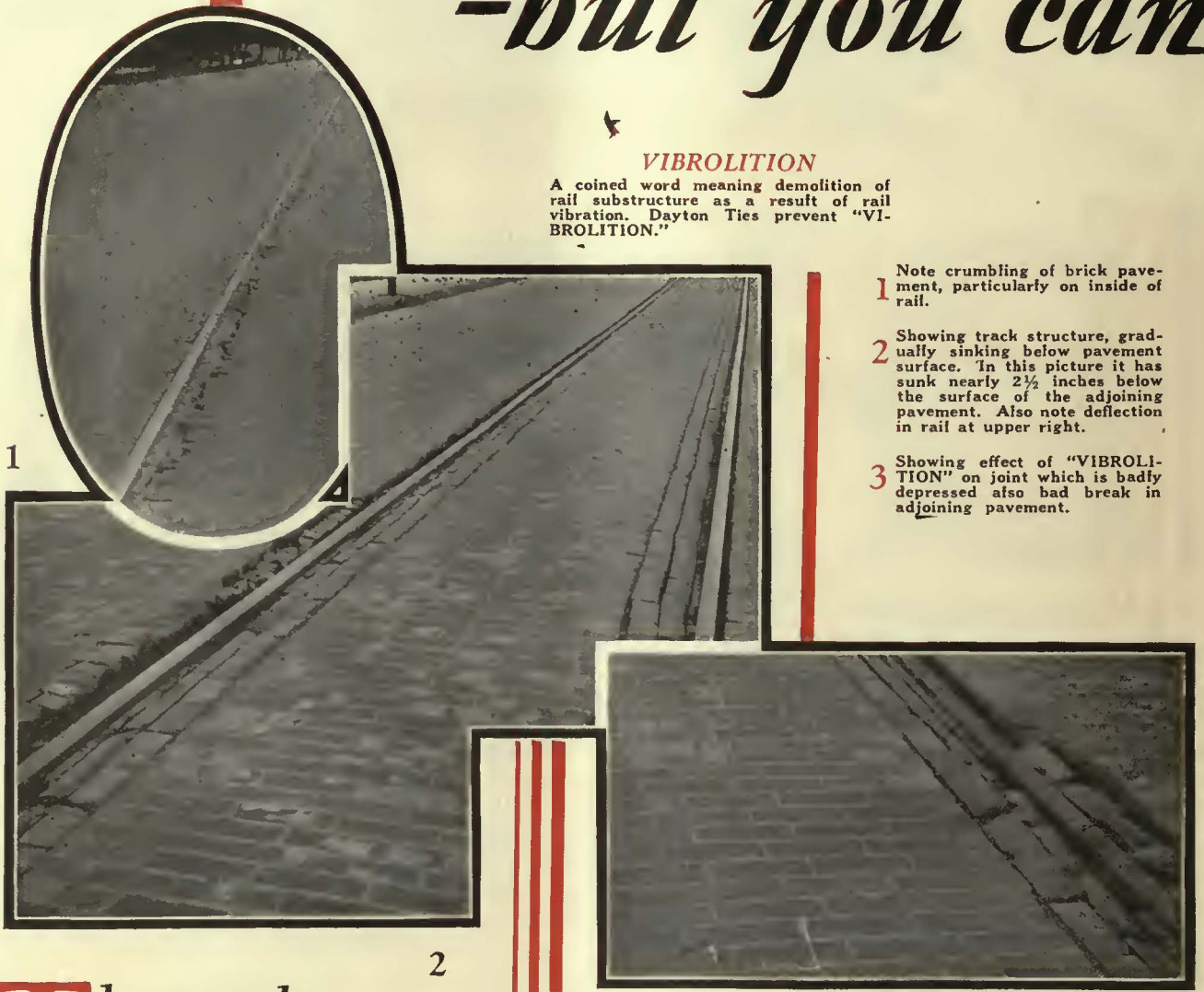


SPECIFY GOODRICH *to* **KNOW** *your* **NEW BUSES**

You *can't* bury *-but you can*

VIBROLITION

A coined word meaning demolition of rail substructure as a result of rail vibration. Dayton Ties prevent "VIBROLITION."



- 1 Note crumbling of brick pavement, particularly on inside of rail.
- 2 Showing track structure, gradually sinking below pavement surface. In this picture it has sunk nearly 2½ inches below the surface of the adjoining pavement. Also note deflection in rail at upper right.
- 3 Showing effect of "VIBROLITION" on joint which is badly depressed also bad break in adjoining pavement.

The result of trying to bury **VIBROLITION!**

DO YOUR STREETS SHOW IT?

Concrete correctly used—is the ideal foundation for track and paving substructure. But it must be protected from "VIBROLITION."

As long as the marks of "VIBROLITION" remain submerged, they will be ignored, but once they break through to the surface—as they will do—it's everybody's business. These surface signs are only a small indication of the greater physical disorder . . . underneath.

Despite the untold damage done by this scourge of so called permanent structure, however, "VIBROLITION" has accomplished two great things for the electric railway industry. First it has exploded the fallacy that a vibrating steel rail can be permanently installed and secured in concrete without a means of protecting that concrete . . . and secondly, it has brought to the forefront the only tie, substitute or otherwise, that positively and permanently prevents it.

"The Better Tie"

THE DAYTON INTEGRAL SYSTEM OF

Digitized by THE DAYTON MECHANICAL



prevent it ★
with **DAYTON TIES**



The track shown above is a continuation of the track shown in picture No. 1, opposite page. But in this section Dayton Ties were used. Note the unbroken pavement and absence of any sign of "VIBROLUTION."

THERE is no cure for "VIBROLUTION" once this trouble makes known its presence, without complete rehabilitation of the track structure. But fortunately it can be prevented by installing *in the first place* the only tie that will permanently prevent it. And this prevention of "VIBROLUTION" is but one of many advantages which Dayton Ties provide . . . smoother trackage . . . noise elimination . . . increased comfort for passengers . . . decreased wear on rolling stock and most of all, a positive reduction of maintenance costs. No other tie, substitute or otherwise, can do this for you. And yet, Dayton Ties can be installed at lower costs than the cheapest track you ever built.

Can you afford to ignore such facts without first getting a quotation for your 1930 work? Write today.

*Send for your
 copy of
 this book!*

Every maintenance engineer interested in lower maintenance costs will want a copy. Write today for yours.



Without an Alibi"

TRACK AND PAVING STRUCTURE

TIE CO.,-DAYTON, OHIO Digitized by Microsoft®

GARY

WROUGHT STEEL WHEELS



.... "ILLINOIS" on a wrought steel wheel is more than a mark of identification. It means a wrought steel wheel produced by the best and most modern equipment... Expert supervision, careful workmanship and frequent inspection from wheel block to finished wheel all tend to produce multiplied mileage at low cost.

Our Wheel Engineers are at your service.

Illinois Steel Company

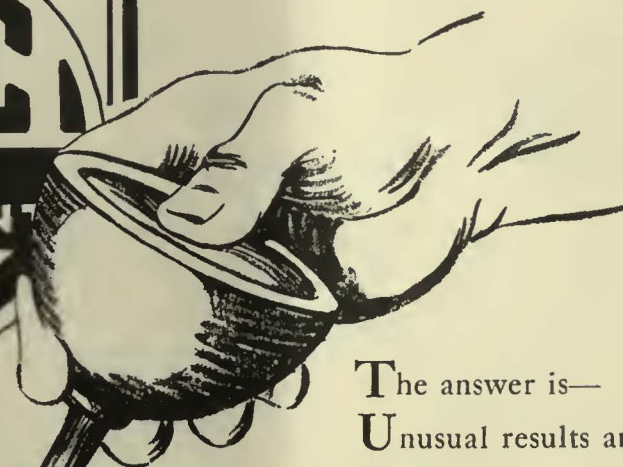
Subsidiary of United States Steel Corporation

General Offices:

208 South La Salle Street .. Chicago

ALL THAT GOOD WHEELS SHOULD BE

What is TULC?



The answer is—
Unusual results and
Less maintenance
Costs.

In the operation of
Street Railway

Appliances.

Lubricant which produces
Unexcelled results.

Bearing life increased—
Replacement costs lessened.

It reduces hot boxes, etc.

Cuts lubricating troubles—
Always uniform—

No acid—no filler—no dripping

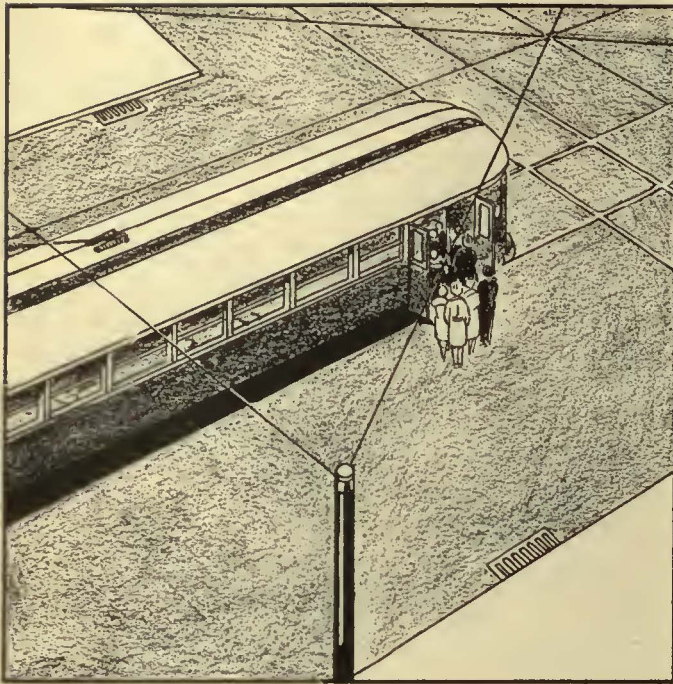
Test it—see for yourself.



The UNIVERSAL
LUBRICATING CO.

Dist. by CLEVELAND - - - - OHIO

DAM UP THE LEAKS AT TRANSFER POINTS WITH A GLOBE- DESIGNED TRANSFER SYSTEM



P.M. This Company's new transfer is on hand at P.M. HOUR 001000 Not easily detached	
Only 1 2 3 4 5 6 7 8 9 10 11 12 M 12 1 2 3 4 5 6 7 8 9 10 11 12 W 12 1 2 3 4 5 6 7 8 9 10 11 12 TH 12 1 2 3 4 5 6 7 8 9 10 11 12 F 12 1 2 3 4 5 6 7 8 9 10 11 12 S 12 1 2 3 4 5 6 7 8 9 10 11 12 S 12 1 2 3 4 5 6 7 8 9 10 11 12	July-Aug-Sept-Oct-Nov-Dec-1 001000 GENCY 1 3 GOOD ONLY UNTIL 5 7 9 GOOD ONLY UNTIL 11
United Electric Railways Co. TRANSFER TICKET FROM ATWELLS AVENUE IN-BOUND TO (1) Chalkstone Av. (2) Promenade St. Also all other lines except Broadway Bus, Chalkstone Av. Street St. Prom- enade St. at first point of intersection.	
5 a.m. 0 6 a.m. 15 7 a.m. 30 8 a.m. 45 9 a.m. 0 10 a.m. 15 11 a.m. 30 12 noon 45 1 p.m. 0 2 p.m. 15 3 p.m. 30 4 p.m. 45 6 p.m. 0 6 p.m. 15 8 p.m. 30	P025000 001000 11

Many well-known street-railway companies are cashing in on a new transfer system, designed by Globe to meet modern traffic demands. No two will operate exactly alike, and right here is one reason why Globe's half-century of experience is of value. Having on file many problems similar to the one in question (yours, let's say), we can help you initiate a series of transfers to eliminate a majority of the revenue leaks now suffered by the present system.

Are we sincere? Investigate, Buffalo, Toledo, Akron, Baltimore, and the rest. Then let us help you.

Globe

TICKET COMPANY

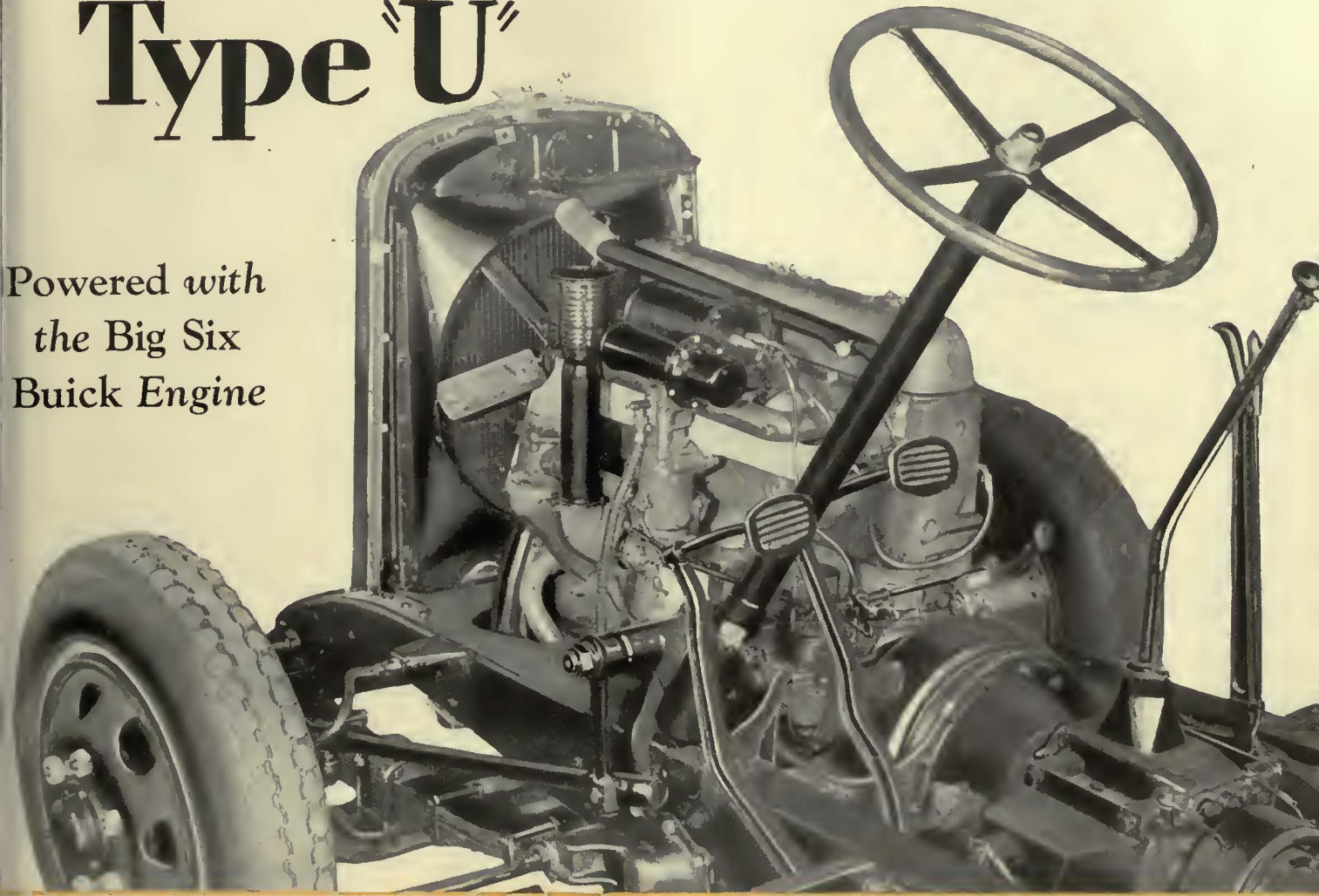
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Announcing a *New* Yellow Coach Type "U"

Powered with
the Big Six
Buick Engine



Buick Power Plant Assembly
in the Type "U" Chassis

THE persistent demand for a coach that would be *the same as the Yellow Type "W" but powered with a six-cylinder engine* is now met in this new Type "U" Yellow Coach—the latest addition to the Yellow line.

Type "W" introduced wholly new standards in small capacity coach construction. In the new Type "U" these standards are duplicated and maintained. Only in the most costly large capacity coaches will the same features be usually found. The Type "W" made them available at a new level of economy.

Now they are found in this latest addition to the Yellow family—at a price that represents still a greater saving in initial cost.

In Type "U" is found the same powerful, smooth four-wheel service brakes with their perfect automatic equalization of brake pressure on all four wheels . . . the same exceptionally strong and rigid frame with its seven sturdy cross members; three of them tubular . . . the same outboard

The 21 Passenger City Service





The 16 Passenger Parlor Coach

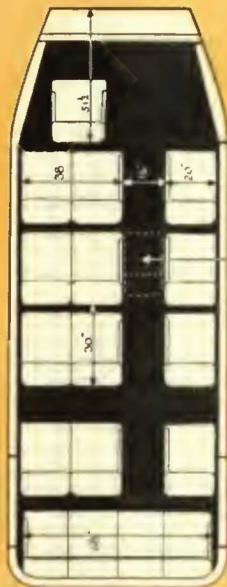
mounting of the front springs; secret of the exceptional riding qualities, roadability and easy steering of the Type "W" . . . the same oversize, underslung worm drive rear axle . . . the same accessibility and betterments that simplified maintenance and reduced operating costs in the Type "W" . . . all are here.

In addition to the Type "W" with its 8-cylinder engine, the Type "U" now makes available a six—the big new Six developed by Buick . . . famous for its power, low maintenance cost and fuel economy. Its exceptional stamina and dependability have been demonstrated in many millions of miles of actual service.

To balance with this power plant a different clutch, transmission and transmission brake has been developed, thoroughly tested and adopted.

With these exceptions, virtually the same chassis specifications that apply to the Type "W" fit the Type "U". Many of the chassis parts are interchangeable. And in appearance, dimensions, workmanship and appointments the bodies are identical.

Parlor Coach Seating Plan



GENERAL MOTORS TRUCK COMPANY

Pontiac, Michigan

Subsidiary of
Yellow Truck & Coach Mfg. Co.

Type "U"

MODELS AVAILABLE
21 passenger city service
16 passenger parlor coach

Yellow Coach

Powered with *The Big Six* Buick Engine

Announcing
A new
Series

Type "W"
with the new and more powerful
8 cylinder Cadillac Engine



21 Passenger Observation

IN THE entire history of bus operation in America no model of coach has ever enjoyed the popularity of the Type "W." More Type "W"s were purchased last year than any other type or model of motor coach produced in America.

Everywhere, Type "W" has been extraordinarily satisfactory to the hundreds of different companies who have put this model in operation. It has successfully demonstrated its capacity in every class of service . . . built revenue and cut operating costs for many companies in both city and intercity service . . . been adopted with unusual success for

developing new routes, for rendering de luxe service at a high rate of fare, for special charter service. It is recognized everywhere as a thoroughly tried and seasoned transportation vehicle.

Now comes the new series Type "W," retaining all of the proven features of design that have been so

enthusiastically endorsed by operators plus new betterments and refinements that definitely add to performance, to ease of maintenance and to still lower operating costs.

Chassis improvements include the new and more powerful eight-cylinder V-type Cadillac engine,

*Equipped with the new and more powerful 8 cylinder,
V-Type Cadillac Engine*





The 21 Passenger City Service

modified to meet the requirements of motor coach operation . . . increased displacement . . . increased bore . . . smoother operation. A bigger generator . . . 600 watt capacity. Better carburetion . . . automatic heat control . . . air cleaner. Improved ignition distributor . . . with heavier condensers and provision for lubricating bearings. Dual ignition coils . . . provision against road failure . . . with a ten second change-over switch. An improved starting motor . . . with Bendix drive. An improved clutch of the twin disc dry

plate type . . . smooth . . . long lived. On the highway or in city service the performance of the new Type "W" is smooth, quiet, and powerful beyond any comparison in the small coach field. Its flexibility and rapid acceleration are truly remarkable — truly comparable to passenger car performance. And it has the fastest, smoothest trouble-free brakes ever designed for coach use.



GENERAL MOTORS
TRUCK COMPANY
Pontiac, Michigan

*Subsidiary of
Yellow Truck & Coach Mfg. Co.*

Type "W"

MODELS

- 21 passenger parlor observation
- 21 passenger city service
- 21 passenger de luxe city service
- 17 passenger parlor coach

Yellow Coach

with the new and more powerful

Cadillac Engine

3 types of Johns-Manville FLOORING

to meet every need

of the modern Bus and Railway Car

CONSIDER the flooring of your buses and cars. Why not specify it as you do other equipment? Flooring not only affects the cost of the bus or car, but what is equally important—the cost of maintenance and the appearance. Johns-Manville offers a choice of flooring from the lowest-cost, lifetime floor to the most De Luxe flooring obtainable. For every type of bus or railway car there is a J-M Flooring that will meet every requirement and insure lasting service.

J-M Masticoke Low Cost — Long Life

J-M Masticoke provides a floor that is pleasing in appearance, is long-lasting and *low in cost*. This modern flooring will meet the severest service requirements. It will last the life of the bus or car without maintenance. Its surface is slip-safe. It will not retain dust, dirt or germs. It is easily cleaned by flushing with water. Its color is a pleasing dark gray. When you want a *low-cost* floor that will give trouble-free service, specify J-M Masticoke Flooring.

J-M Magnesite For Decorative Effects

Where, in addition to durability and free maintenance, you want an attractive flooring which can be



J-M MASTICOKE



J-M MAGNESITE



J-M TILE FLOORING

secured in flat colors to harmonize with the bus or car interior, specify J-M Magnesite. In attractiveness and durability, this floor will give the best-dollar for dollar-flooring value in a colored floor that can be bought for your buses.

J-M Tile Flooring The De Luxe Flooring

For the highest type of equipment, here is a flooring that provides the utmost in appearance without sacrifice of durability. Light in weight, this flooring allows color combinations and assorted designs which will greatly enhance the decorative effect of the most luxurious coach or interurban car. J-M Tile Flooring is resilient—quiet and comfortable to walk on. It provides the superlative in flooring. Its cost is not high.

The long life and satisfactory service of J-M Masticoke Flooring has been well demonstrated by its extensive use on railroad coaches and Pullman Cars. Where color is necessary, J-M Magnesite and J-M Tile Flooring answer every requirement of railway car and bus service and maintenance at a comparatively low cost. Mail the coupon for information on these J-M Floorings.

Bus & Car Insulation Refractory & Insulating Cements Fibre Conduit Asbestos Exhaust Pipe Covering Asbestos Shingles Packings Brake Blocks & Linings Transite Built-up & Ready-to-lay Roofing Asphalt Plank Tile Flooring Power Plant Insulations Masticoke & Truss Plate Flooring Electrical Insulating Materials Friction Tape



Johns-Manville

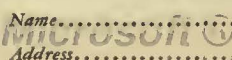
SERVICE TO TRANSPORTATION

Address **JOHNS-MANVILLE**
At nearest office listed below

New York Chicago Cleveland San Francisco Montreal
(Offices in all large cities)

Please send me complete information on J-M Bus and Railway Car Floorings.

Name.....
Address.....



RCF-115-2

HOW MUCH SHOULD A WHEEL WEIGH



ENOUGH metal must be put in a car wheel to give adequate strength and wear resistance. How much of it is necessary to fulfill these conditions depends upon the kind of metal used. By reason of its special heat-treated composition the Davis "One-Wear" Steel Wheel can secure a given result with a minimum weight. It's the special metal that makes the difference.

AMERICAN STEEL FOUNDRIES

NEW YORK

CHICAGO®

ST. LOUIS

For
heavy-traffic
locations

use *silico-manganese* trackwork

THE new Bethlehem Silico-Manganese Weldable Trackwork has high resistance to impact and abrasive wear. The extremely fine-grain and dense structure of silico-manganese steel becomes more firmly set under constant impact. These qualities combined with weldability make Bethlehem Silico-Manganese the logical trackwork to install at all heavy-traffic locations.

Bethlehem Silico-Manganese Trackwork is readily weldable by any of the standard methods, such as electric-arc, oxy-actylene or Thermit welding.

The wear-resisting properties of Silico-Manganese steel are well established. For years it has been the standard for high-grade tools such as punches, chisels, shear blades, etc., as well as for finest quality automobile springs, and for parts subject to



Bethlehem Silico-Manganese Weldable Crossing and turnout at 10th and Arch Sts., Philadelphia, Pa.

shock and extremely hard grinding wear with little or no lubrication.

Bethlehem Silico-Manganese Weldable Trackwork can be installed at all heavy-duty locations with confidence that it will stand up under the most severe conditions of service.

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General Offices: Bethlehem, Pa.

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BETHLEHEM
Silico-Manganese
Trackwork—Design 999

The inevitable by-product

More fares
induced by quieter, smoother, faster,
more comfortable transportation

▼
Lower costs
less weight; faster schedules that mean
more passengers per car-hour; lowered
maintenance of equipment and tracks

▼
inevitably produce



THE TIMKEN-DETROIT

BIGGER PROFITS



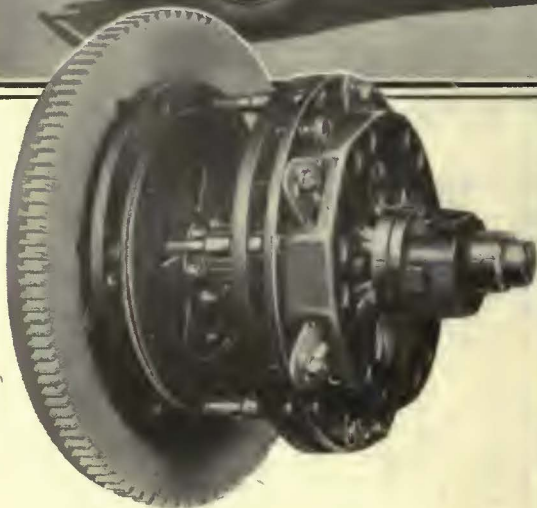
TIMKEN 52 WORM DRIVE CAR TRUCK

TIMKEN
worm drive
TRUCKS

for electric railway cars

AXLE CO., DETROIT, MICH.

**LONG
CLUTCHES
ARE USED
ON THE
COMPLETE LINE
OF
AUTOCAR
TRUCKS**

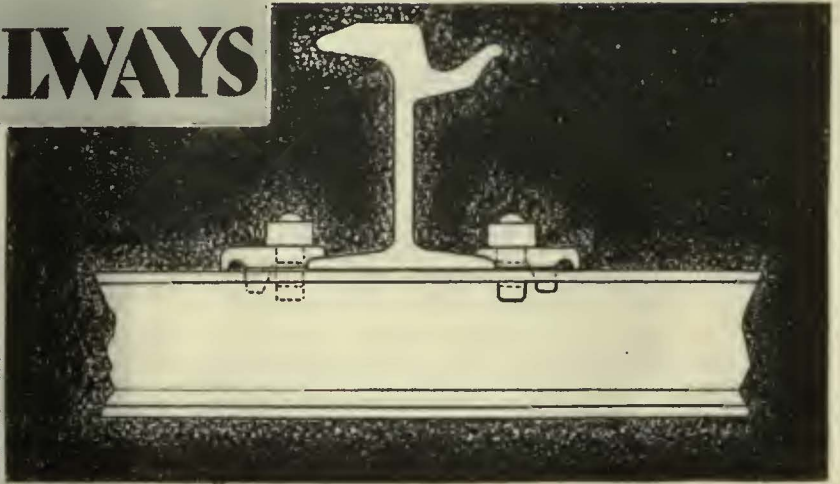
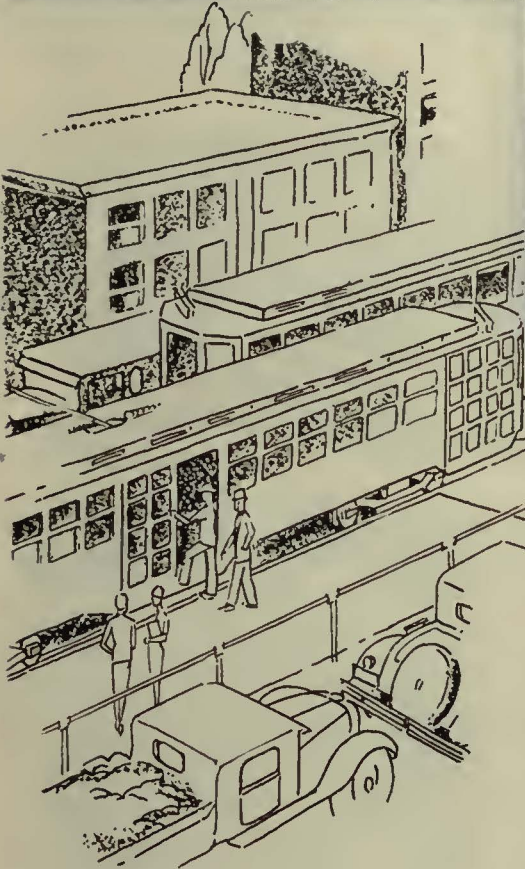


**LONG PRODUCTS
AUTOMOTIVE CLUTCHES
AND RADIATORS**

**LONG MANUFACTURING CO.
DETROIT MICHIGAN**

LONG

CROSS TIES *for* STREET RAILWAYS



CARNEGIE STEEL CROSS TIES provide the foundation for a smooth, repair-free track—a track that saves wear and tear on rolling equipment and greatly enhances its comfort. Electric railway operators, facing the competition of automotive vehicles, realize the importance of providing safe, comfortable transportation. Passenger appeal begins with the track.

Carnegie Ties are easily installed. The bolt and clip by which the rail is secured are simple and efficient. The unit cost (cost per foot of track per year) is considerably less than for wood ties.

Plan to include Carnegie Steel Cross Ties in your 1930 track construction program. It will prove to be an investment that pays dividends—particularly in passenger satisfaction.

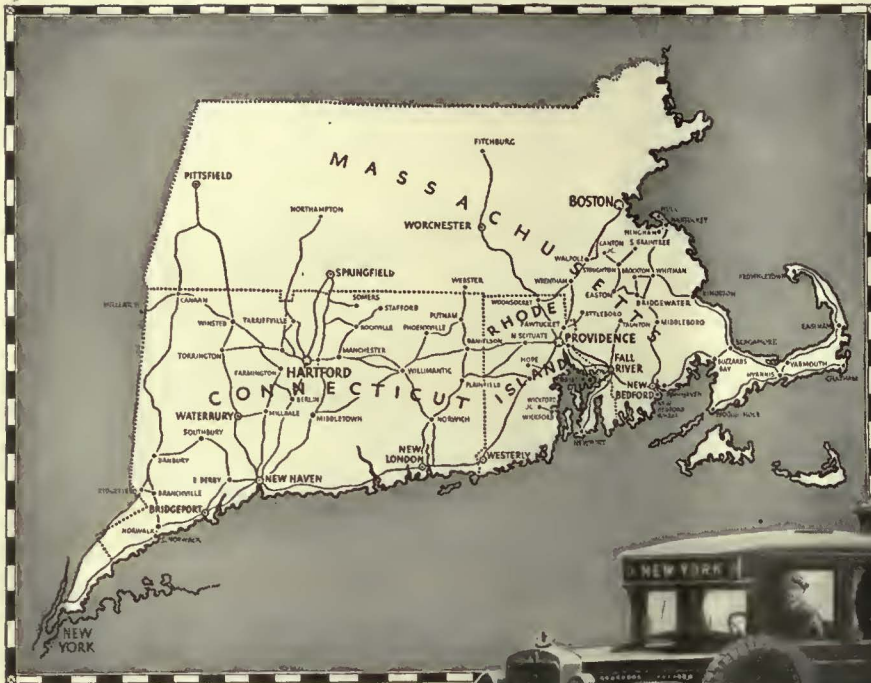
CARNEGIE STEEL COMPANY

Subsidiary of United States Steel Corporation

PITTSBURGH, PA.

45

CARNEGIE STEEL CROSS TIES



For the fifth straight year, the New England Transportation Company is using U. S. Tires. 1930 finds all of its more than 280 vehicles on the new U. S. Royals.



OFFICIALLY OK'D by Leading Bus Fleets

The new year brings still greater success . . . more widespread endorsement of the new U. S. Royal Heavy Service . . . both Balloon and High Pressure.

Millions of tire miles a month are demonstrating its trouble-free, on-schedule performance and the added gripping power of its wide, deep tread and buttressed shoulders.

It is a matter of record that every prominent bus line which used these tires in 1929, has officially ok'd them as standard equipment for 1930.



UNITED STATES RUBBER COMPANY



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World's Largest Producer of Rubber

Safety is but one feature of modern air brake control



The heart of the air brake, this dependable compressor is one of the type which furnishes air for the Westinghouse Automotive Air Brake and is standard equipment on all A. C. F. coaches.

The Westinghouse Automotive Air Brake is coming more and more to be known not alone as a safety device . . . but as one of the most important units of economic necessity in modern coach operation.

Westinghouse Automotive Air Brakes have enabled thousands of coach operators to increase schedule speeds. The results are obvious—better service, more passenger



A tuned combination of the Pneumatic Horn, a unique warning signal designed especially for the modern motor coach by Westinghouse engineers. This unusually effective signal operates from the same air source as the Westinghouse Automotive Air Brake.

loads and greater profits. The fact that Westinghouse control assures perfect equalization of braking force at all times is also a feature of no small importance. Skidding is minimized . . . brake adjustments are less frequent and lining life is lengthened materially.

The Westinghouse braking system also furnishes an air supply for the operation of various pneumatic devices such as warning signals and door control mechanisms.

The far reaching advantages of Westinghouse Automotive Air Brakes are more fully outlined in several recent publications which may be had by addressing the WESTINGHOUSE AIR BRAKE COMPANY, Automotive Brake Division, Pittsburgh, Penna.

WESTINGHOUSE Automotive AIR BRAKES

THE SAFETY CAR CONTROL EQUIPMENT

~ PROVIDES
Greater Convenience

INTERLOCK of brakes with doors, by means of a common operating valve, simplifies manipulation, and the selective door control feature, which permits treadle control of rear exit, insures prompt and flexible passenger interchange under varying traffic conditions.

SAFETY CAR DEVICES CO.
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Postal and Telegraphic Address:

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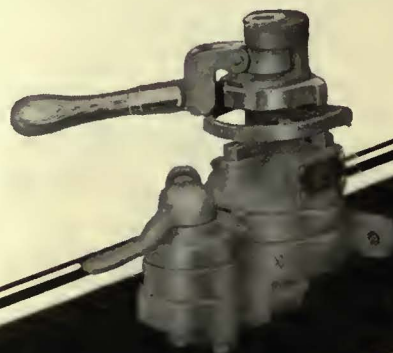
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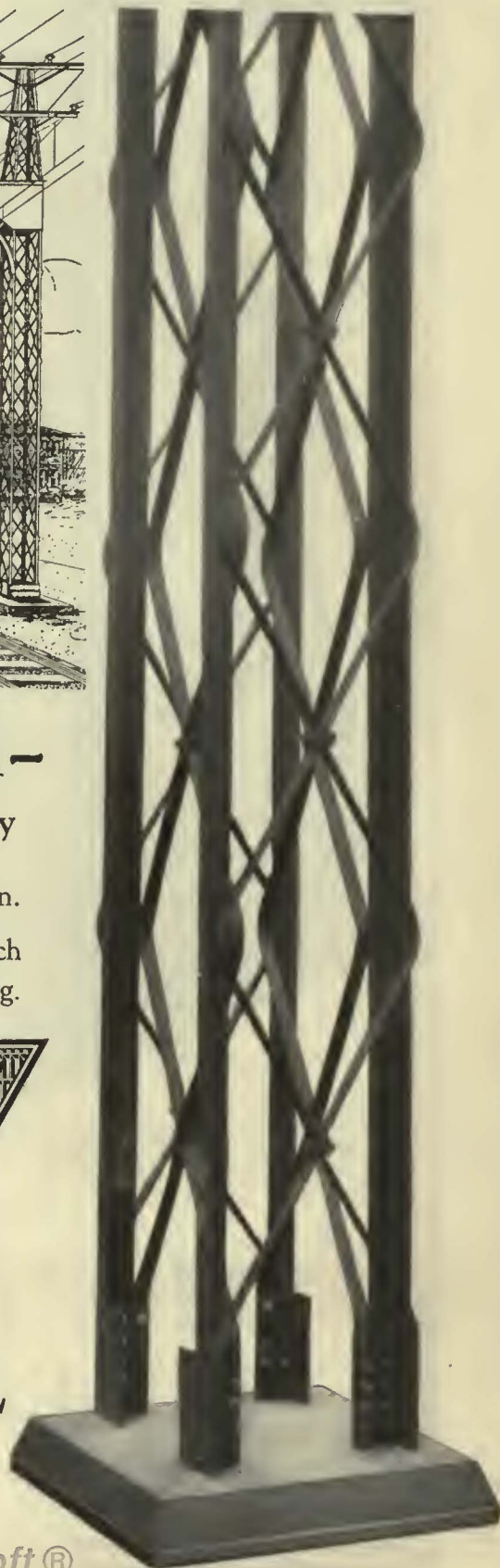
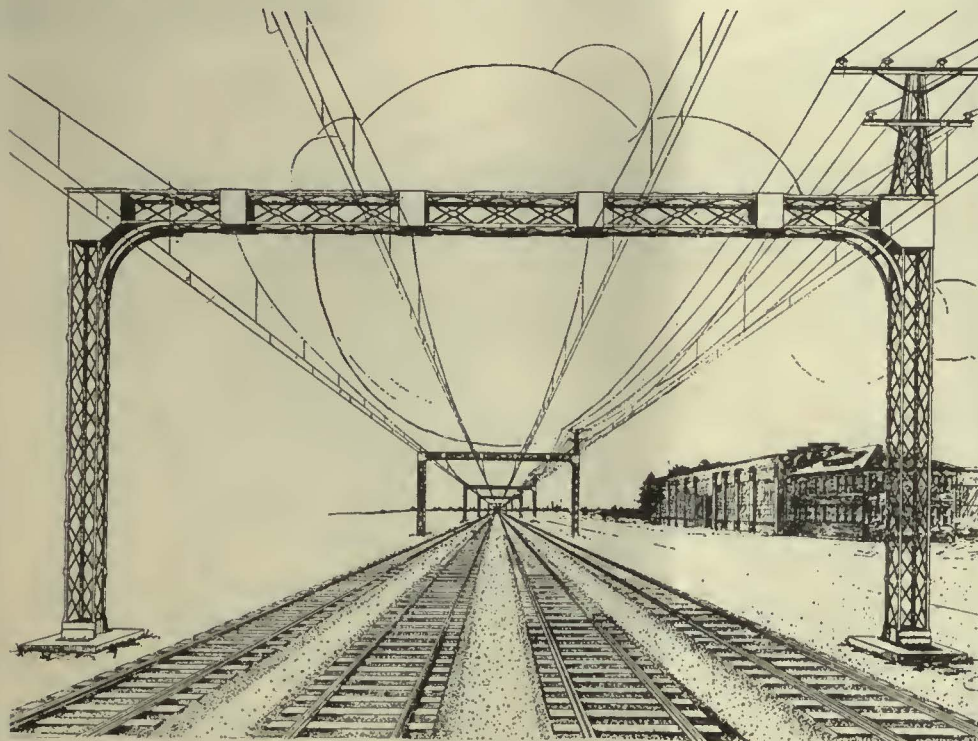
PITTSBURGH

NEW YORK



Walter Bates Steel

EXPANDED SQUARETRUS

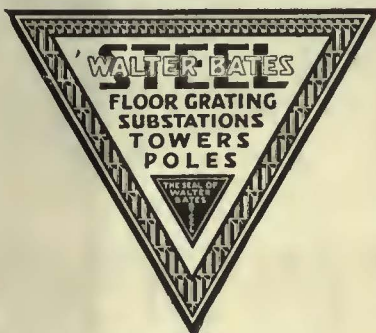


SQUARETRUS Construction— for Strength, Appearance, Economy, Efficiency

More lbs. of strength for lbs. of weight than any other design.

“SQUARETRUS” Poles are made from four main pieces. Each corner leg angle is intact with one set of expanded lacing. Erection of structures is obviously a simple matter, easily kept at a minimum expense.

Very few bolts; examine the cut carefully for detail of construction. Tabulated data gladly furnished.



WALTER BATES STEEL CORPORATION

GARY

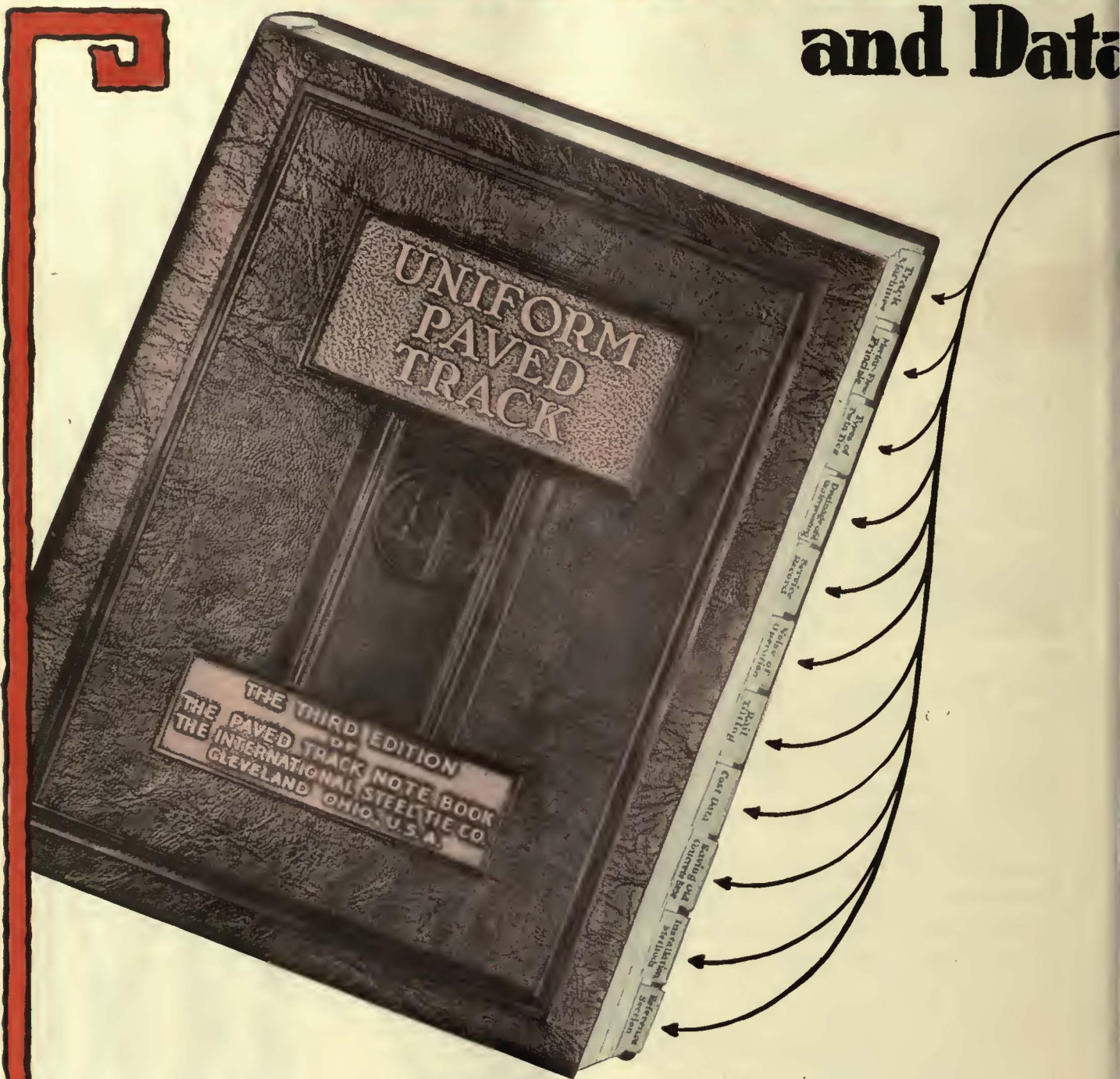
INDIANA

See our advertisement in the January 4th issue of Electrical World, Pages 250-251.

Let us hear from you—you will promptly hear from us.

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THE GREATEST SINGLE and Data



THE INTERNATIONAL STEEL TIE COMPANY

16702 WATERLOO ROAD, CLEVELAND, OHIO

SOURCE OF FACTS . . . on Paved Track Construction

Now Ready To Mail . . .

Third Edition of the Paved Track Notebook

'UNIFORM PAVED TRACK'

IN three short years, the Paved Track Notebook has become recognized as the greatest single source of facts and data on modern paved track construction utilizing steel ties.

"Uniform Paved Track" is the title of this new, enlarged Third Edition.

In it previous data is brought up to date. The addition of a wealth of new material makes this handbook 25% 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. Exact 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 anywhere.

Modernized Twin Ties with the new "Precision" Rail Clip—which is sawed and

drilled, *not* punched and sheared—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 the important subject of 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 over 60 miles of track, permits application of this data to your local conditions.

A Reference Section with notes on concrete, and a convenient table of cubic contents of typical track trenches completes this remarkably informative "Uniform Paved Track" Notebook.

Every Railway man who has to do with paved track will want a copy of "Uniform Paved Track." Offered in three bindings: DeLuxe, Leather covered, permanently bound, for executives; a leather covered, loose leaf ring book for engineers; for general use, a loose leaf leather folder with clips.

Your copy awaits your request. Mail the coupon—now!

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Executive Binding



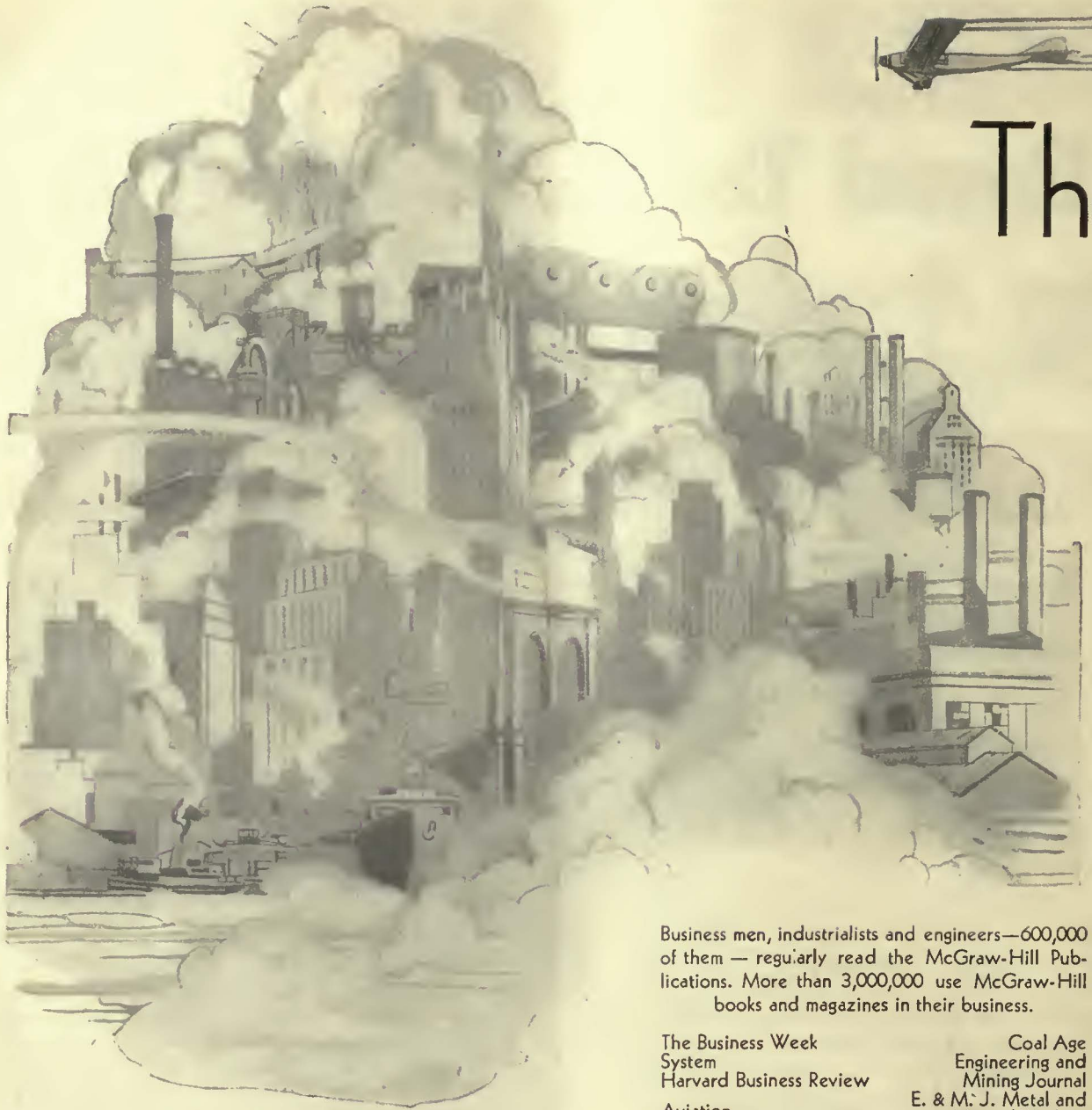
Engineering and Reference



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Plowman lifts his head



WITH bare hands, the plowman fought for his food. Hunger harried him . . . bent his back, bowed his head.

Then the machine . . . freedom . . . time to cultivate his fellows as well as his fields . . . to live, to think, to be.

Industry gave every man a hundred hands . . . farms produced more with less men. Millions of workers flowed from farm to factory. Swiftly industry expanded, became complex.

As the pace grew faster there was a vital, growing need for the interchange of experience. Men of industry had to keep constantly informed of Industry's activities and progress . . . of the current news and developments in their own specialized fields. Out of these needs came the industrial press—the McGraw-Hill Publications.

Today 600,000 men of industry, the very men who lead, guide and operate the modern business world, read the McGraw-Hill Publications because they realize that they must read . . . or fall behind! They are paid in advance subscribers. Each has placed a cash value on the information that the McGraw-Hill Publications bring him.

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ARE YOUR MOTOR COACHES *Guilty?*



THE automobile or truck may gas pedestrians with impunity—but you cannot permit your motor coaches to do so. You can't afford to antagonize these potential patrons by subjecting them to stifling fumes.

If your motor coaches are releasing objectionable fumes, try Red Crown Gasoline and Polarine Motor Oil. The sulphur and impurities that are present in many fuels and lubricants and which are a major cause of obnoxious combustion odors, have been reduced to a minimum in Red Crown and Polarine.

Red Crown Gasoline and Polarine Motor Oil form an ideal combination . . . a gasoline that gives power, mileage and complete combustion . . . a motor oil that is pure and rich, supplying thorough, efficient lubrication to the motor. Working together they give that perfectly balanced performance which insures efficient service and low cost operation.

Have our engineers make a test of Red Crown and Polarine in your motor coaches and let the result speak for itself.

STANDARD OIL COMPANY
(INDIANA)

910 S. MICHIGAN AVE., CHICAGO, ILL.

826



RED CROWN GASOLINE

POLARINE MOTOR OIL

WAR WINNERS



..CAN YOU
AFFORD TO
SUPPORT
OLD AGE ?

| IF NOT...

... modernize



DODGE BROTHERS

for lower costs with Dodge Coaches

THERE COMES A TIME WHEN BURDENSOME MAINTENANCE COSTS MAKE REPLACEMENT AN ECONOMY

Operators, large and small, are discovering this simple truth: It is more economical to replace old equipment than to continue using it with resultant high maintenance costs.

Dodge Coaches are built for modern service requirements — the Street Car Coach is of the 21-passenger type, the Parlor Coach seats 16 passengers. Their depend-

ability is acknowledged by experienced operators. Their economy in operation and maintenance is conclusively proved. Their comfort and fine appearance attract and hold the preference of riders.

Your maintenance costs may now be excessive. Lower them by replacement with modern, economical Dodge Coaches.



MOTOR COACHES



. . . AND YOUR
MAINTENANCE COSTS WILL
CONTINUE LOW BECAUSE A
DODGE BROTHERS DEALER—
ONE OF YOUR REPUTABLE
LOCAL BUSINESS MEN—
CARRIES AN AMPLE STOCK
OF REASONABLY PRICED
REPLACEMENT PARTS . . .

DODGE BROTHERS
MOTOR COACHES

Around the World 4000 TIMES on FISK TIRES

THE FISK method of Engineering Analysis on motor coach operations, different from all others, is so fundamentally sound—and Fisk Tires are so markedly superior—that the trend to Fisk has become a procession. Some of the country's largest bus operations will travel 100,000,000 miles on Fisk Tires during 1930.

Operators of great coach fleets—railroads, street railways and other big bus systems—don't buy tires out of habit or friendship. With public favor and company profits at stake, their purchasing agents measure values with the most exacting yardsticks.

They search the whole tire field...invite solicitation by competing tire builders...examine

tires, figures, records. Then they choose—and the trend to Fisk has become a procession! Why?

Fisk Transportation Engineers study every tire equipment problem and supply the *right tires* for each coach, each route, each transportation job. Fisk's nearby service stations co-operate 52 weeks a year.

Fisk actually *lowers tire costs per mile*. Because Fisk shows an overwhelming record for *tires that give uninterrupted service*.

THE FISK TIRE COMPANY, INC.
Commercial Tire Department
CHICOPEE FALLS MASS.

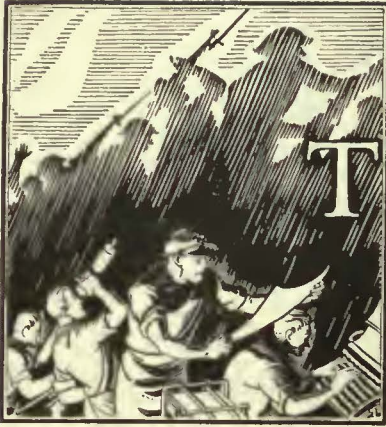


Time To Re-tire
GET A FISK!
TRADE MARK REG. U.S. PAT. OFF.



mileage

FISK



WAR + + + ON THE RED

THE ONLY RED WORTHY OF THE FEAR of modern business is the baleful red that glows from figures written in scarlet ink, silently flashing the news of wastes that eat up profits, of excessive costs and inadequate returns. They are the figures of defeat. The world of business rightly hates these red figures. It wages against them a war without quarter, bitter and implacable.

In that war the business paper serves as artillery. Its guns are presses. Its projectiles are facts in their most potent form + + + for truth and printer's ink are a combination more devastating than TNT and steel.

In every field of industry or trade where there is a live business press a barrage of fact is being fired against wasteful practices. Production costs crumble daily under its drumfire of information on machines, materials, technique and management. Distribution costs are coming in for their share of pounding. The business paper as the attacking arm of business progress is out to do away with the things that eat up profits. The Reds must go.

Honestly, independently, the modern business press carries on its battle for better business practice. Its facts are accurate, tested, correlated and organized. They are unbiased. There is no special pleading, no "blurb," no catering to vanities. It has won the respect of its readers by its self-respect. By its dependability it has won their dependence. It commands a paid circulation on its own merits. It enjoys a sound advertising revenue because its character constitutes it a sound advertising medium.



THIS SYMBOL identifies an ABP paper . . . It stands for honest, known, paid circulation; straightforward business methods and editorial standards that insure reader interest . . . These are the factors that make a valuable advertising medium.

THE ASSOCIATED BUSINESS PAPERS, INC.
 FIFTY-TWO VANDERBILT AVENUE - NEW YORK CITY

+ + + + +

This publication is a member of the Associated Business Papers, Inc. . . a cooperative, non-profit organization of leading publications in the industrial, professional and merchandising fields, mutually pledged to uphold the highest editorial, journalistic and advertising standards.



—PRODUCTS—

Wrought
Steel
Wheels

Armature
Shafts

Springs
and
Axles

What is it that you desire in wheels?

Safety—

Elimination of broken
flanges and flats—

Increased mileage—

Low maintenance costs—

“Standard” Wrought Steel
Wheels will meet these re-
quirements.

STANDARD STEEL WORKS COMPANY
PHILADELPHIA, PA.

CHICAGO

ST. LOUIS

NEW YORK

BRANCH OFFICES
PORTLAND

RICHMOND

SAN FRANCISCO

WORKS: BURNHAM, PA.

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

“WELD PLATES”

For EFFICIENT, ECONOMICAL
JOINTS

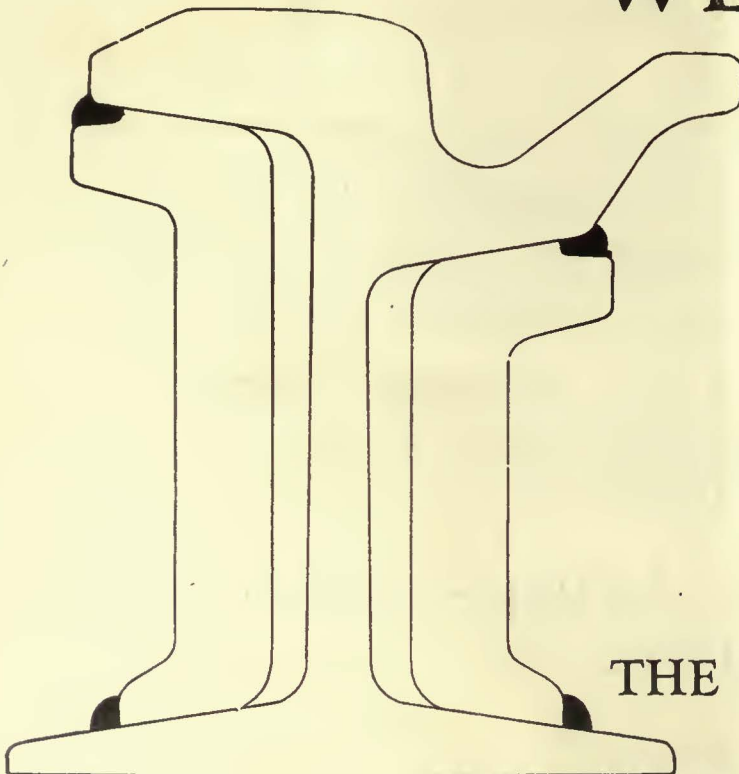
Do you believe in statistics? Rely on performance records? If so, the performance records of the many “Weld Plates” now in use will convince you that they lead the bar-weld joints in efficiency and economy.

“Weld Plates” represent the most modern welding practice. They are the strongest and most up-to-date plates rolled especially for electric welded joints. Note the shape—the grooves for retaining plenty of weld metal along the upper edges—the wide contact areas at top and bottom—the suitability for the use of short bolts.

A trial will convince you of their efficiency and economy.

THE RAIL JOINT COMPANY

165 Broadway, New York



ACCESSORIES...

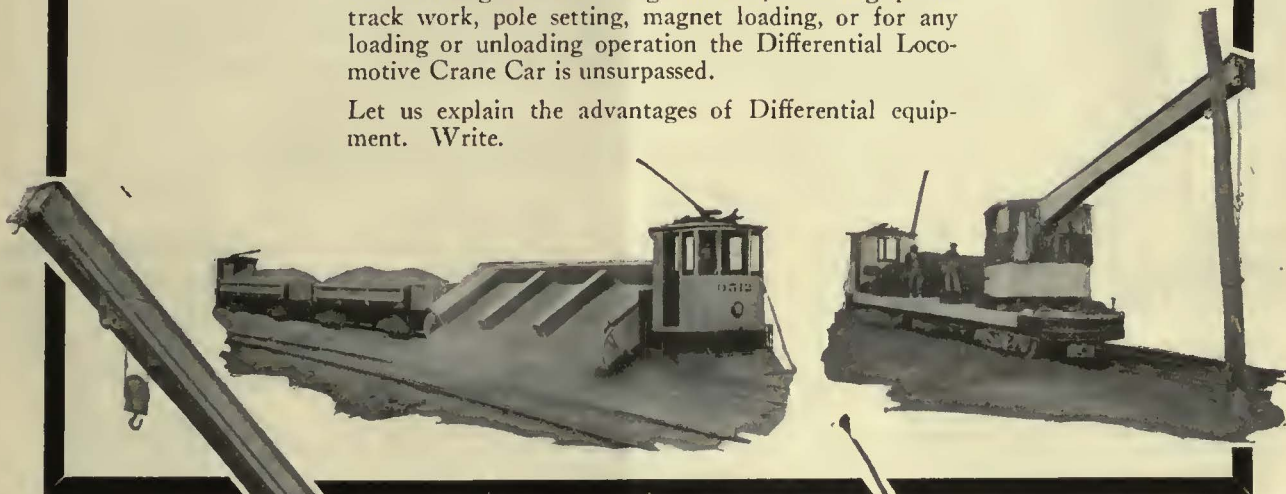
That Better Track Construction

DIFFERENTIAL Dump Cars, Differential 3-way Truck Bodies, Clark Concrete Breakers, Differential Electric Locomotive Crane Cars—are accessories to better track laying methods, better track, lower costs.

Take, for example, the Differential Electric Locomotive Crane Car. One man from a revolving turret controls the car movement and four distinct crane movements. It is fast and safe. It conforms to Electric Railway clearances. Does not block traffic on adjacent tracks.

For handling rails and bridge timbers; for doing special track work, pole setting, magnet loading, or for any loading or unloading operation the Differential Locomotive Crane Car is unsurpassed.

Let us explain the advantages of Differential equipment. Write.



The Differential Steel Car Co.

Findlay, Ohio, U. S. A.

Differential Electric Locomotive Crane Car

Capacity: Five tons at radii up to 26 feet, two tons at radii from 26 feet to 44 feet.

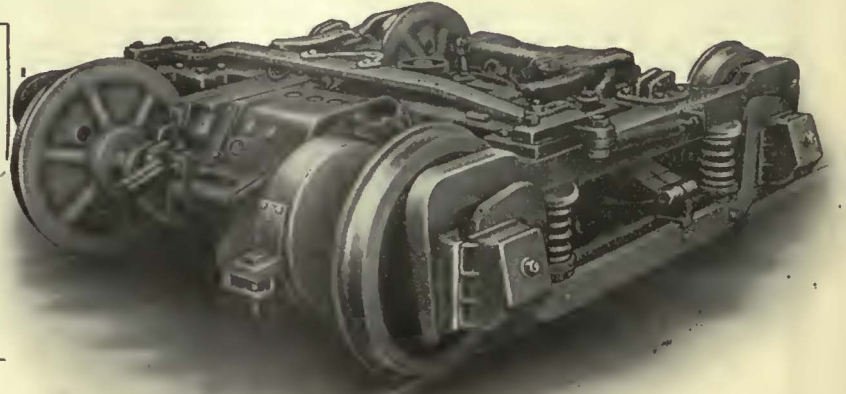


Commonwealth Trucks

cut operating costs

Cast Steel Frame, including cross and end transoms, a single unit.

Pedestals cast integral with frame, protected from wear by renewable hardened spring steel liners.



(PATENTED)

The Commonwealth Street Railway Truck illustrated above has given years of satisfactory service with maintenance costs practically eliminated. The unsurpassed performance records of this and other Commonwealth Trucks are responsible for their use by many leading railways.

General Steel Castings Corporation
Commonwealth Division GRANITE CITY, ILLINOIS

Small Parts . . . With large responsibilities

Small parts though individually inexpensive, can become, if frequently replaced, a major item of expense. Replacement involves not only cost of parts but also that of labor and of "time out" for rolling stock.

The responsibility for keeping these costs down is often overlooked when purchasing small parts. Boyerized parts are specially made to shoulder this responsibility.

Their slight additional cost over ordinary parts justifies itself through longer service. By charging a little more, the manufacturer is able to use the best materials, give more attention to design, and to use the famous "Boyerizing" heat treating and hardening process which ensures three or four times longer life.

It pays to specify them, and to insist on getting them.

BEMIS CAR TRUCK COMPANY
ELECTRIC RAILWAY SUPPLIES
SPRINGFIELD, MASS.

Representatives:

F. F. Bodler, 903 Monadnock Bldg., San Francisco, Cal.
W. F. McKenney, 56-60 First Street, Portland, Ore.
J. H. Denton, 1328 Broadway, New York City, N. Y.
A. W. Arlin, 519 Delta Building, Los Angeles, Cal.

Spring Post
Bushings
Spring Posts
Bolster and Plates
McArthur
Turnbuckles
Manganese Brake
Heads
Manganese Truck
Parts
Bronze Bearings
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Brake Hangers
Brake Levers
Pedestal Gibs
Center Bearings
Side Bearings
Case Hardened
Bushings
Transom Chafing
Brake Fulcrums
Forgings
Trolley Pins

BOYERIZED PARTS

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.

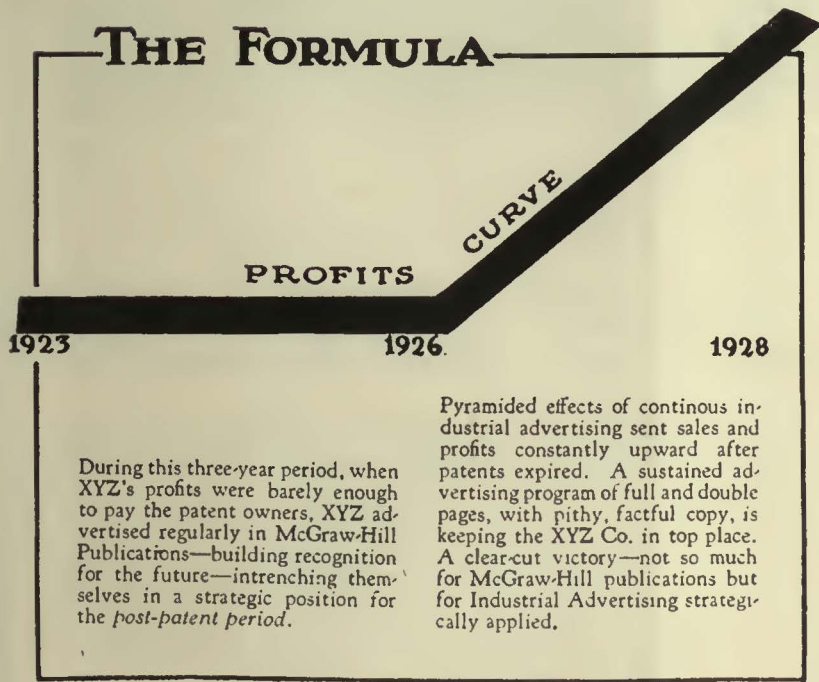
PATENTS EXPIRING!

what'll we do?
 what'll others do?

BASIC patents on a machine used extensively by a specific industry were owned by the ABC Corp.

The XYZ Co. also made the machine, along with other products, paying the ABC people a royalty for every machine sold. The XYZ Co. chose to stay in business without making a practical profit on this particular product. *Why?*

Two years or so ago the patents expired. The expected happened. Dozens of manufacturers turned to making the machine. But instead of diminishing sales for the XYZ Co., there came increased sales, pyramiding profits and leadership in the field. This leadership is being maintained today by the same formula that was used steadily for three years before industry-at-large was free to make the machine.



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TEXACO OFFERS A

NEW

LUBRICATION



*The New Texaco
Leather Oil Seal*



Cut of journal box on which Texaco Oil Seal and Texaco Lovis Oil have been used for three years. This is a type of journal box in use on equipment of The United Railway and Electric Co., Baltimore, Md. Note clean, resilient waste still saturated with Texaco Lovis Oil.

Electric railway car journal lubrication has been revolutionized. Power losses have been substantially reduced. Bearings, journals and waste can now be effectively protected from abrasive dust and water and effectively lubricated.

The new Texaco Oil Seal and Texaco Lovis Oil are accomplishing what was formerly regarded as impossible. Texaco Oil Seals are being installed on many of the country's leading roads.

This new Texaco Lubrication has aroused the interest of the entire electric railway industry. It is something with which every railway executive should be familiar.

Tests will gladly be arranged by Texaco engineers at the request of any operating executive. Write The Texas Company.



TEXACO

THE TEXAS COMPANY
Dept. L, 17 Battery Place, New York City
Offices in Principal Cities

LUBRICANTS

$$E = \frac{MV^2}{2}$$



STRONG TO BEAR BURDENS — LIGHT TO MOVE

TRANSPORTATION revolves around 3 things—starting, continuing, stopping—weight. One of the problems is dead weight. It slows up schedules, requires extra power to move, takes its toll of profits.

Today, thanks to light, strong Alcoa Aluminum alloys, dead-weight's menace is diminished. Car-bodies, structural members, trucks, are being made of *equal strength—with less than half the weight*. Dead-load is transformed to pay-load. Result—better service with substantial power-savings, faster schedules, reduced maintenance-of-way expense.

ALCOA ALUMINUM



$$E = \frac{MV^2}{2}$$

Cleveland Street Railways Carry Loads That Pay Instead of Prey

Cleveland, the first to use Alcoa Aluminum strong alloys, to banish old-fashioned heavy metals; the first to step out from under the menace of dead-weight—reduced the weight of a car by 12,900 pounds. Cleveland found that Westinghouse 50 H. P. could be replaced by 35 H. P. motors, that the weight of the motors consequently was reduced 660 pounds. Schedules were speeded up; lubrication costs reduced; power costs cut in direct proportion to the weight saved.

Cleveland quickly discovered that the same car covered more territory, attracted more riders, stayed out of the shop longer, and did all this at a much lower operating cost because it carried a load that paid—instead of preyed on power and profits.

Our engineers will be glad to consult with you upon the practical application of Alcoa Aluminum strong alloys in transportation.

ALUMINUM COMPANY of AMERICA, 2463 Oliver Building, PITTSBURGH, PA.

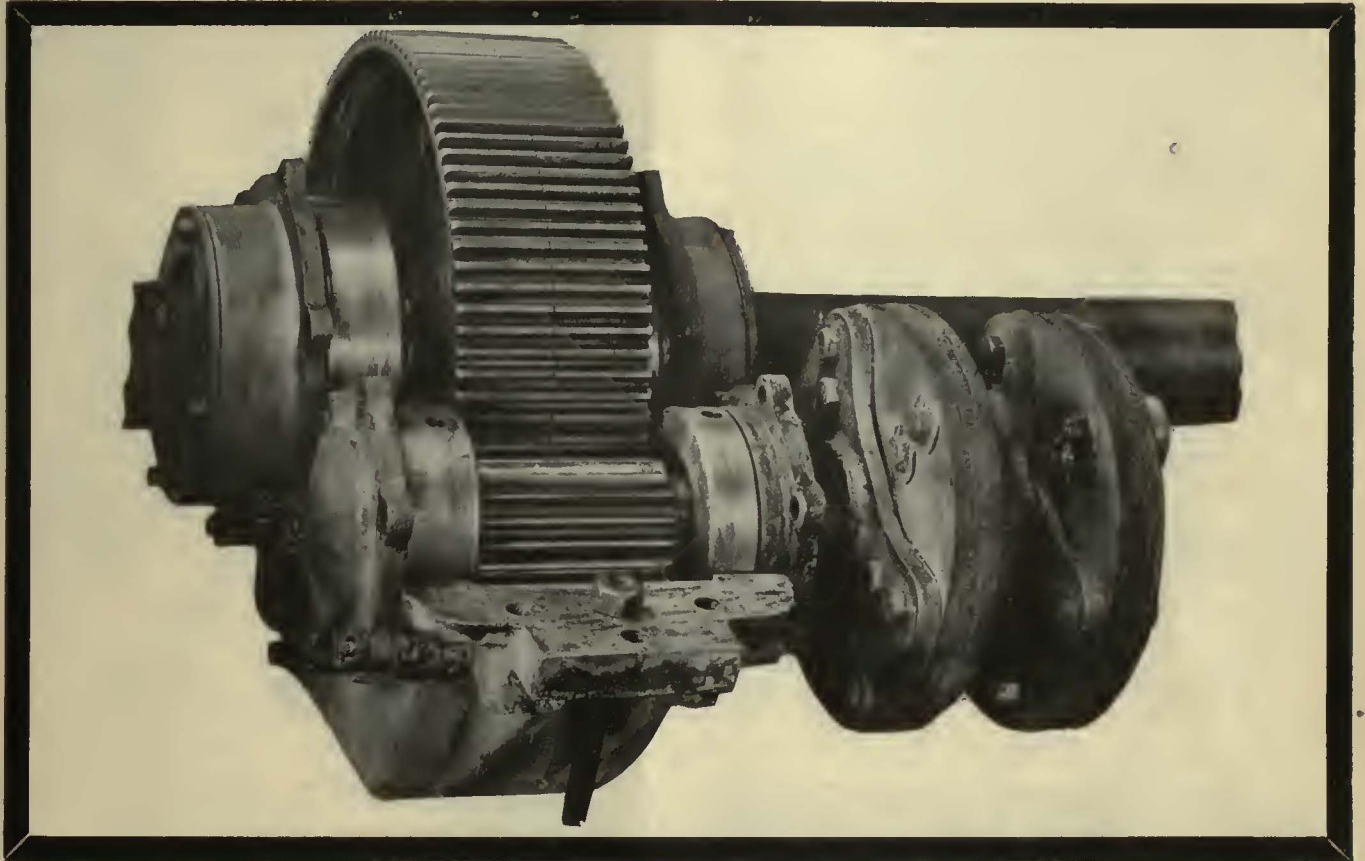
Offices in 19 Principal American Cities



ALCOA ALUMINUM



"TOOL STEEL" SINGLE REDUCTION UNIT



A REVENUE BUILDER —A COST REDUCER

S MALL, light and compact—utilizing fully the advantages of the light, high speed motor—this single reduction unit has proven more than an efficient drive.

It is a sales influence—a powerful factor in increasing patronage. It holds present riders—gains new ones—by assuring faster running time—quick pick-up and noiseless operation.

3,000 lbs. per car reduced weight compared with conventional motor drive.

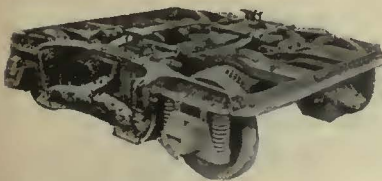
A single spur gear, a pinion and a flexible coupling of proven design makes up the unit. It is simplicity itself.

Fifteen months of trouble-free service has proved its dependability. Carefully conducted tests have shown no measurable wear on gear, pinion or bearing surfaces. The long life qualities of this remarkable drive reduces maintenance cost to a minimum.

Meeting the need for faster car movement and shorter schedules this drive unit merits your investigation.

We shall be glad to send you the complete story.

**REDUCTION UNIT
MOUNTED IN TRUCK**



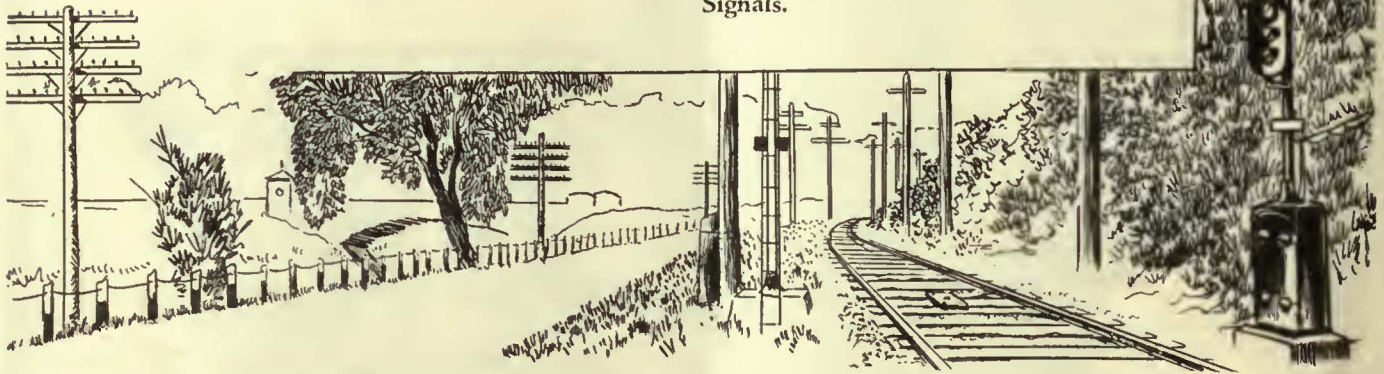
THE TOOL STEEL GEAR & PINION CO.

Cincinnati, Ohio
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WHEN COMPETITION BECOMES SERIOUS

When competition seriously threatens the position of an established transportation business the reason can be found, usually, in the time saving which competitors offer. And there is no better way for an electric railway to create savings than to signal its right-of-way with "Union" Automatic Signals.

"Union" Automatic Signals, interlocking installations, and remotely-controlled, power-operated switches, produce definite savings. The higher average speed and the consequent saving in time per trip which results can be represented as return on investment. When competition becomes serious, the answer is "Union" Signals.



1881



Union Switch & Signal Co.



1930

SWISSVALE, PA.

NEW YORK

MONTREAL

CHICAGO

ST. LOUIS

SAN FRANCISCO

Look to your seats for rider comfort

For better seats mean more riders. This fact is recognized by the many operators who specify General Leathers.

Clean, neat, easily washed, durable—and always attractive.

Specify General Leathers on your next order for Electric Cars, Buses and Taxi-Cabs—Send for samples:

- Majestic Full Grain Leather
- 20th Century Spanish Leathers
- Genleao Leathers
- Salon Hand Buffed Leathers

General Leather Co., Newark, N. J.

Makers of the Famous Tried and Proven "00" Leathers

Detroit Office:
Stoddard Lovely & Co.,
10-219 General Motors Bldg.

West Coast Office:
A. J. & J. R. Cook, Inc.,
221 Eighth St., San Francisco

London Office:
R. & A. Kohnstamm, Ltd.,
21 West Smithfield,
London, E. C.

Canadian Office:
Colonial Traders, Inc.,
78 William St., Chatham, Ont.

PANTASOTE

TRADE MARK

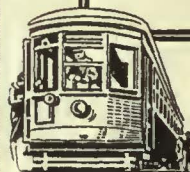
—the car curtain and upholstery material that pays back its cost by many added years of service. Since 1897 there has been no substitute for Pantasote.

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.

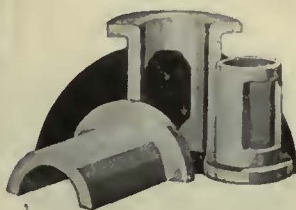
The PANTASOTE COMPANY, Inc.
250 Park Avenue
NEW YORK

THE Proper Quality and Design FOR YOUR NEEDS

National products are the result of intensive specialization. Practical and economical in service, they fully meet the requirements of modern electric railway operation. Their advantages can be quickly proven by a trial. Prices and full details submitted upon request.



Trolley Wheels and Harps



"Tiger" Bronze Axle and Armature Bearings



Armature Babbitt Metal

National Bearing Metals Corporation

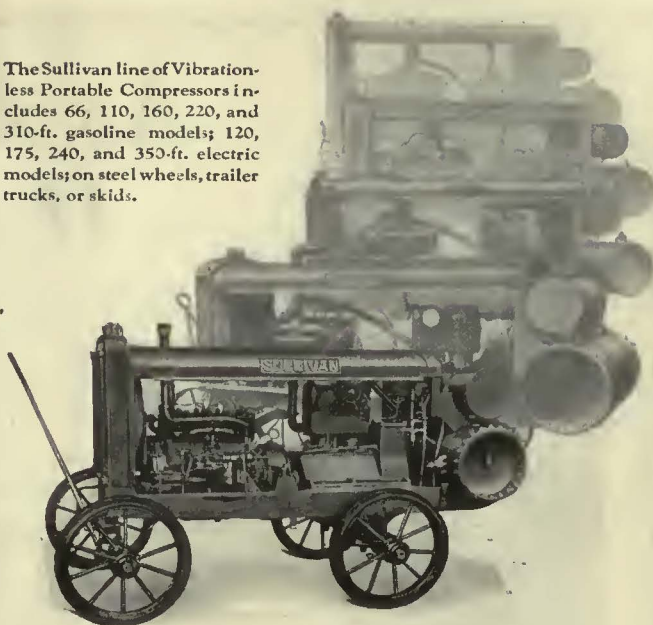
ST. LOUIS, MO.

JERSEY CITY, N. J.
PORTSMOUTH, VA.

NEW YORK, N. Y.
ST. PAUL, MINN.

PITTSBURGH, PA.
MEADVILLE, PA.

The Sullivan line of Vibrationless Portable Compressors includes 66, 110, 160, 220, and 310-ft. gasoline models; 120, 175, 240, and 350-ft. electric models; on steel wheels, trailer trucks, or skids.



Sullivan adds the 66-ft. Vibrationless Compressor

Vibrationless Portable Compressors have given a new meaning to dependable air power service.

So popular have these Vibrationless Compressors become, that Sullivan Engineers have now added the 66-foot size to the Sullivan line.

You will find this new compressor a real profit maker on small jobs of rock drilling, spray painting, concrete or asphalt cutting, clay digging, tamping, riveting, calking, cleaning—wherever a small amount of work is to be done with air, or where tools will be run intermittently.

Details of the new Vibrationless Compressor

The 66-foot "WK-312" has two cylinders $4\frac{3}{4} \times 4$ inches—is run by an 18 H.P. engine, and is good for 100 lbs. pressure.

It may be mounted on steel wheels (wt. 2500 lbs.) spring mounting with rubber tires; skids or two-wheel trailer.

Standard Sullivan Equipment includes: American Bosch high tension magneto and impulse starter, Zenith carburetor, Pierce Governor, Sullivan slow-down governor, pilot valve unloader, Imperial engine primer, and AC Filters.

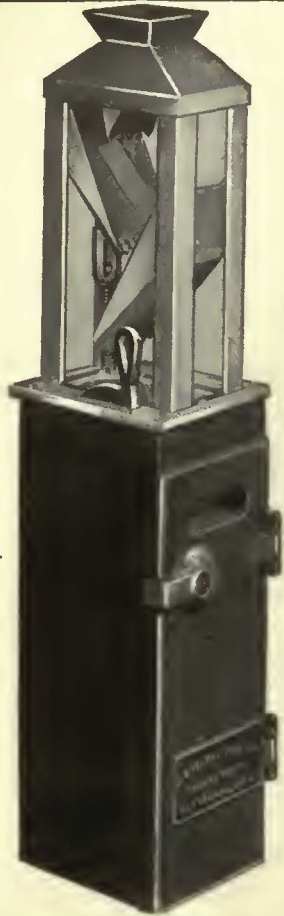
Vibrationless Compressor Catalog, No. 83-F

SULLIVAN AIR POWER EQUIPMENT

SULLIVAN MACHINERY CO.

809 Wrigley Building, Chicago, Ill.





As Efficient as It is Simple

The Cleveland Fare Box meets every modern fare collection need—without depending on a complicated, involved system for its efficiency.

It is fitted for any rate of fare or system—handles zone fares as readily as unit fares.

Once installed a Cleveland Fare Box never becomes “obsolete”—it meets any change—accommodates fractional fares, flat fares, either paper or metal tickets.

The Cleveland Fare Box Co.

4960 Lexington Ave., Cleveland, Ohio

Canadian Cleveland Fare Box Co., Limited, Preston, Ontario

“4-Way” Padlocks, Coin-Auditing Machines, Change Carriers,
Tokens

For Overhead
Trolley Work
of Any
Description

TRENTON

TOWERS



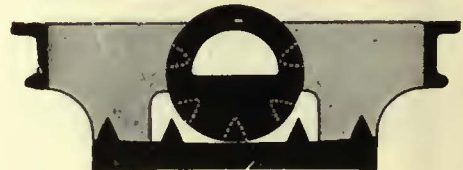
Trenton Towers are universally known as the safest, fastest and most practical method of bringing overhead construction within working range.

They are economical to operate and provide safe, easy working conditions for line men. Indispensable for rapid repairing of pole type equipment, braces, trolley wires, traffic signal lights. Gas or electric chassis. Will be glad to send a catalog. Write.

J. R. McCARDELL & COMPANY
391-401 SOUTH WARREN ST., TRENTON, N. J.

STUCKI SIDE BEARINGS

SPECIAL CARBON STEEL
HEAT TREATED

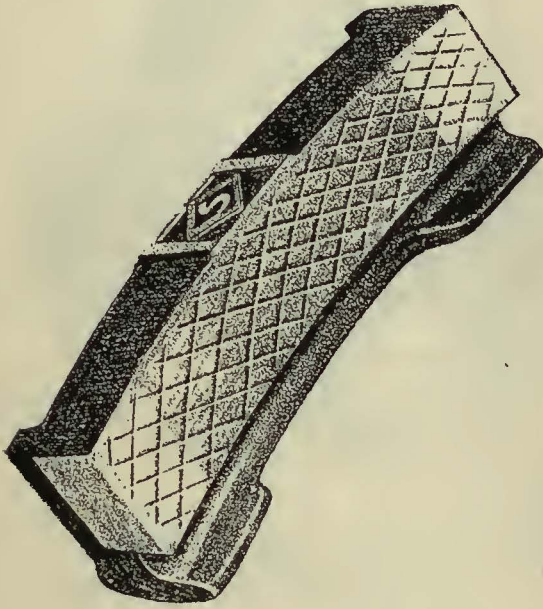


LARGE WEAR SURFACES
FREE ROLLER
ONLY TWO PARTS

A. STUCKI CO.

OLIVER BLDG., PITTSBURGH, PA.

Better Brakes Need Better Brake Shoes



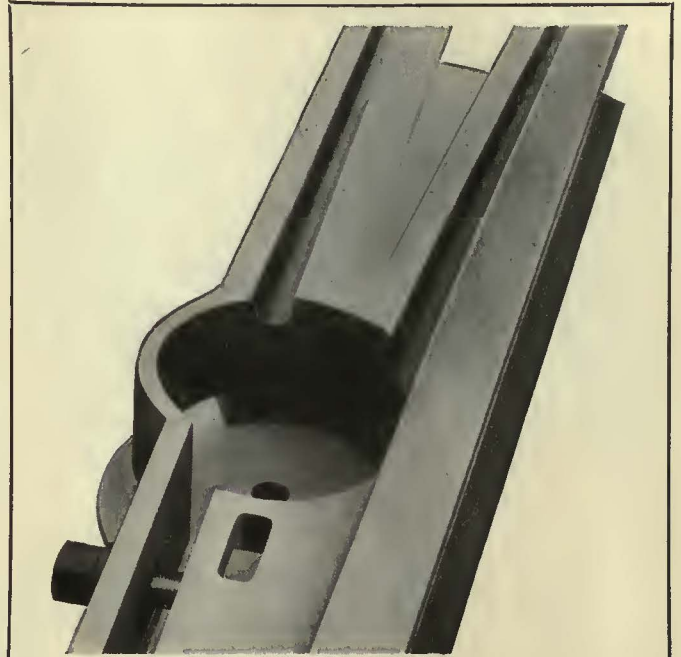
IMPROVEMENT of trolley-car schedules in urban service involves faster starts and quicker stops and has made the redesign of braking systems imperative. The new brakes now being advocated work faster and more powerfully than any systems hitherto used.

These improved brake mechanisms vastly increase the strains upon brake shoes due to higher speeds, quicker application and heavier pressures. They should be equipped with Diamond-S brake shoes, the features of which keep them in operation long after ordinary brake shoes have worn out.

The American Brake Shoe and Foundry Company

230 Park Ave., New York

332 So. Mich. Ave., Chicago

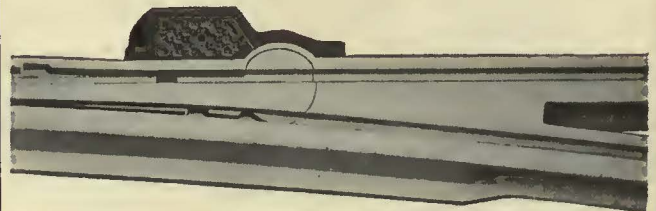


A NEW WHARTON CONTRIBUTION to the industry

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. in diameter and 6-in. deep. This construction eliminates a holding-down device, prevents kick-up and forward movement of the tongue.

We can help you on trackwork layouts whether complicated or simple.
Write.



**Wm. WHARTON Jr.
& COMPANY, Inc.**

EASTON, PA.

News

brief, late news flashes for the electric railway industry



To supplement the service of the regular monthly issues of *Electric Railway Journal*, a separate NEWS service appears on thirty-nine Saturdays during the year. This supplement keeps you in touch with court decisions . . . fare increases . . . new ordinances . . . association meetings . . . financial statements . . . equipment purchases.

Subscription Price: For all countries taking domestic subscription rate, \$2 per year.

ELECTRIC RAILWAY JOURNAL
475 TENTH AVE.
NEW YORK CITY

Enter my subscription to the Electric Railway Journal News. Bill me for \$2.

Name

Address

City State

How to fit yourself for leadership in business



Examine these Five Helpful Books Free!

Craig and Charters—Personal Leadership in Industry.

McClure—How to Think in Business.

Schell—Technique of Executive Control.

French and Uhler—English in Business.

Hoffman—Public Speaking for Business Men.

Library of PERSONAL EFFICIENCY IN BUSINESS

These five practical volumes give you the methods used by successful executives in getting results for themselves in business. They represent actual business conditions—they cover situations exactly the same as you face in your daily work—and they show you clearly and definitely just how these situations can be handled for your own best interests.

They discuss everything the executive must do in taking care of the personal element in his job. They take up business thinking, speaking and writing. They discuss business relations with subordinates, associates and superiors. They cover the executive's handling of his personal self. All of it explained in the light of "getting results." All of it in absolute answer to the question "What makes a good executive?"

5 volumes, 1158 pages \$10.75
Easy monthly payments

Send the Coupon Today.

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McGraw-Hill Book Co., Inc., 370 Seventh Avenue, New York.

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Name

Home Address

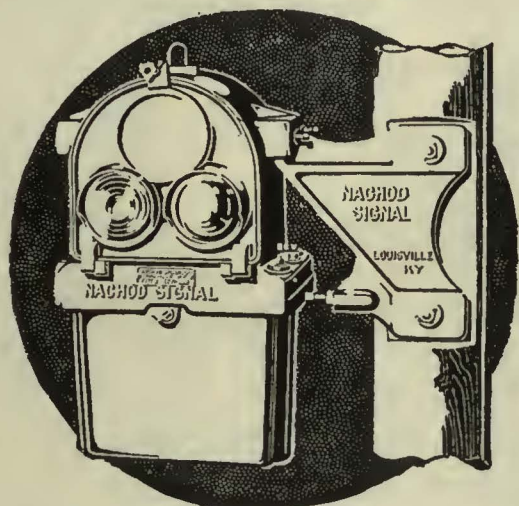
City State

Position

Subscriber to Electrical World?..... Mem. A.I.E.E.?.....

(Books sent on approval to retail purchasers in U. S. and Canada only.)

Chance and Memory VS. Automatic Control



THERE'S no good argument for operating on chance and memory. Even the argument of lower cost doesn't hold true. Time and again collisions and crashes have demonstrated how costly "Chance and Memory" really is.

Its cost is continuous—you never know when, depending on the human element alone, it will take toll in lives, property and equipment.

With Nachod Automatic Block Signals the first cost gives you the protection. They operate independently of the train crew—chance and memory are out of the picture. At all times these signals insure safe, fast operation— are adapted for single or double track.

Type CD, shown above, for single track, shows when the block is clear or, if occupied, which way the car is moving. On a clear block it tells the motorman when he has set the Stop signal at the other end, shows the car following into the block that it is already occupied, and gives each motorman an indication that he is protected in entering. The system is Permissive, allowing several cars to follow into the same block under full protection.

NACHOD SPELLS SAFETY

Today is the day of fast schedules. The industry has found in NACHOD & U. S. Block Signals, the equipment that provides maximum safety under all conditions of operation.

**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, Highway Crossing Signals, Headway Recorders.



Now Built To Work Both Ways

The Racor Oil Cylinder Retarding Dash Pot has long been used to prevent spring-return switch points from being banged to pieces. When the first wheel flange forces the points aside the Dash Pot offers no resistance, but it does retard their return so that following flanges do not strike them hard.

Now this useful specialty is made double-acting. In other words, it may be attached to either side of the switch without special assembling and it permits the switch to be run through from either side, checking the return of the points regardless of their position. Also, the switch may be hand-operated in either direction without interference from the dash pot.

Used in combination with Ramapo Automatic Return Switch Stands it provides ideal control for siding switches.

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.

ALL types of City and Interurban cars of latest design and Modern construction are built by—

CUMMINGS CAR AND COACH CO.

Successors to McGuire-Cummings Mfg. Co.

111 W. Monroe St.
Chicago, Ill.



R 11 Double Register

A Fare Registration System that Gains the Confidence of ALL

The durability, accuracy, speed and convenience of International Registers has given them the nation-wide reputation for efficient service that they have enjoyed for over thirty years.

Electric operation gives the new types even greater speed, accuracy and convenience. Registers can be furnished for operation by hand.

The International Register Co.
15 South Throop St., Chicago



Drip Points for Added Efficiency

They prevent creeping moisture and quickly drain the petticoat in wet weather, keeping the inner area dry.

The Above Insulator—No. 72—Voltages—Test—Dry 64,000
Wet 31,400, Line 10,000.

Our engineers are always ready to help you on your glass insulator problem. Write for catalog.

Hemingray Glass Company
Muncie, Ind.

Est. 1848—Inc. 1870

Dundee "A" Clings

The electrical worker wants a tape that sticks, because it speeds up his job. A tape that is hard to wrap in cold weather makes his work harder.

Dundee "A" fills his requirements nicely because it clings in any weather. It is moderate in price, too, and yet is a true friction tape with the adhesive thoroughly calendered into the fabric under heavy pressure.

THE OKONITE COMPANY

Founded 1878

THE OKONITE-CALLENDER CABLE COMPANY, INC

Factories: Passaic, N. J. Paterson, N. J.



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NEW YORK CHICAGO PITTSBURGH ST. LOUIS BOSTON

ATLANTA BIRMINGHAM SAN FRANCISCO

LOS ANGELES SEATTLE DALLAS

Novelty Electric Co.,
Philadelphia, Pa.

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

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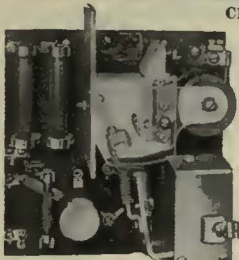
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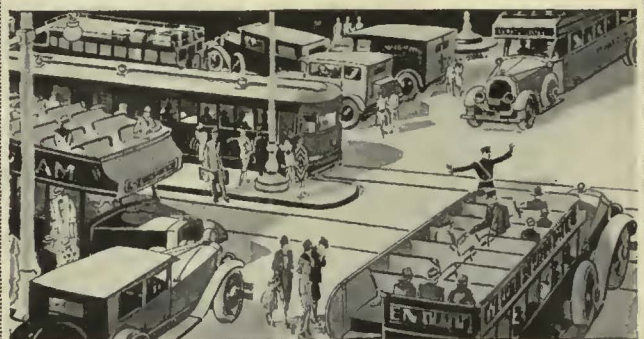
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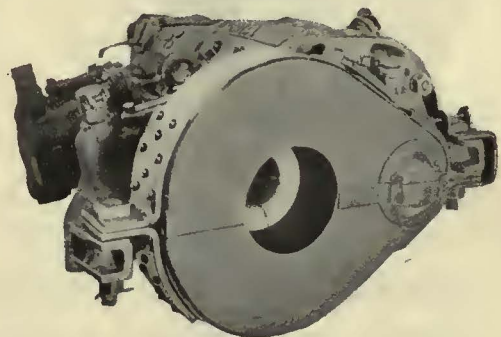


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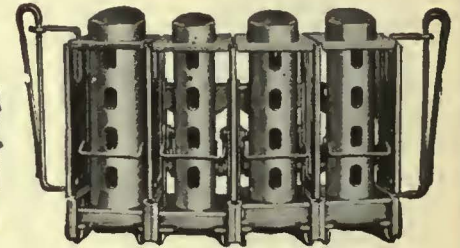
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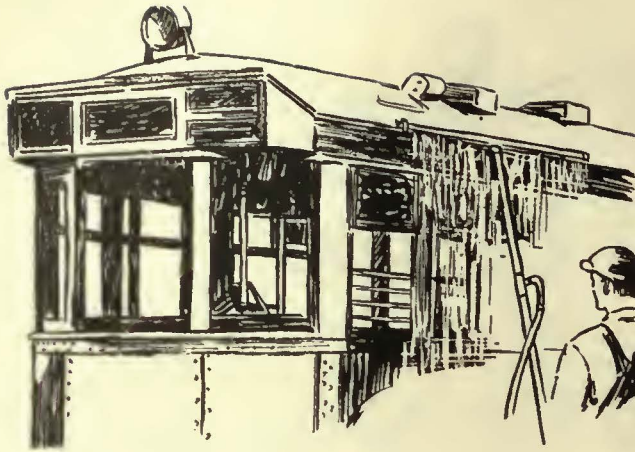
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