

# ELECTRIC RAILWAY JOURNAL

Publising Company, Inc.

AUGUST, 1930

Thirty-five Cents per Copy

## KEEP YOUR CARS ON TIME ON TIMKENS

More time for themselves and less time for transportation is the aim of the traveling public, and at no previous period has the clamor for speed reached such proportions.

Electric railways cannot afford to lag behind in the race for public patronage, and progressive companies are operating on faster running schedules... schedules in which delays have no place... schedules based on modern Timken Bearing Equipped cars.

Lower power, lubrication and maintenance costs and greater riding comfort are other valuable advantages incidental to the exclusive radial-thrust load carrying combination of Timken tapered construction, Timken positively aligned rolls and Timken-made steel.

Car builders will gladly cooperate to give you Timken benefits. The Timken Roller Bearing Company, Canton, Ohio.



The illustration shows a vintage electric railway car with a tan and brown color scheme. The car has large windows and a central door. A woman in a blue dress is entering the car. In the foreground, a man in a brown suit and hat and a woman in a brown dress are walking. In the background, there is a large clock tower and other buildings.

# TIMKEN *Tapered Roller* BEARINGS

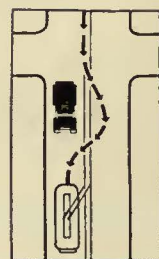
WESTINGHOUSE—A PIONEER AND LEADER IN TROLLEY BUS APPLICATION

Where the  
track ends ~  
service does  
not stop



**T**HE Trolley Bus lends itself admirably to trolley line extension. New residential sections are developing in many cities where the traffic may not justify the cost of laying tracks. The Trolley Bus with its lower initial and operating costs and its deluxe service is the solution.

*Westinghouse furnishes complete electrical equipment for trolley buses including overhead and current collecting equipment.*

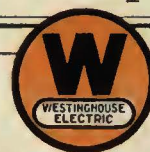


*Weaving in and out from the curb, dodging slow street traffic, prove the value of the trolley bus in keeping fast, accurate schedules and satisfied patrons.*

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

# Westinghouse

T 31430



TUNE IN THE WESTINGHOUSE SALUTE OVER THE N. B. C. NATION-WIDE NETWORK EVERY TUESDAY EVENING.

# Electric Railway Journal

MORRIS BUCK  
Engineering Editor

GEORGE J. MACMURRAY

CLIFFORD A. FAUST

J. W. MCCLOY

JOSEPH R. STAUFFER

Consolidation of  
Street Railway Journal and Electric Railway Review

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

Vol. 74, No. 9

Pages 497-554

PAUL WOOTON  
Washington

W. C. HESTON  
Pacific Coast Editor

ALEX McCALLUM  
London, England

LOUIS F. STOLL  
Publishing Director

## Trolley Bus Operation Increasing

NEW installations have recently been made in a number of cities. Everyone is interested in this new transportation vehicle. A series of articles giving details of routes, equipment, operating results, etc., will appear in future issues of the JOURNAL.

## McGraw-Hill Publishing Company, Inc.

Tenth Avenue at 36th Street  
New York, N. Y.

CABLE ADDRESS:  
"MACHINIST, N. Y."

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1930

Official correspondent in the United States for  
Union International de Tramways, de Chemins  
de fer d'Intérêt local et de Transports Publics  
Automobiles.

NEW YORK, *District Office*, 285 Madison Avenue  
WASHINGTON, *National Press Building*  
CHICAGO, 580 North Michigan Avenue  
PHILADELPHIA, 1600 Arch Street  
CLEVELAND, *Guardian Building*  
BOSTON, 1427 Storer Building  
GREENVILLE, S. C., 1501 Woodside Building  
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SAN FRANCISCO, 833 Mission Street  
LOS ANGELES, 632 Chamber of Commerce Bldg.  
LONDON, 8 Bowyer Street, London, E. G. 4

Published monthly, with one additional Con-  
vention Number during the year. \$3 per year.  
35 cents per copy. Entered as second-class  
matter, June 23, 1903, at the Post Office at  
New York, N. Y., under the Act of March 3,  
1879. Printed in U. S. A.

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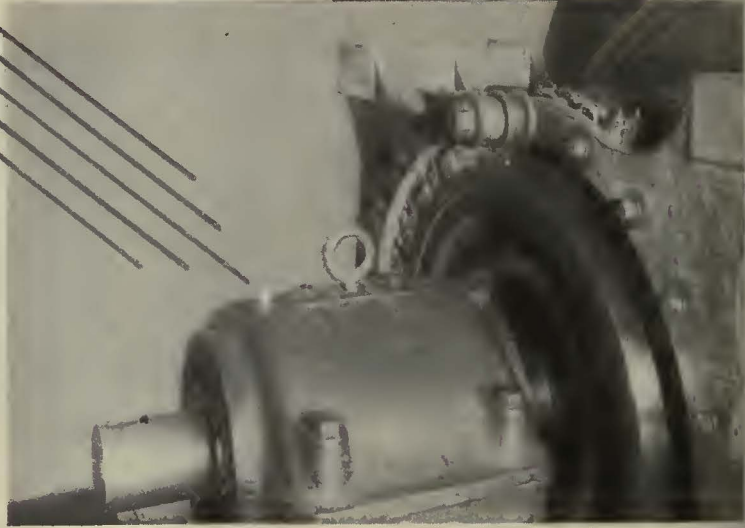
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# BALANCED

*so  
accurately  
that a coin  
will stand  
on edge*



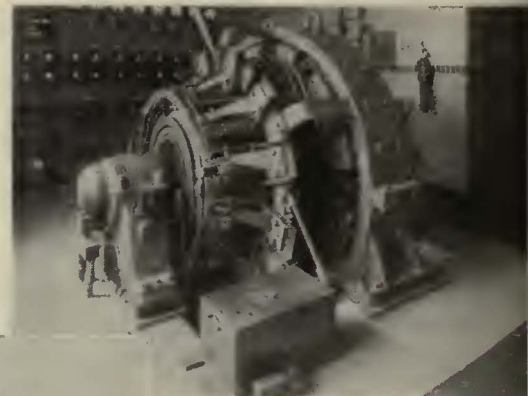
*The "coin test" for balance.*

**S**MOOTH operation of any electrical machine depends upon accurate balance—both electrical and mechanical.

The city of Detroit recently installed a 2000-kw. Westinghouse Synchronous Converter which operates so smoothly that a coin the size of a nickel can be stood on edge on the bearing cap with the machine running under load.

Westinghouse Converters are of perfectly balanced design and will give you efficient service with smooth operation.

*Below—Exterior view of the Turner substation.*

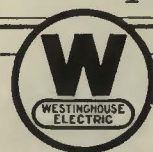


*Above—Installation view of 2000-kw. Westinghouse Synchronous Converter in the Turner substation of the City of Detroit.*

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

## Westinghouse

T 31434

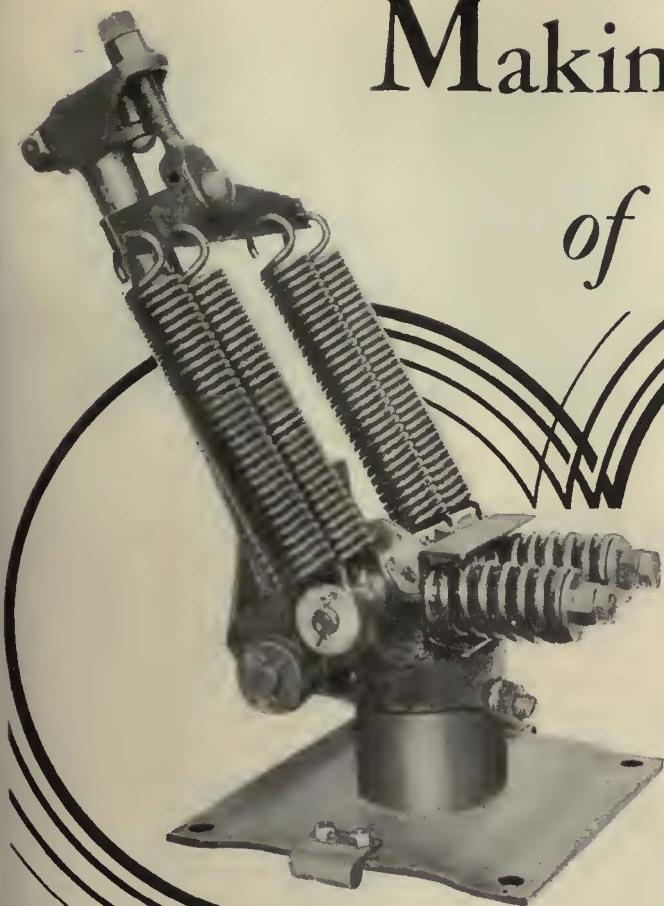


TUNE IN THE WESTINGHOUSE SALUTE OVER THE N. B. C. NATION-WIDE NETWORK EVERY TUESDAY EVENING.

# Making a few pounds of STEEL

*save*

## Maintenance DOLLARS



**W**ITH the positive-acting spring buffer on the new Westinghouse-Nuttall US-24-A Trolley Base, significant cost-saving advantages in operation and maintenance are afforded.

Made entirely of steel, exposure to weather has no deteriorating effect upon the sensitiveness of this buffer. Nor are renewals necessary, for with all-metal construction, the lasting strength and durability that has been built into the rest of this new all-steel base are fully matched.

The unvarying certainty with which this buffer quickly and effectively stops pole oscillation, minimizes the possibility of damage to trolley and overhead equipment.

Adjustable springs provide a means of easily varying the activity of this buffer to get the most desirable effect with different pole equipments or under other variations in operating conditions.

Yet, even with the  $8\frac{1}{4}$  pounds of steel used to afford these advantages on a spring buffer, the total weight of the US-24-A Trolley Base is only 77 pounds.

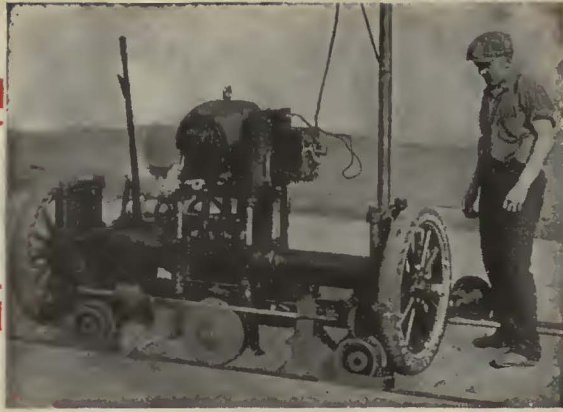
*Service, prompt and efficient, by a coast-to-coast chain of well-equipped shops*

# Westinghouse

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TUNE IN THE WESTINGHOUSE SALUTE OVER THE N. B. C. NATION-WIDE NETWORK EVERY TUESDAY EVENING.

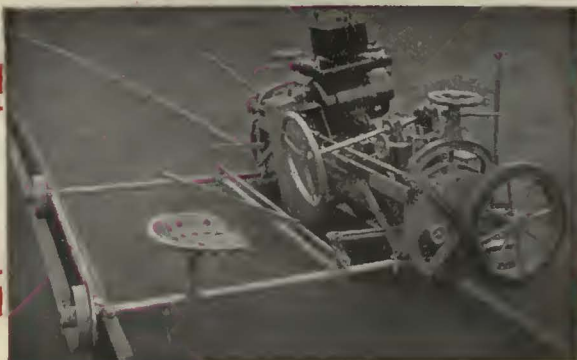


Imperial Track Grinder



RTW Curve Oiler

“Not a Jar  
in a carload”



Improved Atlas Rail Grinder



Eureka Radial Rail Grinder



Reelproceating Grinder Car, showing one of the grinding units.



Heavy Duty Reelproceating Rail Grinder.

“Rock a bye baby  
 On the street car;  
 You can sleep soundly  
 With nothing to mar  
 Your dream so restful,  
 So quiet, serene;  
 Not a jar in a car load  
 In this limousine.”

—*Cincinnati  
 Commercial  
 Tribune*

That's what good track does.  
 Grinding makes it good.  
 Grinding keeps it so.  
 The tools shown here do it  
 economically.

## Railway Trackwork Co.

3132-48 East Thompson Street, Philadelphia

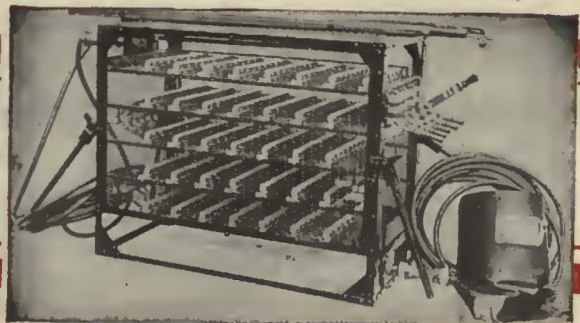
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- Chas. N. Wood Co., Boston
- H. F. McDermott, 208 S. LaSalle St., Chicago
- F. F. Bodler, San Francisco, Cal.
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Ⓢ 4539



Reelproceating Track Grinder



Ajax Electric Arc Welder

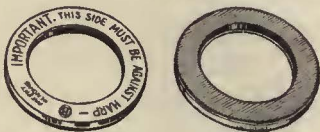
# TWO IMPORTANT NEW IMPROVEMENTS IN THE O-B Trolley Wheel ADD SURPRISINGLY TO SERVICEABILITY

**S**EVERAL years ago O-B introduced an entirely new principle in trolley wheel design. This new wheel offered outstanding service advantages—including two and three times the mileage formerly expected from a trolley wheel.

Oiling was done away with because graphite plugs inserted in a one and one-half inch axle provide for wheel lubrication. This factor alone resulted in remarkable savings, for cost of trolley wheel oiling is a considerable item each year on any electric railway property.

Scores of properties service tested the O-B Trolley Wheel. Many found that it vastly bettered current collection—that mileage was greatly increased—that maintenance was reduced to a minimum. These properties adopted the O-B Trolley Wheel—and they have been highly gratified with results.

Now, painstaking studies into the experience of these properties have indicated certain improvements which provide even better service from trolley wheels.



A new copper-graphite composition washer, formed by pressing composition into a brass retainer cup.

The first result of these studies has been the replacement of the fibre washer between the hub and the harp with a copper-graphite composition washer. This new washer—proved by over a year of testing in service—effectively improves current collection.

The fibre washer was an insulator. This caused all of the current to pass through the axle to the harp. The



new washer—an excellent conductor—permits most of the current to go directly from the wheel to the harp through the washer. Thus the tendency toward the pitting of the axle, and the inside of the hub, has been effectively eliminated.

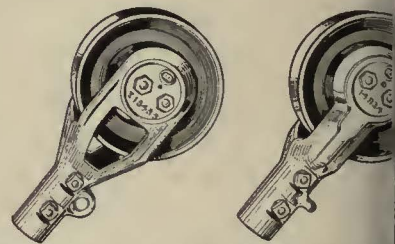
Besides this, the copper-graphite composition washer is a lubricant for the wheel, reducing wear at the ends of the hub and doing away with end play in the wheel.

This proved feature has "stepped up" mileage with a corresponding reduction in wheel maintenance. And even more important, the permissible operating speed has greatly increased, thus widening the proper use of O-B wheel to cities and semi-high speed suburban service.

A further improvement has been accomplished by redesigning the harp. It now provides materially greater protection to the wheel, especially in the event of a harp strike or dewirement, if the harp strikes span wires.

Thus, O-B contributes again to further reduction in operating costs by adding miles and better service to the unusual service already being rendered by the O-B Trolley Wheel.

A trial installation proves this saving. The next or four summer months provide an excellent opportunity for you to demonstrate to your own satisfaction that the O-B Trolley wheel should be on all your cars:



Observe the protection provided by the new harp (at the left) as compared to the old harp (at the right).



MORE LITTLE ACORNS  
WHICH WILL GROW IN  
TO BIG OAKS.



**O**PERATING expense is made up of countless small items, many of which are not readily visible. But little savings in labor here, a little more service life there, when totaled grow into important sums. They are like the little acorns which grow into big oaks.

WHEN the doorbell rings, you can be rather certain that somebody is at the door. Circumstantial evidence is often as convincing as direct evidence. Early, the fact that 120 electric railway properties in the United States



Una Type Rail Bond

and Canada use O-B Una Rail Bonds indicates that these bonds must offer some unusual service, a greater economy, or both. The facts are quite apparent. Bonding by the Una process is quicker, a definite saving in installation costs. Bonds thus perform a homogeneous union between the rail and bond strand, the union is a dense and very strong weld, with high mechanical strength; a resist-

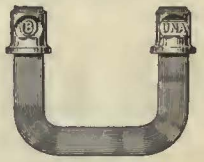


Una Type CL Rail Bond

to shear of about 32,000 lb per terminal. Thus maximum electrical conductivity and uniform low electrical resistance in the track circuit are definitely assured for the long life of an O-B bond.

An unusually strong bond is the result of the Una carbon mold, which holds the molten metal in a molten state. Thus, the temperature of the strand and the rail are kept up to the temperature of the welding metal.

ized on Unas. These properties, over 120 in number, have had adequate proof by actual experience that the service life, strength and uniform low resistance of the Una rail bonds is equal to expectations.



O-B Una Type LUA Rail Bond

An O-B Una Rail Bond when properly applied by the carbon mold process, either with a resistance welder or motor-generator set, becomes as much a part of the rail as sugar becomes part of the cake. The use of O-B Duron

# O-B Una Rail Bonds

THE CHOICE OF  
120 ELECTRIC  
RAILWAY PROPERTIES



O-B Una Type CBA Rail Bond

welding rod is a great aid to proper application.

Seven types of O-B Una Rail Bonds adequately provide for every bonding requirement. All are fully described on pages 53 to 63 of New Products Supplement No. 3 to O-B Catalog No. 20. If your copy is not quickly available, a copy will be gladly sent upon request to Ohio Brass Company, Mansfield, Ohio. In Canada, Canadian Ohio Brass Company Limited, Niagara Falls, Canada.



A view of the right-of-way of the Chicago Rapid Transit Co., Chicago. This property is an extensive user of Una Rail Bonds.

1282CB

# Ohio Brass Co.

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

- PORCELAIN INSULATORS
- LINE MATERIALS
- RAIL BONDS
- CAR EQUIPMENT
- MINING MATERIALS
- VALVES

# Stalwart Strength

is built into  
**GENERAL  
 ELECTRIC**

**POLE LINE  
 HARDWARE**

and

*Construction  
 Specialties*

**Y**OU can count on General Electric Pole Line Hardware for long life and dependability. G-E standard quality is always there.

High-grade, open-hearth steel expertly treated, processed and finished goes into every metal part.

And each one is *double-dipped hot galvanized* to give highest resistance to rust...to make its unexcelled strength *enduring*.

General Electric makes a complete line of pole line hardware and construction specialties—everything for pole line service in the railway field.



**DOUBLE-DIPPED  
 HOT  
 GALVANIZED!**

**G-E Standard Anchor  
 Rod has unsurpassed  
 strength and  
 durability.**



*Write for the new catalog!*

Section C 818, Merchandise Dept.  
 General Electric Co., Bridgeport, Conn.  
 Please send me the new G-E Pole Line Hardware and Construction  
 Specialties Catalog.

Name.....  
 Address.....

**GENERAL**  **ELECTRIC**  
**POLE LINE HARDWARE**





A new type of Keystone roof ventilator which may be used in conjunction with the Mueller-Evans heating and ventilating system or independently.

NOW IS THE TIME  
TO CONSIDER

# HEATING

FOR YOUR BUSES

GET DATA ON THE  
SIMPLE AND PRACTICAL

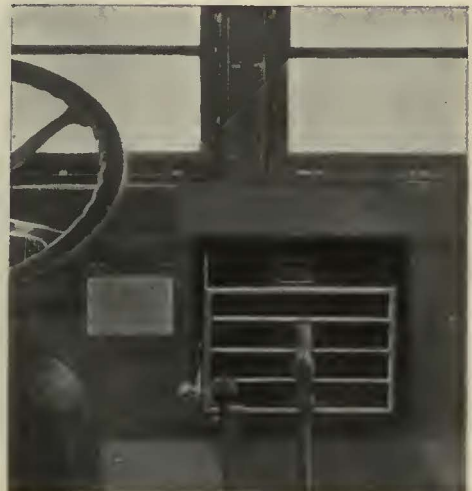
## MUELLER-EVANS SYSTEM

A MODERN, up-to-date system of forced heating and ventilating which utilizes the fan of the motor and the heated air as it comes through the radiator. This fresh heated air is forced through a duct into the bus body. It provides 60° of warmth in zero weather and abundant fresh air which is the only way to prevent the ingress of gas and other odors. The system is simple in construction—easily removable and is not subject to wear. It costs nothing to operate. It is easy to install and is relatively low in first cost as compared to other complicated systems. The Mueller-Evans system is the answer to your problem of bus heating and ventilating. Write for complete data.

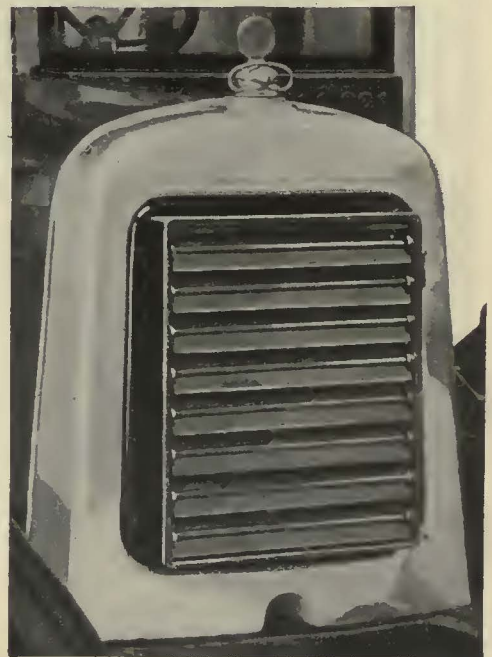
### ELECTRIC SERVICE SUPPLIES CO. Manufacturer

**RAILWAY, POWER AND INDUSTRIAL  
ELECTRICAL MATERIAL**

Home office and plant at 17th and Cambria Sts., PHILADELPHIA; District offices at 111 N. Canal St., CHICAGO; 50 Church St., NEW YORK; Bessemer Bldg., Pittsburgh; 88 Broad St., Boston; General Motors Bldg., Detroit; 316 N. Washington Ave., Scranton; Canadian Agents, Lyman Tube and Supply Company, Ltd., Montreal, Toronto, Vancouver, Winnipeg.



This air diffuser, installed in dash, distributes the warm air.



Radiator shutters as installed on M-E equipped bus.



Air duct which conveys warm air from back of radiator into bus body.



MANGANESE WELDING HAS PROLONGED THE LIFE OF MANGANESE FROG AND CROSSING CASTINGS FROM TWO TO SIX YEARS

**S**TOODY MANGANESE WELDING ROD applies equally well with alternating or direct current. The fact that it applies easily, as well as the fact that it forms a smooth, hard deposit which requires little, if any, grinding makes this rod particularly suited for night welding on street railways . . . If you haven't tried **STOODY MANGANESE WELDING ROD** . . . see your nearest **STOODY JOBBER** or write.

**STOODY COMPANY**

*Manufacturers of*

**Welding Rod** ♦ **Alloy Steels** ♦ **Equipment**  
**WHITTIER, CALIFORNIA**



**Even a child finds the NP  
Treadle operated exit door**



*The Easiest Way Out - - -*

**NATIONAL PNEUMATIC CO**

## CAR SEATS LIKE THESE REST AND REFRESH



These new Osgood Bradley cars are equipped with Hale & Kilburn No. 909 seats and the Brooklyn and Queens surface lines find that they are very popular with passengers.

It may be hard for a man who works in a comfortable chair to realize that women shoppers get dog tired, that men's feet burn and their backs ache as they trudge around on their business calls. It may be hard for an important traction executive to sense the restfulness of riding in a luxurious chair after a tough afternoon in the city.

But people who rain nickels and dimes into fare boxes know all about it. They appreciate such thoughtfulness far more than they can make us realize. That is why those traction systems that install this new and luxurious Hale & Kilburn seating are enjoying increased income from their communities.

### HALE & KILBURN CO.

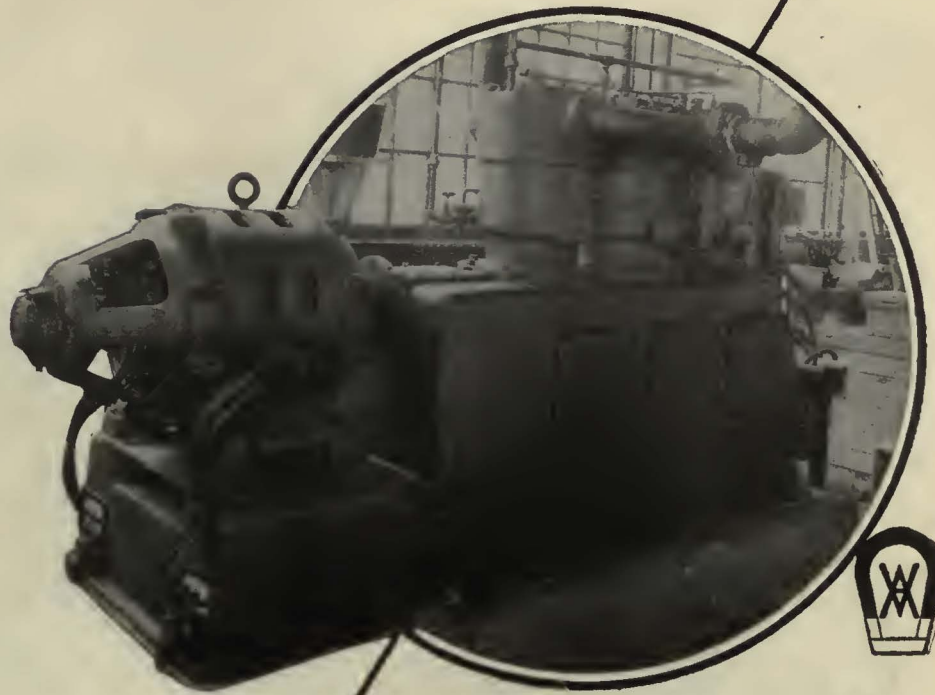
General Offices and Works:  
1800 Lehigh Ave., Philadelphia

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# HALE & KILBURN SEATS

# WESTINGHOUSE-NATIONAL *Air Compressors*



**POWER  
HOUSE**

**CAR  
BARN**

**SHOP**

WHEREVER there is a need for compressed air on street railway properties, Westinghouse-National compressors can and are being used. For every requirement — in power house, car barn, shop, or on the right of way—there is a suitable type and size available (ranging from 2½ to 700 cu. ft. displacement).

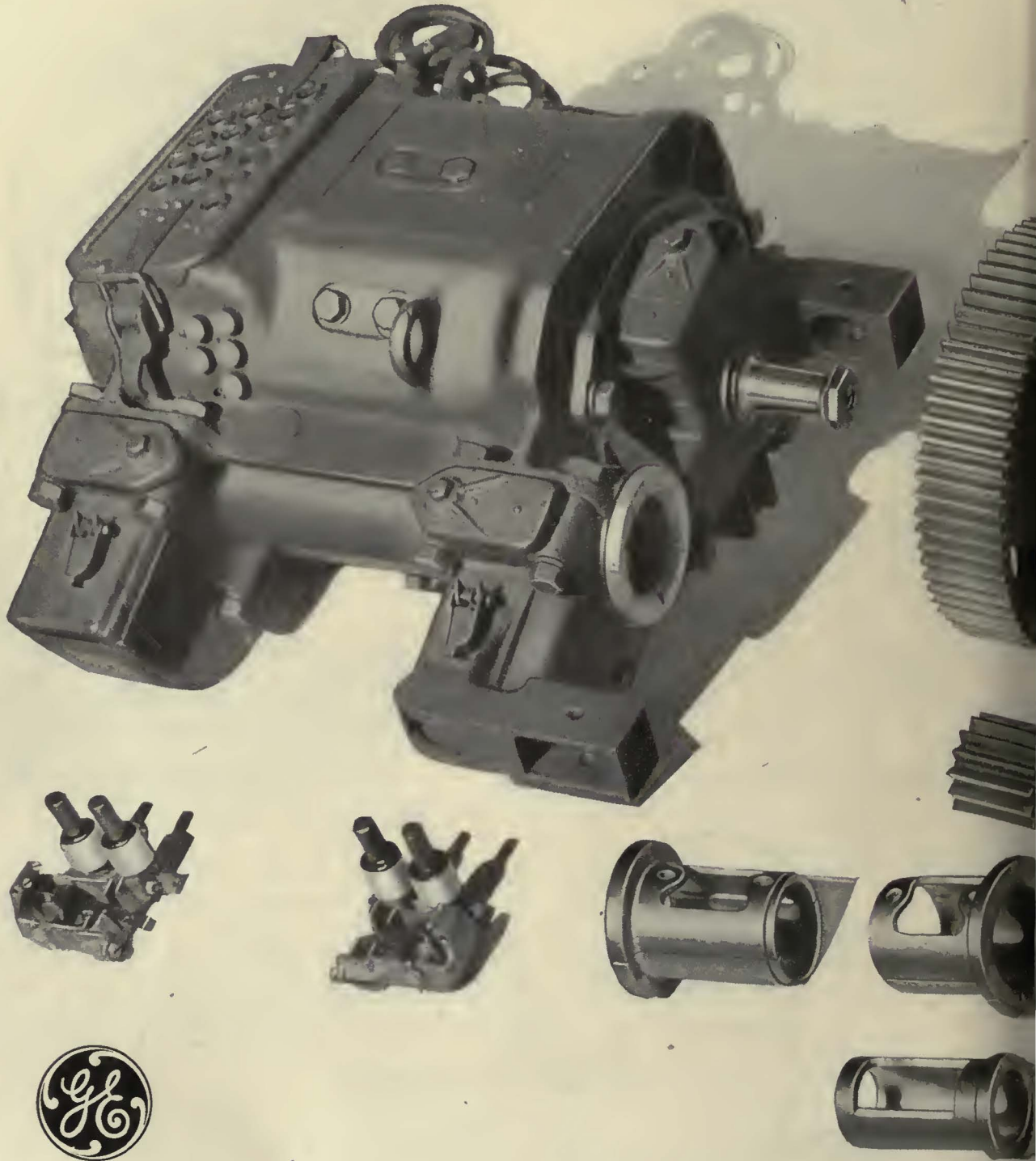
*When you think compressed air for any purpose,  
think Westinghouse-National!*

**WESTINGHOUSE TRACTION BRAKE CO.**

*General Office and Works: Wilmerding, Pa.*

**“QUALITY MACHINES FOR QUALITY SERVICE”**

# General Electric Renewal Part



# GENERAL

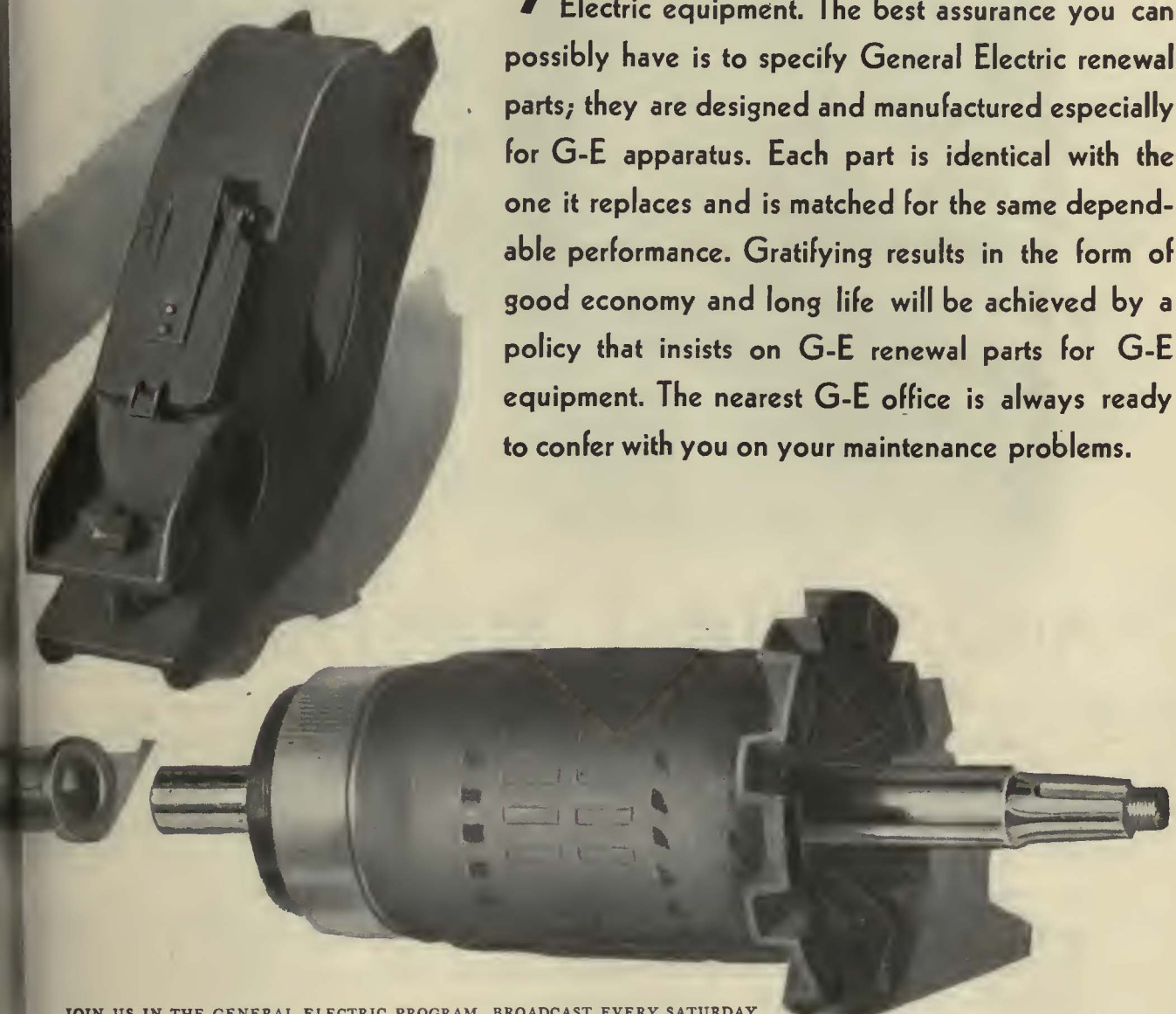
GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y.



# for General Electric Equipment

## ...the one way to be assured of original-equipment quality

**Y**OU expect the utmost service from your General Electric equipment. The best assurance you can possibly have is to specify General Electric renewal parts; they are designed and manufactured especially for G-E apparatus. Each part is identical with the one it replaces and is matched for the same dependable performance. Gratifying results in the form of good economy and long life will be achieved by a policy that insists on G-E renewal parts for G-E equipment. The nearest G-E office is always ready to confer with you on your maintenance problems.



JOIN US IN THE GENERAL ELECTRIC PROGRAM, BROADCAST EVERY SATURDAY  
EVENING ON A NATION-WIDE N.B.C. NETWORK

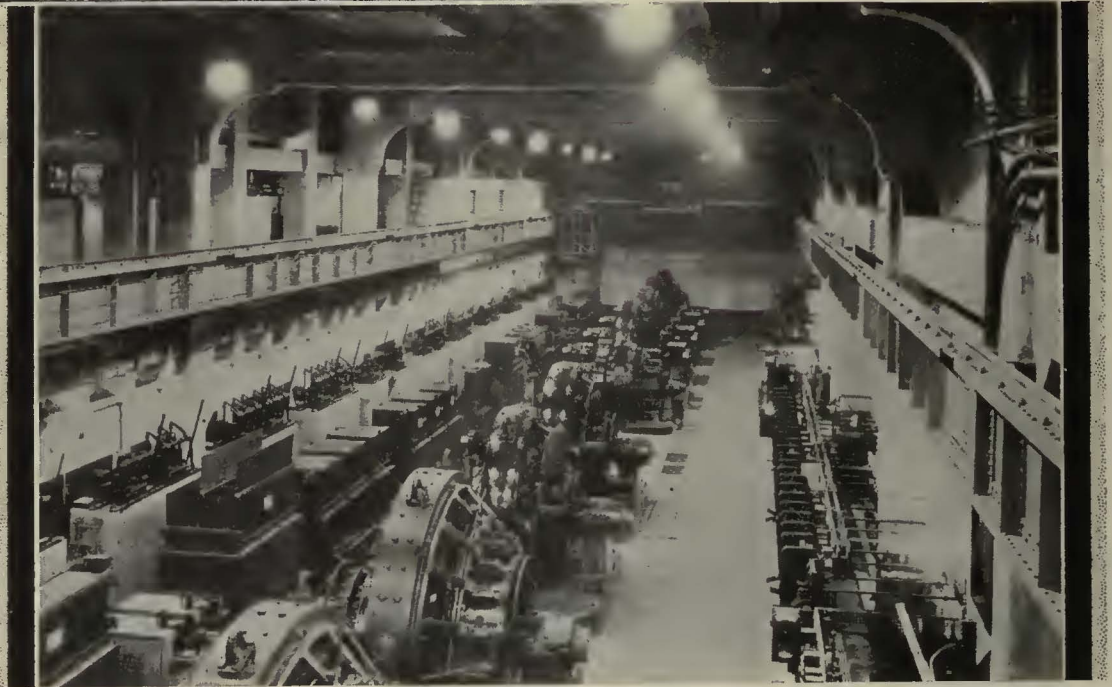
# GENERAL ELECTRIC

330-149

SALES AND ENGINEERING SERVICE IN PRINCIPAL CITIES



## 100 FEET BELOW THE SIDEWALKS OF NEW YORK



*Courtesy New York Central Railroad*

# GRAND CENTRAL SUBSTATION

ONE of the most remarkable substations in existence has recent'y been completed by the New York Central Railroad—100 feet below the street level at Forty-third Street and Lexington Avenue. ¶ This substation, which supplants a smaller one formerly located at Fiftieth Street, supplies power for the operation of trains as well as the lighting of several large buildings in the terminal zone. The equipment includes ten G-E synchronous converters, several being of 4000-kw. capacity, and G-E manual switching apparatus. ¶ G-E engineers coöperated with the Railroad Company in making the installation without interruption of service to either the railroad or to the buildings. This was an unusual achievement when one considers that much of the equipment of the new substation is the same equipment that was formerly in operation at the Fiftieth Street substation.

GENERAL  ELECTRIC

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, August, 1930

Number 9

## Chicago Transit Settlement a Message to the Industry

CHICAGO'S display of good sense in passing the franchise ordinance providing for co-ordination of transit facilities was more than a victory for the companies involved. Important as it was to the city and the local railways, the adoption of the ordinance really was a victory for the entire industry in that it recognizes more effectively than do other modern grants, the right of the companies to live and the community of interest that exists between them and the municipality.

There is a far-reaching civic aspect to settlements of this kind, and Chicago took that aspect properly into consideration. The rapid transit lines, with a 50-year renewable franchise granted under the steam railroad law, were in a good position. On the other hand, the grant of 1907 under which the Surface Lines was operating was limited to a term of twenty years in accordance with state corporation law. For nearly this entire period it has been difficult to obtain money for development of the property to meet the city's growth. In the face of the expiring franchise and the uncertainties that necessarily are a part of negotiations for a new grant, however, the Surface Lines never let down. By this attitude the railway built up public good will which was an influential factor in the favorable outcome of the recent referendum.

In the new deal, recognition has been secured of the right of the companies to live. The principles have been established that they are entitled to rates that are self-sustaining, that subways shall be built with city money and by the assessment method, that the terminable permit is a sound device, that valuation is more than a matter of barter and trade and should be carried forward on a basis of fact, and that any excess earnings over an amount needed by the companies to carry on aggressively day by day shall go to the general improvement of the system at once. These are matters of great significance as reflecting changed points of view—points of view that augur well for Chicago in the future.

In addition, the new grant is significant in that it recognizes the fact that a comprehensive program of rapid transit development should be the backbone for the future, while it takes full account of the need for the intensive use of the street car, the bus and the trolley bus, in their respective fields. In the future the character of the traffic carried on the surface lines is likely to change greatly. As they lose in through riders, they will become increasingly important as feeders. Now only 20 to 30 per cent of the total of passengers carried in Chicago are transported on the rapid transit lines. Under unification these proportions may be expected to change, but only to the extent that scientific planning shall determine.

Already a start has been made on the program of improvements—a start that calls for the immediate expenditure of \$12,000,000 even before formal acceptance of the grant has been filed on behalf of the new consolidated company. Articulation and rapid transit planning are going ahead. The more pretentious parts of the \$200,000,000 program calling for rapid transit construction must necessarily proceed slowly toward realization, but co-ordination of existing facilities and the building of supplementary surface tracks and the installation of bus and trolley bus lines will go forward at once and as fast as is consistent with careful planning.

## Politics Should Not Be Permitted to Seep Into Utility Regulation

DISQUIETING proposals have appeared of late indicating politics is likely to play a larger part in utility regulation in the future than it has in the immediate past. Not long ago the governor of New York spoke of the need for "a strong-arm man who will bring the [Public Service] commission back to its original role of defender of the public interest." During recent sessions of the legislatures of various states, a number of ill-considered and impracticable measures, aimed at the utilities, were introduced. The cry has been raised that it would be better for the state to own the utilities than for the utilities to own the state. While the electric railways were not, in most instances, the primary targets of the law makers, the industry cannot afford to stand aloof on the side lines and watch.

Utility regulation has evolved painstakingly. Many utility heads have accepted the idea reluctantly, but the majority have realized its advantages. They were for it in the beginning and they are for it now. Those who have done things in contravention of the regulatory law, however, have been sufficient in number to give political promise to the cry that regulation has broken down. By its very nature, regulation, born as the result of popular hue and cry against the utilities, has always been susceptible to the charge of manipulation. The original idea was to take the utilities out of politics by means of regulation. In this a considerable measure of success was achieved. But of late it has been apparent that politics is playing an ever increasing part in regulation. Therein lies a serious menace to the future of the utilities.

High-minded men in the industry sense the growing menace. Supine acceptance of regulation by the utilities is one thing: unyielding opposition to the exercise of the right of the state to have a hand in the control of its own creatures, is something quite different. The question is not merely whether certain practices are legal, but whether under present economic and social conditions, they are in the public interest. The situation is

fraught with grave dangers. The utilities can meet it most successfully by keeping the public informed on fundamental principles of valuation, rate-making and similar subjects which are the chief concern of regulation. The idea of regulation is sound. The menace to regulation lies in its possible political perversion. Any serious threat at the commissions imperils the railways.

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## Merit Alone Should Control Substitution of Buses for Cars

**T**HAT something should be done to improve surface transportation facilities in New York City has long been apparent. Recently attention has been focused anew on this important subject by the proposal of the New York Railways to substitute buses in place of cars on all of its lines. As the interests which now control this company have always been staunch advocates of the bus as a mass transportation vehicle, it is not surprising that they should suggest buses as the solution of the problem. Moreover, there has been considerable public and political agitation for the creation of an extensive system of bus routes in Manhattan. The establishment of such a bus system upon a competitive basis would almost certainly have a ruinous effect upon existing street railway lines. Substitution of buses for cars on the routes of the New York Railways might, however, forestall the establishment of an independent bus system.

That the proposed wholesale substitution is actually the best solution of the surface transportation problem seems doubtful. Conditions are not the same on all of the routes of this company, and the type of vehicle which is best suited for one is likely to be unsuitable for another. The particular needs of each route should be studied. Where the bus is a better vehicle than the street car to meet these needs, the substitution should be made. Where the street car is a better vehicle, it should be retained.

Exaggerated ideas of what can be accomplished by bus substitution are prevalent. While the bus is an excellent vehicle for certain purposes, those who expect to find in it a miraculous cure for all of New York's transportation troubles are doomed to disappointment. Many of the advantages which the bus possesses under favorable circumstances would be lost under the conditions existing in mid-town Manhattan.

For example, one of the ordinary advantages of the bus is its ability to draw up to the curb to receive and discharge passengers. In New York, however, the advantage actually gained through this flexibility is comparatively small. With almost universal parking, the curb is inaccessible. Even where there is no parking, buses seldom pull in closer than 5 or 6 ft. from the curb. No doubt it is easier for a prospective passenger to wait on the sidewalk and step out this short distance to board a bus than it is for him to wait unprotected in the center of the roadway for a street car. But there is no reason why he need wait without protection. The safety isles used in scores of other cities provide waiting places as safe as the sidewalks. They could be used equally well in New York.

Speed is often cited as an advantage of the bus, but this advantage could not be realized on New York's congested streets, where all vehicles have been forced to crawl because of the system of traffic control. At present the car speed on the New York Railways averages 6 m.p.h., while the average speed of the Fifth

Avenue Coach Company's buses is a little more than 7 m.p.h. The latter, however, includes considerable operating outside the congested area. In Chicago, where modern traffic signals are used and all parking is prohibited in the business district, the average speed of street cars is 11.44 m.p.h., and even in the most congested section, the Loop, it is between 6 and 7 m.p.h. From this it would appear that speed depends on traffic conditions rather than on the type of vehicle.

A widespread belief prevails that general substitution of buses for cars would contribute to the relief of traffic congestion. In reality, the result would probably be to make congestion worse on heavily traveled routes, as more vehicles would be required to handle the same number of passengers and these vehicles would be weaving in and out across several lanes of traffic, instead of moving in a straight line in the center of the street.

On heavy traffic lines the bus possesses no advantage over the modern car from the standpoint of operating cost. Because of the age and worn-out condition of its equipment, the present operating cost of the New York Railways is extremely high, being in excess of 53 cents per car-mile, while revenue is 66 cents per car-mile. Buses certainly could be operated for considerably less than 53 cents per mile. In fact, the costs of the Fifth Avenue Coach Company are now about 45 cents per mile. If buses were substituted in place of cars, however, a considerable increase in the number of vehicle-miles would be required to accommodate the heavy traffic, and the receipts per bus-mile would be materially less than present car-mile receipts. On the other hand, experience in other cities shows that modern street cars can be operated for less than 40 cents per mile, and their use in New York would permit a reduction from the number of car-miles now operated with a corresponding gain in car-mile receipts.

In view of these facts it appears that complete substitution of buses for cars on all the lines of the New York Railways would be a mistake. While improvement in surface transportation facilities is urgently needed, it would be well to proceed with sufficient deliberation to assure the selection on each route of the type of vehicle which is best suited to meet its particular transportation needs.

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## City Transit Problems Are Becoming Better Understood

**T**RAFFIC engineers, city planners and operating officials of public transit facilities have long recognized that the street car, the bus and the taxicab have definite places in the general scheme of urban transportation. Transportation to be successful must be profitable. Uncontrolled and unregulated competition has always proved detrimental to profits. Not only do the operating companies suffer, but the service rendered to the public also suffers.

That these simple facts are becoming more widely understood is encouraging. Publications other than those of the technical press are discussing traffic and transportation problems more frequently. Editors are presenting to their readers the basic problems of city transit and are appealing for support in their solution.

In a recent issue of the *Saturday Evening Post* the leading editorial discussed the subject of co-ordinated transportation and particularly the evils resulting from cut-rate or low-rate taxicabs. It was pointed out that

in the great majority of places the street car easily carries the bulk of the load, and that no substitute can take its place because of the inherent lack of street room. "Buses, taxicabs and private automobiles are all important and desirable," continued the editorial, "but they are less essential than the street car or subway, where there is one, and city transit cannot reach its proper goal until this fact is taken more fully into consideration by city planners and traffic experts."

Appealing for regulated co-ordination the editorial continued: "Just as the street railway deserves a living wage, so does the taxicab. Just as one is a proper subject for strict regulation by a utilities commission, so is the other. It is difficult to see how conditions can be anything but chaotic unless the number of taxicabs are regulated and unless reasonable fares, both maximum and minimum, are provided by public utility."

Views such as these, based on sound reasoning, presented in an unbiased manner to the millions of readers of the *Saturday Evening Post* undoubtedly will have a far-reaching effect.

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### Few Pension Plans on a Sound Basis

**P**ENSION plans for veteran electric railway employees appear to be approaching a critical period in their development. In one recent instance, it was necessary to revise pension rates downward because the expense threatened to become too heavy for the company to carry. On another subway system, additions to the pension roll have been temporarily suspended for a similar reason. Confidential replies received to an inquiry recently made by the *JOURNAL* indicate that a considerable number of electric railway managers are apprehensive concerning the future status of their pension plans. Evidently it is time for the industry to pause and consider the situation carefully.

Apparently the difficulty arises because a majority of the present pension plans were not originally established on a sound actuarial basis. The payment of benefits is now found to be exceeding the early estimates. In part, this is due to the increase which has occurred with the passage of time in the number of eligible employees. In part, it is due to the present high wages upon which the pensions are calculated, which were not foreseen when the plans were first established. There is a cumulative effect which must be viewed at long range to be fully appreciated, and few railways appear to have realized at the beginning what the ultimate results would be.

With the exception of a small number of railways which have established reserve funds, it is the practice to make current pension payments out of current earnings. In this the electric railways are following the practice imposed upon the steam railroads by the Interstate Commerce Commission. It is inevitable, however, that with obligations increasing steadily, difficulties will be encountered in making pension payments by this method. No company should agree to make a future obligation without at the same time making some provision for funds from which to pay it.

Despite the difficulties which are being encountered, the railway executives replying to the *JOURNAL*'s inquiry were unanimous in expressing the belief that the railways should provide pensions for veteran employees. This is not a matter of charity, but of sound business practice. To be successful, however, pension plans must be based upon something more than good intentions and guesswork.

### Increasing Speed Through Detailed Analysis

**S**PEED is one of the most vital factors in modern surface car transportation. Passengers are interested in comfort, convenience and attractive appearance of cars, but they are even more interested in speed. If one of the original electric cars of 40 years ago could, by some magic, be made to travel at 40 miles an hour, it would undoubtedly be able to take away business from the more comfortable and attractive electric car of today, operated at present speeds. Only in so far as its speed enables it to hold its place in traffic, can the electric railway car hold its place in the transportation scheme.

All this is well understood by electric railway men. Merely to say that speed is essential, however, accomplishes little. The vital question is how to increase present speeds. So many difficulties lie in the way of achieving this objective that operating officials frequently become discouraged. Perhaps one reason for this is that the problem is usually looked at in its entirety. Viewed in that way, the difficulties appear exceedingly formidable. But if the problem is broken down into component parts and each part considered by itself, the obstacles no longer seem insurmountable.

The first step in this direction might well be to make a detailed analysis to determine accurately the actual speed on short sections of each route. Preferably, the limits of these sections should not correspond with old established time points, but should be points arbitrarily selected at approximately equal distances along the line. Such an analysis will show a wide variation between the speed on some sections and the speed on others, and it is quite likely that loss of time will be disclosed at unexpected places. By attacking these problems one by one, a number of small improvements can be made which, in the aggregate, will produce a substantial reduction in the over-all running time.

Many of the contributory causes of slow operating speeds are within the control of the railway. Frequently it will be found that the acceleration and braking rates are too low. Perhaps the cars have not sufficient power to negotiate the grades. It may be that the entrance and exit arrangements prevent quick loading and unloading of passengers. Sometimes it is wrongly supposed that safety demands slow speeds. Or it may be that time is lost because of long established operating customs that could easily be changed. Looking at the problem as a whole, it is often difficult to discern the true reason for slow operation. Looking at it in detail, the reasons soon become evident.

The method of detailed analysis is valuable also in studying conditions outside the immediate control of the railway. A widespread tendency exists to blame traffic congestion for most of the delays which occur in street car operation. Certainly there is considerable justification for this attitude. But the municipal authorities are probably doing the best they know how to speed up traffic movement. Specific suggestions are of infinitely more value than a general indictment of existing conditions. If a particularly bad situation is pointed out to them and a means of improving the railway service suggested, the municipal authorities will usually be entirely willing to co-operate in effective improvement.

No magic solution of the problem is likely ever to be found. But the first step in effecting improvement is exact knowledge of what the trouble is, and where it occurs. Only by detailed analysis can these questions be answered.



Clark Street, one of Chicago's principal thoroughfares, passes through the heart of the famous Loop district. This picture is looking north from Van Buren Street

## *Chicago to Have*

# Immense Transportation

**R**ATIFICATION, on July 1, by a vote of 325,837 to 56,690—nearly six to one—of the new Chicago transportation ordinance marked the completion of the efforts of the city authorities, public bodies and the companies involved, to arrive at a plan to give the city of Chicago and the entire metropolitan area a unified local transportation system. The campaign has been prolonged many years and has gone through vicissitudes of various sorts, but out of it has been evolved a plan which should give Chicago a type of local transportation second to none in the world.

The ordinance, which was passed by the City Council on May 19 by the affirmative vote of 47 of the 50 aldermen, calls for a comprehensive unified local transportation system for Chicago and the metropolitan area. It is based on principles which long have been agreed to by leaders of thought on the subject. Elevated lines, subways, surface cars and buses are included in the plan. In addition to the consolidation of systems, a city-wide program for extensions, additions and improvements to the transit system is mapped out in the ordinance. The new company which is now being formed, to be known as the Chicago Local Transportation Company, will be required to expend at least \$200,000,000 during the first

ten years of the grant, in the construction of extensions and additions which are specifically described in the ordinance. Of this sum, \$65,000,000 must be expended during the first three years of the grant. Thus the project provides not only for a system adequate for the immediate needs of the city but capable of expansion to meet future demands. Further extensions, additions and improvements may be required by order of the Transit Commission upon the authorization or direction of the City Council. Many more extensions and additions may be required during the first ten-year period as well as thereafter.

Twice before ordinances for unification of the transit facilities in Chicago have been prepared and adopted by the City Council. But both were defeated at the polls. In addition, numerous plans have been worked out in more or less detail which have been discarded before being brought to a vote. It is needless to recapitulate here the various projects that in the past have been suggested for solution of the transportation problem. They have been discussed in detail in this paper from time to time.

The ordinance, in its final form, represents the united efforts of the City Council's committee on local transpor-

tation, of which Joseph B. McDonough, alderman of the Thirteenth Ward, is chairman, and its sub-committee, aided by the Citizens' Traction Settlement Committee and various civic organizations. The work on this draft of an ordinance dates back to June, 1928, and its provisions are based on legislation obtained at the last session of the Illinois General Assembly. This legislation was necessary to remove certain bars which stood in the way of the consolidation. One of these was that the elevated lines were organized under the steam railroad law, while the surface lines were organized under the street railway law. Another was the removal of the definite twenty-year term from the franchise, which was the maximum permitted in the state.

### HOME RULE A FEATURE

Provision is made in the ordinance for a comprehensive unified local transportation system, operated under a terminable permit by one corporate management, and subject to control of a local home rule commission of three members to be appointed by the Mayor. In addition to the

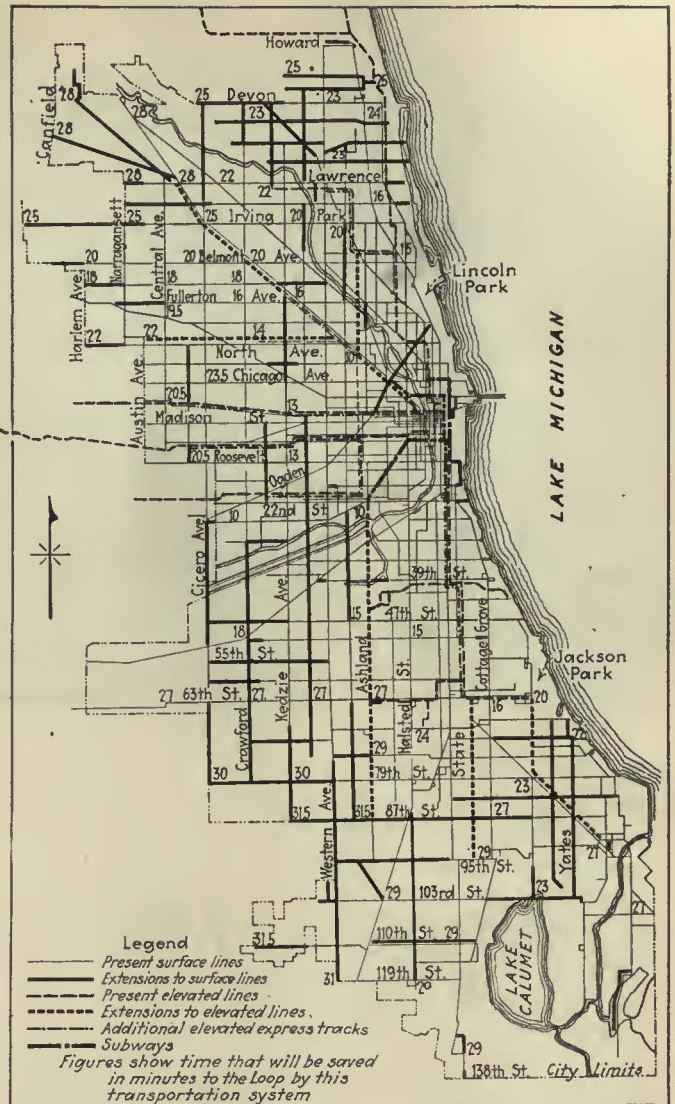
Ratification by voters of ordinance for unified transit assures construction in ten years costing \$200,000,000. This includes rapid transit, surface cars and buses. In addition the city will construct subways costing \$100,000,000. Details of the ordinance are given

# Development

expenditure of \$200,000,000 by the company within the ten-year period, the city is to build a subway system in which it will invest the sum of \$100,000,000 and for which the company will provide equipment and operate cars as a part of the rapid transit system, the cost of the subways to be met by use of the city transit trust fund and such special assessments as can be levied upon the property especially benefited.

The initial rates of fare provided in the ordinance are to be unchanged from those at present existing on the rapid transit and surface lines. There is, however, a provision that transfers will be issued between the two systems. Free transfers will be given from the rapid transit lines to the surface lines, and transfers will be given from the surface lines to the rapid transit lines on payment of 3 cents. Universal transfers on all of the surface lines and on all the elevated lines are to be maintained, providing for a continuous ride in one general direction over the entire system.

Under the new ordinance the company is to pay, as compensation for the use of public property, 3 per cent of its gross receipts, plus any excess in any fiscal year over a just and reasonable return as fixed from time to time by the local transit commission. The gross receipts



This map of the Chicago transportation system indicates how the \$300,000,000 will be spent within the next ten years

The extensions include 300 miles of surface lines and 110 miles of single track for the rapid transit system. This will amount to an increase of 30 per cent in the surface lines system and 56 per cent in the rapid transit system. Subways are included for the central business district, but they will be constructed by the city at its expense. The plans also include the purchase of 1,000 rapid transit cars and 1,000 surface cars or buses.

of the existing traction companies for the year 1929 were \$83,985,242, of which 3 per cent would amount to \$2,519,557. This is slightly less than 55 per cent of the net receipts for the year, which is the amount that would be paid under the present arrangement with the surface lines, plus the small amount received from the elevated lines. This 3 per cent, however, will increase in amount with the growth of population and traffic and with any increase in the rate of fare, while the net receipts may be substantially reduced by increased operating expenses, such as the employee pension fund.

The present traction fund of \$61,250,620 is to be turned over to the city transit fund or utilized in such other manner as the city may provide for the construction of the initial subways. Following this construction the city may, if it wishes, apply the fund to future subways or subway extensions and to certain relatively minor purposes specified in the ordinance. The primary purpose



One of the latest cars of the Chicago Surface Lines, recently put in service

of this fund, however, is the amortization of the capital value of the company and the corresponding reduction in the purchase price at which the city or its permittee may take over the property, and also the corresponding reduction of the investment upon which the just and reasonable return to the company is based under the law as now declared by the state and federal courts.

The city is to have the right to purchase the traction properties at any time upon payment of the company's then unamortized capital value, and may designate a permittee which shall also have the right of purchase, subject to the provision that the permittee shall pay an additional percentage of the capital value if the purchase is made during the first twenty years. The ordinance also contains specific provisions for amortization appli-

cable to special conditions such as the removal of the elevated loop, the sale of real estate or other property, the application of insurance money now used to replace the property insured, and the application of the renewal fund for amortization when property is retired or abandoned and not replaced.

Before the new company can accept the ordinance it must acquire all the properties and rights of the existing street and elevated railroads. The total or aggregate value of these properties is agreed to be, as of Aug. 31, 1929, the sum of \$260,442,063, with appropriate adjustment of this value by actual capital additions and deductions to the date of actual acquisition. The company is given the right to purchase these properties subject to certain existing mortgages or liens of the rapid transit company. The reason for this is that there is no effective method by which the Chicago Rapid Transit Company can remove these mortgages or liens except at an unjustifiable cost to the company. They will, therefore, be allowed to run until maturity, when they will be replaced by other securities of the new company subject to the provisions of the ordinance.

The valuation of \$260,442,063 was arrived at by adding to the purchase price or capital value of the properties of the surface lines under the provisions of the ordinance of 1907, the present value of the rapid transit system as appraised at the request of the City Council's committee on local transportation. This appraisal was confined to the physical properties; nothing was included for franchise rights or other intangibles. Leading authorities agree that this valuation is fair and is fully in



This intersection at Lake and Wells Streets, the northwest corner of the Loop, is said to be the busiest railroad crossing in the world. In the maximum hour, 224 trains of 1,244 cars pass through it





A daily scene in the rush hour. One of the platforms of the Adams and Wabash Station of the Elevated. Here both tracks run northward

accord with the earlier legislation. To this initial capital value is to be added in the future only the actual expenditures in money for additions to plant and property, as approved from time to time by the transit commission, together with such amounts as the company may supply with the approval of the commission for working capital. In the event of purchase by the city or its permittee, the working capital as well as the properties constituting the system will be required by the purchaser.

Necessity for rapid transit improvements is recognized in the ordinance, and a certain amount of central subway construction is specifically provided. There is to be a four-track north-and-south subway on State Street from a junction with the present elevated lines at Chicago Avenue to a junction with the present elevated lines near Sixteenth Street. This will immediately relieve the elevated loop and enable it to be utilized for rapid transit facilities primarily serving the west side. An additional subway primarily serving the west side, which includes northwest and southwest, is to be constructed by the city within the ten-year initial construction period. For transfer from one subway to another and between the elevated structures and subways conveniently and without either transfer slips or additional fare, six pedestrian

tunnels or passageways are to be constructed. These subways are imperatively needed to accommodate the traveling public which desires to pass to or through the central business district. In addition, elevated lines will be provided, such as the mid-city line, so that those who wish to travel between outlying points can do so quickly and conveniently without passing through the central business district.

Special assessments against benefited properties are recognized in the new ordinance. It provides that the city shall proceed to construct or acquire such subways out of new funds raised by such special assessments as the city may deem necessary and proper, or out of the city transit trust fund, or both. The ordinance states specifically that there is no obligation on the city to raise funds for financing subways by general taxation.

Among the rapid transit extensions listed in Exhibit B, the principal ones are a mid-town trunk line extending along or near Ashland Avenue from 87th Street to the Douglas Park branch; an extension on Milwaukee Avenue to Lawrence Avenue; an extension of the Humboldt Park branch from the present terminus along West North Avenue to Austin Avenue; an extension along Milwaukee Avenue to connect with the



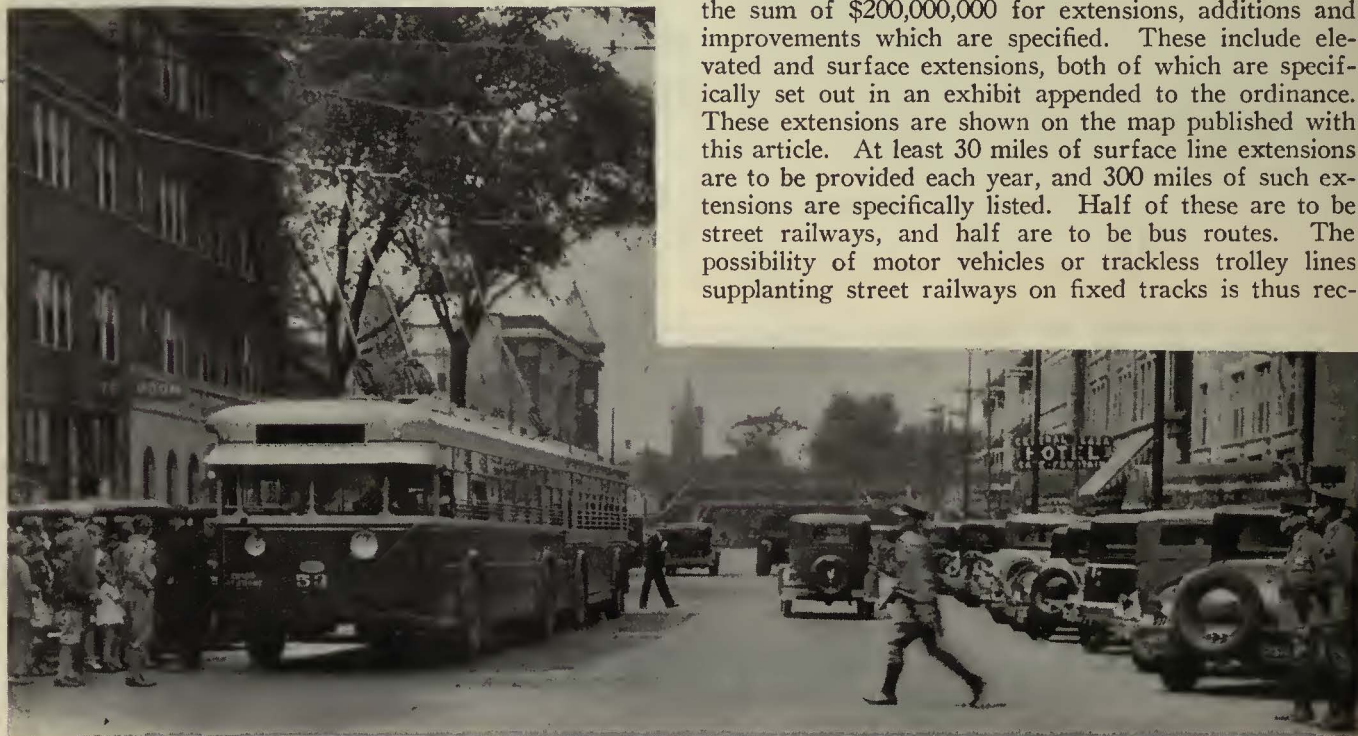
Rapid transit service already has been extended well into the suburbs. This is the Dempster Street terminal of the Niles Center branch

new subway; an extension from a connection with the Jackson Park branch in East 63rd Street, along the Illinois Central and the New York Central Lines to a point near the intersection of East 92nd Street and Baltimore Avenue; an extension along South Park Avenue from a connection with the Jackson Park branch in East 63rd Street, along South Park Avenue to 95th Street. The other elevated extensions are principally additional tracks on existing lines and the necessary inclines and structures to connect with city-owned subway structures.

Of the two subways, Route No. 1 will connect with the rapid transit system at a point between West Division Street and West Chicago Avenue, extending along a curve to the east, intersecting West Chicago Avenue near North Franklin Street, thence along West Chicago Avenue to North State Street, thence south along

cars or motor vehicles of modern design are to be provided for surface operation. The present rapid transit system not only will be greatly extended, but the existing plant will be improved. This will include the straightening out of the curves, the reconstruction and extension of structures, the building of new stations and platforms, the installation of escalators where needed and the elevation of the tracks of the Ravenswood branch so as to eliminate grade crossings.

General supervision of service, including extensions, additions and improvements to the new system, is vested by the statutes of Illinois in the Illinois Commerce Commission. That control will pass to the Chicago Transit Commission when such a body is created by the city. In accordance with the enabling act authorizing a terminable permit, the new ordinance requires that the company shall provide and expend, within the first ten years, the sum of \$200,000,000 for extensions, additions and improvements which are specified. These include elevated and surface extensions, both of which are specifically set out in an exhibit appended to the ordinance. These extensions are shown on the map published with this article. At least 30 miles of surface line extensions are to be provided each year, and 300 miles of such extensions are specifically listed. Half of these are to be street railways, and half are to be bus routes. The possibility of motor vehicles or trackless trolley lines supplanting street railways on fixed tracks is thus rec-



Trolley buses, the latest addition to the Chicago Surface Lines fleet, now serve 40 miles of bus lines

North State Street under the Chicago River to a point near East Sixteenth Street, where it will connect with the elevated structure.

Route No. 2 will connect with the elevated structure near Milwaukee Avenue, extending southeasterly along a curve to a point near West Grand Avenue and Milwaukee Avenue, thence in West Grand Avenue and under the Chicago River to a point near North Dearborn Street, thence south in North Dearborn Street under the Chicago River to a point near West Harrison Street, thence westerly along West Harrison Street under the south branch of the Chicago River to a point near Blue Island Avenue, where it will again connect with the elevated structure. This route may be changed at the option of the city by substituting West Ohio Street for West Grand Avenue, Clark Street for Dearborn Street and Polk Street for Harrison Street. Connecting subways will be provided to connect the two routes.

Not less than 1,000 additional steel or other metal cars of modern design are to be purchased for use on the rapid transit system, and not less than 1,000 additional

ognized. Under the new ordinance the rapid transit lines in subways and on elevated structures on private right-of-way, free from the congestion of public streets, will form the essential framework of the adequate system of local transportation. The construction of the surface extensions is to proceed concurrently with the construction of the city-owned subways.

Removal of the elevated loop structure is not required, but the ordinance contemplates and provides for its removal in the future, whenever, by the substitution of additional subways or other facilities or the development of the transit system as a whole, the Transit Commission shall, after a hearing, find that the elevated loop structure, or any portion thereof, is no longer required by public convenience and necessity.

Provision is made for the continuance of interurban service to the center of Chicago over the rapid transit lines. The new ordinance authorizes the company to permit the use of its tracks and facilities in the subways by any company now having the right to operate over the tracks of the existing companies under operating agree-

ment. Any future agreement must be approved by the Transit Commission and must not interfere with the passenger service of the new company. Better utilization for local transportation purposes of the existing rights-of-way of steam or electric railways in Chicago and the metropolitan area have long been advocated. A section of the new ordinance expressly authorizes the new company to make operating leases or agreements for this purpose with the approval of the Transit Commission.

#### DETAILED PROVISIONS OF THE ORDINANCE

The ordinance as passed contains a great deal of detail and covers all of the subjects which experience has proved necessary. As published by the City Council, it comprises a 43-page folio. While it is impossible here to go into all of the details of the ordinance, the following summarization discusses the more important provisions:

**Grant of Authority**—The new company is granted authority to establish, construct, reconstruct, maintain and operate a comprehensive, unified local transportation system to consist of the surface lines and rapid transit systems, together with the equipment of subways, motor vehicle lines and additions and extensions thereto. The grant is to continue in force until terminated, as provided in the ordinance.

**Termination of Grant**—The city reserves the right to purchase the properties of the company upon six months' notice, upon the payment of a sum equal to the capital value of the transit system as fixed by the ordinance. The city also reserves the right to require the company to transfer its property to a designated permittee of the city on the same terms, except for the addition of 10 per cent if the transfer is required within the first ten years, this percentage to decrease one-tenth each year during the subsequent ten-year period. The city at any time may compel the company to comply with the terms of the ordinance through injunction, mandamus, or other appropriate proceedings in any court of competent jurisdiction.

**Extensions and Improvements**—In the first ten years, designated as the "initial construction period," the company is to acquire funds from the sale of securities and construct the extensions designated in Exhibit B of the ordinance. The total cost of these improvements during this period is estimated at not less than \$200,000,000. During the first three years succeeding the effective date of the ordinance the company is to provide not less than \$65,000,000 of this total amount for extensions and improvements. If the company fails to build the extensions, interest or dividends will not be paid either on any securities or stocks which are junior to the 3 per cent compensation paid for the use of public property, or on common stock, which, in the initial financial set-up of the bankers, represents \$77,000,000 of the capital value, and this income would be applied to the building of any extensions, thus making good the default of the company. The company assumes the obligation of rendering local transportation service within the territory in all subsequent periods which the local transit commission, after hearings, shall find to be required by public convenience and necessity. It shall construct or acquire such additional extensions and additions authorized by the city and ordered by the local transit commission, after hearing.

**Subways**—The city agrees to construct the subways, shown in Exhibit C of the ordinance, during the initial ten-year period, the construction to be financed by special assessments levied only on properties directly benefited and from the city transit trust fund. Subsequent to the ten-year period additional subways will be built by the city in the same way. The company is obligated to equip and maintain the subways and use them as a part of the rapid transit system.

**Rates of Fare**—Rates of fare on the surface and elevated lines will remain the same as at present until changed by the local transit commission. Free transfers will be granted from the elevated lines to the surface lines, but a charge of 3 cents will be made for transfers from the surface lines to the elevated lines. Universal transfer privileges are provided for a continuous ride using the rapid transit lines, the surface lines or a combination, if the appropriate fare has been paid. The company is required to designate convenient and appropriate transfer points between rapid transit and surface lines, and additional transfer points may be required by the local transit commission. Employees of the company, city policemen, firemen and health department employees, when in full uniform, may ride free, and special provisions are made for letter carriers.

**Paving and Clearing Away Snow**—The company is required to pave the right-of-way in all paved streets occupied by its tracks,

except where the city designates such an area as a parkway. All pavement on rights-of-way shall be maintained by the company. The company at its own cost must keep clear of snow the portion of the streets occupied by its tracks and provide a traffic lane on each side of its tracks, in so far as practicable. The city maintains the right to have snow, street sweepings, garbage or other street refuse transported at night on the surface lines if it so desires.

**Maintenance of Property**—The company is required to maintain the system in first-class operating condition. A fund representing 7 per cent of the gross receipts is to be set aside for renewal, depreciation and obsolescence. The company also is required to create a fund of 2½ per cent of its gross receipts as a damage reserve fund. The local transit commission may enter orders from time to time increasing or decreasing the per cent appropriated so that funds may be adequate to meet the needs.

**Compensation to the City**—The company will pay into the city transit trust fund 3 per cent of its annual gross receipts as compensation for the use of public property. For the administration of this fund the Mayor will appoint a Chicago, state or national bank or trust company, with a capital stock and surplus of at least \$2,000,000, as trustee. The present city traction fund will be transferred to this new city transit trust fund within 30 days after the ordinance becomes effective.

**Use of City Transit Trust Fund**—Money from the fund may be used for the following purposes:

1. To pay the salaries of the Chicago Transit Commission.
2. Compensation of the trustee.
3. The sums authorized by the City Council to meet the cost of the construction of subways provided in Section 9.
4. The sums authorized by the City Council "to pay expenses of the city in connection with the protection of the rights of the city or the enforcement of the company's duties and obligations under this ordinance."
5. Sums required for the cost of renewal or replacement of any destroyed portions of the subway.
6. The cost of the city's share of relocating company's tracks, as ordered by the transit commission.
7. The cost of any additional subways, and the sums required to complete the final purchase of the property of the company.

**Employee Pensions**—The company must establish and maintain a pension system upon such terms as the company and its employees may agree, subject to the approval of the local transit commission. Reasonable life and health insurance for employees also must be provided out of the operating expenses of the system.

**Value of Properties**—The value of the properties of the surface lines and rapid transit company as of Aug. 31, 1929, is agreed to be \$260,442,063.82, "to which may be added such amount as the Illinois Commerce Commission may approve to meet the working capital requirements of the company." It is agreed that this sum will be augmented by additions to capital value and from it will be subtracted deductions in capital value, made between Aug. 31, 1929, and the effective date of the ordinance, and the total thus obtained shall be the initial capital value. Subsequent additions to the initial capital value must be approved by the local transit commission, and this initial capital value, plus all additions and less all deductions or reductions of capital value, shall constitute the true capital value of the company's property, which will be taken as the actual net investment of the company in determining the basis for fixing rates of fare and return to the company. Additions to the capital account are confined to actual expenditures for new additions.

**Return to the Company**—It is agreed that the company is entitled to, and shall receive, a just and reasonable return, to be fixed from time to time by order of the local transit commission. If the corporate income of the company in any fiscal year is in excess of the return so fixed, the excess will be paid into the city transit trust fund as additional compensation to the city.

**Approval of the Ordinance**—The ordinance will not be in full force unless:

1. It be approved at the referendum vote on July 1, 1930.
2. The Illinois Commerce Commission authorizes the purchase of the properties and the issuance of securities as provided in the ordinance.
3. The company accepts within 120 days after the referendum.

There are four exhibits which are part of the ordinance. Exhibit A lists the properties of the surface and rapid transit lines now owned which are to be acquired by the new company. Exhibit B lists the extensions and additions provided for the initial ten-year period. These are shown in the map published with this article. Exhibit C provides the routes of the proposed subway structures. Exhibit D lists the bonds of the Chicago Rapid Transit Company which will continue as liens until maturity.

# C.E.R.A. Analyzes Condition

## of the Industry

IN VIEW of the serious decline in riding and revenue accompanying the present business depression, the Central Electric Railway Association, which convened at Cedar Point, Ohio, on July 17 and 18, devoted a major part of its program to a discussion and analysis of the situation. It was the general opinion of the body that although the depression had caused great losses to all transportation companies and an immediate upturn could not be expected, the economy measures instituted and service adjustments made to offset these declines would yield increasing and continuing benefits to the railways with a return to normalcy. The trolley bus, taxation and modern braking were other subjects presented.

The meetings were conducted under the chairmanship of the association president, L. G. Tighe. In his opening address Mr. Tighe commented on the present condition of the industry and summarized the replies to a letter sent to several member companies to gain a cross-section of the industry's status. With the exception of two, all the companies reported serious falling off in passenger and freight revenue and unfavorable industrial conditions in their territories. The replies revealed, however, the many steps being taken to hold up the net. Increasing speed, improving equipment, rearranging routes, eliminating stops, abandoning unprofitable lines, adjusting fare schedules, affecting all economies possible, merchandising rides, giving pick-up and delivery freight service and making the service generally more attractive are some of the activities Mr. Tighe reported.

"Look beyond the present" was the counsel of G. C. Hecker, general secretary American Electric Railway Association, in his address on the general situation of the industry and the San Francisco convention high spots. In spite of all the adverse figures, he related, optimism prevailed at the Coast meeting. This was prompted by the general feeling that an upturn would be witnessed in the fall, and by the progressive moves being made to develop new cars, secure adequate fares and meet the competition of the private automobile. Mr. Hecker told of the Presidents' Conference plan, announced at the convention, the purpose of the organization and its plan of attacking the problem. He stated that progress necessarily would be slow and added that companies should not defer car purchases.

Another encouraging factor, the speaker pointed out, is the rapid approach of the private automobile to its saturation point. Leaders of the automotive industry expect a stabilization in the manufacture of their product very soon, a condition which will have a vital influence on the electric railway riding habit. In the meantime, Mr. Hecker added, the railways should give the most in speed, comfort and convenience to approach automotive service.

The speaker commented on the wide variation in maintenance costs, the opportunities for interchange of ideas and the adoption of new practices, the problems facing the small cities and the development of freight business.

The convention was addressed next by W. J. Clardy, Westinghouse Electric & Manufacturing Company, who spoke on the trolley bus. "A new form of successful transportation without rails," he stated, "has been introduced by the modern trolley bus. This vehicle is permitting the economic expansion of the field of street railway business and is a much-needed tool for increas-

ing transportation revenues. It offers a means of providing service in smaller cities or extending into new territory in larger cities, with a reasonable investment and low operating cost. The outstanding factor in favor of the trolley bus is that its application has resulted in increased gross receipts. It appeals to both the public and operating men."

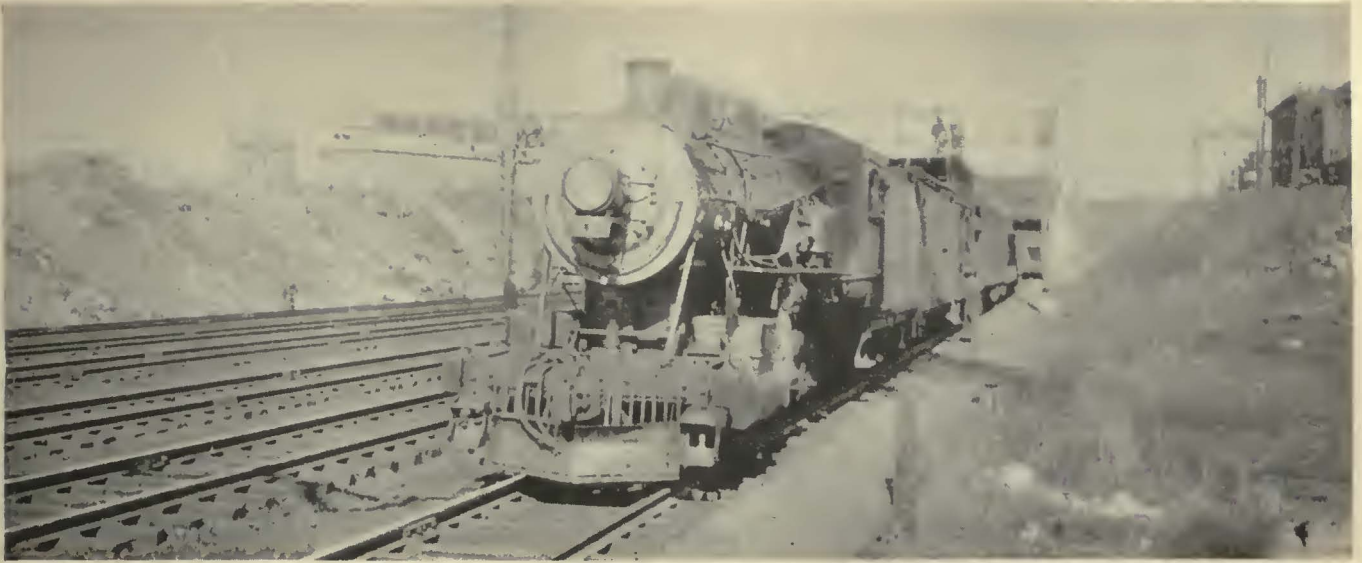
The subject was discussed also by C. A. Burleson, General Electric Company; L. M. Zapp, Eastern Michigan Railways; G. C. Hecker, A.E.R.A.; R. N. Graham, Penn-Ohio System, and Ross Schram, Twin Coach Corporation.

"Transportation and the Finest Motive in the World," was the subject of an address at the second session by Allan Rogers, supervisor public relations New York Central Lines. Mr. Rogers commented on the essentiality of the industry and stated that the public really is interested in transportation. Enthusiasm, according to the speaker, is the greatest need of both the steam railroads and electric railways to forge ahead. "Have faith in your industry and confidence in yourself," was the counsel added. Mr. Rogers urged the development of new business and spoke at some length on "taxation without due compensation."

Following Mr. Rogers' address a paper was presented by G. L. Cotter, engineer Westinghouse Traction Brake Company, on "Modern Braking of Electric Railway Cars." "Traffic density during the past few years," Mr. Cotter stated, "has seriously affected average schedule speeds of street railway cars. Inability to start and stop as quickly as other vehicles has caused a slowing down to permit safe operation. This can be remedied, however, by improving the car brakes. The more nearly the street car approaches the stopping ability of the automobile, the better it is prepared to hold its place in the traffic stream. By modernizing the brake equipment the stopping distance can be decreased 40 to 50 per cent.

"Since there are thousands of old cars in service, a great improvement in average braking performance on any railway can be obtained by modernizing the equipment. This involves, first, the reduction of time of application and release from the three to five second rate to the recent standard of one second or less, and second, bringing the braking force nearer the point of wheel sliding than has been the practice."

The convention was concluded with an interesting symposium on "What's Ahead for the Industry." Those who participated were: Charles H. Jones, Chicago, South Shore & South Bend Railroad; R. R. Smith, Northern Indiana Railways, Inc.; H. A. Nicholl, Union Traction Company of Indiana; L. M. Brown, Interstate Public Service Company; R. N. Graham, Penn-Ohio System; Claude L. Van Auken, *Electric Traction*; Clifford A. Faust, *ELECTRIC RAILWAY JOURNAL*; L. M. Zapp, Eastern Michigan Railways; T. A. Ferneding, Dayton-Xenia Railway; W. S. Rodger, Eastern Michigan Railways; G. C. Hecker, A.E.R.A.; W. H. Beattys, Westinghouse Electric & Manufacturing Company; James H. Drew, Ohio Brass Company, and R. H. Palmer, Westinghouse Electric & Manufacturing Company.



Maintenance train used on the overhead system of the New Haven's main line

# *Maintaining the* DISTRIBUTION SYSTEM *of an Electrified Railroad*

By B. F. BARDO

Superintendent of Electric Transmission,  
New York, New Haven & Hartford Railroad

**R**ELIABILITY that is required in railroad service is of such a high degree that everything must be done to put the distribution plant of an electrified system in the best shape possible and to keep it so. Electric motive power is helpless without a supply of energy.

The electrification of the New Haven Railroad, while not the largest in this country from the standpoint of route-miles, is perhaps the most comprehensive one in the United States at the present time. In round numbers, the company owns 583 miles of electrified track, distributed as shown in Table I. The location of lines and the dates of electrification are given in one of the accompanying diagrams.

The contact and feeder wires have a voltage of 22,000 between them, with 11,000 volts from each to the rail return. As a rule, both the feeder and contact wires are supported from the same structures, which are of steel and spaced a nominal distance of 300 ft. apart. On all except the New Canaan and Danbury branches the feeder system is in duplicate, two No. 0000 wires being on each side of the right-of-way.

Power for signals is carried on duplicate single-phase, two-wire No. 00 circuits. Most of these operate at

11,000 volts, although those west of New Rochelle and on the New Canaan branch carry 2,300 volts. Duplicate single-phase one-wire No. 00 circuits at 11,000 volts carry power for circuit breaker control between Harlem River, Woodlawn and New Haven. Between South Norwalk and New Rochelle there are also two three-phase, three-wire 11,000-volt No. 0000 circuits, and between New Rochelle and Oak Point similar circuits, but of No. 00 wire. Throughout the electrified territory low-voltage multiple conductor signal cables are suspended by steel messengers from the main supporting

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Table I—Mileage of New Haven Railroad with Electrified Contact System

	Route-Miles	Track-Miles
Main line, four track.....	62	248
Branch line, six track.....	12	72
Branch line, four track.....	4	16
Branch line, two track.....	5	10
Branch line, single track.....	42	42
Yards (track miles).....	195	195

**Table II—Classification of Feeder System on New Haven Electrified Section**

	Miles
Four traction feeders, single phase, one wire.....	81
One traction feeder, single phase, one wire.....	24
Two power feeders, three phase, two wire.....	69
Two signal feeders, single phase, two wire.....	66
One signal feeder, single phase, two wire.....	12
One signal power cable, two and four wire.....	12
Two control feeders, single phase, one wire.....	75

structures. The different types of circuits and mileages are shown in Table II.

Contact and feeder systems are sectionalized at 26 points, most of which are interlocking signal stations. More than 700 oil circuit breakers are involved, all re-

service is known to be severe. Trains are used from the tops of which the inspection is made. The various items requiring attention are recorded and later are used to form a work list for each individual electric section.

The indicated maintenance items are done in order of their importance with a view of preventing a plant failure. If maintenance items of a similar nature occur in any quantity they are programmed and the material prepared in advance. Sometimes special facilities must be employed to be sure to get the work done before difficulties arise. It is far simpler to schedule, say, a 30-minute maintenance job in the middle of relatively dense service than to run the risk of a plant failure at an unknown time with repairs which may take hours. As a result there are but few preventable failures.

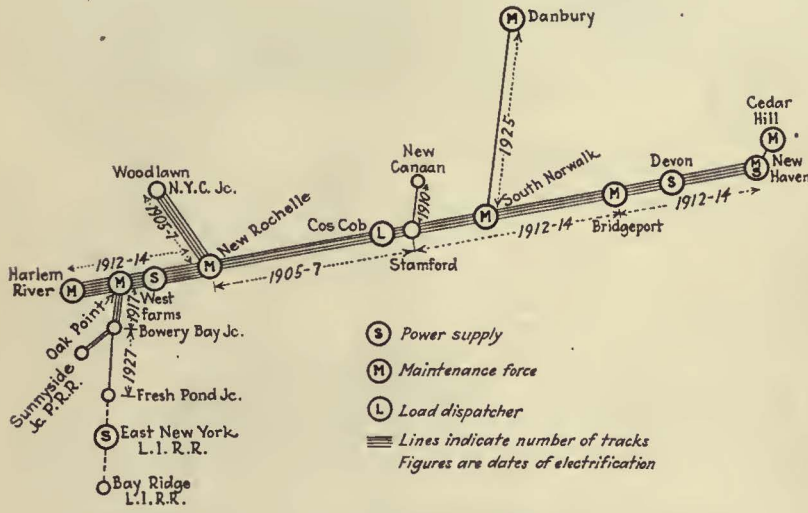
Each summer a survey is made of the entire electric zone to determine the height of the contact wire above the rail under each overhead highway bridge. All locations lower than 16 ft. are inspected to ascertain what must be done to increase the clearance to that value. The distance from contact wire to rail tends to decrease due to several causes, the more important of which are: (1) Slack catenary messengers or trolley or overlong hangers; (2) raising the rail more or less unconsciously during track tamping; (3) replacing rail and tie plates with new material of greater over-all height.

The results of the clearance survey are kept for reference when a question is raised as to the possibility of moving an over-dimension car. A published permissible height for cars may be 15 ft. 7 in., based on a nominal limiting clearance between contact wire and rail of 16 ft.

Over-dimension cars may be routed from one track to another, or even handled under dead wire if that appears better than reloading.

Besides general annual inspections there are intermediate schedule inspections of special parts.

During the five-year period 1925-1929 the time of our maintenance trains was distributed as shown in Table III. Ordinarily these trains are manned by one foreman and three linemen. We have tried to make the train equipment as complete as possible: The trains have been designed for speed in doing the work, because that actually makes the time more productive. They operate both day and night and are electrically lighted, the equipment including floodlights and one portable 6-volt storage battery lamp. The elevating platform of the tower car is operated by a compressed air motor. Compressed air is also used for operating wrenches and for drilling. Each train is equipped with a forge, drill press, rod shear, automatic die heads for threading rods up to 1/2 in., and other small tools. Oxyacetylene cutting and weld-



Schematic diagram of the New Haven's electrified system, showing locations of power supply, maintenance forces and load dispatchers

motely controlled and practically all automatic. There are about the same number of disconnecting switches. All of the oil breakers and about half of the disconnecting switches are under the control of the load dispatchers.

**POWER GENERATED AND ALSO PURCHASED**

The principal source of power is the company's steam station at Cos Cob, Conn. Supplementary supplies are obtained from the United Electric Light & Power Company through a joint substation at West Farms, N. Y., and the Connecticut Light & Power Company at Devon, Conn. Emergency connections of limited capacity are maintained to the Connecticut Company at New Haven and the Long Island Railroad at East New York.

The normal daily traffic includes 264 passenger trains on both main and branch lines, and an average of about 37 freight trains. In addition there are the usual work trains and light engine movements. All yards, both freight and passenger, west of Stamford are operated entirely by electric switchers. East of Stamford both steam and electric switching is employed.

Operation, maintenance and construction of the entire distribution system are handled by an organization which is shown in detail in the accompanying chart. Besides the general officers, two general foremen are in charge of all maintenance and construction in the territory east and west of Stamford respectively. The chief load dispatcher and his assistants are located at Cos Cob.

Each fall a close-up inspection of the entire catenary and contact system is made. Each spring a similar inspection is made at interlocking plants and also where the

**Table III—Distribution of Time of Maintenance Trains on New Haven Electrified System, in Hours**

	1925	1926	1927	1928	1929
Total time.....	14,720	17,374	17,497	17,778	15,573
Delay for causes beyond control*	6,471	8,119	7,378	6,654	6,531
Traveling.....	3,183	3,372	3,414	3,847	3,296
Time on maintenance work.....	4,488	4,868	5,373	5,575	3,399
Time on construction work.....	578	1,015	1,332	1,702	2,347
Total work.....	5,066	5,883	6,705	7,277	5,746

\*Includes transportation delay, waiting for engine on cars and time held in yards or sidings clearing superior trains.

ing equipment is carried. We also are experimenting with a compressed air operated pay-out and pick-up reel holding about 5,000 ft. of two-conductor, rubber-insulated cable, by means of which our train can keep in touch by telephone with the load dispatcher.

In the yards and on the branch lines the basis of maintenance effort is the periodic inspection. In the four major yards the personnel consists of an emergency foreman with a lineman and a helper on the day trick, supplemented by an electric switch operator on each of the other two tricks. The Danbury branch has a crew similar to that used in yards on the day trick. At the Oak Point and Cedar Hill yards and on the Danbury branch a gas rail-and-tower car combination, as shown in one of the illustrations is used. This equipment covers the ground readily and provides a well-equipped point from which to work.

Substation or anchor bridge maintenance includes all inspection and repair work on breakers, disconnecting switches, transformers, control cables, switchboards and other equipment at sectionalizing points. In the inspections every attempt is made to ferret out faulty conditions before failures occur. Oil circuit breakers are inspected internally after closing once on a short circuit, or after opening six times under short circuit conditions. Exceptions are the circuit breakers on stub-end circuits, which are inspected after each operation under short circuit conditions. An individual card for each piece of major substation equipment carries a brief record of the inspection and maintenance of that piece.

Insulating oil in large transformers is sampled every six months. If the average of three samples from the bottom of any tank fails to exceed the minimum breakdown limit, two to four barrels are drawn off from the bottom, a like amount of new oil added, and another test made. Every two years the oil is filtered by a portable centrifuge. Circuit-breaker oil is changed every two years unless more frequent replacement is necessary on account of operating developments. The bus supporting and other pin and suspension insulators at all anchor bridges are tested annually by a standard device, and defective ones scheduled for replacement. Operation of all relays is checked twice yearly.

#### SAFETY METHODS ARE STRESSED

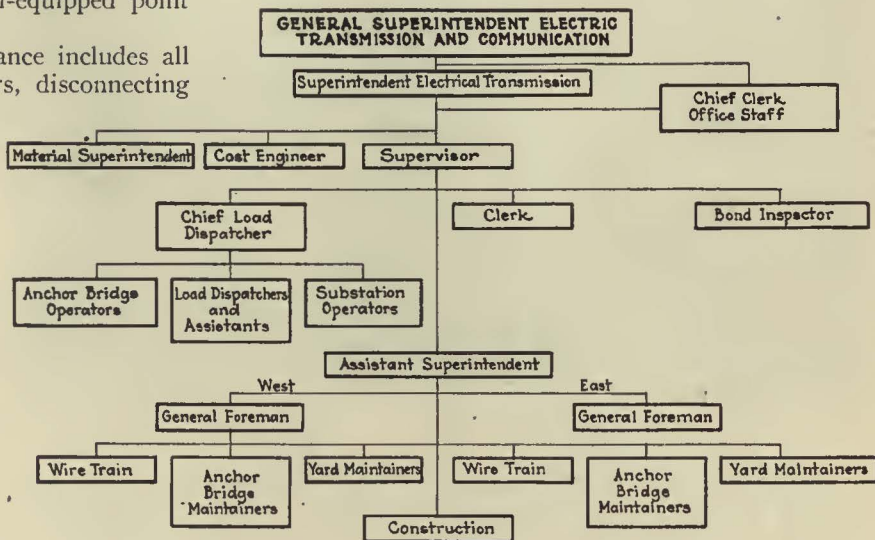
Safety of employees is given considerable attention. No work is done on wires of the traction distribution system until they are de-energized and grounded, usually at two or more points. Each employee must pass an examination on the more important of the safety rules. In addition safety officers must qualify on certain fundamental rules of the operating department.

Practices known to be safe are developed in detail and the forces are instructed in their use. Cards are used for reporting practices or conditions which are considered unsafe. These are referred for correction to the department involved, and are made the subject of comment at the regular monthly safety committee meeting, of which the general superintendent of electric transmission and communication is chairman and most of the supervising officials are members. In addition, all accidents are analyzed.

Besides these meetings, other monthly meetings, lasting about one hour, are held by field forces. At these meetings safety rules, accident analyses and first-aid work are handled. Since 1928 a course in first aid has been available. A number of the department employees hold Red Cross certificates.

#### METHOD OF SYSTEM OPERATION STANDARDIZED

Operation of the distribution system, which handles about 200,000,000 kw.-hr. per year, differs from that of a power company principally in that the system is broken up into very much smaller parts. The chief load dispatcher at Cos Cob is assisted by four load dispatchers and two assistant load dispatchers covering the 24-hour



The organization of the electric transmission department of the New Haven Railroad

period. The two principal duties of the load dispatchers are: (1) Isolation of faults, and (2) procuring track, feeder or other circuits for maintenance and construction forces in co-operation with operating department officials.

In the isolation of faults the load dispatchers are assisted principally by reports from signal station operators, who control all sectionalizing breakers. A fault or ground is cleared by the automatic opening of circuit breakers at adjacent signal stations. The operators report immediately by selector type telephone to the load dispatcher, who proceeds to energize those circuits which do not appear to be directly involved. In general, it is the practice to close main line and yard traction circuit breakers directly on the fault, but this is usually done immediately and only once. Faulty traction circuits are left de-energized if reports to the load dispatcher disclose clearly the nature of the trouble. Faulty feeder circuits usually are left open until after an inspection to locate the difficulty. Faulty traction circuits on the single-track New Canaan and Danbury branches normally are tested once. If they do not show clear they are left de-energized until a member of a train crew reports. The load dispatcher instructs the crews to drop the pantographs, after which the circuit is tested again. If the branch then shows clear, the inference is that there was difficulty with the locomotive and the crew is informed accordingly. If no trains are on such single-track branches additional tests may be made at the option of the load dispatcher, but an inspection is always ordered as soon as possible.

Maintenance and construction forces inform the load

dispatcher as to the extent of the circuits or equipment they require, and for how long. When traction circuits are involved the load dispatcher consults the train dispatcher. After mutual agreement has been reached the load dispatcher has the necessary circuits de-energized and so informs the foreman or assistant foreman of the gang involved. The foreman enters the time and the description of the circuit or circuits in his log book and has them grounded for protection. He gives each man who is to work on or near them a copy of the log or

test receiver is used by the bond inspector to locate difficulties not readily apparent. A complete record is kept of every radio reception complaint investigated.

Firemen who are fighting fires contiguous to, or on, the right-of-way must be protected. The fire departments of all communities served by the electrified section have been informed on whom to call if the fire requires de-energizing of wires. In the event of a call of this kind it may be necessary to de-energize all wires by the scene of the fire for a short period. Responsible officers of the operating or distribution departments are hurried to the scene of the fire to take steps for restoring normal service.

To assist in clearing up after wrecks or other emergencies, a car of wood poles and a framed wood bent is kept available at New Rochelle. At Bridgeport and New Rochelle two circuit breakers are held completely assembled ready for immediate use. There is also a section of control switchboard with the usual equipment ready for wiring, and operating circuit breakers. A spare 2,000-kva. balancing transformer is kept on a special car at New Rochelle, with equipment for installing it quickly. Spare small transformers and other equipment are available at both New Rochelle and Bridgeport.

The total number of grounds and preventable defects for the latest five-year period available is given in Table IV. This table sets forth grounds as differentiated from faults. For instance, an insulator, particularly of the wood strain type, may flash over a number of times before definitely failing. There is only one fault but a number of grounds. Every fault is investigated so that it may be properly classified as between preventable and otherwise, and that so far as possible steps may be taken to prevent a recurrence.



In the yards and on the branch lines gas rail tower cars are used

clearance slip. When the work is finished the log slips are taken back, the protective grounds removed, and the circuit or circuits turned back to the load dispatcher.

When employees of other departments or outside contractors have much work to do for which circuits of one kind or another must be de-energized and grounded, an employee familiar with the system is assigned to prescribe safe working space and to procure and ground such circuits as may be necessary.

Besides their principal duties load dispatchers have several others. All remote controlled circuit breakers are daily put through a complete cycle of operation, usually during the early part of the second trick. If any circuit breakers misbehave, repairmen are then available to fix them. On days of special traffic, such as football days or those preceding holidays, this test is omitted. Once every 24 hours the load dispatcher requests each signal station operator to inspect his switchboard and report all open circuit breakers. This check catches any breakers which are open or closed incorrectly.

Interference with radio reception is a source of little difficulty with us, although any arcing contacts usually will affect nearby reception. Fuses, disconnecting switches, poorly fitted catenary hardware and devices for feeding the draw span of bridges cause practically all of the difficulty. A small radio head set in the load dispatcher's tower is used to indicate trouble. A portable

## Commercial Frequency for Single-Phase Road

EXPERIMENTS are being made in Germany with single-phase current of commercial frequency for railway service. Two locomotives have been built and are being tried on an industrial railroad, according to *Elektrotechnische Zeitschrift*. The locomotives are capable of starting a train of 1,400 tons 60 times an hour in either direction, with control no more difficult to operate than that of a direct-current locomotive.

The power is developed from single-phase compensated motors in conjunction with three-phase motors. On the first control step the single-phase motor is connected in cascade with a three-phase motor of the same number of poles. For reversing, advantage is taken of the characteristic of the induction motor whereby it turns in the direction of the rotating field when fed through the stator and opposed when fed through the rotor.

For starting, the converter is started first to supply direct-current for excitation of an intermediate rotor. When this attains synchronism the locomotive is ready to start. The control is actuated with direct current converted on the locomotive.

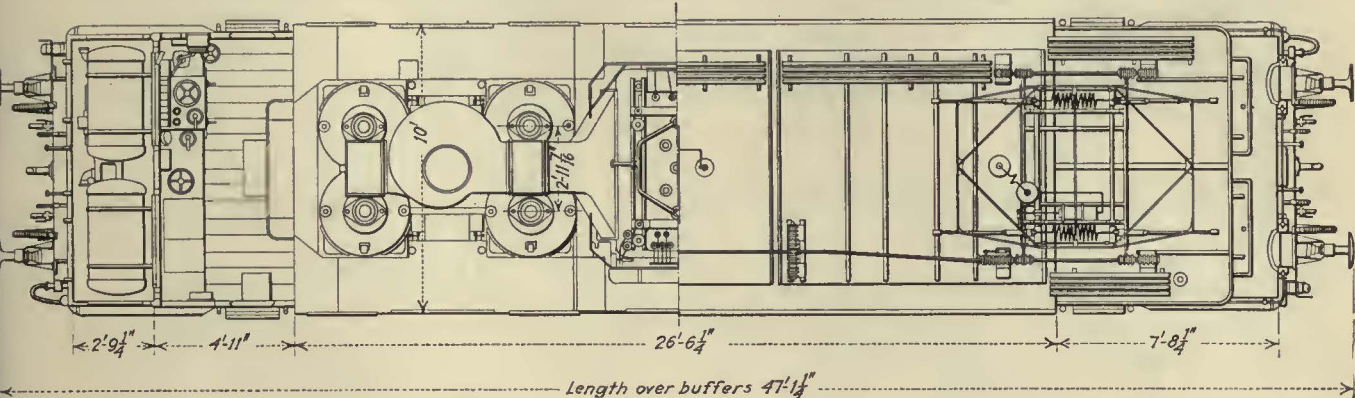
Table IV—Total Number of Grounds and Preventable Defects on New Haven Electrified System, 1925-1929

Cause	1925	1926	1927	1928	1929
Distribution system.....	502	425	322	248	209
Other known causes.....	1,358	1,361	1,312	1,032	830
Unknown and unclassified...	568	743	600	488	371
Total.....	2,428	2,529	2,234	1,768	1,410
Preventable defects....	Not recorded	201	166	108	89





One of the new Austrian Federal Railways locomotives with vertical twin motors



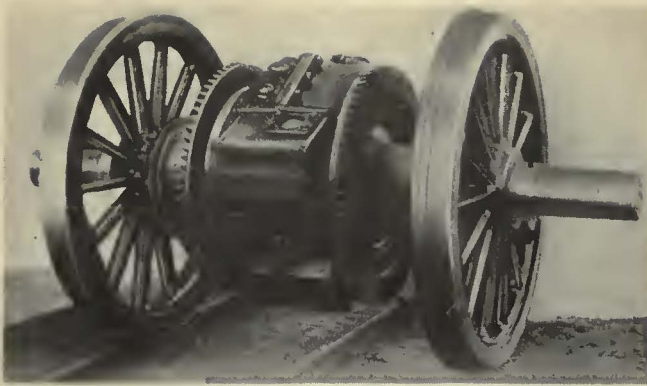
The twin motors drive individual axles. As they are within the cab they are readily accessible

# Vertical Motors Feature Austrian Locomotives

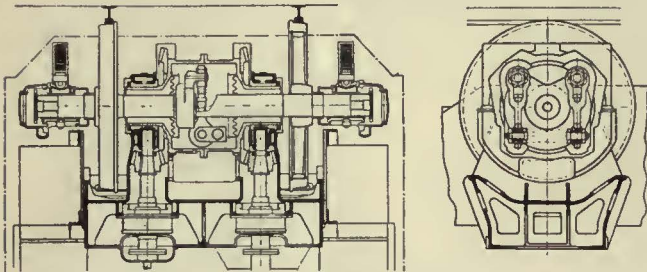
Built for high-speed passenger service, twin motors drive individual axles through bevel gears

LOCOMOTIVE drive of a type differing radically from that in use in America has been found successful on the lines of the Austrian Federal Railways. The principal feature is the use of vertical motors connected to the driving axles through bevel gears. The drive is somewhat similar to that brought out a short time previously by the Midi Railway of France. At first, the Austrian Federal Railways bought four locomotives of the vertical type. These had four driving axles, with a motor mounted above each. The satisfactory performance prompted the railway to adopt a similar design for use in high-speed passenger service on the Innsbruck-Salzburg division of the main line. This section has grades up to 2.5 per cent and curves with a minimum radius of 225 meters (75 ft.), over which trains of 360 tons are hauled at speeds of about 70 km. (42 miles) per hour. Since it was desired to run the

trains through without change of motive power and to attain the highest schedule possible, it was deemed advisable to increase the rating. Both types of locomotives have the same general arrangement of parts. The new type, of which 29 are now in service, differs from the earlier design principally in having twin motors geared to each axle. Each axle carries a quill which is flexibly mounted through links. At each end is a bevel gear, held in a fixed position with respect to the motor and the locomotive frame. The driving mechanism is completely housed in a drum-shaped casing. The flexible links between quill and axle are carried inside the drum. Two guiding rods are linked on one side to two arms on a short shaft carried in bearings within the drum, the other ends of the rods being connected to two crankpins mounted on arms projecting



Assembly of a driving axle showing the inclosed flexible links and the twin bevel gears



Detail of the flexible drive. The double-link connection permits of considerable motion between wheels and body of the locomotive

from the driving axle. Ball joints at either end of the rods provide full flexibility in every direction between the driving wheels and the spring-supported unit of body, motors and quills.

The bevel gears are of the helical type, and are said to be extremely smooth and quiet in action. There is a twin-step bearing on each motor shaft to absorb the vertical thrust.

Location of the motors within the cab makes the commutators and brushes accessible even when the locomotive is in motion. The high center of gravity gives good riding qualities at high speeds. The available lateral play of the drivers permits the use of a leading truck at either end of the locomotive, with one idle axle and one driving axle. With the low unsprung weight and small-diameter wheels, the wheelbase was made short, and easy guiding over the sharp curves on the mountain division was made possible.

The principal reason for the change from the single motor to the twin motor design was the need for an increased output. The twin motors weigh only slightly more than a single motor. Due to the smaller armature diameter, the rotating masses are smaller and the inertia

effect is reduced, making acceleration and retardation easier. The gyratory effect in each group is compensated by having the motors equally spaced about the center line.

The motors are connected permanently in series. It has been suggested that the same locomotive design can be adopted for freight service with the motors connected for half speed, although this has not been done as yet.

Following are the specifications of the locomotives:

### Specifications of High-Speed Locomotives of Austrian Federal Railway

	Series 1570	Series 1670
Electric system	Single-phase, 15,000 volts, 164 cycles	
Number of units.....	4	29
Diameter of drivers, in.....	53½	53½
Wheelbase, ft.-in.....	36-2	36-2
Length between buffers, ft.-in.....	46-0	47-2
Number of motors.....	4	8
Motor voltage.....	385	385
Gear ratio.....	1:3.82	1:3.82
Continuous transformer output, kva.....	1,550	2,840
Continuous locomotive output, kw.....	1,270	2,200
One-hour locomotive output, kw.....	1,650	2,440
Speed at continuous rating, m.p.h.....	41	45
Speed at one-hour rating, m.p.h.....	35	41
Maximum safe speed, m.p.h.....	53	67
Tractive effort at starting, lb.....	37,500	42,000
Weight, mechanical equipment, tons.....	57.2	56.7
Weight, electrical equipment, tons.....	44.0	49.0
Weight total, tons.....	101.2	105.7

## British Subway Tries Roller Bearings

ROLLER bearings on electric cars have just been put into service by the Metropolitan Railway, of London. This is the first use of bearings of this type on electric trains in the United Kingdom. If they prove satisfactory, as seems likely, they are to become standard equipment on this subway.

The roller-bearing axle boxes and motors of these trains are the result of intensive research, and constitute a radical departure from conventional design. They give promise of substantial economies, together with greater mechanical efficiency, smoother running and quicker acceleration. Attention to lubrication is said to be necessary only about once a year. The reduction in train resistance will, it is hoped, lower the demand for electrical energy on starting, give increased speed without involving the risk of hot bearings, and also permit the introduction of heavier trains.

It is not without interest that the company is returning to the compartment type of coach, which it now regards as affording the speediest method of discharging and loading passengers.



Compartment type coach of Metropolitan Railway of London equipped with roller bearings

# Bonus Plan Works Well

## on New York & Queens County Railway

Receipts have been increased, accidents have been reduced and employment has been stabilized since employees have shared in earnings

**B**ONUSES for certain classes of employees, based upon earnings, have contributed measurably toward the successful operation of the New York & Queens County Railway during the past seven years. When Gen. Lincoln C. Andrews assumed control of the property, in 1923, the receipts of the company were the lowest per car-mile of any of the street railways in the New York metropolitan area, averaging just over 29 cents. Setting a quota of 31 cents per car-mile, the management agreed that for every cent per mile which the property should earn above this figure, certain of the employees should have their base rate of pay increased 1 cent per hour. Those participating include all platform men and supervisors, all employees of the shops and mechanical department excepting the superintendents, all employees of the line department, and all substation employees. Trackmen are not included because the track force is a seasonal one and few of the men employed in this capacity remain with the company for more than a few months at a time.

To be eligible, an employee of the transportation department must work at least 150 hours each month. In order to stimulate interest in safety and to reduce accident expenditures, it has been further provided that trainmen involved in accidents for which they are at fault shall lose their bonus for the month. Shop employees responsible for poor maintenance resulting in pull-ins, etc., may also be penalized in this way at the discretion of the management.

From the very inception of the plan receipts began to exceed the figure of 31 cents per car-mile, making the bonus plan operative at once, and this continued with only one break until August, 1924. During the latter part of 1924 and the first half of 1925 receipts fell below the quota figure and no bonus was paid. When the company sought, and obtained, an increase in fare from 5 cents to 6 cents, effective in July, 1924, the basis of the bonus was raised to 37 cents per car-mile. Receipts have run above this figure continuously for the last 52 months, reaching a maximum of 46.75 cents per mile, as shown in the accompanying table.

When the Interborough Rapid Transit subway was extended to Flushing in 1928, it was thought that the receipts of the New York & Queens County Railway would suffer a severe decline, but the rapid development of the community has prevented this. Certain unprofitable lines were abandoned and service on others was reduced, with the result that neither receipts per car-mile nor the gross receipts of the company have suffered to any extent.

Under the original plan, the money earned in the form of a bonus was made available and was included in each payroll, being based upon the earnings of the previous

Monthly Bonus Payments, in Cents per Car-Mile,  
by New York & Queens County Railway

	1923	1924	1925	1926	1927	1928	1929	1930
January....	.....	0.013	.....	.....	0.0450	0.0425	0.0375	0.0425
February....	.....	.008	.....	.....	.0400	.0375	.0350	0.450
March....	.....	.....	.....	0.007	.0370	.0475	.0525	.0375
April....	.....	.016	.....	.011	.0500	.0500	.0625	.0500
May....	.....	.025	.....	.026	.0690	.0625	.0675	.0675
June....	.....	.046	0.012	.054	.0740	.0975	.0525	.0575
July....	.....	.036	.006	.047	.0310	.0800	.0325	.....
August....	0.014	.008	.008	.023	.0375	.0650	.0225	.....
September..	.015	.....	.034	.030	.0450	.0525	.0500	.....
October....	.018	.007	.050	.050	.0800	.0850	.0500	.....
November....	.008	.....	.027	.029	.0575	.0475	.0475	.....
December..	.006	.....	.....	.047	.0400	.0375	.0500	.....

month. Effective Jan. 1, 1929, however, the plan was altered so as to permit men to leave the bonus on deposit in a savings bank to be paid in a lump sum, plus 4½ per cent interest, at the end of the year. It was also provided that those choosing to do so could have the bonus paid monthly as had previously been the practice.

Two weeks before Christmas, 1929, a general distribution was made of the bonuses which had accumulated during the year. The total amount distributed in this manner was approximately \$9,000. Through the monthly payrolls an amount even greater had been distributed, the total bonus payments for the year aggregating \$21,531. The amount of the individual bonuses varied, the highest three awarded being respectively \$184, \$177 and \$174.

Every day the receipts per car-mile of the previous day are posted in the trainmen's quarters at the car-house. The cumulative earnings of the month are also published, so that the men can determine very closely, from day to day, just what the month's bonus is going to be. The entire force takes a lively interest in this and follows the company's fortunes closely.

Edward A. Roberts, general manager of the property, is convinced that the men are making a real effort to increase the company's business, and that their efforts along this line are largely responsible for the success that has been attained. He is also convinced that the accident clause in the agreement with the men has had a salutary effect. In order to clear themselves of responsibility, the trainmen are provided with "my own fault" cards, upon which they secure, if possible, the signatures of drivers or others with whom they become involved in accidents. This practice has proved effective in reducing damage settlements, the expense of which, during the past year, totaled less than 1 per cent of the gross receipts. Since the bonus plan was inaugurated there have been no labor troubles of any description, and the management believes that the plan has had the effect of stabilizing employment, particularly among the older trainmen and shop employees.

# Employee PENSION PLANS

Survey covering 27 electric railways shows unanimous agreement concerning desirability of pensions. In almost all instances entire cost is carried by company, and difficulties are anticipated as number of eligibles increases.

PENSIONS for veteran employees and methods of financing such an arrangement have been receiving more and more attention from electric railway executives during recent years. On some properties pension plans have been in effect for more than twenty years, and on a considerable number they have been in effect for ten or fifteen years. Recently has come the discovery that the payment of benefits is exceeding the early estimates, and the annual appropriations for pension purposes are assuming considerable proportions. It appears likely that this problem will become more serious as time goes on. For the purpose of determining the facts of the situation, and to secure the opinions of executives of companies where pension plans are in effect, *ELECTRIC RAILWAY JOURNAL* has made a survey covering more than a score of such properties in the United States and Canada.

Considerable similarity in the experience of the various companies was disclosed by the survey. Without exception the executives expressed the opinion that a pension plan of some kind is desirable. At present very few of the railways have established any reserve to meet pension requirements. The almost universal practice is to make payments from current earnings. As the number of employees eligible for pensions has increased, this policy has created a serious problem. A majority of the executives believe that the present plan is not satisfactory, but opinions vary concerning steps which should be taken to improve the situation.

Discussing the desirability of pensions, J. N. Shannahan, president Omaha & Council Bluffs Street Railway, states: "In general, I consider a pension plan for old employees a necessary arrangement, and if there were none in effect I am sure we would have to take steps toward the adoption of one." A similar opinion is expressed by K. B. Thornton, general manager Montreal Tramways, who says: "I believe that it is only fair and right that the company should grant a pension to employees after a period of 25 years of faithful service, and I think that the company should devise some means whereby it can be provided."

A pension plan is very desirable both for the company and for the employees, according to T. Julian McGill, vice-president Twin City Rapid Transit Company. On this subject he says: "It is quite impossible to discharge men who have become too old or too disabled to perform a satisfactory day's work after they have worked for a company for many years. Without pensions, such situations require donations or special jobs, making somewhat of a beggar of the employee and naturally decreasing the efficiency of the company. We consider an old-age pension essential both from a business and a humane standpoint."

Speaking for the Washington Railway & Electric Company, H. C. Kimball, assistant to the comptroller, says: "We consider a pension plan to be a practical and satisfactory arrangement and we would favor the establishment of the same if we did not already have one in effect." Similar sentiments are voiced by F. L. Butler, vice-president Georgia Power Company; Fred D. Gordon, vice-president and general manager Cumberland County Power & Light Company; C. C. Vargas, vice-president Key System Transit Company; Elton S. Wilde, president Union Street Railway, New Bedford, Mass.; M. H. Parkinson, auditor Municipal Service Company, Altoona, Pa., and Hugh J. Sheeran, president New York Railways Corporation.

## AGE AND SERVICE REQUIREMENTS

In general the pension plans in effect in the electric railway industry stipulate an age limit for retirement of from 60 to 70 years, with a requirement of from 20 to 25 years of continuous service. Continuous employment, however, appears to be variously interpreted. On some properties a lapse of employment of six months to a year is provided; with other companies a longer period is allowed, provided the man's service record is satisfactory. The majority of plans provide for disability retirement at an earlier age, or with a lesser period of service. Certain properties also give wide discretionary powers to a "pension committee," so that exceptions may be made in meritorious cases. The Boston Elevated even provides for the extension of pension benefits to the widow for a period of one month or longer at the discretion of the committee. In a number of instances eligibility depends upon membership in the employees' benefit association.

Employees of the Interborough Rapid Transit Company, New York, who shall have attained the age of 70 years, provided they have been in the service not less than 25 years, are eligible to a pension. The plan also provides for pensions to employees with 25 years of service, regardless of age, who have become permanently disabled. The plan of the Omaha & Council Bluffs Street Railway, Omaha, Neb., provides arbitrarily for the retirement on pension of any employee 70 years of age who has been continuously employed for 20 years or more, but an employee with 20 years of service and 65 years of age may, at his option be retired. A disability clause also provides for the retirement of any employee with a service record of 20 years, provided disability is incurred while in the discharge of his duties.

The Washington Railway & Electric Company, Washington, D. C., divides its eligibles into five classes: (a) Employees 70 years of age, with 15 years of service; (b) employees over 55, with 15 years of service, who have become physically disqualified; (c) employees with

# ANALYZED

15 years of service who have become physically disqualified by reason of injuries received in the discharge of their duties; (d) employees under 55, with 15 years of service, who have become disqualified may be granted limited pensions, within the discretion of the pension board; (e) employees with less than 15 years of continuous service who have become disqualified by reason of injuries received while in the discharge of their duties, for which they are neither wholly nor partially to blame, may be granted pensions for a limited period.

The Boston Elevated Railway is another property which classifies its pension eligibles into various grades, namely, all employees of an age of 65 years or more, with 20 years of service; employees aged from 60 to 64 with 25 years of service, and employees less than 60 years of age with 30 years or more of service. At the discretion of the pension committee and with the approval of the board of trustees, any employee with a 15-year service record who has become totally disabled as the result of accidental injury arising out of and in the course of employment by the company, may be granted a pension. It is further provided that employees with 20 years of service, regardless of age, may be retired if disabled as the result of sickness or injury.

Any employee of the Twin City Rapid Transit Company who has reached the age of 70 years, with 20 years of continuous service and who is a member of the employees' mutual benefit association, and whose salary has been \$250 per month or less, is pensioned. Continuation in the service of employees past the age of 70 is subject to the approval of the medical director, department head and the president of the company. An employee who has reached the age of 60 years, whose salary and service render him eligible to a pension, may be pensioned at the option of the pension board. If incapacitated after 15 years of service, an employee is also eligible.

Key System Transit Company, Oakland, Cal., draws a line between employees who "may" and who "shall" be retired. All officers and employees who have attained the age of 70 years shall be retired; such of them as have a continuous service record of 20 years or more are entitled to pensions. Certain classes, including conductors and motormen, may be retired at 65 with pensions, if they have been 20 years or more in the service. Employees between 60 and 70, who have been 20 years or more in the service and who have become incapacitated and who cannot be transferred to other work which they are able to perform, may be retired and pensioned. The same rule applies to employees under 60, with service records of 25 or more years.

Effective Jan. 10, 1930, the Montreal Tramways Mutual Benefit Association, by a large majority of its membership, approved a resolution reducing the retirement age from 65 years to 60 years, at the same time raising the daily pension from \$1.50 to \$2. One of the most liberal of the plans is that of the Bangor Hydro-Electric Company, which provides for voluntary retirement with pension at age 65, and compulsory retirement with pension at age 70, in each case only 12 years of continuous service being required.



Ready to retire after a quarter century of faithful service. What provision has his company made for his future?

Eligibles under the retirement pension plan of the Georgia Power Company, are classified under four groups. Those who have been in the service more than 30 years and who are 60 or more years of age, are automatically retired with pension, unless they express a desire to continue in the service and are deemed capable of performing their duties. The other groups grade down to 15 years of service, regardless of age, where the employee has become permanently disabled in the course of his employment.

The plan of the Cumberland County Power & Light Company, Portland, Me., makes provision for the enforced retirement of men employees at the age of 65 and of women employees at the age of 60, unless for special reasons they desire to be continued in active service. This plan also provides that men may be retired at age 60 and women at age 55.

One large Southern property has no age retirement and does not pension employees on the basis of age alone, its present arrangement including only employees with 15-year service records who have become disabled. This same property, however, is now considering a general pension plan for taking care of aged employees.

Pensions are available to employees of a railway in the Mid-West after they have been continuously in the service of the company for 15 years. Retirement is optional at 60 years of age and compulsory at 70. Em-

ployees who have become totally and permanently incapacitated for further duty with the company, provided they have been in the service for 15 or more years continuously are entitled to a pension for a maximum period of 14½ years.

Many companies make provision for the eligibles to be continued in the service where they are physically able to perform their duties and choose to do so, rather than to retire. In some cases it is arranged to assign superannuated employees eligible to pensions to lighter tasks. Obviously, any arrangement which defers the day of retirement works to the advantage of the pension fund. Not only is the payment reduced but also the life expectancy over which pensions would have to be paid is shortened. The Montreal Tramways latest report shows 66 employees still on the payroll, each of whom had a service record of 35 years or longer. A considerable number of these have passed the retirement age of 60 years, but evidently prefer work at substantial wages to retirement on \$2 per day.

It is provided in practically all of the plans now in effect that the pensioned employee may, at his option, engage in other work so long as it is not of a character detrimental to the company's interests.

#### PENSION RATES BASED ON PREVIOUS WAGES FOR VARIOUS PERIODS

General practice appears to favor basing the amount of the pension upon the average annual wages earned during the ten-year period prior to retirement, multiplied by the number of years of service. The amount is usually further fixed by maximum and minimum stipulations. An exception to this rule is the Montreal Tramways plan which provides a flat pension of \$2 per day.

The pension plan of the Twin City Rapid Transit Company provides that any employee whose continuous service began prior to July 1, 1924, is entitled to a pension amounting to 2 per cent of his average monthly salary during the last ten years of service, multiplied by the number of years of continuous service, but in no event more than \$50 per month, provided his salary or wage has been \$175 per month or less. An employee receiving an average wage of from \$175 to \$250 per month may receive a pension not to exceed \$60 per month. Employees beginning their continuous service subsequent to July 1, 1924, may receive 1.5 per cent of their average monthly wage the last ten years, but such monthly pension may not exceed the following: \$40, if the average ten-year salary is \$150 per month or less; \$50, if the average ten-year salary is \$151 to \$175 per month; \$60, if the average ten-year salary is \$176 to \$250 per month.

The Omaha & Council Bluffs Street Railway has a plan which provides for conductors and motormen a pension of \$1 per month for each year of continuous service, with no pension exceeding \$30 per month. Other employees eligible to pension are retired on an allowance based upon 1.25 per cent of the annual wages received at the time of retirement, multiplied by the number of years of continuous service; but no pension shall equal more than 35 per cent of such employee's salary or wages received at the time of retirement, and in no event shall it exceed \$500 per annum; neither shall any pension be less than \$20 per month. The plan of the Interborough Rapid Transit Company, New York, provides for pension allowances upon the following basis: For each year of service 1 per cent of the average monthly wages based on the rate of pay for the ten years next preceding re-

tirement, provided that in no case shall the aggregate pension allowance be less than \$20 per month.

Pensions of the Bangor Hydro-Electric Company are computed upon the basis of 1.5 per cent of the average monthly pay received during the last ten years before retirement, multiplied by the number of years of service. The minimum pension is \$15 per month.

The Boston Elevated Railway has had a pension plan in effect since 1920. In the intervening years several changes have been made in the provisions of the plan, but the present arrangement provides that the amount of the pension shall equal 1 per cent of the average yearly earnings for the ten years prior to retirement, times the number of years continuously employed, but such pensions shall not be more than \$2,000 per year nor less than \$375 per year.

Pension allowances authorized by the Washington Railway & Electric Company are fixed upon the following basis: If the service has been continuous for 15 and less than 20 years, 20 per cent per annum, in equal monthly installments, of the average annual wages for the ten years next previous to retirement; if the service has been continuous for 20 and less than 25 years, 25 per cent of the average annual wages for the ten years next previous to retirement; if the service in the company's employ shall have been continuous for 25 years, 30 per cent per annum of the average annual wages for the ten years next previous to retirement; if the continuous service exceeds 25 years, then for each year in excess thereof there shall be allowed an additional 2 per cent of the average annual wages for the ten years next previous to retirement. It is provided, however, that the pension allowance to any employee shall be not less than \$20 per month nor more than \$50 per month. There is further provided a funeral allowance of \$100 to be paid upon the death of any employee on the pension roll.

Wide discretionary powers are vested in the pension board of the Key System Transit Company, Oakland, Cal., by a clause which provides that "for exceptionally long and unbroken service, with first-class record, or for other good and sufficient reasons apparent to the board of directors, upon recommendation of the board of pensions, the board of directors may, at its discretion, place any officer or employee on the pension list and fix a pension or pensions at such an amount as may in the judgment of the board of directors be equitable and appropriate." The regular pension allowances of this company, however, are authorized upon the following basis: For each year of service, an allowance of 1.5 per cent of the first \$50 of the highest average monthly pay of the officer or employee during any consecutive ten years of service, and in addition, 1 per cent of any excess of such highest average monthly pay over \$50; provided, however, that in no case shall the allowance made be less than \$20 nor more than \$75 per month.

The plan of the Georgia Power Company contains a clause providing that "all annuities shall be based on the gross earnings of employees during the 12 months next preceding their retirement."

The amount of each pension is based upon a combination of age and years of service, under four classifications. Those 60 years old, with 30 years or more of service receive a yearly sum equivalent to 30 per cent of the gross earnings, as set forth above. Those with service records of 25 years and not more than 30 years, receive 27.5 per cent, while those with service records of between 20 and 25 years, and who have reached the age of 60, receive 25 per cent of the last twelve months earn-

ings. Total disability, following 15 years of service, regardless of age, entitles the employee to a pension based upon 25 per cent of his last year's wages.

Retirement annuities of the Cumberland County Power & Light Company range from 1.5 per cent to 2 per cent of the average annual salary of the employee for the period of continuous service, times the number of years of service, but not exceeding 50 per cent of the final annual salary nor shall the amount exceed \$6,000 per year.

#### PAYMENTS MADE FROM CURRENT EARNINGS

Few of the properties reporting have set up an adequate reserve to meet future or accrued liabilities. The usual method followed is to make payments from current earnings. A notable exception is the Montreal Tramways, whose plan, based upon well-considered principles, has permitted the accumulation of a reserve of more than \$540,000. Following an analysis of its plan in 1923 the Twin City Rapid Transit Company began to deposit to the credit of its pension fund \$10,000 per month. At the present time payments are aggregating about \$50,000 per year, and the company's reserve as of July 1, 1930, has reached \$608,159.32. Another large company inaugurated its pension plan in 1910 by setting aside 0.25 per cent of its gross receipts to meet contingencies. A reserve of approximately \$50,000 has been accumulated during the intervening years, but at the present time pension disbursements are taking practically all of the regular allotment and no additions are being made to the reserve. One of the most recent plans, that of the Cumberland County Power & Light Company, makes provision for setting aside 1 per cent of the annual payroll from which to meet future retirement pensions.

"Under the terms of our agreement with our employees' mutual benefit association," writes a Mid-West executive, "the company sets aside 1 per cent of its operating revenues to cover relief work and pensions. The balance available after current payments on these accounts is turned over to a trustee to be credited to the pension fund, but in no event is the amount so created to be less than 0.5 per cent of the company's operating revenues in any one year. The employees themselves make no contribution to the pension fund."

With a few notable exceptions none of the plans examined provide for contributions from employees, although several properties maintain benefit associations or even life insurance plans in which employees participate through regular deductions from their wages. Members of the Montreal Tramways association are charged an admission fee of \$1, and pay monthly dues of \$3. This sum, however, covers much more than the pension, as the association pays its members sick and disability benefits, as well as permanent disability benefits, provides medical and pharmaceutical attention and pays the premium to an outside company on group insurance to the amount of \$1,000 on each member.

The Washington Railway Relief Association, maintained and supported by employees of the Washington Railway & Electric Company, provides, among other things, for sick benefits, life insurance and a pension of \$30 per month to each member who receives a pension from the company. There is, however, no connection between this pension and that of the company, so the plan cannot be strictly classified as a contributory one.

While few of the properties providing pensions appear to have sought actuarial advice when the plans were inaugurated, a number have since done so and others are

contemplating early action in this direction. When the Montreal plan was first organized a competent actuary analyzed it and decided that the association could be successfully conducted along the lines proposed.

One large operating company states: "We have had actuarial computations which show that in the course of years the monthly payment will be extremely high." Another company writes, "When these two plans (pension and group insurance) were put into operation it was forecast that the maximum liability would be reached in five to six years, but this was not the case. In 1929 a detailed study was made of the future liability, and it was estimated that the costs would be 40 per cent greater in ten years than at the present time." One property which has gone into the matter very thoroughly was told by actuaries that \$2,250,000 should be invested to guarantee payment of future pensions. Another estimates its pension liability at \$500,000.

The Montreal Tramways, which has always supported its employees' mutual association most generously, appropriated for this purpose \$158,721.26 in 1929, an increase of \$16,260.85 over the 1928 allowance. Union Street Railway reports that 0.68 per cent of the total payroll was required to meet pension payments between 1925 and 1929. It is estimated that 1930 payments will require 1.13 per cent of the company's gross revenues. Another property is at the present time paying out in pensions between \$5,000 and \$6,000 per month. The Interborough Rapid Transit Company provides for its pensions out of a company donation of "not to exceed \$50,000 per year." The Twin City Rapid Transit Company sets aside \$10,000 each month for this purpose. The present annual cost of the Omaha & Council Bluffs Street Railway pension plan is estimated at \$24,000.

#### OBLIGATIONS BECOME LARGER THAN ORIGINAL ESTIMATES

From the tenor of the replies received in the JOURNAL survey it is quite apparent that a number of the companies which have adopted pension plans are experiencing difficulty in meeting their growing obligations, while others anticipate difficulty in the future. One company has already announced that, while present pensioners will be taken care of so long as it is possible to do so, no further pensions will be granted until the company's financial position is improved. Another property, in the hands of a receiver, anticipates difficulties at an early date.

The Washington Railway & Electric Company writes: "The number of pensioned employees and the amount of their payroll is at present in excess of the original figures planned by our management, and as time goes on it will undoubtedly be necessary to make some changes in our present system in order to provide for the gradually increasing number of pensioners." A company which, in addition to supporting a pension plan, also carries group insurance for its employees writes: "Our payments for 1929 were much in excess of the maximum estimate when these forms of gratuity were adopted." This company rewrote its entire plan quite recently. Existing pensions will be carried on as heretofore, but the pensions of employees who retire in the future will be considerably reduced below the former figure. Even so, the mounting costs of this form of relief are causing the management serious concern. The Boston Elevated Railway has been obliged to reduce its pension allowance 1 per cent, effective Sept. 1, 1929.

"On account of the average age of our employees I

expect that the pension obligations will become very heavy as time goes on," writes C. C. Vargas, Key System Transit Company, while another manager states that although no present difficulty is anticipated he is concerned as to the future and proposes to have an actuarial analysis made. The Georgia Power Company views the future with some uncertainty, in the belief that the present setup holds the possibility of difficulties later on.

"Ours is a joint utility, doing both an electric railway and an electric power business," writes one executive, whose company is setting aside 1 per cent of its operating revenues to meet pension and relief payments. "In the electric utility, which is the fastest growing service, the quantity of labor required per dollar of operating revenue is materially less than in the railway department. The faster growth of the electric business is, therefore, continuously operating in our favor. With the railway utility alone we are quite sure that our present reserve provisions would prove inadequate. The net result has probably been to gradually strengthen the position of the reserve, and while we are not certain of the present adequacy of our reserve fund, we feel that its position is steadily being improved. Certainly, we are in no serious or immediate danger."

With few exceptions the present plans are not definitely contractual. Protective clauses usually provide that the amount and terms of the pensions may be changed or discontinued at the discretion of the management. A typical protective clause provides as follows: "Whenever it shall be found that the basis of pension payments herein provided shall, in the judgment of the president of the company, create demands in excess of the company's revenues available for pension payments, a new basis ratably reducing existing and future pension payments shall be established." Another plan stipulates that "the foregoing provisions for pensioning aged and injured employees are and are to be accepted as purely voluntary and gratuitous, and as imposing no contractual or other obligations upon the part of said companies to continue the same, either as a whole or in any individual case or cases, or to deny to said company the right to withdraw from the same, or to discontinue the said pension, or any individual pension thereunder, if at any time, in their own judgment and discretion, it shall be expedient or desirable to do so, in which event all or any pensions allowed thereunder shall forthwith cease."

The pension plan of the Interborough Rapid Transit Company contains the following clause: "Whenever it shall be found that the pension allowances shall create demands in excess of the annual appropriation (\$50,000), and as often as such conditions shall arise, a new basis ratably reducing the pension allowance shall be established to bring the expenditures within the limit of the fund, and the decision of the board of directors in establishing such a basis shall be absolutely conclusive." The Boston Elevated Railway reserves the right to reduce all pensions pro rata so that the entire expenditures for pensions during any year shall not exceed 2 per cent of the salaries and payroll for that year. The Omaha & Council Bluffs Railway plan contains a section which states: "The establishment of this pension system by the company is purely voluntary and gratuitous . . . and the company hereby reserves the right to alter or abolish the pension system and all allowances under it. . . ."

The plan of the Georgia Power Company expressly states that "the company reserves the right to discontinue any and all annuities or any part thereof at any time." The company further reserves the right to withdraw or

discontinue all annuities theretofore granted and then being paid, and to alter or amend the plan as necessity may dictate.

Anticipating possible future pension legislation the Cumberland County Power & Light Company stipulates that "in case any benefit, annuity or pension shall be payable by the company under the laws now in force, or hereafter enacted, in any state or county, . . . the excess only, if any, of the amount prescribed in this plan above the amount of such benefit, annuity or pension prescribed by law, shall be the benefit or annuity payable under this plan." The company's board of directors is further authorized under the plan to "annul, alter, add to, or amend, any and all provisions contained in this resolution."

"The establishment of this pension system," reads a clause in the plan of the Bangor Hydro-Electric Company, "is intended only to declare the present policy of this company and to give authority and instructions to the officers of the company to carry out this policy, and neither the establishment of the system nor the granting of the pension, nor any action now or hereafter taken by the pension board or officers of this company shall be held or construed to create a contract." It is further provided that "the company hereby expressly reserves the right . . . to terminate the pension system or any pension or pensions previously allowed, or to modify the pension system in any respect either generally or in its application to any specific case."

#### CONTRIBUTORY SUPPORT DESIRABLE

Few of the pension plans now in effect require any contributory support from the employees themselves, although a number of executives replying to the JOURNAL's inquiry expressed themselves in favor of some such arrangement. For example, one executive writes: "From our experience, I do not believe a company itself should attempt to carry a pension plan; it should be taken out with one of the established life insurance companies. A pension plan, in effect, is for the purpose of creating an estate for an employee in his old age from which he may derive an income. If his savings plus a similar contribution on the part of the company could be held over a term of years until he comes to the retirement age and then distributed to him with interest over the remainder of his life, it would have the same effect as a pension plan and might have some better features. I feel that our men would appreciate a pension plan more if they were to contribute to a portion of it."

"I believe that the employees should contribute to this future annuity," writes a general manager whose company has a successful plan in operation, "and that the employer should charge against each year's operations the present value of his future pension liability accruing on account of employment during any year. I further believe that the employers' and the employees' contributions should be deposited with some outside trustee."

"I am strongly convinced that the employee should pay something toward his pension," writes an executive whose company has supported a pension plan for the past sixteen years. "In the first place," he continues, "one is not so apt to appreciate something for nothing as he would something to which he had personally contributed. In the second place, it is an increasingly heavy drain on any company to carry its pension costs unaided, especially where there is a very small labor turnover. More and more men are growing old in the service and will ultimately be candidates for pensions."





Group participating in track foremen's training classes conducted by the Cleveland Railway

## SELLING AN IDEA *to the Foreman*

"IF YOU were asked who is the key man constituting the bridge between capital and labor, between executives and wage earners, what would be your reply? Mine would be the foreman. The influence, the importance of the foreman is but poorly understood by many employers. Correcting this defect would mean much for the furtherance of better relations between employers and employed and of national stability. American foremen, collectively, have more to do with molding sentiments among the rank and file of the people and families of this country than politicians, editorial writers, preachers, teachers, or labor union leaders, or any other class. Training schools for foremen should constitute an outstanding feature of American industrial and economic life."

—B. C. FORBES, EDITOR *Forbes' Magazine*  
quoted from the *Cleveland News*

By HOWARD H. GEORGE

Superintendent of Way Cleveland Railway  
Cleveland, Ohio

In the belief that standardization of track construction and maintenance methods can best be brought about by uniformity of instruction, the Cleveland Railway has conducted a foremen's training course which has produced excellent results.

In order to put this theory into practice, there was organized, during the past winter, in the Way Department of the Cleveland Railway, a track foremen's training class. The membership in this class comprised all division foremen and general foremen, together with a selected group of foremen and sub-foremen, whom we had reason to believe would develop, in such a school, into suitable foreman material. Classes were held one evening each week during the first three months of the year, and attendance was compulsory for the division foremen and general foremen, but optional with the others.

A regular series of talks was mapped out in advance covering all the more important phases of track construction and maintenance operations. These talks were mimeographed and, at the close of each class, a copy

ON THIS very important subject the writer is in full accord with Mr. Forbes. Many track operations today require more than ordinary skill and training for which the run of common labor is not fitted. Because of the conditions which exist in the field from which our labor must be recruited, it is doubly important that the work be in the charge of a competent foreman and that each foreman be thoroughly instructed as to what is expected of him.

# Code of Ethics for Foremen

CLEVELAND RAILWAY—WAY DEPARTMENT

[ 1 ]

The foreman should regard his profession as a field of social service offering an opportunity to help working people obtain maximum satisfaction from life.

[ 2 ]

The foreman should endeavor to earn, and guard carefully, a reputation for good moral character, good citizenship and common honesty, and to support and promote the uplifting influences of the community.

[ 3 ]

The foreman should recognize that every man above, beside, or below has an inherent desire to do good

work and to be a useful and respected citizen. He should not assume that any man wants to do anything less than his best until he has considered every other possible motive.

[ 4 ]

The foreman should keep an open mind on all subjects, striving to maintain a broad and balanced outlook, and being always willing to recognize merit in another's ideas.

[ 5 ]

The foreman should deal fairly with the management, the men and other foremen, assuming responsibility for his own mistakes and refraining from shifting blame to others.

[ 6 ]

The foreman should strive to understand the principles of business which make for success or failure of industry. He should pass at least some of the fundamentals of business principles along to his men, so they can see their own relation to the general scheme.

[ 7 ]

The foreman should keep informed as to the latest developments in equipment and processes. He should recommend, or put into effect, such methods as will produce improved quality, lower costs for the product, and better working conditions.

was given to each member present. Each lecture was informal but covered the same field as the printed copy which the men afterwards received, so that they had it available for reading and study during the ensuing week. The talks were illustrated with blackboard sketches, models and large scale blue prints.

The first half hour of each evening was devoted to a written examination covering the subject of the preceding week. The next three-quarters of an hour were devoted to the subject for the evening. There followed fifteen minutes for reading to the class the correct answers to the questions covered by the quiz of the evening, and the last fifteen minutes were devoted to general questions and answers.

Perhaps some of you will say "Maybe George can do it, but if all his track foremen can read and write, he is more fortunately situated than I am." My answer is that our situation in this respect is actually no different from that which probably exists on any other property of our size. Out of the total registration of 45 in the class which we conducted, ten were of general supervisory grade and were not required to take the written examination. The men, however, were required to attend class and assist in the conduct of the examinations, as will be explained more fully later. Of the remaining 35 who took the examinations, nineteen were unable to read or write although, in every case, they had been track foremen or sub-foremen for many years. Most of the men who could not read or write were Italians. Where the men were unable to read for

themselves, they arranged to have some one read the various lectures to them during the week. Usually this was done by one of the older children in their own family who had the advantage of at least a grammar school and frequently a high school education.

In the written quizzes, we assigned one of our supervisory force or some one from our engineering department to sit with each man who was unable to write. These helpers read and explained the questions and put down the student's answers in as nearly their own language as possible. Each question was given a rating, based upon a total mark of 100. In no case did spelling, grammar, punctuation or penmanship play any part in the grading of the answers. We were entirely satisfied if the answer convinced us that the man knew what the correct answer was in each case.

At the opening of the course, each member was furnished a copy of the small printed booklet prepared by Howard J. Montgomery, Chicago, entitled "If I Were a Foreman." This booklet, while necessarily containing some reflections which do not apply to the track foreman, certainly does contain many observations which fit his case admirably, and if the track foreman will study them and apply as many as possible to his own case, he cannot help but increase his value to his employer and raise himself in the estimation of those directly under his control as well. In addition, we furnished each man in the class with a copy of the Code of Ethics for Foremen, which was prepared by a committee of the National Association of Foremen.

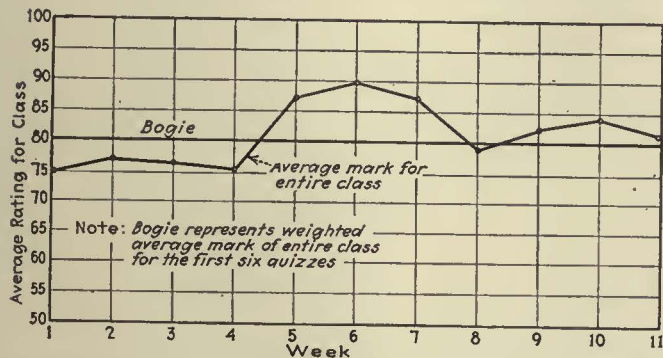


Model of grooved girder rail and tie assembly, with screw spikes and clips, used in demonstration before foremen's training group

The subjects scheduled for discussion at the various classes were as follows:

- Purpose of Course and General Duties of Track Foreman.
- Subgrade, Drainage and Ballast.
- Ties.
- Rails and Rail Joints.
- Miscellaneous Rail Fastenings.
- Track-laying and Surfacing.
- Pavement and Its Foundation.
- Welding and Grinding Rails and Joints.
- Track Tools and Equipment.
- Track and Pavement Maintenance Practices.
- Safety First Talk on Accident Prevention.
- Review and Track Construction Moving Pictures.

When the classes were announced, we were flooded with requests to be allowed to attend, and could easily have formed three classes had membership been thrown open to all applicants. In order to ascertain how much of the interest was real and how much was forced, we extended to any one in the class the privilege of dropping out after the fourth session, but only one man took advantage of the opportunity. The men were willing and



Progress made by Cleveland track foremen's class, as indicated by average rating of all quiz papers submitted. The heavy horizontal line represents the bogie, determined by calculating the weighted average rating of the class for the first six quizzes

anxious to learn and displayed a disposition to work hard and acquire what knowledge we were trying to teach them.

There was, at first, a feeling among a number of the men that they were being examined for the purpose of determining whether or not they were to be retained in the service or discharged, and there was, as a consequence, some uneasiness on this score. We were soon able, however, to reassure every man on this score by making it clear that we had but two objects in view in organizing the class. The first was to help the men increase their own knowledge of the business, and to enable us to become more familiar with their individual qualifications. The second was that, through the course, the Cleveland Railway would benefit by reason of better supervision of its track work, with a resulting higher standard of construction and consequent longer life of its track structure.

What we are trying to do is to give every foreman the same kind of instruction, to the end that our work may be more uniformly done. We are striving to impress upon the mind of each man the important relation between the care which is given the various details of construction and the life of the structure. The only practical way this can be accomplished is by getting the men together in a class.

Just how much we will be able to accomplish, as compared with the goal towards which we are striving, remains to be seen. Judging, however, from the interest which every man in our last winter's classes displayed,

and from the intelligent questions which were asked in open class, there is no doubt regarding the outcome, and we will undoubtedly make this class an annual affair. It is even possible that the course will be split into two classes, one for the more advanced men, the other for the more backward. Suffice it to say that the results obtained thus far have fully justified our expectations.

## Effective Sales Promotion Work by Trainmen at Norfolk

By F. C. WOMACK

Manager of Transportation Norfolk Division  
Virginia Electric & Power Company

SALES promotion of street car and bus transportation is the only solution for the gradual yearly falling off in gross revenue that is now so threatening a menace to the very life of the industry. Definitely committed to this policy, the Norfolk division of the Virginia Electric & Power Company is preparing to launch an intensive campaign of transportation sales promotion in Norfolk which is in line with like campaigns to be inaugurated in the other divisions of the Virginia Electric & Power Company in Richmond, Portsmouth and Petersburg.

With the steadily increasing popularity of the automobile, there has been a corresponding decrease year by year in the gross revenue to transportation companies throughout the country for street car and bus transportation. This decline, which during the past five years has varied between one and five per cent annually, presents a grave emergency which transportation companies must meet and overcome if they are to continue to furnish reasonably good service.

During this same period, realizing that the emergency must be met, transportation companies have concentrated their efforts toward reducing the cost of operation and at the same time increasing efficiency. In this they have, as a rule, been remarkably successful. Under the principle of mass purchasing and other modern methods, the companies have been able during this period to greatly increase efficiency, replace old with modern equipment, speed up schedules and, at the same time, pay a higher wage to the operator—all at a decreased yearly cost of operation.

This decrease in the cost of operation, to some extent, has acted as a sort of financial buffer to take up the shock of the gradual falling off in gross revenue. The situation has now reached the place, however, where the cost of operation has been cut to the bone, and still there is no letting up in that gradual falling off in gross revenue. The one solution which will solve the problem is the "selling" of bus and street car transportation to the public.

The main cog in the operation of this sales promotion machinery is the operator of the street car or bus. Through our experience in accident prevention contests, we have found that the men who operate our street cars and buses are always ready and willing to stand four-square behind whatever move for the betterment of the company in which the officials show a real interest. Convinced that the officials were vitally interested in the reduction of accidents, the Norfolk division during March reduced the number of accidents to less than 50 per cent

of the number for the same month a year ago. Last year the total number of accidents in the Norfolk division was 273. This year it has been reduced to 127. One of the main factors in this reduction was the fact that the men at the controls of the street cars and buses, realizing that the heads of the company were vitally interested in reducing accidents, became imbued with the same interest.

A similar result can be achieved when the operators realize that the heads of the company are vitally interested in increasing the number of customers. Once we can get the operators to look upon every pedestrian and every person they see in a private automobile as a potential customer to be treated as such, much will have been accomplished toward selling street car and bus transportation to the public.

But this is only the first step in sales promotion. Following close behind this there must be a concentrated effort toward educating the public away from the single cash fare. In every instance possible an effort will be made to sell the customer tokens or a weekly pass. One of the characteristics of the American people is that they are inclined to use what they have. Sell a man six cigars and he will smoke twice as much as he would if he bought these cigars one at a time. Sell him a block of theater tickets good any time during a period of six months and he will use them up in the first six weeks. The same is true of street car and bus transportation. Half a dozen tokens sold at one time mean that the customer will ride just about twice as often as he would upon a cash fare basis.

As a final link in the sales promotion activities of the Virginia Electric & Power Company, a group of highly intelligent salesmen will be employed to carry the message of street car and bus transportation direct to the potential customer. To those people living along the suburban lines who have been accustomed to depend upon their own automobiles in most instances and who use the street cars and buses infrequently, the railway will appeal upon the basis of economy, showing them in actual dollars and cents that we can carry them to and from their places of business at a saving. At the same time we are committed to a program of speeding up these suburban lines and maintaining thereon regular schedules of operation that can be depended on. We expect the going to be hard in these sections at first but in the end, we feel certain we will be able to greatly increase business along these suburban lines.

It is an entirely different story with the car owner living in those districts where frequent and steady schedules are maintained and it is upon this type of potential customer that the transportation salesmen will concentrate their activities. In every city there are literally thousands of car owners—merchants, professional men, clerks, salesmen, men in practically every walk of life—whose daily activities are confined to a single office building or store in the business district. For month after month and year after year these men have been using their private automobiles as a means of transportation to and from work all unmindful of the fact that the power company maintains bus and street car service in their district that offers transportation that is not only cheaper but faster than their own cars. It is this type of citizen who must be sold upon bus and street car transportation if the steady decline in gross revenue from this source is to be checked.

Selling of this transportation is to be no hit or miss proposition. There will be no dealing in generalities

when our salesmen approach these prospects. Each man's individual case will be surveyed and studied for weeks in advance before the salesman calls upon him. As a result, the transportation salesman will have concrete facts to work upon when he goes in to sing the praises of street car or bus transportation.

These data are to be obtained first through a study of the automobile license numbers in the different parking stations in the business district and along those streets where parking throughout the day is permitted. Through a follow up system the names of these different car owners will be secured and then for several days the movement of each car will be studied. Distance between the parking station and the place where the owner is employed will be computed, driving hazards will be determined, the cost of parking will be determined and a check of the actual weekly mileage in driving between home and work will be computed.

Once these data have been compiled—and they will be comparatively easily secured—the transportation salesman will call upon the prospect armed with information which will prove conclusively that the bus and the street car offer him quicker, safer and cheaper transportation day after day, week after week, and year after year between home and work. We believe that this campaign will prove effective. We believe, also, that it is the only manner by which this steady decline in gross revenue from bus and street car transportation can be stopped.

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## London "Tube" Extensions to Cost \$65,000,000

CONTRACTS amounting to approximately \$65,000,000 are about to be placed by the London Underground group of railways for extensions and reconstructions on the Piccadilly line. Two extensions are to be started, one to the north from Finsbury Park to Cockfosters, at a cost of \$25,000,000, the other west from Hammersmith to Northfields, at a cost of \$17,500,000. The balance of the \$65,000,000 is to be spent on reconstructing existing stations.

The whole of this work will be carried on simultaneously, and will give employment, when in full swing, to more than 20,000 men. It is hoped to complete both extensions and reconstructions in from 2½ to three years.

This concentrated effort, the largest ever embarked upon by the Underground group in so short a space as three years, has been rendered necessary by the phenomenal growth of London traffic in post-war years.

Work on the Cockfosters extension is expected to commence on Sept. 1 and to occupy two years to complete, but as soon as the line has been carried as far as Arnos Grove, roughly one-half the total distance of 7½ miles of track, it will be opened to the public.

The construction work will involve tunnelling from Finsbury Park nearly to Arnos Grove. There the line will come out into the open, and will be carried across Arnos Park by a viaduct, to disappear into a tunnel on the north side, where the land rises considerably, coming into the open again at Chase side. Thus in the 7½ miles there will be 4 miles of tunnel.

The western extension to Northfields will follow the line of the District Railway. It will be above ground all the way.

Leicester Square is to be made into a subsurface station. It will be a second Piccadilly Circus, but on a

smaller scale, with one set of escalators connecting direct with the platforms. Four entrances will be provided to the booking halls from the pavement level, one at the Hippodrome Corner, another at Wyndham's Theater Corner, and two just north of the present station on either side of Charing Cross Road.

In the reconstruction of Dover Street station the existing entrance will be abolished. Two new entrances provided, one on the south side of Piccadilly, close to the Ritz Hotel and the entrance to Green Park, and the other on the north side near Devonshire House. These will lead by escalators to the platforms.

Similarly, at Hyde Park Corner, entrances are to be made to the station from both sides of the thoroughfare, so that it will be possible to walk by a subway under the road between St. George's Hospital and the Park.

At Knightsbridge the alterations contemplate the construction of new entrances at the top of Sloane Street to the east and at the corner of Hans Crescent to the west.

Another improvement is the provision of interchange facilities between the British Museum Station, on the Central London Railway, and Holborn Station, on the Piccadilly line.

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## International Tramway and Bus Association Holds Biennial Meeting at Warsaw

EUROPEAN transportation men found much of interest at the 22nd convention of the Union Internationale de Tramways, de Chemins de Fer d'Intérêt Local et de Transports Publics Automobiles (International Tramway and Bus Association) which was held at Warsaw, Poland, from June 29 to July 2.

The convention opened informally with a reception at the Polish National Club on Sunday evening, while the official opening was held the next morning in the salon of the Warsaw City Hall. The meetings were presided over by F. de Lancker, managing director of the Brussels Tramways, who is president of the association. Addresses were made by Alphonse de Kühn, minister of communications in Poland; Mr. Szpotanski, vice-president of the Municipal Council of Warsaw, and Mr. Budkiewicz, president of the Polish Union of Means of Transport. In these addresses, the history of Poland since the war was outlined, with particular reference to the plans for modernizing the country's transportation systems.

Technical sessions were held on Monday, Tuesday and Wednesday, both morning and afternoon. A number of papers on a wide range of topics were presented. A paper was read by E. Jayot, director general of extensions, Prefecture of the Department of the Seine, on the comparison of subways and surface lines. Dr. Wilhelm Pforr, general manager of the Berlin Transportation Company, presented a paper on braking tests, following up the work that was done by the committee reporting to the Rome convention two years ago.

At the Monday afternoon session was presented a report prepared by M. H. Coens, chief of substations and distribution of the Brussels Tramways and A. Allard, chief engineer of the Suburban Railways of Brussels, on the subjects of energy distribution for tramways and comparison between systems of conversion from high-tension alternating current to low-tension direct current. Another report presented was prepared by Gaetano d'Alo, traffic engineer of Milan, Italy, on the track structure. A paper was read by P. Lo Balbo, research director of the Piedmont, Italy, tramways, on storage battery vehicles for rail service in Europe.

Two sessions were held on Tuesday, at which numerous reports were given. Dr. Philip Kremer, manager of the Frankfort a.M. Tramways, prepared a report on improvements in rolling stock for railways and road transport with respect to the comfort of passengers,

facilities for service and improvement of operation. This report was a comprehensive review of recent European practice in car and bus design. H. Arnold, general manager, and F. Eichelhardt, chief engineer, both of the Vestischen Railway, Herten, Germany, reported on the use of internal combustion motors burning light oils for rail service. R. Podoski, professor of engineering at the Warsaw Polytechnic School, presented a paper on studies of electrolytic corrosion.

A report on the comparison of systems of co-ordinated transport including tramways, rapid transit lines and buses, was prepared by M. Nestrypke. A paper was read by M. Lange on automatic block signals for single track. Another paper was by L. Sekutowicz, Paris, on the use of light-weight metals in overhead line construction.

Wednesday's session opened with a discussion of the report by H. Werner, vice-director of the Vienna, Austria, tramways, on the development of electric equipment of rolling stock. This report was principally a tabulation of answers to a questionnaire relative to the design features of recent types of propulsion motors, especially those with high-speed armatures developed for the new types of drive. The last paper was that of L. Bacqueyrisse, general manager in charge of operation and technical service of the Société des Transports en Commun de la Région Parisienne, which operates all the transports in Paris, on methods of facilitating the use of the service by passengers on buses, tramways and rapid transit.

At the concluding session President de Lancker summed up the discussion which was held on the various papers and reports. It was decided to continue the preparation of information on the same subjects, to be presented at the next convention, which will be held at the Hague in 1932. Much interest was shown in regeneration of electric energy, and it is planned to make a special report on this subject. A special meeting probably will be held in Paris next October to witness tests of three cars fitted with regenerative equipment.

Following the meeting trips in Poland were taken by three groups of delegates. One of these was to the cities of Krakow and Katowice in Southern Poland, where many of the manufacturing plants are located. The three groups joined at Poznan on July 5 to assist in the formal opening of the International Exhibition of Transport and Touring being held in that city this summer.



This 85-ton locomotive has been built for service on 1,500 volts and 600 volts, both trolley and third rail

## Double-Voltage Operation Features Midland Utilities Locomotive

Service can be given on 1,500 or 600-volt lines on its several subsidiary railways by changes of circuits and minor adjustments

By T. F. PERKINSON

*Transportation Engineering Department  
General Electric Company*

TWO 85-ton direct current electric locomotives with novel features have been obtained by the Midland Utilities Company of Indiana for service on its various associated lines. During certain portions of the year they will be assigned to the 1,500-volt Chicago, South Shore & South Bend Railroad. At other times, when traffic demands require, they will be assigned to 600-volt associated properties, such as the Aurora, Elgin & Chicago Railroad, and the Chicago, North Shore & Milwaukee Railroad. These locomotives, constructed by the General Electric Company, are arranged for easy change-over of control circuits, auxiliary apparatus, etc., so that operation under a 1,500-volt or a 600-volt d.c. contact line or with a 600-volt third rail can be successfully undertaken.

Mechanically the locomotives are of the non-articulated double-truck type. The center plate of each truck is floating, supported by two transverse semi-elliptic springs suspended from the truck transom by centering hanger links. The transom casting is bolted to steel side frames which carry the pedestal jaws. The side equalizers are unusual, each being formed by two irregularly shaped forged steel plate bars. Two heavy coiled springs rest in cast pockets supported by the two plates

forming the equalizer bar and carry the weight of the side frames with their superimposed loads. The wheels are 42-in., A.R.A. standard, with  $3\frac{1}{2}$ -in. steel tires. The truck brake work is of the spreader type and is actuated by two cylinders, one mounted on each side of the truck frame. The Miner friction draft gear is used and couplers are of the standard A.R.A. type with 6x8-in. shank.

The cab superstructure is of the modified steeple type. The main cab has two operating compartments and an apparatus compartment with passageways on each side. All necessary control apparatus is in duplicate. Each operating cab has 4 kw. of electric heaters.

The center compartment contains the contactors, reverser, resistors, switches, control motor-generator set, etc., necessary for control of the traction motors. Access is obtained through a door from one of the operating compartments. The lower portion of the sides are covered with wire screening, giving a clear view of the apparatus and eliminating the danger of accidental contact with it. The top section of the compartment, containing the accelerating grids, has four transverse ventilators welded to the cab roof, giving natural circulation of air. Each auxiliary end cab houses an air compressor and a propulsion motor-blower set so located that a short

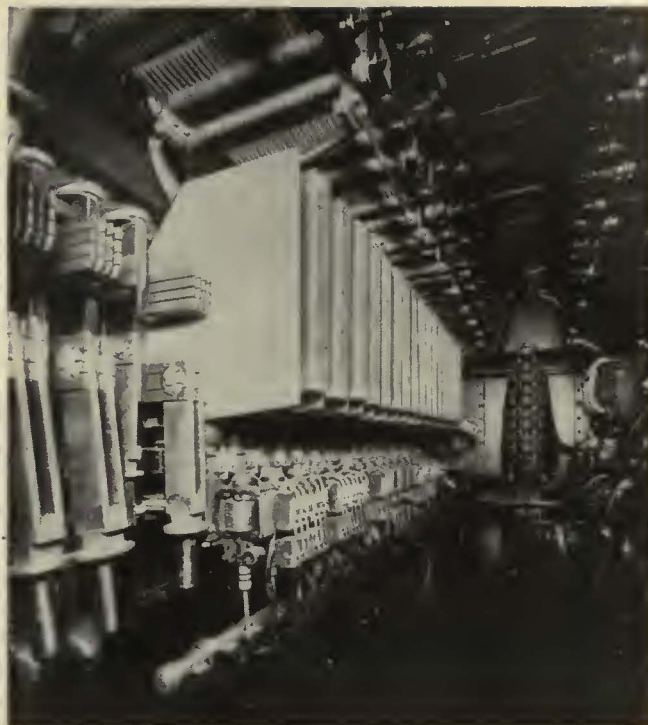
direct path from the fan outlet into the longitudinal air duct is secured.

Four GE-704 d.c. series motors for 750 volts drive the wheels through single reduction gearing. These motors are of the box-frame, nose-suspended, forced-ventilated, commutating-pole type insulated for 1,500 volts. Air from the ventilating duct is led to each motor through an all-metal duct arranged to permit swiveling of the trucks. The air is taken in to the motor through an opening in the frame located above the commutator and passes out through protected openings at the pinion end.

The motor armature bearings and axle suspension bearings are of the waste-packed constant oil-level type.

The gears and pinions are of high-carbon steel, heat treated, and forged from solid steel blanks. The gears are of the non-resonant type, ringing being practically eliminated by the use of lubricant retaining rings inside the gear ring on either side of the web.

The control equipment is of the non-automatic electro-pneumatic type, arranged for multiple-unit operation. There are two motor combinations available for



Control equipment and resistors are compactly mounted in a compartment in the center of the locomotive cab

### Principal Data of Double-Voltage Locomotives

Class of service.....	Freight and switching
Trolley voltage.....	1,500 or 600
Driving wheels, number.....	8
Driving wheels, diameter, in.....	42
Total weight, lb.....	170,000
Weight on driver, lb.....	170,000
Weight per axle, lb.....	42,500
Weight electrical equipment, lb.....	57,600
Weight air brake, lb.....	5,400
Weight mechanical equipment, lb.....	107,000
Length over knuckles.....	39 ft. 1½ in.
Width over arm rests.....	11 ft. 1½ in.
Height, trolleys locked down.....	14 ft. 0 in.
Total wheel base.....	27 ft. 0 in.
Rigid wheel base.....	8 ft. 8 in.
Type of control.....	PCL, multiple unit
Motors, number and type.....	Four GE-704-A-1
Gear ratio.....	71/18
*Continuous tractive effort, lb.....	16,800
*Continuous speed m.p.h.....	26.7
*Continuous current rating, amp.....	650
*Continuous output, hp.....	1,196
*One hour tractive effort, lb.....	22,600
*One hour speed, m.p.h.....	24.3
*One hour current rating, amp.....	800
*One hour output, hp.....	1,465
Starting tractive effort at 25% adhesion, lb.....	42,500

\*Rating given on 1,500 volts at trolley, and motor fields shunted.

each direction of motion on either 600 or 1,500 volts. The first or low-speed combination has eight resistance steps, one full-field running step and one reduced field running step. The second or high-speed combination has seven resistance steps, one full field running step and one reduced field running step. The two groups of two motors each are connected in series on 1,500 volts, and in parallel on 750 or on 600 volts. The first combination connects two groups of motors in series, and the second connects them in parallel.

Manual knife-blade switches in the main circuits perform the following operations: Selection of trolley, pantograph, or third-rail shoes; connection of the main and auxiliary circuits to the bus line couplers; connection of the traction motor circuits to the source of energy; isolation of individual pairs of traction motors in the event of damage.

Master controllers are of the recently developed cam-operated type. In this the operating lever causes a camshaft to revolve, opening or closing individual contactors in a manner similar to that found in the conventional type of pneumatic cam-operated main-motor controllers used for multiple-unit car service. The reserver handle is mechanically interlocked with the main handle.

Protection for the electrical equipment is afforded by

an inclosed expulsion type fuse in the main circuit ahead of the main switch and auxiliary fuse. Individual motors are protected by a series overload relay.

When the locomotives are assigned to territories with different operating voltages, change-over of the main circuits from 1,500 to 600 volt operation, or vice versa, is facilitated by terminal boards to which the motor and grid connections are brought.

There are two traction motor-blower sets, each consisting of a 1,500-volt d.c. motor driving a multivane blower. Each set furnishes air to the pair of motors located in the truck beneath it. The blower motor field coils, armature, brushes, and brush-holders are interchangeable with those of the compressor motors.

The two compressors are of the CP-130, 1,500-volt type, and are designed to deliver 50 cu.ft. of free air per minute each when pumping against a reservoir pressure of 90 lb. per square inch. The compressors are of the single-acting, single-stage type with horizontal cylinders. When the locomotives are assigned to 600-volt territory the compressor motors, blower motors, and the motor of the control motor-generator set will be provided with armatures, field coils and brush rigging differing in electrical characteristics from, but physically interchangeable with, these parts furnished for 1,500-volt operation. Control and lighting energy is furnished by a 2 kw. 1,500/32-volt motor-generator set, which floats across and charges a 200 amp.-hr. "Exide" battery.

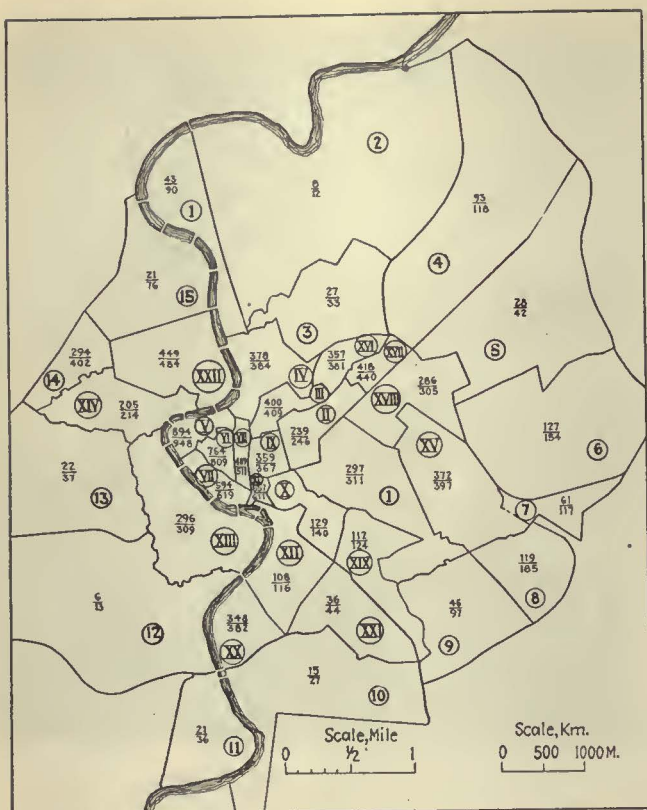
Bus line coupler sockets, plugs and jumpers permit emergency operation of two locomotives by means of power furnished solely from either.

The air brake equipment is of the straight and automatic type manufactured by the Westinghouse Air Brake Company. Each truck has two 10x12-in. brake cylinders mounted on the truck frames and working the brakes for each adjacent pair of wheels. Two air tanks suspended beneath the platform and between the trucks have a total capacity of 43,000 cu.in.

## Rome to Have

# MODERN

Construction of rapid transit line will provide direct routes connecting the principal points in the center of the city with six outlying terminals. It will round out a unified transportation system in which surface cars serve the major portion of the city with buses in the congested central area



Rome population density by districts, 1921 and 1927

The population density is given in inhabitants per hectare, a hectare being equal to 2.47 acres. The upper figure is the density in 1921, the lower is the density in 1927. Roman numbers in circles designate rioni (wards) in the central city and Arabic numerals in circles designate quartieri (districts) in the outer territory now also included in the city of Rome

**R**APID transit for the city of Rome, Italy, has been brought much nearer by the preparation of detailed plans for a subway system which are now being studied by the Superior Council of Public Works. The project calls for three lines with a total of 15½ miles of route. It is estimated that construction work can be completed in 12 years. Additional lines totaling 19½ miles, proposed for later construction, to round out the system, could be completed in 25 years.

Of the three routes included in the first group, as shown on the map, A, the one proposed for immediate construction, is from Piazza Verbano to the Ostia railroad station, with a branch from Porta Pia to Sant' Agnese. The second is that portion of route C between Piazza Re di Roma to Stazione Termini, followed by the remainder of the line C, from Stazione Termini to Viale delle Milizie. Finally, route B would be built from Viale delle Belle Arti to the Ostia station.

These plans are the result of proposals which date back to 1924. In Italy, a city railway entirely within a municipality is under the jurisdiction of the local government, except in the city of Rome, in which all rights are reserved to the national government. In August, 1926, the Minister of Public Works appointed the technical committee to plan a rapid transit system, which has just rendered the report under consideration.

In making the survey, two purposes were kept in view. First was the relief of traffic congestion in the center of the city. This area has winding streets cramped between buildings whose historic and artistic character prohibits

removal or modification to provide wider roadways. With the increasing use of automobiles, traffic jams have become so bad that vehicle movement is almost impossible. The second purpose was to permit a redistribution of the population so that more people can reside in the outer districts. The need for this will be seen from the population maps, which give the number of inhabitants per hectare for the wards (rione) of the older central city and the corresponding districts (quartiere) of the outer section.

It will be seen that the three rapid transit lines proposed will skirt the heart of the city, joining Stazione Termini, Piazza Colonna and Piazza Venezia, with six branches extending toward the most important outlying districts. In order to promote flexibility of routing, track connections will be made at two points, Piazza Venezia and Stazione Termini.

### SELECTING THE TYPE OF TUNNEL

Shallow subways built by the cut-and-cover method were rejected, in part on account of the cost. It was also considered inadvisable to disturb sections of the ground which might contain material of archaeological importance. Accordingly, the plans have been prepared for the tunneling method such as is used in railroad construction. Toward the outer ends of the line, however, the plans call for shallow subways using the cut-and-cover method. In the lowest section of the city, in the vicinity of the Tiber River, it was decided to use the shield method of tunneling, the tubes being lined with sectional cast-iron rings.

It was deemed inadvisable to adopt special sections for the tube tunnels which differ from those used successfully in Paris and New York. The section shown in one of the illustrations was adopted where possible, and the portion built by the tunneling method is shown in another illustration.

Many test borings along the proposed route indicated that in general there is a superficial layer of soil varying from 7 to 46 ft. In the higher portions of the city there is a stratum of volcanic earth, below which are blue



# SUBWAY

By

Engineer Ugo Vallecchi

Director of Traffic and of the Technical Office  
for the Subway System, Rome, Italy

marls and clays. In the lower sections are blue and yellow marls and mixtures of clay and sand. Along the Tiber are large sandy pockets which it is feared may be difficult to handle during the tunneling

While in general the streets are followed, it has been found possible to hold to a minimum radius of 75 m. (246 ft.), limited in general to track at the ends of stations. This radius has made it possible to adopt a car width considerably greater than that used in the Paris subway, without increasing the dimensions of the masonry tunnel or the cast-iron tubes at curves of minimum radius.

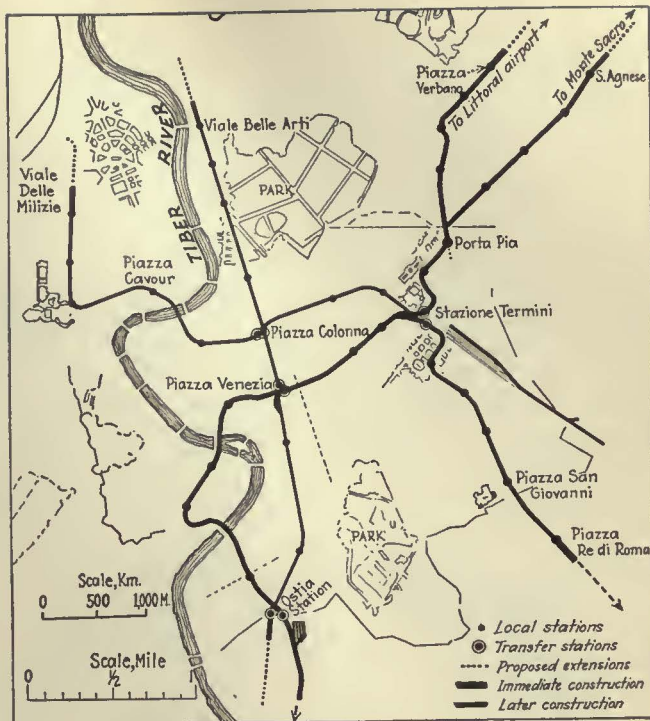
In this connection a study of the maximum permissible speed was made. With stations about 500 m. (1,650 ft.) apart, it was found that a maximum speed necessary to give good schedules was 60 km.p.h. (37.3 m.p.h.). It was decided to use a super-elevation of 17 cm. on curves as the maximum. This permits a speed of 37.7 km.p.h. on a 75-m. radius, 45.4 km.p.h. on a 100-m. radius and 59 km.p.h. on a 150-m. radius. The lines also have been laid out so that a straight section of at least 80 m. is left between tangents to circular curves, permitting parabolic easements, with intermediate horizontal straight track capable of containing the four axles of a car between curves.

The maximum gradient is 3.8 per cent at one point on line A and 3.7 per cent at one point on line C.

A study of the use of approach grades at the entrances and exits to stations, calculated for a straight section of track 500 m. long, showed a 22 per cent economy in energy consumption, a 13 per cent reduction in motive power and a saving in time of 4 per cent. These advantages were found to be offset by the increased difficulty of subway construction, the greater exposure to infiltration of water and the impossibility of running express trains and local trains on the same track. The topography also made it impossible to put more than two consecutive stations at the same level. A compromise profile adopted obtains a portion of the advantages of the approach grades.

## CONSIDERING LOCATION OF STATIONS

It was desired to keep the distance between stations as great as possible, in order to save construction costs, obtain maximum schedule speeds and simplify construction. A study of various systems showed that in Paris the distance between stations varies from 600 m. to 425



Map of proposed Rome subway system

The main line A is 8.603 km. long, with the branch between Porta Pia and Santa Agnese 2.262 km.; line B is 5.410 km. long, and line C is 7.944 km. long. In addition, connecting tracks of 0.236 km. are planned, making the total length 24.455 km.

m.; in London it is about  $\frac{1}{2}$  mile; in Madrid it is close to 500 m.; in Hamburg, 750 m.; in Berlin it varies from 500 to 1,200 m. The distances adopted for Rome average about 550 m. (0.34 mile).

In determining the length of a station, the possibility of operating long trains was set off against the financial necessity of investing as little money as possible for future demands. The normal length of stations finally adopted is 80 m. (264 ft.). This is based on the assumption that the cars will have an over-all length between buffers of 15.2 m. (50 ft.). Five-car trains would be 76 m. (250 ft.) long, and would have ample clearance, while six-car trains, with an over-all length of 90.5 (300 ft.) could also be used with the front and rear doors of the trains closed.

Cars with the dimensions proposed will have a normal capacity of about 150 passengers. A six-car train, then, will have a total capacity of about 900 persons. With a maximum frequency of 90 seconds, there will be a capacity of 36,000 passengers per hour, or for an operating period of 20 hr. per day, an ultimate capacity of 780,000 passengers in each direction.

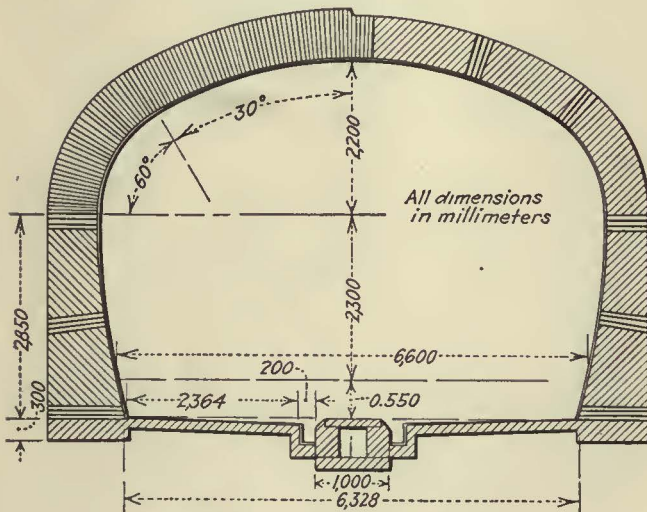
## INDEPENDENT STATION PLATFORMS ADOPTED

A study of the system of separate platforms on the outside of the track as compared with island platforms was made. In Paris, Madrid, Barcelona and Tokio, outside platforms are used exclusively. In Berlin and Hamburg island platforms are used. In London the ordinary lines have outside platforms, while in the tubes central platforms are standard. Island platforms reduce the total width of the station and simplify the stairways, but lead to interference between incoming and outgoing passengers and, in general, limit the volume of traffic that can be handled expeditiously. It is believed that shorter

stops can be made with outside platforms, and passenger travel is confined to one direction. In Paris, the stops average between ten and fifteen seconds, and even in the principal stations seldom exceed twenty seconds, whereas in Berlin the stops equal or exceed double these values. The use of central platforms also involves insertion of curves on each track at each end of the station.

#### SELECTION OF ROLLING STOCK

Limiting dimensions of rolling stock are fixed by the subway section. The selection of an internal diameter of 7.3 m. (24 ft.) for the cast-iron tubes thus determines the dimensions of the car. As to clearances it was found that in the Paris subways a clearance between passing trains of 50 cm. was adopted to allow passengers to walk along the tunnel in the event of accident. The adoption of cars with intercommunicating doors, as in the London and German subways, however, makes these clearances



Typical section of Rome subway

entirely unnecessary. Hence it was decided to adopt the dimensions for rolling stock in effect on the principal routes of the Italian State Railways. The minimum clearances between cars on adjacent tracks are 300 mm. (10.8 in.) and 150 mm. (5.4 in.) in a horizontal direction between cars and stationary obstructions. Dimensions of the cars adopted are shown in the illustration. The reduction in width at the ends provides clearance on the curves with 75 m. radius.

Adoption of wheels of 900-mm. (35½-in.) diameter allows the future adoption of motors somewhat more powerful than those previously planned, and gives a height of car platforms of 1.06 m. (41¼ in.) with a clearance of 103 mm. (4 in.) between the wheel and the bottom of the car floor. With station platforms 1 m. (39.4 in.) above the rail level there is a difference of 6 cm. (2⅝ in.) between the platform and the floor of the empty car. All cars, both motor and trailer, have been designed alike. The couplers will be identical so that it will necessitate only the addition of electrical equipment to convert the trailers to motor cars, if later developments require.

The principal dimensions of the cars are given in the accompanying table.

The general appearance of the cars is indicated in the plan. There will be three doors on each side, 1.5 m. (4 ft. 11 in.) wide. These doors will be of the double sliding type, automatically operated.

Longitudinal arrangement of the seats was adopted to

give easier circulation of passengers in the car and to allow better lighting. Since it is proposed, at least experimentally, to provide for two classes of passengers, the trailers can be divided into two parts, permitting one to be finished and upholstered for first-class service.

The seating capacity of the cars is normally 32. There are places for 121 standing passengers in the motor cars. The trailers will have 36 seats and 119 standing passengers. A normal train of five cars will then have capacity for 771 passengers, of whom 168 are seated. The weight will be 184 kg. (405 lb.) per place offered.

Ventilation will be provided by opening the upper section of the windows, or by means of automatic suction fans. This was considered preferable to the use of a monitor deck, being less expensive, more substantial, and better in appearance. The normal train will consist of three motor cars and two trailers, alternating. Until the necessity for greater capacity arises, three-car trains, consisting of two motor cars with a trailer between, will be used. Automatic couplers will make mechanical, air and electric connections between cars.

#### SUBSTANTIAL TRACK CONSTRUCTION PROPOSED

The track will be constructed with Italian State Railway standard rail type FF.SS, weighing 50.6 kg. per lin. m. (102 lb. per yd.), laid on oak crossties, 26 being used in each section of 18 m. This corresponds to a spacing of 27¼ in. Every fifth crosstie will be extended to support the third rail. The same type of track has been adopted not only for the main lines, but also in the stations. In the carhouses and yards, as well as on side tracks rail weighing 36 kg. per m. (73 lb. per yd.) will be used, with 24 crossties for every 18-m. section. On curves of 300-m. radius or less, inside guard rails will be used. The ballast will be made up of gravel and will have a depth of 55 cm.

#### 750-VOLT THIRD-RAIL SYSTEM USED

It is proposed to use the 750-volt direct current system. Although the 3,000-volt d.c. system will be used for future railroad electrification in Italy, it was felt that the clearances with low voltage would be less and that the saving in cost in the distribution system would not have offset the higher cost of the equipment and its maintenance. It was pointed out that with few exceptions all other rapid transit lines in the world use between 800 and 600 volts. One Barcelona rapid transit line uses 1,700 volts for the third rail and the other 1,400 volts with overhead trolley. The Nord-Sud line in Paris has a three-wire system at 1,200 volts, but only 600 volts between each third rail and the return wire. In Berlin and Hamburg 800 volts are used with the third rail. All the other rapid transit systems, including those in America, Paris, Madrid, and Tokio, employ 600 volts. Of these the one in Madrid is the only one using an overhead contact line.

All calculations of motor power were based on the use of a standard train of three motor cars and two

#### Principal Dimensions, Rome Subway Cars, as Proposed

	Meters	Feet and Inche
Length of body.....	14.5	47-7
Width of body.....	2.6	8-6½
Height, rail to roof.....	3.3	10-10
Rigid wheelbase.....	10.0	32-9½
Truck wheelbase.....	2.3	7-6½
Length over buffers.....	15.2	49-10½
Weight of motor car, metric tons (2,204 lb.).....		34
Weight of trailer car, metric tons.....		20

trailers weighing 178 metric tons. The braking rate is assumed at 0.85 meters per second (1.9 m.p.h.p.s.). It is planned to use automatic acceleration and, with an adhesion coefficient of 18 per cent, to reach a speed of 40 km. per hour (25 m.p.h.) in 14 seconds. This calls for an average acceleration up to full motor voltage of 0.8 meters per second per second (1.8 m.p.h.p.s.) and a maximum acceleration of 1.15 meters per second per second (2.6 m.p.h.p.s.). On this basis the type of motors adopted has a one-hour rating of 170 hp. at 750 volts and a continuous rating of 130 hp. at 750 volts. There will be four such motors per motor car, with pairs connected permanently in parallel. Electro-pneumatic control will be employed and remote electro-pneumatic devices will govern the action of the third-rail shoes and motor compressors. Each motor car will have a switch-board in the cab at each end. No control equipment is included on the trailers. Multiple-unit control will be used and the trains can be operated from any cab.

The car lighting will be from the 750-volt supply, with an emergency storage battery circuit. Quick-acting air brakes will be employed, with two brake shoes on each wheel.

Electric power will be supplied by a third rail of special steel located between tracks. Copper feeders will be connected to the third rail at each station, by remote control switches. The track will form the return circuit, with inductive bonds so as not to interfere with the signal circuits. The feeders were calculated on the basis of standard operation with three-car trains at intervals of two minutes 30 seconds, while by using the reserve equipment in the substations it will be possible to run either with trains of five cars at the same headway or with trains of three cars at 90 seconds headway.

Power will be converted in five substations with a total installed capacity of 30,000 kw., of which 10,000 kw. normally will be held in reserve. An investigation is being conducted to determine the feasibility of using mercury vapor converters instead of rotary converters, and doing so in connection with the regeneration of energy on motor cars.

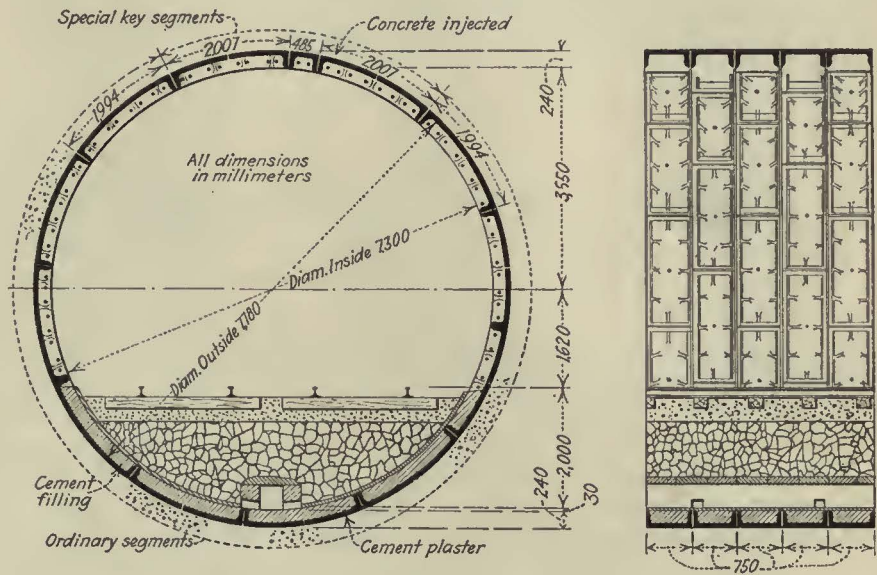
The substations will be fed from two three-phase lines at 8,200 volts and 45 cycles. For the first line to be placed in service there have also been provided two storage batteries of a total capacity of 1,000 amp.-hr. for discharge in ten minutes, and an average potential of 500 volts. In the event of an interruption in the supply, these batteries will enable any train which may be between stations to reach the nearest stop. These batteries are also connected to the emergency lighting circuits of the stations and of the line.

The block signal installation was designed to permit a frequency of 40 trains per hour, or a headway of 90 seconds. All signals will be of the color-light type. Caution signals will be installed only where the stop signal may not be visible at a sufficient distance for the motorman to stop his train when proceeding at maximum speed.

An automatic train stop will set the brakes and cut off current from the motors of any train that may pass

the signal. At the entrance to each station, a safety signal will be located at such a distance from the end of the platform or switch point that a train whose brake has been set by the automatic stop will positively be stopped before running into a standing train in the station. Each station will also have departure signals at the leaving end of the platform. The automatic block signals will show normal clear indications, while the interlocking signals will show normal stop indications and must be cleared for the passage of each train. The signal system adopted is controlled by alternating current in the track circuits. The track circuits, control circuits, automatic stop devices and lamps will be fed by three-phase current of 220 volts. Communication between stations, switch cabins, substations and depots will be by means of a telephone system.

The subway will normally be unlighted. If the cur-



Section of tunnel of concentric cast-iron rings used under the Tiber River and at other points

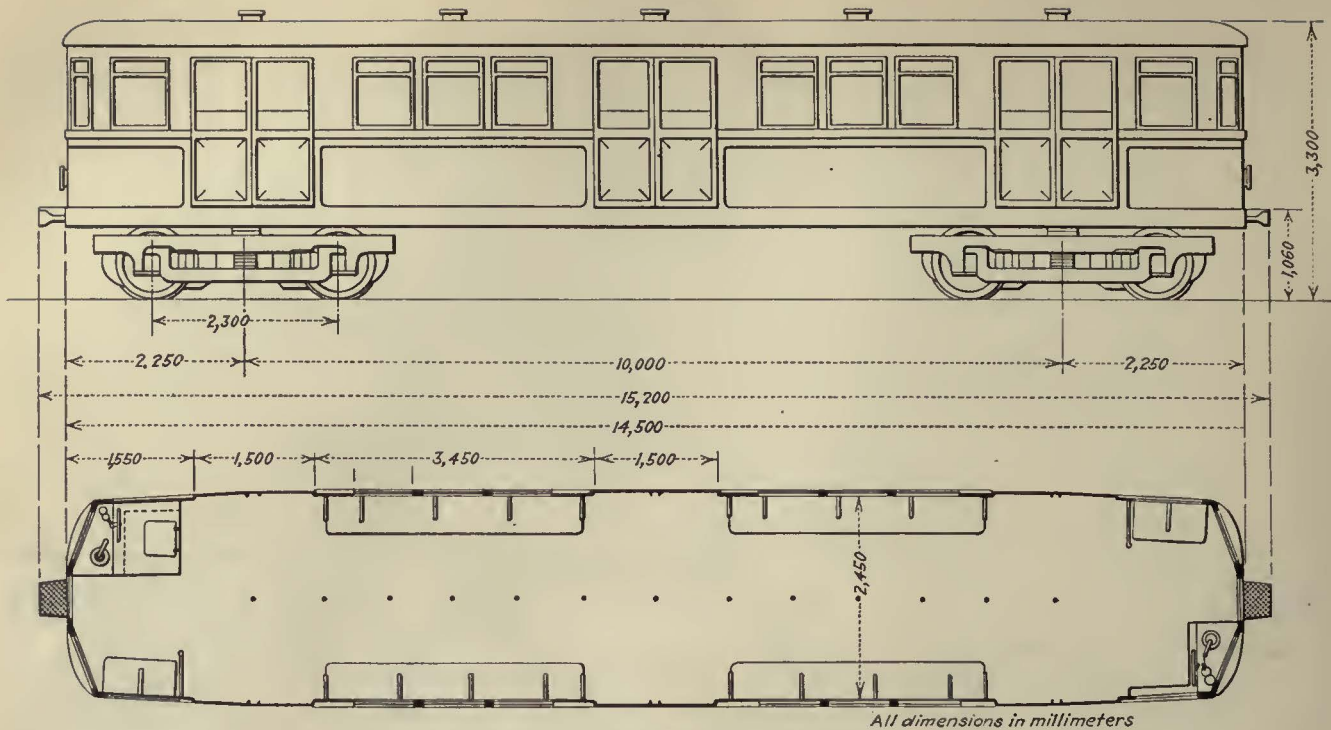
rent fails an emergency lighting system fed by the storage batteries will be cut in automatically so that passengers may be able to make their exit. An independent system of emergency lighting fed from a separate storage battery will be installed in the stations.

Along each track there will be a pair of exposed telephone wires. By bringing them into contact the automatic switches in the substation will be actuated. The same two wires can be used by the train crew to communicate with substations by means of a portable telephone set. Fire extinguishers will be placed in stations and along the line, their location being indicated by blue lamps fed from the signal circuit. Special switches in the stations will permit the crew to set the signals against movement, in the event of a blocked track.

#### SHOPS AND CAR STORAGE

Adjacent to the terminal on line A, adjoining the station of the Rome-Ostia line of the state railway, will be the carhouse and shops. Two large adjoining carhouses, 84 m. by 21 m. each, will contain twelve storage tracks, eleven of which are provided with pits for the inspection of the cars. Each track will accommodate a five-car train, making the total capacity 60 cars.

The main repair shop will be placed back of the storage house, being separated by transfer tracks. The shops will have a series of seven bays and will cover 4,400



Proposed car for the Rome Subway

Motor and trailer cars will be identical in general dimensions. Control equipment will be placed on motor cars only

sq.m. (47,000 sq.ft.). For six of the bays, intended for repairs on rolling stock, a transverse crane is provided. The remaining bay is reserved for servicing of the lines, tracks, electrical system, signals and miscellaneous work. In front of these bays is to be a two-story building, 2,320 sq.m. (25,000 sq.ft.) in area. On the ground floor will be rooms for the machinery, tools and miscellaneous equipment connected with car repairs. The second floor will contain the administration offices and space for lodgings for officials. The storehouse will be in the end of the shop and office buildings and in the adjacent yards.

There will be a yard with a total area of 4,900 sq.m. (50,000 sq.ft.) in which material necessary for operation will be received. This yard will be served by tracks of the city surface line and through a connecting spur by the state railway system. The storage yard will be served by a gantry crane permitting direct unloading from the cars. There will also be a small storage yard, equipped with pits, and shops for routine night inspections in the terminal stations and in the station at Piazza del Cinquecento on line A.

The proposed schedule calls for the operation of three-car trains on a headway of two minutes 30 seconds. During hours of light traffic the service will be on a five-minute headway. The first runs will start at 5:30 a.m. and the last run will end at 1 a.m. The program calls for the operation of trains with a total capacity of 11,000 passengers per hour in each direction during the rush period. This schedule contemplates the absorption of the business at present handled on the surface cars, so that the plan of co-ordinating the subway system with the present surface car system will be complete.

The construction program provides for the completion of route A within six years. In the two years following the section of route C between Stazione Termini and Piazza Re di Roma should be completed. This will establish rapid transit communication between the center of the city and Piazza San Giovanni, to which point will

be transferred the terminal station of the railway to Castelli Romani. In the four years following the second section of route C and all of route B should be built.

The costs of construction and equipment, including damages and allowing for contingencies, are estimated as follows:

	Lire	Dollars
Route A (10.865 km.)	300,000,000	15,750,000
Route C (section between Stazione Termini and Piazza Re di Roma, 3.036 km.)	70,000,000	3,675,000
Route C (section between Viale delle Milizie and Stazione Termini, 4.908 km.)	170,000,000	8,925,000
Route B (5.410 km.)	155,000,000	8,137,500
Total	695,000,000	36,487,500

In order to assure a sufficient return on the capital stock, assistance on the part of the state will be necessary. It is proposed that the state should guarantee the interest on an issue of bonds for an amount corresponding to about two-thirds of the total cost of the work which is equivalent to 90 per cent of the cost of the sub-structure. At the expiration of the franchise, 50 years, or in the contingency of appropriation of the system, the state would naturally become the owner of the sub-structure. The state would also be entitled to participation in the net profits.

Calculations indicate that the remaining routes, including the first portion of route C, can be carried on without further assistance from the state.

#### Growth of Population in Rome, 1921-1927

	1921	1927
Rioni (wards of central city)	451,097	477,206
Quartieri (districts) of outer city	152,312	236,751
		5,026
Total	603,409	718,983
Suburban districts	28,205	57,064
Agricultural districts	34,426	54,628
Total exclusive of garrisons	666,100	830,675
Garrisons	25,561	17,444
Total population of Roman district	691,661	848,119
Average population (inhabitants per hectare) of rioni and quartieri, exclusive of garrisons	115	135

## Long Poles Made by Splicing

**D**UE to the extension of the Bronx River Parkway under 232nd Street, the foundations of some of the span wire poles used by the Third Avenue Railway System, New York, were removed. Two novel methods of supporting the overhead construction were adopted. One was to support both wires by a horizontal arm attached to the pole on the side opposite the railroad cut. An extension approximately 12 ft. long was made to this pole by means of a malleable iron reinforcing clamp. From the top of the lengthened pole guy wires were attached to support the horizontal arm, as shown in an accompanying illustration. This arm projected back a short distance over the sidewalk and was guyed at that end as well as at the long end.



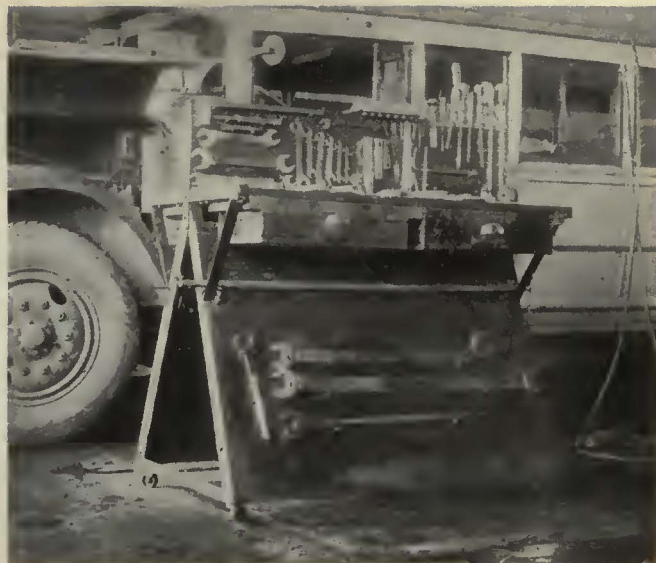
At left—Pole lengthened by splicing to support horizontal arm for attaching trolley wires on Webster Avenue. At right—Extra long pole made by splicing two ordinary poles together with reinforcing clamp

The other method used to support the trolley overhead was the erection of a 60-ft. pole, the foundation of which was in the new cut. To obtain a pole of this length the railway took two ordinary 30-ft. poles and placed one upside down on top of the other, joining them by a malleable iron reinforcing clamp.

## Portable Rack for Special Bus Tools\*

By STEWART PALMER  
Foreman Berea Garage  
Cleveland Railway

**T**O SPEED UP bus inspection a semi-portable tool stand is used at the Berea Road Garage of the Cleveland Railway to hold all special wrenches needed, as well as a supply of nuts, bolts, lamp bulbs and other small items necessary for this kind of work. The stand is placed between two pits where it is readily accessible for the mechanics working in each inspection pit. This material would normally be kept in the stockroom but because



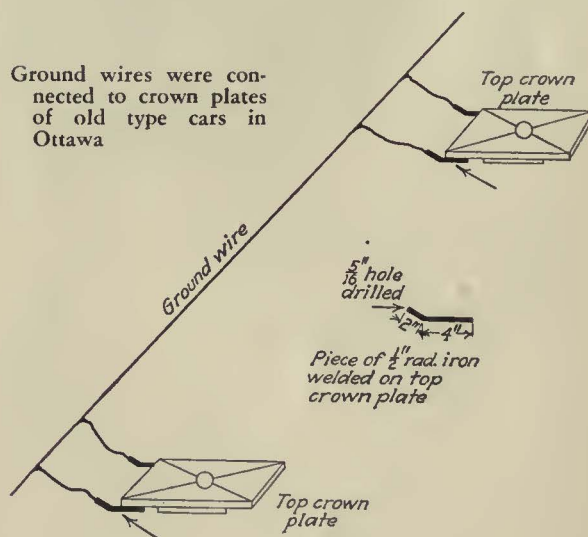
Rack for special bus tools and equipment speeds up the work in garages of the Cleveland Railway

the same work is performed in these two pits continually, it is more economical to place special tools and equipment on the floor. At the close of the inspection period, the rack is moved into the stockroom.

## Cars Grounded on Crown Plate\*

By J. MUNFORD  
Electrical Foreman  
Ottawa Electric Railway, Ottawa, Canada

**D**IFFICULTY has been experienced in Ottawa to keep ground wire connections tight on old type cars, cars frequently being pushed in dead on account of this failure. To overcome this, four pieces of  $\frac{1}{2}$ -in. round iron 6 in. long were cut and bent at 45 deg. at a distance



of 2 in. from one end. A  $\frac{5}{16}$ -in. hole was drilled in the short end and tinned. This iron ground connection was then welded on the long end to the top crown plate, with the tinned holes upward to retain the solder while the taps from the main ground wire were being soldered in place. Since this installation none of these ground connections has given any trouble.

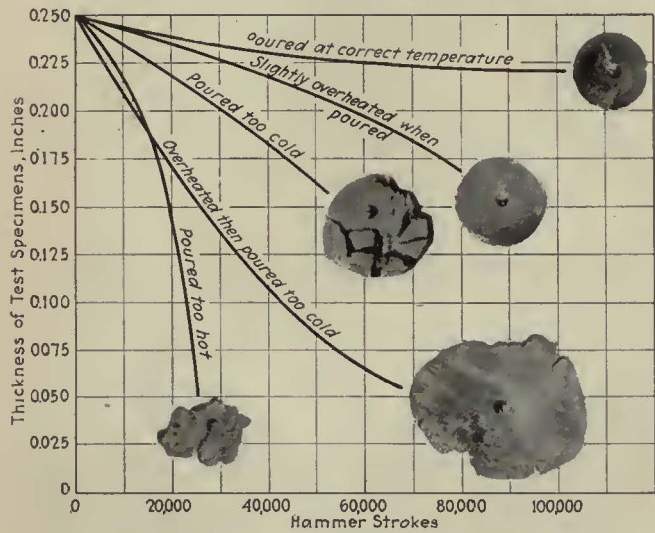
\*Submitted in ELECTRICAL RAILWAY JOURNAL Prize Contest.

# Tests Show Importance of Correct Babbitting

By J. S. DEAN  
Renewal Parts Engineer  
Westinghouse Electric & Manufacturing Company

**B**ABBITT metal commonly used for lining bearing shells was originally a composition of 89.3 per cent tin, 3.6 per cent copper and 7.1 per cent antimony. More recently a great variety of bearing metals have been brought out under different trade names.

In general, the various babbitt metals used in railway motors are divided into two distinct classes, known as tin base and lead base alloys. They usually contain from 80 to 90 per cent tin or lead respectively as their fundamental element. Both classes give good results in service when properly handled during the melting and pouring process while babbitting the bearing shells. Most electric railway operators seem to favor the use



Results of hammer tests of babbitt metal poured under various conditions

of the tin base alloy for armature and axle bearings, although a few have tried the less expensive lead base alloy as an experiment with good success.

To show the variety of materials used in some of the well-known babbitt metals, the following table represents five different brands of tin and lead base alloys commonly used:

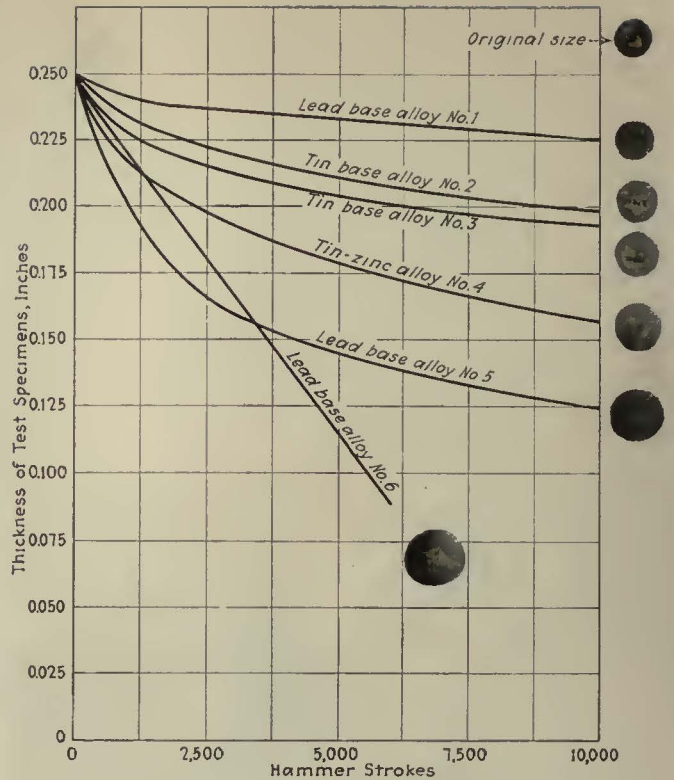
Composition of Babbitt Metals								
Sample	Tin Base Alloy Per Cent			Sample	Lead Base Alloy Per Cent			
	Tin	Copper	Antimony		Lead	Copper	Antimony	Tin
(1)	85	7.5	7.5	(1)	64	1	14.4	20.6
(2)	83.0	5.0	12.0	(2)	81.3	1.8	11.4	5.5
(3)	*89.3	3.6	7.1	(3)	76.2	.2	14.4	9.2
(4)	90.0	2.0	8.0	(4)	82.3	.2	16.6	.9
(5)	83.4	8.3	8.3	(5)	79.5	.8	19.5	.2

\*Original formula of Isaac Babbitt.

The mechanical strength of the two different types of alloy are shown in the following table:

Strength Tests of Babbitt Metals						
Class of Alloy	Ultimate Stress		Elastic Limit		Per Cent Elongation in 2 In.	Brinnell Hardness
	Tension	Compression	Tension	Compression		
Tin base.....	11,875	16,800	5,000	7,000	5.5	*30
Lead base....	10,900	14,500	3,200	3,000	1.0	*24

\*These tests were made on sample specimens 2 in. in diameter and ¼ in. thick



Results of hammer tests of babbitt metal of various compositions

The results of vibration and pounding tests made on a number of sample bearing shells which were babbitt lined, tin and lead base alloys being used, show interesting results. Tests made on bearing shells (tinned before babbitting) show that a tin base alloy resists failure due to pounding and vibration 2½ times better than a lead base alloy. Similar tests made on bearing shells (not tinned before babbitting) show that a tin base alloy resists failure due to pounding and vibration five times better than a lead base alloy. These bearings were subjected to two different tests. In the first test the bearing was mounted in a specially designed hammer machine which pounded the flange of the bearing. In the second test a special vibration testing machine was used which delivered a series of rapid vibrations to the body of the bearing shell.

Test pieces of babbitt metal of 1 in. diameter and ¼ in. thickness were prepared and subjected to a series of hammer blows, after which the thickness of the pieces was measured and the corresponding number of strokes recorded. Results of these tests show the importance of pouring babbitt metal at the proper temperature, as may be seen from the accompanying curves.

Results of actual service tests made on railway motor armature bearings lined with an approved grade of tin and lead base alloy show that either class of these babbitt metals will operate satisfactorily in service. The following figures were obtained from actual service bearings:

Service Tests of Babbitt Metals				
Kind of Service	Babbitt Lining	Armature Location	Actual Mileage	Maximum Wear
City.....	Tin base	Pinion end	290,000	0.061 in.
City.....	Tin base	Commutation end	290,000	.006 in.
Interurban.	Lead base	Pinion end	240,000	.028 in.
Interurban.	Lead base	Commutation end	240,000	.037 in.
City.....	Tin base	Pinion end	374,900	.075 in.
City.....	Tin base	Commutation end	374,900	.025 in.



Temporary crossover used by the Cleveland Railway is easily and cheaply installed

## Economical Overhead for Temporary Crossovers\*

By ANGUS G. SCOTT  
Assistant Superintendent of Overhead Lines  
Cleveland Railway

**E**RECTION of overhead crossings over portable track crossovers is facilitated at Cleveland by the use of a  $2\frac{1}{2}$  in. x  $1\frac{1}{2}$  in. x 12 ft. board, which acts as an intermediate span wire. This board is provided with three barn hangers which move freely back and forth. The first step in erecting a temporary crossover is to install a frog over each switch. The frogs are then connected by a short piece of  $\frac{5}{16}$ -in. or  $\frac{3}{8}$ -in. stranded span wire which is prevented from sagging and is kept in alignment by the hanger on the board. Reclaimed ears, frogs and wire are used in the installation of such a temporary overhead crossover. This device can be installed in about 30 minutes at a saving of approximately \$3 in labor costs alone, as compared with the old method of installing overhead crossovers.

## Center Subdrainage System Reduces Track Maintenance Cost

**D**RAINS placed directly under the center of the electric railway track of the East Bay division, Southern Pacific Company, Berkeley, Cal., have lessened track maintenance work and insured better riding qualities. The installation of these drains is part of an extensive improvement program which has been in progress for some time past. The project involves the complete reconstruction of the track using 90-lb. T-rail with creosoted ties on rock ballast.

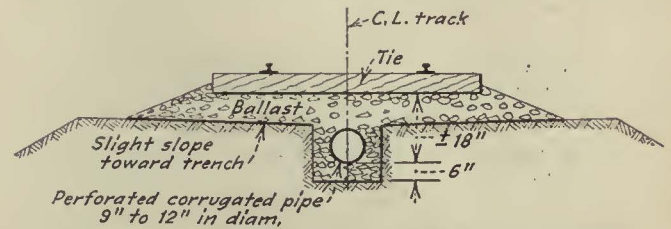
Poor drainage conditions on the old track had been a fruitful cause of low and pumping joints, bumpy surface

\*Submitted in ELECTRIC RAILWAY JOURNAL Prize Contest.

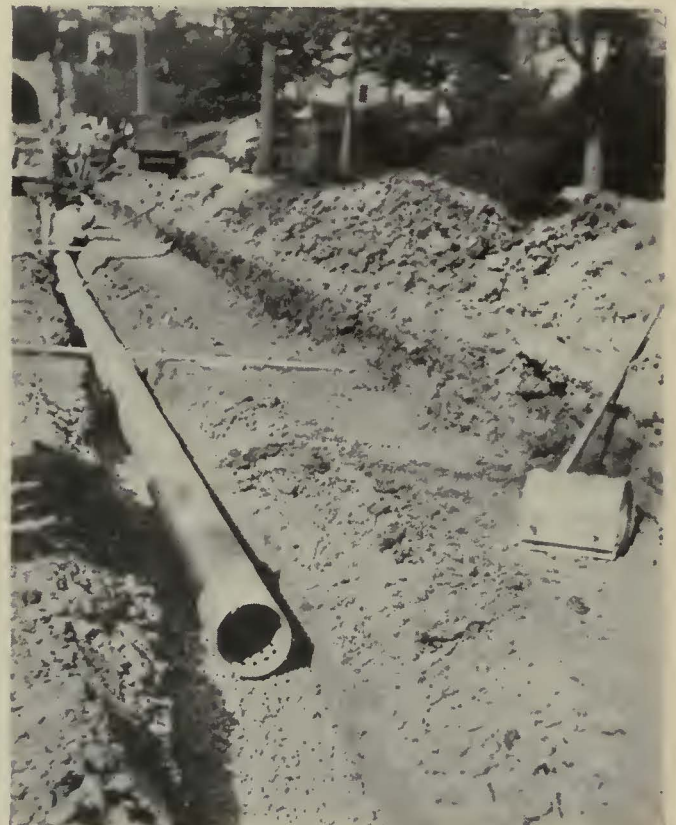
and heaved pavement. To safeguard against such conditions on the new construction, a system of center subdrainage was designed. Placing of the drains under the center of each track is believed to have several advantages over the old method of placing subdrains to the side of and between tracks. By placing the drains in the center, sloping the subgrade slightly toward the trench and using a pervious backfill, one line of drain is sufficient to remove water quickly before it has a chance to lessen the bearing power of the soil. A drain so placed stabilizes the soil supporting the track and its weight of traffic.

However, successful use of this design demands a drain of considerable strength if it is to bear without breakage the shock and impact of traffic. Even where it is desired to lower the water table and the drain is placed at such a depth that the impact factor becomes of less consequence than the dead load, a non-crushable drain of continuous construction which will not disjoint in unstable and shifting soils is necessary to avoid costly replacement work.

The trench was excavated to a width of from 9 to 12 in. greater than the diameter of the pipe, to permit careful tamping of the rock backfill around the pipe. The trench depth was maintained at 6 in. below



Drainage system used for open track on suburban lines



Perforated iron pipe on a 6-in. layer of coarse rock used for track drainage in Berkeley, Cal., by East Bay division of Southern Pacific Company

the flow line to provide for a bed of crushed rock below the pipe. The flow line was kept at approximately 18 in. below the ties, varying somewhat because of the grade. Where it was necessary to lower the water table this depth was increased to any desired depth for which it was possible to secure an outlet. The rock backfill was carried to the top of the trench, where it became integral with the ballast section. It is considered to be highly essential that rock backfill be used to the top, in order that direct and rapid interception of run-off, rather than slow percolation through soil, will result. The surface of the subgrade was sloped slightly toward the trench for the same reason. In general it was decided to install a drainage system conforming to this design over originally swampy land, through cuts or side-hill sections, or where adobe pockets in the original fills were impounding water.

## Testing of Field Coils\*

By C. B. HALL

Chief Clerk Mechanical Department  
Virginia Electric & Power Company, Norfolk, Va.

**S**IMPLE and effective apparatus for testing field coils has been developed in the shops of the Virginia Electric & Power Company, Norfolk, Va. A transformer or "growler" was assembled for this purpose by the electric shop foreman. A table, measuring 30x30 in., was made of 2x2-in. angle iron and topped with a piece of 1½-in. hickory. The table back is of transite board on which is mounted a 30-amp. safety switch, a 50-amp. a.c. ammeter and knife switches for short circuiting the ammeter and selecting the different number of turns in the transformer winding. The core is made of No. 20 gauge sheet steel, the cross section being 4x5 in., while the inside of the rectangle measures 9½ in. vertically and 12 in. horizontally. The top horizontal member is hinged and counter-weighted so that it may be easily moved up and down providing free space for putting a field coil in place for test and at the same time making it easy to close the iron circuit during the testing. The front vertical leg is flush with the surface of the table. A removable piece represents the portion of the iron circuit between the short vertical leg and the moving horizontal member. The primary winding is wrapped around the portion of the iron under the table, No. 10 A.W.G. double cotton-covered wire being used. The winding has 180 turns, with taps at 60 and 90 turns

\*Submitted in ELECTRIC RAILWAY JOURNAL Prize Contest.



Assembly of field coil testing apparatus

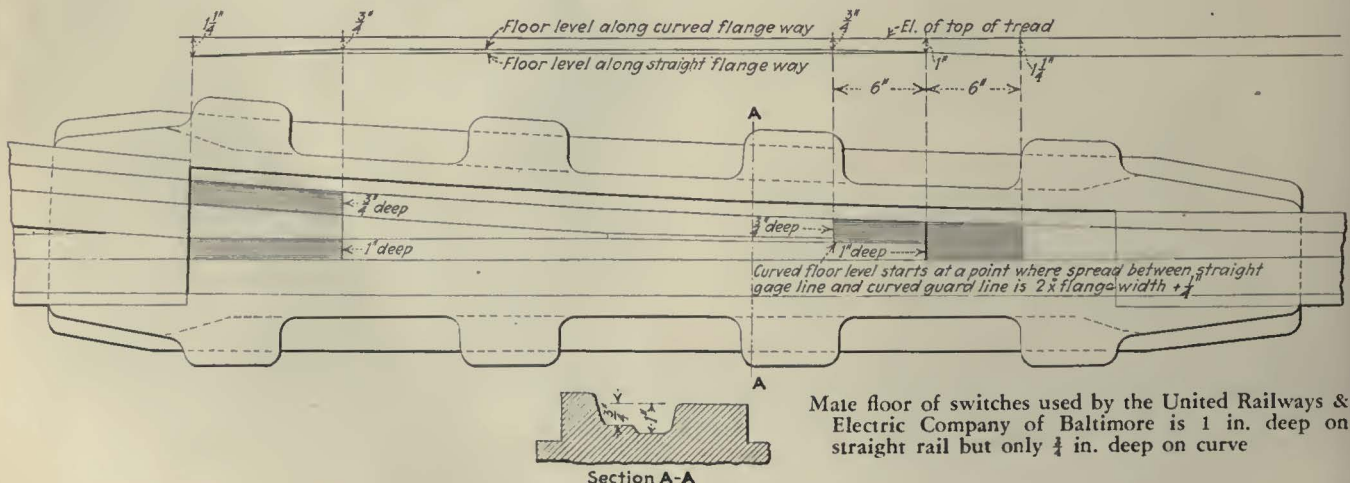
leading to knife switches. The 90-turn winding is used for regular testing, the 60-turn winding for burning out a shorted turn quickly, and the 180-turn winding when repairing a shorted coil. Field coils are tested by placing them on the table and closing the iron circuit of the transformer. The safety switch is then closed, energizing the transformer. The knife switch connected across the ammeter is then opened. If the field coil is without shorted turns, the ammeter will indicate a current of exactly the same value as it does without a field coil on the transformer. If the field coil has any shorted turns, the current will be greater, the degree of short circuit being indicated by ammeter reading. It is for this reason a switch, short circuiting the ammeter, is used because a badly shorted coil will show an ammeter reading in excess of 50 amp. This apparatus has saved time and labor by the detection of defects at an early stage.

## Redesigned Mate Floor Prevents Derailments\*

By W. P. DAVIS

Roadmaster United Railways & Electric Company,  
Baltimore, Md.

**A**T TURNOUTS where the principal car movement is on a straight track and where floor bearing mates are used, a groove is soon worn in the floor on the straight side. This tends to cause derailments with car



Mate floor of switches used by the United Railways & Electric Company of Baltimore is 1 in. deep on straight rail but only ¼ in. deep on curve



movements on the curve side. To avoid this trouble the United Railways & Electric Company of Baltimore has redesigned its switches so that the floor on the straight side is made 1 in. deep and the flanges do not touch, while on the curve side the floor is only  $\frac{3}{4}$  in. deep. The approach to this higher floor is made at such a point that the car wheels will have already been guided into position by the switch tongue before the flanges touch the high floor. This design was adopted several years ago for wheel flanges  $1\frac{1}{4}$  in. wide and 34 in. deep, and proved very satisfactory.

## Shunting Motors to Obtain Greater Speed

By R. S. BEERS

*Transportation Engineering Department  
General Electric Company, Erie, Pa.*

**S**UBSTANTIAL increase in the operating speed of existing street cars can sometimes be simply and cheaply accomplished by shunting the motors with non-inductive shunts. This has been tried successfully in several cities. It has been done on a considerable number of equipments by the Key System Transit Company and the United Railways & Electric Company of Baltimore. Where the operation includes considerable suburban running, with relatively infrequent stops, a material increase in schedule can be accomplished; the method is of little or no value, however, if the stops are close to each other.

The recommended practice is to accelerate the car on full field and, after all the resistance has been cut out of the circuit by the controller, to shunt the motors. As there is a considerable increase in current when changing from full field to shunt field, it is customary to have the motor current govern the change through the intermediary of a current relay. This method simplifies the control devices, so that they may be added readily to almost any existing control equipment.

The material used includes one ME-67 field shunting switch, weighing about 105 lb., one EW resistor, weighing about 35 lb., and cable and details. The ME-67 switch is used for either two or four-motor equipments, and includes the governing relay as an inherent part of the device. The EW resistor is used as a shunt for the motor field; all the shunts for either a two-motor or a four-motor equipment are included in the one EW resistor. With a Type K controller it is necessary to add a control finger, and with remote controls it is necessary to add an interlock to one or two of the contactors.

In general the method cannot be applied to advantage to non-commutating pole motors such as the GE-67, GE-80 and W-101. The conditions of operation, car weights, commutation of motors, etc., vary so much that no one can recommend field shunting with certainty of success in every instance. It is recommended that one equipment be installed and an actual test used to ascertain whether or not the method is successful.

## Adjustable Scaffold for Car Washing\*

By R. C. SOHL

*Engineer, Mechanical Department Cleveland Railway*

**H**ORSES and planking assembled to form a scaffold to reach the upper parts of the car, in the wash house of the Cleveland Railway, have been replaced by a set of brackets which hang from the window sills of the car. These brackets are constructed from 3-in. channel iron, bent to the shape of the window sill. They are adjustable by means of sets of horizontal rivets. The parts which rest on the window sill are covered with canvas and leather as a protection to the woodwork. This new equipment not only saves valuable space occupied by the horses formerly used, but also saves much of the

\*Submitted in ELECTRIC RAILWAY JOURNAL Prize Contest.



Brackets suspended from the windows support platform used in car washing or painting in the shops of the Cleveland Railway

time required to set them up. Safety has been increased considerably. Whereas the old equipment rested on the floor and was unstable on a soapy concrete, the suspended scaffold eliminates the danger of slipping. The cost of a bracket is about \$2.50. Four are necessary for one side of a 50-ft. car.

## Belt Conveyor for Loading Concrete Mixer\*

By E. B. SPENZER

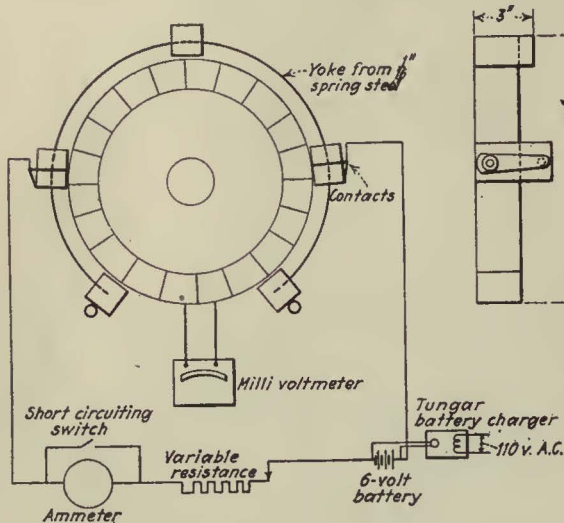
Way Department Cleveland Railway, Cleveland, Ohio

### Test for Partially Open Circuit\*

By H. J. BEADLE, E.E.

Dallas Railway & Terminal Company

READY detection of cracked or partially cracked coil leads has been attained by an additional test recently installed by the Dallas Railway & Terminal Company. A yoke which is made of  $\frac{1}{8}$ -in. spring steel is supported



Circuit arrangement in making open circuit test

on five fiber blocks and will fit the commutator of any armature from 25 to 65 hp. This steel yoke is therefore insulated from the bars and supports the leads which carry the current to the commutator while testing. This current is supplied from a 6-volt storage battery and is varied by means of a rheostat. After a current of about 6 amp. has been attained, the ammeter can be short circuited and thus be protected during a time when a great many armatures are being tested. The tungar battery charger is connected to a 110-volt a.c. circuit and in this way the battery is kept in good condition at all times. It is important to keep the battery fully charged so as to insure a constant current while testing. The milli-voltmeter is used to get the voltage drop across each pair of bars and unless the voltages are between bars exactly alike there is something wrong with the armature. A higher reading than normal would indicate a partially open or broken lead and a lower reading would indicate a short between bars. This test is adaptable to modern high-speed motors with small wires where broken or cracked leads become more serious.

\*Submitted in ELECTRIC RAILWAY JOURNAL Prize Contest.

TIME and labor are saved in loading material into the skip of a concrete mixer by using a belt conveyor loading device which has been developed by the Cleveland Railway. The method of loading by hand or wheelbarrow resulted in waste of time as the men crowded around the skip. Trucking proved equally costly, and frequently was impracticable when the mixer was placed in an inaccessible location.

With the belt conveyor connected to the mixer by a long draw bar, the material is shoveled on the conveyor from the side where it has been unloaded in a continuous pile from the work trains. One man stands at the skip and puts in the cement from the sacks. He also gages the amount of sand and gravel that the conveyor throws into the skip and when there is enough material for a batch, he blows a whistle as a signal for the men to stop shoveling on to the conveyor. These men stand at intervals along the conveyor for a distance of 30 ft. and have ample room in which to work. In the time required to mix a batch of concrete, the skip of the mixer is loaded. Thus no time is lost.

This conveyor is built on a low frame, 30 ft. long, mounted on two sets of small trucks. An endless belt runs horizontally along the car over two pulleys, one at each end. Guide pulleys are spaced at 3-ft. intervals and at a 45-deg. angle to tilt up the edges of the belt. Inside the edge of the belt and projecting lip are two side boards which prevent the material from going off the belt. Two steel aprons are on the side of the conveyor from which the material is loaded. These extend to within 1 ft. of the pavement and prevent the material from being thrown on to the surface track. The conveyor is operated by a small motor in the center of the car.

The number of men required for the complete job of mixing is reduced from 24 to 11, while the speed of mixing is increased by 20 per cent.



Belt conveyor used by Cleveland Railway for loading concrete mixer saves 53 per cent in labor

# NEW PRODUCTS

## for the Railways' Use



Light-weight convenient tower ladder developed for use on motor trucks

### Triangular Tower Ladder

FOR light work of various kinds, a triangular tower ladder has been developed by J. R. McCardell & Company, Trenton, N. J. It has been designed for use with a small motor truck equipped with a steel supporting frame.

The ladder is placed erect at the side of the truck body, and is held firmly in position by the supporting frame and a resting leg attached to

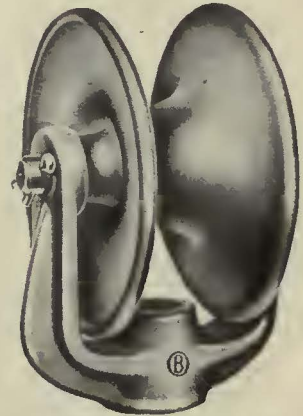
the outside post. The length of the resting leg can be adjusted to obtain a solid support. With an outside dimension of 26 in., the ladder weighs approximately 250 lb., and attains a height of 25 ft. from the ground to the platform. The outside section is equipped with 1½-in. steel rollers running in grooves of the inside section, which is raised and lowered by means of a block and fall with ½-in. rope. The ladder can be detached from the frame by removal of a pin.

### Cable Roller for Stringing Feeder Wire

DAMAGE to feeder wire brought about by contact with crossarms during stringing is avoided by the use of a feeder cable roller, a new product of the Ohio Brass Company, Mansfield, Ohio. In this device attention has been paid particularly to ease of application and substantial construction. The yoke of the roller is provided with a hole tapered to correspond with the threaded portion of a standard insulator pin, over which it is slipped while in use. By this means, no special attachments are necessary. All parts are made of Flecto malleable iron, hot-dip galvanized, with the exception of the

¾-in. hardened-steel axle. The wheel has an over-all diameter of 6½ in.

In operation, the roller is placed on a pole crossarm pin and the wire is fed over it from one crossarm to another for as long a distance as may be desired. The wire is then lifted from the roller, which is removed



Cable roller for crossarm facilitates stringing feeder wire

from the pin, and the insulator installed. The rollers are then moved ahead on the job and the operation repeated. They are made to give long service, and accommodate all sizes and weights of feeder wire.

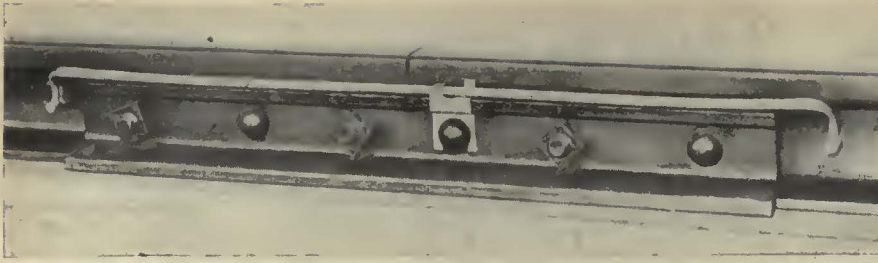
### Combination Steel and Copper Rail Bond

OWING to the success obtained with strand steel bonds for automatic block signal circuits on the Pennsylvania Railroad, it was decided to determine if the signal bond, or a modification of it, would be adequate for the propulsion current for the 11,000-volt single-phase alternating current system used on that property. The American Steel & Wire Company made numerous experiments and finally developed a bond conductor which proved suitable.

It was necessary to develop a bond which would carry safely 400 amp. at 25 cycles without undue heating. It was also necessary to develop a bond having a relatively low a.c.-d.c. resistance ratio. Experiments were conducted with so-called mixed strands having different arrangements of copper and steel wires. In carrying out this work, it was not only essential to satisfy the alternating



Telescoped sections of the ladder are easily carried on small motor truck



Rail bond especially designed for 11,000-volt single-phase a.c. railroad electrification

current impedance characteristics and current carrying capacity, but to develop a bond conductor which possessed the proper mechanical strength, and which was relatively inexpensive.

The bond, as finally developed, is quite simple and has two strands, each having ten copper and seven steel wires, arranged as shown in an accompanying illustration. Terminals are of soft steel and are tapered to make a drive fit into  $\frac{3}{8}$ -in. holes in the rail web. The terminal is the same as for signal bonds which are very widely used throughout the country. The two strands are flash butt welded to the terminals simultaneously. This weld is very strong and the heat of welding is so localized that the strand is not affected thereby.

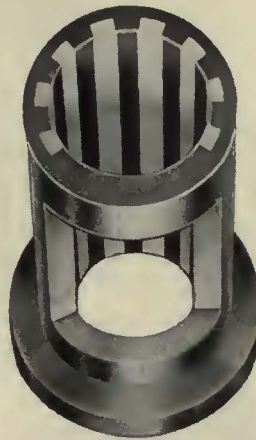


The bond consists of two strands each having ten copper and seven steel wires, arranged with seven copper wires in the center and three copper and all the steel wires on the outside

In order to give the bond an appearance of all steel, the steel wires are galvanized and the copper wires are tinned. The construction of the bond with two parallel conductors serves two purposes: the alternating current carrying capacity is increased over what it would be with a single conductor of cross-section twice the size; in case of failure from fatigue or outside mechanical injury, the likelihood of both strands breaking simultaneously is remote. As the bond is completely exposed for inspection, partial failures can be detected readily.

The bonds were put under laboratory test where it was found that 72 deg. C. rise in temperature resulted from a load of 400 amp. at 25 cycles. In the test piece terminal pins were driven into two pieces of rail.

### Bimetallic Armature Bearing

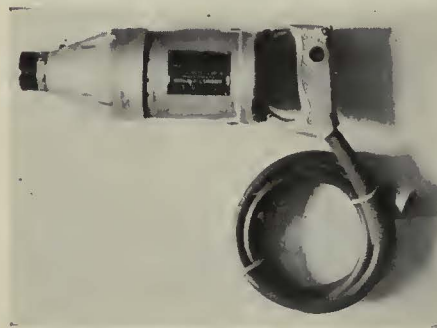


In this type bearing the contact surface is a combination of bronze and lead base babbitt strips

**R**EDUCTION in the amount of babbitt metal required is an advantage claimed for a new bimetallic armature bearing developed by the National Bearing Metals Corporation. In this bearing, eight slots have been cut in the bronze parallel to the axis of the armature shaft, thus giving a combination contact of bronze and lead base babbitt metal. During tests of these bearings, 160,000 miles of service was obtained without serious wear on the bearing.

### Portable Electric Hand Tool

**A** SINGLE power unit arranged to drive a variety of hand tools has been developed by the J. G. Brill Company. This new device is known as the Brill Multi-tool. It weighs



Electric tool adaptable for many uses weighs only 5½ lb.

only 5½ lb., and particularly lends itself to convenient storage of attachments. It is specially adapted to the transportation field. More than fifteen major operations and almost unlimited minor functions can be accomplished by the use of this one power unit. These include drilling, grinding, buffing, sanding, sawing, nut setting, screw driving, planing, filing, valve grinding, reaming, under cutting, nibbling, shearing and mixing.

In the automotive field this tool, in addition to valve grinding and carbon removing, can also be used for body cleaning and polishing, tire and battery repairing, and metal polishing.

### Rail Preheater Made More Compact

**G**REATER compactness, lightness and suitability for joint maintenance are features of a rail preheater developed by the Metal & Thermit Corporation. Either kerosene or gasoline is used as fuel. This is mixed with air from a positive pressure blower driven directly by a motor. Its air intake is through a rotating air filter or strainer located high enough



Compact preheater for making Thermit joints

above the ground to avoid the dust and grit always found around construction work. The fuel tank is of ample capacity and is underslung beneath the chassis which is mounted on Ford cushion-tire wheels.

This machine is built in two models. One uses a 550-volt d.c. motor. The other is driven by a 220-volt d.c. motor connected in series with standard space heaters which thoroughly warm the incoming air. It is stated that this gives more economical operation, as it is easier to maintain the fuel in suspension in the preheated air.

# Monthly and Other Financial Reports

	Operating Revenue \$	Operating Expenses \$	Taxes \$	Gross Income \$	Net Income \$
<b>Market Street Railway, San Francisco, Cal.</b>					
June, 1930	743,277	646,615a		96,662	42,297
June, 1929	779,474	658,763a		120,711	61,314
12 mo. end June, 1930	9,508,732	7,976,986a		1,531,746	848,573
12 mo. end June, 1929	9,585,384	8,205,288a		1,380,096	749,242
<b>Northwestern Pacific R.R., San Francisco, Cal.</b>					
May, 1930	485,027	446,844	35,854	2,243	2,800d
May, 1929	534,895	423,138	38,237	73,438	73,597d
5 mo. end. May, 1930	2,065,839	2,175,458	180,856	290,704	313,032d
5 mo. end. May, 1929	2,188,737	2,196,811	191,182	198,353	208,873d
<b>Capital Traction Company, Washington, D. C.</b>					
June, 1930	340,623	245,606	26,155	74,103	40,884
June, 1929	359,494	255,072	27,406	82,420	49,097
6 mo. end. June, 1930	2,125,179	1,520,047	165,434	452,200	269,091
6 mo. end. June, 1929	2,201,290	1,529,901	173,578	512,768	330,298
<b>Jacksonville Traction Co., Jacksonville, Fla.</b>					
May, 1930	89,731	71,286	8,820	9,061	
May, 1929	98,918	77,774	9,215	11,349	
6 mo. end. May, 1930	1,106,580	903,838	106,919	89,432	66,663
6 mo. end. May, 1929	1,177,796	951,547	106,664	113,242	47,682
<b>Honolulu Rapid Transit Co., Honolulu, T. H.</b>					
May, 1930	88,437	50,810	8,819	31,008	19,704
May, 1929	88,382	51,892	7,932	29,569	18,346
5 mo. end. May, 1930	432,827	257,161	44,096	138,095	78,392
5 mo. end. May, 1929	442,981	255,608	50,395	142,578	86,461
<b>Chicago Surface Lines, Chicago, Ill.</b>					
June, 1930	4,766,687	3,835,838a		930,848	776,880g
June, 1929	5,118,795	4,015,900a		1,102,899	848,376g
<b>Louisville Railway, Louisville, Ky.</b>					
4 mo. end. Apr., 1930	1,770,201	1,318,286a		451,915	
12 mo. end. Dec., 1929	5,263,949	4,111,045a		1,152,904	
<b>United Railways &amp; Electric Co., Baltimore, Md.</b>					
June, 1930	1,332,275	916,851	126,157	301,565	35,318e
June, 1929	1,368,136	941,037	133,435	313,638	33,710e
6 mo. end. June, 1930	8,495,733	5,791,821	832,822	1,939,299	299,082e
6 mo. end. June, 1929	8,390,353	5,766,486	819,136	1,893,889	195,687e
<b>Department of Street Railways, Detroit, Mich.</b>					
June, 1930	1,787,953	1,446,482	65,090	285,834	159,027
June, 1929	2,193,665	1,704,344	62,422	437,112	296,727
12 mo. end. June, 1930	24,338,810	19,473,857	766,462	4,227,336	2,503,598
12 mo. end. June, 1929	26,329,072	20,888,667	754,745	7,872,689	3,130,286
<b>Eastern Massachusetts Street Railway, Boston, Mass.</b>					
June, 1930	619,456	408,468	26,824	194,018	28,672
June, 1929	685,474	434,376	30,658	241,536	69,138
6 mo. end. June, 1930	4,089,923	2,565,349	181,441	1,402,961	345,916
6 mo. end. June, 1929	4,437,488	2,700,240	199,581	1,648,727	537,689
<b>Twin City Rapid Transit Co., Minneapolis, Minn.</b>					
3 mo. end. June, 1930	3,019,470	2,226,077		793,392f	211,426
3 mo. end. June, 1929	3,249,703	2,420,057		829,645f	223,887
6 mo. end. June, 1930	6,598,966	4,766,007		1,832,958f	645,037
6 mo. end. June, 1929	7,013,530	5,086,337		1,927,192f	686,923
<b>Kansas City Public Service Company, Kansas City, Mo.</b>					
June, 1930	656,292	562,398a		93,393	6,396h
June, 1929	713,507	587,000a		126,506	41,959h
6 mo. end. June, 1930	4,279,230	3,577,378a		701,852	234,288h
6 mo. end. June, 1929	4,518,265	3,637,842a		880,423	405,261h
<b>Fonda, Johnstown &amp; Gloversville R.R., Gloversville, N. Y.</b>					
May, 1930	79,126	60,712	4,800	17,953	13,182
May, 1929	84,881	57,674	7,840	23,075	9,974
5 mo. end. May, 1930	411,851	317,177	24,000	96,157	59,443
5 mo. end. May, 1929	430,636	308,612	39,200	95,531	64,263
<b>Brooklyn-Manhattan Transit Corporation, New York, N. Y.</b>					
June, 1930	5,070,028	3,231,745	359,998	1,543,947	776,675
June, 1929	4,168,000	2,741,014	213,037	1,346,674	603,523
12 mo. end. June, 1930	60,700,981	39,786,537	4,001,506	17,774,285	8,494,218
12 mo. end. June, 1929	48,586,548	31,256,534	3,304,037	15,073,622	6,518,373
<b>Brooklyn &amp; Queens Transit Corporation, New York, N. Y.</b>					
June, 1930	1,968,238	1,478,334	125,622	381,037	257,482
June, 1929	2,059,234	1,661,608	82,283	343,224	216,693
12 mo. end. June, 1930	23,589,180	18,386,370	1,389,324	4,065,018	2,563,546
12 mo. end. June, 1929	24,142,066	19,851,748	1,261,034	3,296,208	1,759,252
<b>Hudson &amp; Manhattan R.R., New York, N. Y.</b>					
June, 1930	989,627	499,396a		490,231	154,985
June, 1929	1,006,646	508,250a		498,396	162,264
6 mo. end. June, 1930	6,252,254	3,105,535a		3,146,718	1,137,836
6 mo. end. June, 1929	6,286,632	3,161,901a		3,124,730	1,108,429
<b>Interborough Rapid Transit Company, New York, N. Y.</b>					
June, 1930	5,832,071	3,815,405	212,325	1,804,339	218,727j
June, 1929	5,725,994	3,452,601	189,726	2,083,666	48,761
12 mo. end. June, 1930	72,747,907	45,401,437	2,322,435	24,824,034	2,155,077j
12 mo. end. June, 1929	69,735,730	42,344,462	2,393,735	24,997,532	3,007,900

	Operating Revenue \$	Operating Expenses \$	Taxes \$	Gross Income \$	Net Income \$
<b>Long Island Railroad, New York, N. Y.</b>					
May, 1930	3,346,650	2,256,980	285,483	802,990	632,246d
May, 1929	3,569,669	2,358,440	265,585	947,471	772,092d
5 mo. end. May, 1930	15,124,693	11,361,755	814,088	2,944,584	2,202,931d
5 mo. end. May, 1929	15,506,699	11,300,190	752,473	3,443,398	2,701,924d
<b>New York Railways, New York, N. Y.</b>					
May, 1930	486,467	422,715a		63,752	8,003b
May, 1929	541,163	451,918a		89,245	27,911b
12 mo. end. May, 1930	2,269,863	2,038,27a		231,592	132,187b
12 mo. end. May, 1929	2,534,352	2,215,574a		318,778	84,676b
<b>Staten Island Rapid Transit Co., New York, N. Y.</b>					
May, 1930	214,848	159,605	17,000	38,243	25,183d
May, 1929	270,744	178,863	17,000	74,881	89,245
5 mo. end. May, 1930	976,943	758,986	86,500	129,885	95,938d
5 mo. end. May, 1929	1,178,115	864,257	89,000	224,847	40,262d
<b>Third Avenue Railway System, New York, N. Y.</b>					
June, 1930	1,483,592	1,221,475a		262,117	45,078
June, 1929	1,527,603	1,311,997a		205,606	4,714
12 mo. end. June, 1930	17,618,574	14,088,315	1,155,437	2,374,821	199,460
12 mo. end. June, 1929	17,880,641	14,453,412	1,154,847	2,272,382	286,333
<b>New York State Railways, Rochester, N. Y.</b>					
3 mo. end. Mar. 1930	2,229,579	1,983,406a		276,963	95,673
3 mo. end. Mar. 1929	2,556,175	1,920,934a		577,266	200,611
<b>Philadelphia Rapid Transit Company, Philadelphia, Pa.</b>					
3 mo. end. June, 1930	13,423,866	9,946,908a		3,711,646	58,864
3 mo. end. June, 1929	14,255,944	10,748,208a		3,836,208	10,576
6 mo. end. June, 1930	27,254,524	20,520,045a		7,170,926	167,981
6 mo. end. June, 1929	28,441,136	21,546,476a		7,536,182	109,792
<b>Galveston-Houston Electric Ry., Houston, Tex.</b>					
May, 1930	41,686	25,342	2,603	13,740	
May, 1929	49,181	29,271	2,565	17,343	
12 mo. end. May, 1930	552,309	315,903	32,595	204,003	66,653
12 mo. end. May, 1929	617,174	347,172	31,665	238,336	33,508
<b>Houston Electric Company, Houston, Tex.</b>					
May, 1930	262,653	171,687	23,281	67,684	
May, 1929	287,354	173,236	25,530	88,588	
12 mo. end. May, 1930	3,292,401	2,063,386	262,562	985,458	597,837
12 mo. end. May, 1929	3,383,455	2,086,639	287,781	1,009,033	600,635
<b>Pacific Northwest Traction Co., Seattle, Wash.</b>					
May, 1930	29,715	56,384	4,015	19,314	
May, 1929	76,362	60,866	4,157	11,338	
12 mo. end. May, 1930	994,661	703,935	55,176	235,548	120,728
12 mo. end. May, 1929	889,408	749,670	53,215	86,521	37,909
<b>Calgary Municipal Railway, Calgary, Alta.</b>					
5 mo. end. May, 1930	425,934	282,585			11,696
5 mo. end. May, 1929					35,971
<b>Lethbridge Municipal Railway, Lethbridge, Alta.</b>					
4 mo. end. Apr., 1930	18,872	15,546		3,326	7,016
4 mo. end. Apr., 1929					5,279
<b>British Columbia Electric Railway, Vancouver, B. C.</b>					
April, 1930	1,213,993	892,823a		321,170	
April, 1929	1,205,482	816,975a		388,507	
10 mo. end. Apr., 1930	12,324,706	8,640,255a		3,684,451	
10 mo. end. Apr., 1929	14,748,835	10,804,611a		3,944,224	
<b>British Columbia Electric Railway, Vancouver, B. C.</b>					
May, 1930	1,233,292	748,287		485,005	
May, 1929	1,165,279	633,037		512,242	
11 mo. end. May, 1930	13,558,000	7,922,053		5,635,947	
11 mo. end. May, 1929	12,914,845	7,050,820		5,864,025	
<b>Guelph Radial Railway, Guelph, Ont.</b>					
6 mo. end. Apr., 1930	47,641	42,449	514	4,678	13,655
6 mo. end. Apr., 1929					12,337
<b>Ontario Hydro-Electric Railways, Essex District, Windsor, Ont.</b>					
6 mo. end. Apr., 1930	567,633	469,070	2,828	95,734	88,971
6 mo. end. Apr., 1929					56,562
<b>Regina Municipal Railway, Regina, Sask.</b>					
5 mo. end. May, 1930	190,552	125,454			12,015
5 mo. end. May, 1929					18,528
<b>Saskatoon Municipal Railway, Saskatoon, Sask.</b>					
5 mo. end. May, 1930	179,663	118,739	7,057		3,979
5 mo. end. May, 1929					17,802
<b>Mexico Tramways, Mexico City, Mex. c</b>					
May, 1930	859,600	927,280a			67,680
May, 1929	928,094	926,561a			1,533
5 mo. end. May, 1930	4,184,210	4,445,620a			261,410
5 mo. end. May, 1929	4,568,033	4,437,343a			130,690

a Includes taxes. b Before adjustment bond interest. c In Mexican currency. d Net after rents. e After interest on income bonds. f Before taxes. g After city's 55 per cent. h Before depreciation. j Amount by which the full 5 per cent rental on Manhattan Railway guaranteed stock was not earned.

# NEWS of the Industry

## LATE NEWS

**East St. Louis, Ill.** — The Illinois Commerce Commission on July 23 took under advisement the application of the East St. Louis Railway for a straight 10-cent fare instead of 10 cents for single fares and five tokens for 40 cents. Prior to the conclusion of taking the evidence, the commission overruled a motion by counsel for the city for a reappraisal of the company's properties.

**Phoenix, Ariz.**—At a meeting of the Council on July 14, it was decided to increase the fare on the municipal railway from 5 cents to 7 cents cash with four tokens for 25 cents for adults. School fares will be twenty for \$1.

**San Diego, Cal.**—At a recent meeting of delegates of the League of California Municipalities, a committee of the members was appointed, at the suggestion of Commissioner W. J. Carr of the California Railroad Commission, to develop a plan for assisting the cities, and supporting the railroad commission in the work of regulating the public utilities of the state.

**Jamestown, N. Y.** — The Celoron Amusement Company, owned by the Jamestown Street Railway, which has operated an amusement park 5 miles from here on Lake Chautauqua, has been sold for \$400,000, to Thomas and George Carr, managers of the park for the past ten years. The park was established 25 years ago by the late A. N. Broadhead, head of the railway, to promote business on its Celoron-Jamestown line.

**Los Angeles, Cal.**—Five more single-deck, 29-passenger coaches are being delivered to the Los Angeles Railway to be added to the 2,300 series. These coaches are generally similar to the other rear-door equipment recently delivered, but are the first single-deckers to have single-sash drop plate glass windows.

**Rochester, N. Y.**—In an endeavor to remedy abuses of the transfer privilege, the New York State Railways, Rochester lines, has put into use a new transfer to be issued to passengers only on request and at the time of paying fare, expect in emergency cases where cars are turned back. In such cases special emergency transfers will be issued.

**Quebec, Que.** — As the result of an order from the railway commissioners, the Quebec Power Company is authorized to extend its street car service in St. François d'Assise and Charlebourg, as far as the city limits. At present the track runs only as far as the new Canadian National Railway tunnel, but the extension is expected to be completed and in operation by the start of next winter.

(Late News Continued on Page 542)

## Terminable Permit

### Suggested at St. Louis

#### Transportation Survey Committee Recommends Co-ordination With Liberal Subway Construction Program. Need for New Street Cars Stressed

THE Transportation Survey Commission of St. Louis, Mo., made its final report to the Board of Aldermen on July 25. Among other things it suggested that the St. Louis Public Service Company be granted a terminable permit for 50 years, thus giving the city the largest measure of home rule in the regulation of its railway and bus rates obtainable under the present city charter.

In its report the commission also favored co-ordination of cars and buses, ultimate elimination of parking downtown and in other congested districts, restrictions on service car operations, construction of a subway under Olive Street between Third and Nineteenth Streets to cost about \$10,000,000, the rerouting of various railway lines, construction of traffic signals and safety zones at various points, completion of the street widening program prepared by the City Plan Commission and the elimination of 530 little-used street car stops on various lines.

The report recommends the adoption of the comprehensive plan of subway construction suggested by the Kinsey Commission in 1926, such construction to be undertaken when the city's growth demands these improvements. The subways suggested by the Kinsey Commission would cost approximately \$240,000,000.

In his report on rapid transit R. F. Kelker, Jr., who was consulting engineer for the Transportation Survey Commission, contended that St. Louis is not ready for

subways and that the existing surface street car lines can be developed to meet the city's transportation needs for years to come.

Stressing the necessity of new street cars, bus service extensions, rerouting of car lines and additional power facilities, the commission suggests that the Aldermen move to make it possible for the company to borrow \$23,760,000 to carry through a five-year program of expenditures for new cars and betterments.

Two alternative plans of new permits for the railway are suggested:

1. A terminable permit for 50 years and providing home rule by securing necessary enabling legislation at the next session of the Missouri General Assembly to create a St. Louis Transit Commission having full power over local utilities, now vested in the Missouri Public Service Commission.

2. A contract with the railway in which it would agree to unify all mass transportation, and the city agree to acquire ownership of the properties through a share in the receipts from operation. In this connection the commission recommends that when the city obtains ownership of the transportation system it arrange for a lease for private operation.

Walter J. G. Neun, president of the Board of Aldermen, and Edward L. Kuhls, Aldermen from the First Ward, members of the commission, dissented from the recommendation for a terminable permit.

## Start Made on Chicago Subway Plans

Plans for Chicago's subway progressed apace when the first meeting of all concerned on actual subway construction since the approval of the transportation ordinance was held on July 23 in the office of Walter L. Fisher, attorney for the local transportation committee of the Council. The removal of pipes, wires, conduits, vaults and other property of the public utilities in State Street preparatory to digging the subway was discussed, but no decisions were made.

Engineers state that their plans have progressed to a point where it will soon be necessary to know what utilities wish to use the galleries to be provided for them in the subways, and which positions they prefer.

The "L" has filed condemnation proceedings against the property of 203 Chicago owners. It hopes in this way to procure the remaining property necessary for the widening of its Garfield Park branch between Marshfield and Laramie Avenues. Much of the necessary property has already been obtained by private purchase. This proposed improvement will be the first started under the terms of the recent franchise grant.

## The Business Outlook

EXACTLY a year after business scaled the peak of its 1929 boom it is reaching its low in the subsequent depression. As we move further into the last half the paralyzing pessimism of recent months will find less to feed on in the comparative records of this year and last. While general trade is beginning to sag under the pressure of months of impaired confidence, industrial activity and railroad movement show signs of revival under the stimulus of depleted stocks, and non-agricultural commodity prices are strengthening. At this crucial point, emergency Farm Board support of farm prices against the weight of temporary crop surpluses, and further Federal Reserve support of the bond market are vitally necessary. This is the decisive round in the contest with the forces of deflation.—*The Business Week.*

## Electrification Prospects at Chicago

Definite action in Chicago's efforts to have its railroad terminals electrified is gradually approaching. The chairman of the City Council railway terminals committee, said recently:

"This committee has not yet given up hope of obtaining agreement of the railroads to a unified terminal and electrification of lines within the city. We are holding meetings weekly and are hopeful of results. However, if the railroads refuse to co-operate, the city will file a certificate of public convenience and necessity before the Commerce Commission citing the public need for electrification.

"So far the railroads have continued to declare that their revenues have decreased to such an extent that they are unable to electrify. They have stated that they have no prospect of much improvement within the next 25 years because of the increasing competition in passenger service from the automobile and airplane."

## Rochester-Buffalo Coach Order Modified

The Public Service Commission has amended its order granting the Rochester, Niagara Falls & Buffalo Coach Lines, Inc., permission to operate a bus line between Rochester and Buffalo, by way of Lockport, N. Y. The modified order permits operation of buses only from Rochester to Lockport, where transfer must be made to the International Railway to Buffalo.

The coach company may renew its petition for a bus line through to Buffalo at the end of a six-months' period. It was planned to supplant the present Rochester, Lockport & Buffalo electric interurban line with buses. The officers of the coach company are the same as those of the electric railway.

## Segregation Planned at Portland, Ore.

To facilitate compliance with a recent order of the Oregon Public Service Commission that the power and the railway businesses of the Pacific Northwest Public Service Company, Portland, be kept entirely separate, the company proposes to form two subsidiaries for administrative purposes. Under the plan proposed, the Portland General Electric Company will be formed to take over the physical property and franchises covering the power and light and interurban railway operations, and the Portland Traction Company to take the local railway property and franchises. The formation of the new companies has no interest at the present time for investors since the parent Pacific Northwest Public Service Company will become the sole owner.

## 747 Graduates of Chicago First Aid Classes

The Britton I. Budd Medal for the Saving of Human Life was awarded to two employees of the Chicago Rapid Transit Company, one employee of the Chicago, North Shore & Milwaukee Railroad, and one employee of the Chicago, Aurora & Elgin Railroad recently at the eighth annual first aid and safety banquet of the

associated electric railway and motor coach lines serving the Chicago metropolitan area. Presentations of the medals were made by Mr. Budd, president of the companies, who instituted the award in 1926 as a fitting recognition for any employee who succeeds in saving the life of anybody, anywhere and at any time. These awards made a total of 21 employees of the various transportation lines who have saved human lives as a result of first aid training under the direction of the medical department, headed by Dr. Hart E. Fisher, chief surgeon. The banquet marked new records in first aid training of employees in these transportation companies, with a total of 747 receiving diplomas as compared with 558 last year.

## Many Interesting Bus Topics on Pittsburgh Program

More than 1,000 traffic men and engineers, motor truck and motor coach operators are expected to attend the annual National Transportation Meeting of the Society of Automotive Engineers to be held in Pittsburgh, Oct. 22, 23 and 24. The Pittsburgh Section, under the direction of Chairman J. M. Orr, is making arrangements for the dinner and will conduct the affair. For the technical sessions the following speakers and topics have been selected and scheduled:

C. W. Stocks, editor of *Bus Transportation*, "Requirements for Performance-Indicating and Recording Devices, Their Installation and Operation."

H. B. Hewitt, of the Philadelphia Rural Transit Company, "Scientific Inspection of Motor-Vehicles and Their Units."

P. V. C. See, of the Northern Ohio Light & Power Company, "Motor-Vehicle Maintenance Methods to Prevent Delays."

Austin M. Wolf, consulting automotive engineer, "Practical Mathematics for Determining Tractive Ability."

Adrian Hughes, Jr., of the United Railways & Electric Company, Baltimore, "How Advantage Can Be Taken of the Latent Heat of Cooling Water."

James W. Trimmer, of the Carnegie Institute of Technology, "How the Principles of Economics in Motor-Vehicle Transportation Are Taught by Educational Institutions."

The paper by Professor Trimmer will

be supplemented by prepared discussion by J. S. Lowe, of the Northern Ohio Light & Power Company, describing the school of training established by that company for its motor coach operators. Frank D. Coll, of the Aluminum Company of America, will present a paper describing the use of aluminum alloys in commercial motor-vehicles.

## Canadians Announce Program for Ottawa Meeting

The tentative program has been announced for the papers and timely topics to be presented at the 26th annual convention of the Canadian Electric Railway Association at Ottawa on Sept. 18, 19 and 20. The program follows:

WEDNESDAY, SEPT. 17, 1930

*Timely Topics*—"The Effect of Traffic Lights on Street Car Operation," by D. E. Blair, general superintendent Montreal Tramways, and W. F. Irvin, traffic study engineer Toronto Transportation Commission.

THURSDAY, SEPT. 18, 1930

*Paper*—"The Trolley Bus," by E. A. West, general manager Utah Light & Traction Company.

Discussion led by Fred E. Dayes, chief engineer A.C.F. Motors Company, and Ross Schram, vice-president Twin Coach Corporation.

*Timely Topics*—"Fire Protection—Methods Used to Reduce Fire Hazards and Decrease Insurance Premiums," by J. C. L. Ryan, engineer and rating expert Johnson & Higgins, Ltd., Montreal, P. Q., and W. E. P. Duncan, engineer of structures Toronto Transportation Commission.

"Operating Features of Cars Recently Purchased by Canadian Electric Railways," by A. M. Lindsay, superintendent of rolling stock Montreal Tramways, and representative of British Columbia Electric Railway.

FRIDAY, SEPT. 19, 1930

*Paper*—"Street Railway Fares," by Prof. Albert S. Richey.

Discussion led by J. B. Hayes, manager Nova Scotia Light & Power Company, Ltd.

*Timely Topics*—"Welding as Applied to Track Maintenance," by W. A. MacRae, engineer of way Toronto Transportation Commission, and J. G. McCarty, manager Metal & Thermit Corporation, Toronto.

"Bus Inspection Methods," by H. R. Holder, superintendent of autobus department Montreal Tramways, and M. D. Mills, experimental engineer Motor Coach Division General Motors Truck Company.



Trouble Shooters of the Rochester Railway and Bus Lines Being Dispatched by President Tilton

# LATE NEWS

(Continued from Page 540)

**Washington, D. C.**—One-man street cars will be installed on the Mount Vernon, Alexandria & Washington Railway on Aug. 15 if the Public Utilities Commission grants the plea of the railway asking permission for the change.

**New York, N. Y.**—Representatives of the Board of Transportation are engaged in the work of getting written consent of property owners on the proposed subway route along Worth Street, East Broadway and Grand Street, from Church Street to Lewis Street, a project approved by the Board of Estimate recently.

**Chicago, Ill.**—The receivers for the Chicago Railways were ordered by the United States District Court of Northern Illinois to pay regular semi-annual interest and 5 per cent on principal amount of the first mortgage bonds of the company on Aug. 1, 1930. Last year 10 per cent of the principal amount of these bonds was paid by order of the court and interest has been regularly paid since the bonds defaulted in principal in 1927.

**Pittsburgh, Pa.**—Trainmen of the Pittsburgh Railways have defeated a proposal that they work on a six-day instead of seven-day schedule to save the jobs of 300 now on the "extra list" or soon to be there.

**Fort Wayne, Ind.**—Arrangements have been made for the hearing of evidence on the petition of the Indiana Service Corporation for authority to increase the price of a single cash fare from 7 cents to 10 cents and the price of four tokens from 25 cents to 30 cents. The company will continue to sell its weekly pass for \$1. The corporation announced about a year ago, when it granted an increase in wages, that it would ask an increase in fares. Its officials maintain that its rate of return has fallen off since 1926 and that it cannot maintain efficient service and extend its service without the petitioned increase.

**Holyoke, Mass.**—Early installation of the one-man system of operation by the Holyoke Street Railway is forecast. Directors have agreed to authorize the manager to put the plan in force at such time as he deemed necessary.

**Atlanta, Ga.**—The Georgia Supreme Court has upheld the right of the State Public Service Commission to regulate motor carriers. In a decision rendered on July 26, the state's highest tribunal declared the Fulton Superior Court in error in granting an injunction to the Saye M. Davis Transfer Company to prevent regulation. The Supreme Court held that the motor carrier act of Georgia was not unconstitutional, as declared by the petitioner, and that it was unnecessary to determine whether a carrier was a private or common servant.

**Grays Harbor, Wash.**—More than 5,000 youngsters and parents of Grays Harbor County consumed 750 gal. of ice cream and 23,000 cones at the Fourth Annual Kids Party held at Electric Park, Aberdeen, Wash., by the Grays Harbor

Railway & Light Company in July. The announcement of this year's party was one of the first official acts of J. R. Snider, newly elected general manager of the company, to allay the juvenile fears that the party might be discontinued because of the death of its founder, Wallace W. Briggs. A feature of the party was the dedication of an ornamental fountain carrying the following inscription: "Wally Briggs Swimming Hole, built for the boys and girls of Grays Harbor, and dedicated to their happiness by Wallace Wheaton Briggs, general manager, 1929."

**Baltimore, Md.**—William McCallister, president of the Hamilton Improvement Association, has suggested to the United Railways & Electric Company a bus line to connect the Harford and Belair roads, providing a more direct route from that section of the city to the southeastern section. It is urged that the route follow the new Echodale Boulevard, which is to be built.

**Staunton, Va.**—The City Council has directed City Manager Day to transmit to officials of the Shenandoah Traction Company at Pittsburgh an approved draft of a franchise for operation of a bus service here in place of the existing railway. As the draft has the approval of the city attorney and attorneys for the new company, the action is regarded as practically the final step in agreement on a bus franchise. The final franchise draft provides for a fare not more than 10 cents, subject to revision within five years to "not less than 5 cents." The grant is to run for 15 years.

**Rochester, N. Y.**—An order for discontinuance of the Rochester & Eastern Railway, was signed on July 26 by Judge Simon L. Adler in Federal court, on the application of receivers for the New York State Railways. It was made effective at midnight July 31. Seven communities on the route will be left without transportation. Other parts of the line are being served by a bus line with headquarters in Syracuse.

**High Point, N. C.**—Members of the City Council will submit a plan to officials of the North Carolina Public Service Company calling for the operation of buses here instead of street cars, and giving the company the right to remove all trackage that is not needed by the High Point, Thomasville & Denton Railroad for car shifting purposes.

## They Saw It in the News

A 17-LINE ride-selling item in ELECTRIC RAILWAY JOURNAL NEWS for May 31 has provoked inquiries to the company mentioned from Pittsburgh, Binghamton, Los Angeles, Des Moines, Seattle, Tacoma and other cities for further details. This is typical. If you are not reading ELECTRIC RAILWAY JOURNAL NEWS, you are missing a service designed especially to keep you well-informed on current events. And current events are the materials that make history!

**Cleveland, Ohio.**—The charge that the Cleveland Interurban Railroad, which operates the Van Sweringens' Shaker Heights rapid transit line, violated the Ohio utilities regulations when it increased the fare from 10 to 15 cents has been made in a petition filed with the Ohio Utilities Commission.

**Washington, D. C.**—Revaluation of the local railways based on a physical inventory of their used and useful property has been asked of the Public Utilities Commission by Richmond B. Keech, people's counsel. The revaluation is asked to establish a new basis for fixing rates, in an effort to bring about a reduction in the 10-cent cash fare, with four tokens for 30 cents, recently granted by Justice Jennings Bailey, of the District Supreme Court. Mr. Keech contends that radical changes have taken place in prices and equipment since the physical inventory of 1914.

**St. Augustine, Fla.**—Service by bus has been substituted for the trolley line to St. Augustine Beach run by the Florida Power & Light Company.

**Richmond, Cal.**—The Key System Transit Company has applied to the California Railroad Commission for an order permitting the operation of a bus line here in accordance with a permit granted by the City Council.

**St. Louis, Mo.**—Counsel for the St. Louis Public Service Company on July 28 asked the Public Service Commission to dismiss the protests against the rerouting of cars on the Fourth Tower Grove, Compton and Bellefontaine lines. The company points out that it cannot furnish a "door-to-door service to its patrons," and that the line was rerouted in the interest of the general good of patrons and of economy in operation.

**Chicago, Ill.**—Federal Judge Wilkerson entered a decree on July 23 fixing the amount and priority of liens against the Chicago City Railway and the Calumet & South Chicago Railway. Receivership proceedings have been continued until Sept. 25, after which date an order of sale will probably be entered.

**Jamestown, N. Y.**—Work of removing the tracks of the Warren & Jamestown Street Railway in this city is under way. The company abandoned service between Warren, Pa., and Jamestown, N. Y., Dec. 1, 1929, and the removal of tracks marks the termination of the line.

**Venice, Ill.**—Preliminary steps have been taken toward the construction of an 800-ft. reinforced concrete viaduct to carry Broadway here, over the tracks of the Terminal Railroad Association and other railroads. The estimated cost of the project is \$500,000. The Terminal Railroad Association of St. Louis, the Illinois Terminal Railroad and the city of Venice would share the cost.

**Raymond, Wash.**—The Willapa Electric Company has replaced operation of its railway system in the South Bend-Raymond district with buses. Workmen are removing the tracks through Raymond to speed up paving of the state highway which is to form an important link in the Ocean Beach route.



## Amicable Settlement of Niagara Falls Case Arranged

The Public Service Commission on July 29 approved the operation of buses by the International Railway on Hyde Park Boulevard and other streets in Niagara Falls to supplement its trolley service. The line will be established only if the International Railway's petition for an 8-cent fare is granted.

The order of the commission approves a franchise granted to the International Railway by the City of Niagara Falls for the operation of buses over streets extending northward through a comparatively new section of the city and looping at the southeast through an older part of the city. The new line is about 4 miles long.

The proposed bus line is to provide needed additional service for employees of industrial plants at the northern end of the route and at the loop over which the buses are to be turned at the southern end of the route. Buses are to be operated on a 30-minute headway during the day, except that, during the morning and evening rush periods service will be maintained on a 15 minute headway. A 10-cent fare is to be charged and transfers will be given from buses to connecting trolleys and from trolleys to buses upon payment of a 10-cent fare on the trolley cars.

The city of Niagara Falls favored the establishment of the proposed bus line and no opposition was expressed to the application. In a memorandum written by Commissioner Maurice C. Burritt, and approved by the commission, it was stated that "it appears that approval of the petition is in the public interest and that it will add to the convenience of the people of Niagara Falls in traveling over the streets of the city and in supplementing the present street car system."

### CITY AGREEABLE

Without waiting for its new schedule of increased fares to be approved by the Public Service Commission, the International Railway decided immediately to improve service in Niagara Falls, N. Y., by inaugurating a system of more frequent service on every line in the city and by starting the work of improving and renovating its rolling stock.

Application has been made to the Public Service Commission by the company for approval of the schedule of increased fares granted the company by resolution of the City Council, meeting on March 17.

The agreement entered into between the company and the City Council grants the company a trolley fare of 8 cents a passenger on local lines; or sale of two tickets or tokens for 15 cents, and grants an increase from \$1 to \$1.50 on sale of commutation books of 20 tickets each between the old village of La Salle and Niagara Falls with transfer privileges to or from local lines in Niagara Falls, but commutation tickets will not be accepted as part payment for a through fare.

The railway promptly issued a statement to the effect that in appreciation for the "splendid spirit of fair dealing" that the people of the city have displayed in the settlement of the fare controversy it "has decided to do even more than it promised."

The whole matter is a lesson in good public relations not easy to match. Not only did the proposal meet with hearty approval by the public, but the attitude of

the local newspapers, particularly the Niagara Falls *Gazette*, was most helpful. Evidently baiting big business has no zest for the local papers. On various occasions the *Gazette* put the matter this way:

"No contract that is confiscatory is binding. Niagara Falls does not want to take advantage of such a contract, if expressions of the people are to be accepted as indicating public sentiment.

"The Buffalo *Evening News* sees in the Niagara Falls situation a rare opportunity for this community to wallop the traction company, but fortunately we do not treat our business interests that way."

"The increase asked by the company is very reasonable, and its consent to abide by this figure for a term of at least ten years is an earnest of its good faith. The *Gazette* feels that the City Council has performed a good stroke of business for Niagara Falls. The increase in fares was inevitable, and by arriving at this very satisfactory settlement of the matter the city is saved a large sum of money in lawyers' fees, expert hire, and other costly incidentals that usually feature litigations in cases of this character."

## Congestion Greatest Economic Problem Before the Cities

H. M. Patton, district superintendent of the Union Electric Light & Power Company, St. Louis, Mo., was elected president of the Missouri Association of Public Utilities at the recent meeting of that body to succeed Major T. J. Strickler, Kansas City. The election took place at the closing session of the three-day convention of the association which was attended by 200 delegates from various parts of the state.

A feature of the convention was the address of Milton R. Stahl, chairman of the Missouri Public Service Commission, in which he advocated a broadening of the powers of the commission to give it jurisdiction over holding companies for local public utilities and supervision over the sale in Missouri of stock in holding companies.

Better use of existing street facilities would solve many of the traffic problems of large cities, Charles Gordon, managing director of the American Electric Railway Association, asserted in his address. He expressed the belief that existing thorough-

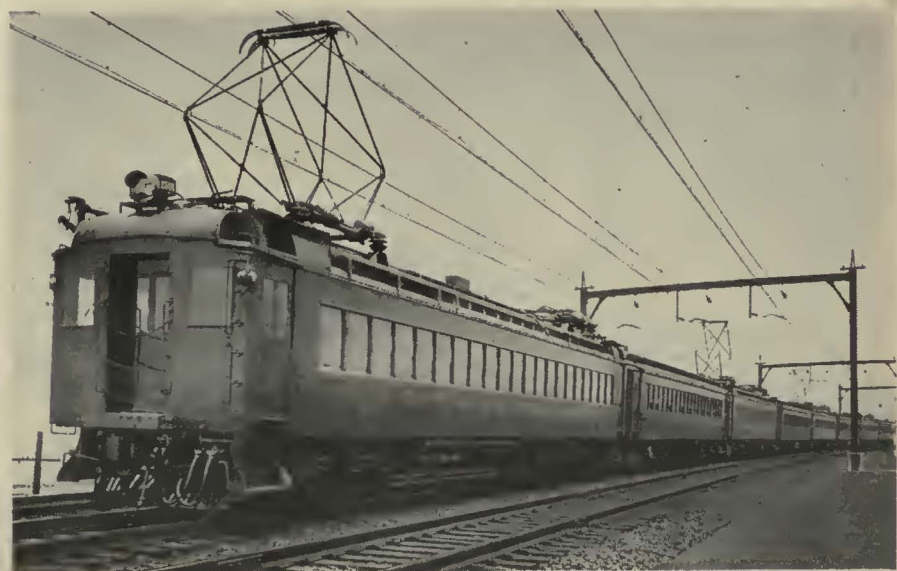
fares should be used to their fullest extent rather than for a city to indulge in expensive street widening and expansion program.

He brought out that acute street traffic problems are manifest in all of the major cities and in many of the small cities and towns as well. He said that congestion of streets has become perhaps the greatest single economic problem confronting modern cities and that it is already having a profound effect upon the business and social life and is threatening to bring about major readjustments of property values and business locations, particularly in the central business districts.

## Lackawanna Plans Electric Suburban Service Sept. 15

Electric service probably will be started by the Delaware, Lackawanna & Western Railroad on the Montclair division about Sept. 15. One electric train at a time will be substituted for a steam train in the regular schedule. Operation and performance will be watched carefully and if any difficulties arise they will be ironed out before the next train is put into service. Subsequent substitutions will be made train for train until full electric service is in operation. Meanwhile, four engineers are receiving instruction on the new equipment daily. To the end that service may be begun as scheduled, the first of the new multiple-unit trains was operated at 4 p.m., on July 17. Since that time four-car and eight-car trains have been run daily between Bergen Junction and Seacaucus, N. J., to test equipment and instruct trainmen. Runs have also been made along the main line from Bergen Junction to Harrison Tower.

Substation equipment is being installed according to schedule. Buildings are completed and electrical apparatus is approximately 50 per cent in place. New cars are arriving and trailers are being converted at the rate of one a day and will continue on that schedule until the completion of 141 units, each consisting of motor car and trailer.



Train Being Used for Tests on Lackawanna's New Electric Zone

## Companies in Suburban New York Seek Fare Increase

The Yonkers Railroad, the Westchester Electric Railroad, and the New York, Westchester & Connecticut Traction Company, on July 30, petitioned the Public Service Commission for permission to increase their fares from 5 to 8 cents in Yonkers, Mount Vernon and other portions of Westchester County.

The petitions of all companies stated that the present rate of 5 cents does not provide a fair return on their investments and that the proposed 8-cent fare will constitute no more than a just and reasonable rate.

The Yonkers Railroad desires to charge 8 cents for rides in the city of Yonkers and in Mount Vernon where it has a line also, and to increase the fare to 8 cents in every instance where a 5-cent fare is now collected. The company states that in 1929 its revenue was \$1,284,598, and that this fell short by at least \$390,000 of meeting the operating expenses of the company, and that it fell short by about \$325,000 of yielding a 7 per cent return.

The Westchester Electric Railroad desires to charge 8 cents instead of 5 cents for rides in the city of Mount Vernon, the villages of Pelham, Pelham Manor and North Pelham and between points where a 5-cent fare is now charged. The petition does not ask an increase for rides originating and terminating within the city of New York. This company states that its 1929 revenue of \$785,349 fell short of meeting operating expenses by at least \$355,000 and of yielding a 7 per cent return by at least \$309,000.

The Westchester & Connecticut Traction Company desires to charge 8 cents for rides in Mount Vernon and North Pelham and between other points where a 5-cent fare is now collected. This company states that its 1929 revenue of \$83,160 fell short by at least \$32,500 of meeting expenses, and that it fell short by at least \$28,000 of yielding a 7 per cent return to the company on its investment and property value.

## Trolleys Speeded by New York's New Stagger System

The co-ordinated "stagger" traffic light system went into effect throughout Manhattan at 7 o'clock on the morning of July 30. Control mechanisms were adjusted after the light control stopped for the night at 3 a.m. and when it went into operation again the light changes were so timed that north-and-south traffic flowed uninterruptedly for about a minute and a half, instead of two minutes as formerly and east-and-west traffic ran for about 30 seconds, instead of one minute.

To speed the movement of traffic in the Times Square district, the light tower at 45th Street was removed. This was the point from which Commissioner Whalen last year observed the results of the traffic regulations he put into effect for the theatrical district. It has stood in front of the Hotel Astor for seven years.

Changing the light mechanism to "stagger" the traffic was a simple matter of setting disks in the central control towers to revolve at constant speed with the signal systems for the various avenues and streets. Readjustments were made at the central control room in the West 30th Street station and at the auxiliary control room in the West 126th Street station.

Police Commissioner Mulrooney had observers stationed in many parts of the city. He reported gains in speed from 15 to 50 per cent. William G. Fullen, chairman of the Transit Commission, who had inspectors on the job, had a table of data showing one gain of as high as ten minutes from west-bound trolley traffic on 34th Street. The Third Avenue Railways reported a 33 per cent gain in speed on the 42nd Street line, with other gains on different lines.

All reports contained assurances as well that while crosstown traffic had been speeded the gains had not been effected at the expense of the longitudinal vehicular flow. Most of the re-

ports said that there had been some speeding up of north-and-south traffic, although to a considerably lesser degree.

William Thompson, vice-president of the Third Avenue Railway, said:

The new system has resulted in a material increase in speed on our crosstown lines without any retarding of north-and-south traffic. In fact we have received reports of some light gains in north-and-south traffic. On the 42nd Street crosstown line the speed gain was about 33 per cent, on the 59th Street line about 19 per cent and on the 125th Street line about 15 per cent.

At the offices of the New York Railways it was announced that the crosstown trolley car movement had shown definite gains in speed, although data had not been compiled to show the actual gains. This statement also emphasized that north-and-south traffic had not been impeded.

Officials of the Fifth Avenue Coach Company said they were still checking their data, but that a preliminary survey had indicated gains in the operation of their buses.

## Indiana Railroad Succeeds to Union Traction Properties

INDIANA Railroad is the new name under which the electric interurban lines of the old Union Traction Company of Indiana began operating on Aug. 1.

Properties of the Union Traction Company, which were purchased at a receiver's sale in Anderson on July 2 by B. P. Shearon, secretary of the Midland United Company, have been conveyed by order of the Madison Circuit Court to the Indiana Railroad, which is a subsidiary of the Midland United Company.

The full amount of the purchase price, \$3,923,933, including \$376,528 in cash and the rest in bonds and other securities, was paid to Arthur W. Brady,

the receiver, by the Midland United Company on July 17. The new owners, however, will not assume full control of the properties until Mr. Brady makes his final report to the court and relinquishes the receivership, probably the latter part of August.

Operation of the Indiana Railroad will be under the direction of Henry Bucher, vice-president of the Indiana Service Corporation. Mr. Bucher is the managing executive of the railway department, through which the operation of other electric railways in central and southern Indiana controlled by the Midland United Company is now co-ordinated.

The electric interurban lines, which will be operated under the direction of one centralized supervisory management at Indianapolis, include the line between Indianapolis and Louisville operated by the Interstate Public Service Company, the lines of the Indiana Service Corporation radiating from Fort Wayne, the line of the Northern Indiana Power Company extending from Frankfort to Kokomo and Marion, and the old Union Traction Company which now becomes the Indiana Railroad.

Co-ordination of service and schedules, which it is believed will be of benefit to the traveling public, is expected to be one of the results of the centralized control of operations of these railways.

The board of directors of the new Indiana Railroad elected the following officers at a meeting held in Chicago, on July 30:

Samuel Insull, chairman of the company.  
Samuel Insull, Jr., chairman of the executive committee.

Robert M. Feustel, president.  
William A. Sauer, vice-president.  
Henry Bucher, vice-president and general manager.

George F. Mitchell, treasurer.  
Bernard P. Shearon, secretary.  
Edwin J. Booth, comptroller.

The directors of the company are: Mr. Insull, Mr. Insull, Jr., Mr. Feustel, Mr. Sauer, Mr. Bucher, Charles W. Chase and L. M. Brown.

### COMING MEETINGS

Aug. 13-14—Wisconsin Utilities Association, Milwaukee, Wis.

Aug. 14—American Electric Railway Assn., Metropolitan Section, Sixth Annual Outing, Luna Park, Coney Island, N. Y.

Sept. 5-6—Central Electric Traffic Association, Wawasee, Ind.

Sept. 10-11—Central Electric Railway Master Mechanics' Association, Miami Hotel, Dayton, O.

Sept. 17-19—Canadian Electric Railway Association, 26th annual convention, Ottawa, Canada.

Sept. 25—Pennsylvania Street Railway Association, Casey Hotel, Scranton, Pa.

Oct. 9-11—Midwest Electric Railway Association, Miami, Okla.

Oct. 22-24—National Transportation Meeting of the Society of Automotive Engineers, Pittsburgh, Pa.

Oct. 29-30—Iowa Electric Railway Association, Des Moines, Ia.

## Vote on Future of the Boston Elevated Railway

At the state election in November of this year there will be submitted to the registered voters of the cities comprising the so-called Metropolitan District, the following plans for determining the future ownership, management and operation of the Boston Elevated Railway, Boston, Mass., namely:

Plan No. 1. Return to the Boston Elevated Railway of the management and operation of its railway system by terminating public management and operation thereof.

Plan No. 2. Continuation of public management and operation of the Boston Elevated Railway in accordance with such terms and conditions as may be agreed to by the stockholders of said company.

Plan No. 3. Purchase by the Metropolitan Transit District of the whole assets, property and franchises of the Boston Elevated Railway, the same thereafter to be owned, managed and operated by said district.

The referendum will have no legal effect, but will merely inform the succeeding Legislature as to the preferences of a majority of the voters of the Metropolitan Transit District. It will be necessary for the Legislature to enact legislation to put into effect any one of the foregoing plans.

## Proposed Abandonment Under Inquiry

Engineers of the Ohio Public Utilities Commission will make a survey of the rolling stock and roadbed of the Scioto Valley Railway & Power Company to aid in determining whether the road should be permitted to abandon railway service between Columbus and Chillicothe and Columbus and Lancaster. At the first hearing, held on July 23, officials of the company testified that \$200,000 would have to be expended to place the rolling stock and the roadbed in good condition. They said the company could not finance this program inasmuch as the road now is operating at a loss of \$7,000 per month. Residents insist the lines are a necessity and that, under more skillful management, the system could be made profitable.

## Question of Jurisdiction in San Diego Hearing

The hearing scheduled to be held by the Railroad Commission in San Diego, Cal., on June 19, in the matter of the application of San Diego Electric Railway to abandon railway operation and remove its tracks in Coronado, substituting therefor through bus service over the ferries of the San Diego & Coronado Ferry Company into San Diego, was continued without taking of testimony as to public convenience and necessity. The application was amended to offer loop bus service in Coronado and continue the railway operation there as a concession to the expressed desire on the part of residents who prefer to transfer from the cars to the upper decks of the ferry boat rather than be shut in on the automobile deck in a bus.

At the hearing the City Attorney and members of the City Council said they had before them the matter of municipal operation with buses to be furnished by a proposed rival bus company on a

rental basis, wherein the city was to be guaranteed against any losses for a period of five years. They requested that action on the application of the railway be postponed until they could determine what action they wished to take in the matter. It was also contended that inasmuch as the operation of the proposed bus service was entirely within the limits of Coronado, the commission had no jurisdiction, the railway being subject only to municipal control through franchise requirements. Since there is some question as to proper in-

terpretation of the Public Utilities Act, the commission took the matter under advisement to determine its jurisdiction before hearing is to be continued.

The matter is of interest because of the attempt of private parties to enter into bus competition with established utility under the guise of municipal operation, the private parties obtaining remuneration through tolls received from ferrage of the vehicles across the Bay of San Diego, including tolls for the passengers, by means of a rival ferry company.

## A. C. Blinn in Charge of Ohio Edison Operations

### Announcement Made of Official Roster of Officers for New Merger Company in Commonwealth & Southern Group Operating in Ohio

OFFICIAL announcement was made, on July 23, of the organization of Ohio Edison Company, created by the consolidation of the Pennsylvania-Ohio Power & Light Company, Northern Ohio Power & Light Company, the Ohio Edison Company, the Akron Steam Heating Company, and the London Light & Power Company. The company will be operated by divisions with the general headquarters in Akron.

#### A. C. BLINN IN CHARGE

A. C. Blinn, who has been vice-president and general manager of Northern Ohio Power & Light Company for many years, will be vice-president and general manager of the Ohio Edison Company in charge of all the utility operations.

L. G. Tighe, for the last six years assistant general manager of Northern Ohio Power & Light Company in

Akron, has been made a vice-president and director of the new company, and will be manager of the Akron division which includes the cities of Akron, Barberton, Cuyahoga Falls, Kent, Tallmadge, Lakemore, Northfield, Brimfield and a large number of other smaller communities.

C. S. MacCalla, formerly vice-president and general manager of the Pennsylvania-Ohio Power & Light Company, is a vice-president and director of Ohio Edison, and will be manager of the Youngstown division, comprising the cities of Youngstown, Girard, Lisbon, Salem, Struthers, Leetonia, Canfield, Columbiana, Kinsman and numerous other towns and communities.

H. E. Miller, former general manager and director of the Ohio Edison Company at Springfield, will be manager of the Springfield division, which includes Springfield, London, Marysville, Urbana, Mechanicsburg, Westville and other communities.

Other officers of the company are: H. G. Kessler, New York, comptroller; P. Murdoch, Akron, general auditor, with H. R. Bowie, Youngstown, assistant; E. G. Dunlap, Youngstown, treasurer; C. H. Lahr, Akron, secretary; L. I. Wells, Akron, E. E. Nelson and C. Wigand, New York, assistant secretaries and assistant treasurers.

#### B. C. COBB THE PRESIDENT

B. C. Cobb heads the new company as president and chairman of the board of directors. Other directors are A. F. Ayers, Akron; W. H. Barthold, New York; A. C. Blinn, Akron; W. H. Foster, Youngstown; H. E. Freeman, Springfield; J. T. Harrington, Youngstown; T. A. Kenney, New York; C. S. MacCalla, Youngstown; H. E. Miller, Springfield; J. G. Robertson, Akron; L. G. Tighe, Akron; W. L. Willkie, New York. Mr. Barthold, Mr. Kenney and Mr. Harrington are also vice-presidents, as is M. W. Arthur of New York.

Ohio Edison Company assumes all the bonds and other indebtedness of the Pennsylvania-Ohio Power & Light Company, Northern Ohio Power & Light Company, the Akron Steam Heating Company, the Ohio Edison Company and the London Light & Power Company.

## A Hitch in Hitch-Hiking

THE practice of "thumbing" for rides has become an annoying business. That it is also extremely dangerous for the good-natured motorist to pick up strangers has been proved in innumerable cases.

Some of these motorists have been murdered by their "pick-ups," and many others have been beaten and robbed of money and cars. Still others have had to defend suits brought for injuries by the thumbers to whom they gave assistance, and on several occasions innocent motorists have become involved with the courts for aiding fugitives, youthful runaways and delinquent girls.

While some states have taken official action to stop ride-begging on their highways, the one way to put a stop to the nuisance is for motorists everywhere to pass the thumbers by. The only persons who can put a real hitch in hitch-hiking are the motorists themselves. Motor clubs could save some of their members much embarrassment and grief, by acquainting them of the dangers they run by picking up strangers on the highways.—Condensed from the Cincinnati Enquirer.

## "Selling Transportation" Is Theme of Coffin Award Review

While it is impractical, of course, to make the full text of the Charles A. Coffin Award briefs available for general circulation, the American Electric Railway Association has done much to overcome this deficiency by publishing a digest in which the outstanding features of the respective briefs are set forth. The latest publication of this nature, covering the briefs submitted in the 1928 and 1929 contests, is now being distributed from the association headquarters to member companies. The book is entitled "Selling Transportation." It has been prepared under the direction of Prof. Albert S. Richey, acting for the Coffin Foundation, with a foreword by J. P. Barnes, president of the association in 1928-29.

The street railway companies which competed for the award in 1928 were: El Paso Electric Company, Gary Railways, Northern Texas Traction Company, San Antonio Public Service Company, Shreveport Railways, and Virginia Electric & Power Company. The El Paso Electric Company and the Northern Texas Traction Company were again contestants in 1929, and in addition briefs were submitted by Chicago, South Shore & South Bend Railroad, Community Traction Company (Toledo), Detroit Department of Street Railways, Houston Electric Company, and the Youngstown Municipal Railway.

Conforming to its title, "Selling Trans-

portation" is made the central theme of the book, and the various chapters, dealing with service betterment, selling rides, going after business, new and modernized cars, the place of the bus, rolling stock and track maintenance, safety, and employee co-operation, are all edited with emphasis upon this main idea of disposing of the product of transportation.

Under the general heading of service betterment, the matter of speed receives special attention. As one of the briefs expresses it, "speed is the very essence of transportation." The Gary Railways, realizing that railways must speed up to exist, points out how it has increased its average speed from 9.11 to 9.95 m.p.h. The Detroit Department of Street Railways features its rapid transit surface line, the Jefferson Avenue Express, which, in 1928, maintained an average schedule speed of 18.5 m.p.h. over its 4.3 mile route, while the Chicago, South Shore & South Bend Railroad credits its high speed interurban service with having done much to check automobile competition.

Perhaps more than ever before is recognition given to the human element and its responsibility in the sale of service. Practically every brief submitted placed special emphasis upon this feature, and the winning companies, the Virginia Electric & Power Company in 1928 and the Chicago, South Shore & South Bend Railroad in 1929, credit their exceptionally successful records largely to this factor. There is a growing appreciation of the fact that it is the man on the platform who makes the service either satisfactory or otherwise.

The efforts of the personnel have been supplemented and backed up by the efforts of the companies in cleaning and painting, and in making the physical plant more attractive.

Advertising and newspaper publicity have attained a much higher level, according to the chapter devoted to this subject. Public relations have greatly improved and, thanks to a general policy of supplementing words with actions, there is, in general, a growing feeling of mutual confidence between electric railway managements and the public and local authorities. This is made evident by the success of Houston in securing relief from jitney competition; of San Antonio, where an increase in fares was granted; and Toledo and Youngstown where notable progress was reported in securing franchises free from many of the onerous impositions of the past.

The chapter on operating economies contains much information of a general nature on this subject, while the chapters on rolling stock maintenance, track construction and maintenance and power and line economies constitute a veritable handbook of good operating practice in these important fields. Solicitude for the general welfare, health, happiness and contentment of employees, individually and as a group was manifest in all presentations. That this has been reciprocated is made evident by the more intelligent co-operation between men and management which characterizes the general trend of employee relations.

In his foreword, Mr. Barnes has aptly expressed the aim and purpose of the volume. "It is offered," he states, "with the hope that the fundamental and far-reaching policies which have characterized award submission of the last two years will prove of maximum inspiration to a maximum number of readers."

## Conspectus of Indexes for July, 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
<b>Street Railway Fares*</b> 1913 = 4.84	July, 1930 7.97	June, 1930 7.97	July, 1929 7.76	July, 1930 7.97	July, 1925 7.27
<b>Electric Railway Materials*</b> 1913 = 100	July, 1930 136.2	June, 1930 138.9	July, 1929 147.5	Dec., 1926 159.2	July, 1930 136.2
<b>Electric Railway Wages*</b> 1913 = 100	July, 1930 231.7	June, 1930 231.7	July, 1929 230.9	July, 1930 231.7	July, 1925 222.5
<b>Electric Ry. Construction Cost</b> Am. Elec. Ry. Assn. 1913 = 100	July, 1930 197.7	June, 1930 199.5	July, 1929 199.0	Nov., 1928 205.7	July, 1930 197.7
<b>General Construction Cost</b> Eng'g News-Record 1913 = 100	July, 1930 201.0	June, 1930 203.4	July, 1929 204.8	Jan., 1927 211.5	July, 1930 201.0
<b>Wholesale Commodities</b> U. S. Bur. Lab. Stat. 1926 = 100	June, 1930 86.8	May, 1930 89.1	June, 1929 96.4	Nov., 1925 104.5	June, 1930 86.8
<b>Wholesale Commodities</b> Bradstreet 1913 = 9.21	July, 1930 10.56	June, 1930 10.77	July, 1929 12.49	Dec., 1925 14.41	July, 1930 10.56
<b>Retail Food</b> U. S. Bur. Labor Stat. 1913 = 100	June, 1930 147.9	May, 1930 150.1	June, 1929 154.8	Nov., 1925 167.1	June, 1930 147.9
<b>Cost of Living</b> Nat. Ind. Conf. Bd. 1914 = 100	June, 1930 154.8	May, 1930 156.2	June, 1929 160.0	Nov., 1925 171.8	June, 1930 154.8
<b>Industrial Activity</b> Elec. World, kw.-hr. used 1923-25 = 100	June, 1930 115.5	May, 1930 119.0	June, 1929 135.2	Feb., 1929 140.4	Aug., 1925 94.3
<b>Bank Clearings</b> Outside N. Y. City 1926 = 100	June, 1930 92.1	May, 1930 92.1	June, 1929 102.2	Oct., 1929 111.8	June, 1930 92.1
<b>Business Failures</b> Number Liabilities, Millions of Dollars	June, 1930 1874 114.40	*May, 1930 2083 57.72	June, 1929 1482 64.15	June, 1930 1874 114.40	Sept., 1928 1348 23.13

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

railway operation and maintenance, weighted according to average use of such materials. Wages index is relative average maximum hourly wage of motormen, conductors and operators on 136 of the largest street and interurban railways operated in the United States, weighted according to the number of such men employed on these roads.

## Noise Elimination in Rapid Transit Studied

Under the direction of Robert Ridgway, chief engineer, the transit experts of the city of New York have been making a thorough study of proposals for the improvement of equipment, rolling stock, road ballast and subway turnstiles to eliminate all unnecessary noises. They also have under consideration the advisability of sound-deadening linings for the reduction of loud noises caused by fast operation of trains through underground tubes.

The city's engineers believe that the method of laying tracks on ties imbedded in concrete, now being used in the new subways, will be less productive of operating noises than the use of the stone or gravel ballast. The latter method, they believe, results in failure of track alignment, low rail joints and other noise-producing defects.

The engineers have designed the city's new subway cars so that they will operate with a minimum of noise. They are also studying the suggestion that subway tubes be sheathed, or partly sheathed, with some sound-deadening application or material, but thus far have come upon no practical method of accomplishing this result.

In a report to Chairman Delaney, Mr. Ridgway pointed out that the problem of eliminating noise from subway and elevated operation was studied as early as 1923 when a special committee was named. Since that time the Board of Transportation's engineers have studied surveys made by operators of the London Underground Railway in an effort to reduce operating noises.

# FOREIGN NEWS NOTES

## Construction of New London Subway Approved

The Select Committee of the British House of Lords has approved the preamble of the bill for the extension of the Piccadilly subway, London, from Finsbury Park to Cockfosters. The measure has already passed through the House of Commons Committee, so that, subject to the formality of the Royal assent, the London Underground Railways combine proposes to have the contract ready for inviting tenders for the work returnable by July 15. Actual work will be started not later than Sept. 1.

The London & North Eastern Railway was the principal opponent of the bill before the committees of Parliament. That company's decision to electrify its suburban lines was subject to two conditions, a satisfactory financial grant from the government under the Development Act, and a satisfactory arrangement for terminal accommodation in central London. The subway project has not killed the electrification proposals. Approval of that bill means competition by subway with that part of the Northeastern line it is proposed to electrify. Should the company not electrify its lines, the loss of traffic to the new subway will be much heavier. Final decision is not likely until the amount of state assistance the company will receive is known.

## London's New Suburban Line

The chief event of the New Year in London up to the present has been the opening of the electrified extension of the Southern Railway's suburban system, linking Wimbledon and Sutton, southwestern suburbs. During business hours trains from these terminals now run to central London every twenty minutes, and every half-hour at other times. The value of this extension will increase with the development of the St. Helier, Sutton Common, and Sutton West districts. From St. Helier station, which serves the new London County Council housing estate, central London is reached in 34 minutes. The new piece of line is 5½ miles in length, and there are six new stations. Work on the sec-

tion began in October, 1927, and 24 bridges had to be built, including three foot bridges. The trains are composed of eight coaches, giving room for 112 first-class and 540 third-class passengers. Cheap weekly, monthly, and quarterly season and cheap day-return tickets are available, and will help popularize the service.

In this connection it should be noted that the electrification of three important new sections of the Southern Railway, one of Britain's railroad "Big Four," is to be completed this year, under the construction plans for 1930. The total expenditure authorized for the year is \$21,500,000, about one-third of which will go to pay for new rolling stock. Approximately \$3,000,000 will be spent on electrification.

## Scenic Trips by Electric Railway in Japan

Electric railways operating from Osaka, Japan, to many suburbs, including Kyoto, Kobe, Wakayama and Nara, enable the tourist to visit many temples, shrines, tombs and scenic points. The Daiki Railway goes to Nara, the ancient capital of Japan, where are the Kasuga Shrine, the Todaiji Temple and the great Buddha. Nara is only a 50-minute ride from Osaka. The trip on the Keihan permits the visitor to see the mausoleum where the late Emperor is buried, and visit Lake Biwa and the cherry blossom region of Mount Arashiyama. Koshien Field with a grandstand and bleachers seating 80,000 persons, is reached on the Hanshin line. Not only have the Japanese gone in for utility as instanced by their rapid transit lines, but they have not neglected the aesthetic side as one of the two accompanying pictures makes plain.

Incidentally it should be noted that plans are being made for further electrification of the Japanese government railways. The portions under consideration are those between Tokyo and Yokosuka, Kozu and Atami, Ueno and Abiko, Yokohama and Hachioji, Tachikawa Asakawa, Kioto and Nara, Tennoji and Umeda, Otsu and Akashi. Details of the plans are being worked out by a special committee in

the railway office. When electrification is completed, it is expected to have a considerable influence on the passenger traffic of the existing interurban lines. Overhead contact lines have already been installed on the section between Tokyo and Yokosuka and between Kozu and Atami.

## Subway Financing for Buenos Aires Arranged

Harris, Forbes & Company, New York, have underwritten financing of a new terminal and subway project in Buenos Aires. Financing will be \$12,000,000 three-year 6 per cent notes of South American Railways, which will be convertible into common stock with purchase warrants attached of the latter company. This financing, with proceeds of \$2,500,000 preferred stock sold recently, will enable South American Railways to purchase \$14,500,000 three-year notes of Buenos Aires Central Railroad & Terminal Company, which is constructing and will operate a subway and terminal project to give it and its interconnecting systems direct access to the heart of the business district of Buenos Aires.

Rome, Italy.—Electrified lines of the Italian State Railways now number 1,625 kilometers, or about 10 per cent of the mileage of the entire state railway system. However, they carry 20 per cent of the total traffic. The use of electricity now permits the state railways to save about 600,000 metric tons of coal annually or slightly less than one-quarter of that which is burned for steam traction. During the past year, 100 locomotives were purchased by the state railway system. Of these 85 were electric.

Mendoza, Argentina—The Mendoza Empresa de Luz y Fuerza, furnishing electric power, light and electric railway service to Mendoza, the fourth largest city in Argentina, has been acquired by the American & Foreign Power interests, which have concluded negotiations for the acquisition also of properties owned by the Compania de Electricidad de la Provincia de Buenos Aires in the cities of Mar del Plata, San Pedro, San Nicolas, Junin, Azul and San Luis. Mendoza, with a population of 175,000, is the metropolis of western Argentina.



A Difficult Piece of Diversion Work on the Elevated Electric Railway, Now Under Construction in Kobe, Japan



White Tile, Electric Direction Signs and Modern Lighting Fixtures Are Features of the Kobe-Arima Railway Station

## PERSONAL MENTION

### A. B. Paterson New President in New Orleans

A. B. Paterson, who has been vice-president and general manager of the New Orleans Public Service, Inc., New Orleans, La., has been elected president of the company to succeed Herbert B. Flowers, resigned. Mr. Paterson has already been named to the vacancy by the board of directors, and will assume his new duties immediately. No action has been taken as yet with regard to the position left vacant by Mr. Paterson's promotion.

The new president of Public Service, Inc., has been with the company for the past ten years, and is widely known in the public utility field. He entered the business in 1905 when he became connected with the Meridian Light & Railway Company, where he remained



A. B. Paterson

twelve years as vice-president and general manager.

He went to New Orleans in 1917 as representative of Henry L. Doherty & Company, operators of Cities Service Company of New York and other large utility concerns. Later he entered the employ of Isidore Newman & Sons, operating utility properties in New Orleans and other Southern cities.

In 1920, Mr. Paterson became associated with old New Orleans Railway & Light Company, predecessor of the New Orleans Public Service, Inc., as engineer in an advisory capacity, and soon after the reorganization of the company, under the name of New Orleans Public Service, Inc., was appointed general manager. Later he was elected a vice-president of the company, and last year was made a member of the board of directors.

### Carl H. Schildgen North Shore Industrial Agent

A new phase in an organized effort to locate new industries in the territory served by the Chicago North Shore & Milwaukee Railroad and associated lines has been entered by appointment of Carl H. Schildgen as industrial agent

in charge of industrial development on the North Shore and the Chicago, Aurora & Elgin Railroad. Charles G. Finnegan has been named assistant industrial agent on both roads by Col. R. H. James, vice-president in charge of traffic.

Mr. Schildgen was formerly general freight agent of the North Shore Line and Mr. Finnegan has been actively identified with industrial development on the North Shore Line for some time.

Gorman Bennett has taken over Mr. Schildgen's former duties in addition to his own work in charge of less-than-carload freight business.

### Robert Ridgway to Assist in Chicago Subway Work

Robert Ridgway, chief engineer of the Board of Transportation of New York City, was appointed on July 14 chief consulting engineer of the Chicago subway. He will serve Chicago with the consent of the Board of Transportation.

Mr. Ridgway has been chief engineer of the Board of Transportation since its organization in 1924. When he became associated with the old Rapid Transit Construction Commission in 1900 in building the New York's first subway he had already achieved a record in railroad construction in the West and in building the New York City aqueduct for water supply.

His advice has frequently been sought on subway building in European and South American cities and he has made frequent trips abroad to study rapid transit. In 1927 he aided engineers in the location of the bridge across San Francisco Bay. He was also a member of the commission which picked the Boulder Dam power site. Last year he was a delegate to the World Engineering Congress in Tokyo.

### L. V. Johnston Master Mechanic at Peoria

Leonard V. Johnston, formerly in charge of maintenance of buses for the Peoria Division of the Illinois Power & Light Corporation, has been appointed master mechanic, succeeding A. T. Leech, deceased. Mr. Johnston went to Peoria in 1915 as maintenance man and engineer for several different power plants. In 1921 he went to work for the Illinois Traction System at the Peoria plant as maintenance man and engineer. Four years later he was promoted to the position of chief engineer. He was placed in charge of the maintenance of buses in 1929.

Mr. Johnston's career has been a varied one. In 1906 and 1907 he was in the employ of the Thomas Fee Construction Company, Chicago, building a dam across the St. Croix River at St. Croix Falls, Wis. From 1907 to 1910 he was in train service on the Northern Pacific between St. Paul and Duluth. After three years of this he worked as construction foreman for the Hydraulic Engineering Company on the building of the Keokuk dam at Keokuk, Iowa. Thence he went to Peoria.

### C. D. Emmons President of the Hudson Tubes

Charles D. Emmons, formerly president of United Railways & Electric Company of Baltimore, has been elected president of Hudson & Manhattan Railroad, New York, effective on Sept. 1, succeeding Oren J. Root, resigned.

Mr. Emmons has had long experience in public utility and railroad work. Having graduated in 1892 from the University of Pittsburgh, with the degree of civil engineer, Mr. Emmons during the following nine years served in the engineering department of the Pennsylvania Railroad. From 1901 to 1903 he served as general superintendent of the Lafayette Street Railway, Lafayette, Ind., and from 1903 to 1911 was general manager of the Ft. Wayne & Wabash Valley Railway, Fort Wayne, Ind. In the succeeding four years he was with the Chicago, South Bend & Northern Indiana Railway.

In 1916 Mr. Emmons became vice-



C. D. Emmons

president and general manager of the Boston & Worcester Street Railway, and in 1918 general manager of the Boston Elevated Railway. From 1919 until his recent resignation he was president of the United Railways & Electric Company of Baltimore.

In 1922-23 Mr. Emmons was president of the American Electric Railway Association.

### K. D. Pulcifer in Charge of Pennsylvania Publicity

K. D. Pulcifer has been made manager of the publicity department of the Pennsylvania Railroad. He succeeds G. B. Harley, who has been appointed special assistant to the vice-presidents.

Mr. Pulcifer has been editor of the *Pennsylvania News*, Western region edition, the employee semi-monthly newspaper of the railroad. He was a staff writer for the Associated Press prior to his connection with the railroad.

Ray D. Casey, formerly special publicity representative of the Pennsylvania in Philadelphia, succeeds Mr. Pulcifer as editor of the *Pennsylvania News* in Chicago. G. E. Payne has been appointed assistant publicity manager in Philadelphia.

## T. H. Tutwiler Withdraws from Active Business

T. H. Tutwiler, president of the Memphis Street Railway, Memphis, Tenn., for 25 years, and president of the Memphis Power & Light Company since its reorganization seven years ago, has resigned both of these posts as part of his plan to withdraw from all active participation in business as an executive.

Mr. Tutwiler's most outstanding contributions to the electrical industry were in the railway field, where he has been long recognized as an organizer and builder. A Southerner by birth—a Virginian—his first efforts were in that section of the country with the Georgia-Pacific Railway and the Louisville, New Orleans & Texas Railroad. From 1892 to 1901 he was engineer in charge of the larger part of the New Orleans Street Railway system. He then became associated with Ford, Bacon & Davis as engineer of the Birmingham Street Railway, and was also associated with Ford, Bacon & Davis as one of the engineers



T. H. Tutwiler

in charge of converting the railway system of the two Kansas Cities from cable to electric power. In 1903 and 1904 he had charge of the rehabilitation of the Nashville Street Railway system, being associated with Ford, Bacon & Davis in that work also.

In 1905, at the invitation of the Newman interests, Mr. Tutwiler removed to Memphis as vice-president and operating general manager of the Memphis Street Railway, of which he became president in 1906. It was through his efforts and ability that the system was placed on such a solid basis of operation that it conspicuously withstood the harassing conditions which afflicted practically all electric railway systems following the World War. He practically rebuilt the entire system of the Memphis company. On Jan. 1, 1923, at the termination of the receivership of the Memphis Gas & Electric Company, Mr. Tutwiler was made president of the reorganized company, known as Memphis Power & Light Company. He is a member of the American Society of Civil Engineers, Engineers Club of Memphis and Louisiana Engineering Association.

E. L. Moore, who succeeds the late G. R. Millican as general superintendent

of the Evansville & Ohio Valley Railway, Evansville, Ind., has been in the employ of the company for 22 years. In 1908 he went to Evansville from his home city of Columbus, Ind., where he was employed by the Interstate Lines. At Evansville he became trainmaster and later superintendent of transportation for the Evansville & Ohio Valley Railway.

## J. R. Snider Chief Operating Executive at Grays Harbor

J. R. Snider, veteran southwest Washington utility executive, is the new vice-president and general manager of the Grays Harbor Railway & Light Company. Mr. Snider, manager of the Willapa Electric Company, Raymond, Wash., for many years, will retain his position as head of the neighboring utility in addition to his responsibilities as general manager at Grays Harbor. He also will continue as active head of the Western Washington Electric Light & Power Company.

Mr. Snider has been connected with the electrical industry in western Washington since 1912 when Sanderson & Porter did development work on Willapa harbor. He became manager of the Willapa Electric Company in 1917, and has since continued in that capacity.

Mr. Snider is a native of Wisconsin. He was graduated from the law school of the University of Wisconsin, and was admitted to the bar in that state.

Mr. Snider succeeds the late W. W. Briggs as head of the electrical operations on Grays Harbor, directed, since the death of Mr. Briggs on Dec. 9, 1929, by the other officers and department heads.

## David E. Matthews South Shore Superintendent

David E. Matthews has been appointed general superintendent of the Chicago, South Shore & South Bend Railroad to succeed J. K. Gray, retired, effective Aug. 1.

Mr. Matthews goes to the South Shore Line with a background of more than 40 years of practical railroad experience. He was connected with the Pennsylvania Railroad for 21 years, starting as a brakeman and becoming successively freight conductor, passenger conductor, yardmaster, and assistant to the superintendent, doing special supervisory work. He has been railroad inspector and examiner for the Public Service Commission of Indiana since its creation, and with its predecessor, the old Railroad Commission since 1905.

Mr. Matthews' whole career has been closely identified with railroad operation, including the investigation of accidents, handling of traffic and inspection of equipment. He has been active in the promotion of safety to passengers and employees on the Pennsylvania System and later in connection with his work for the Public Service Commission.

Mr. Gray, who is retiring, has served as general superintendent of the South Shore Line for the past thirteen years. Previously he was superintendent for six years, and assistant superintendent for one year.

## W. D. Kyser Heads Memphis Utilities Including Railway

W. D. Kyser, a Memphis lawyer, has been elected president and general counsel of the Memphis Power & Light Company. His election followed the resignation of T. H. Tutwiler, president of the company since its reorganization seven years ago. Mr. Kyser also has been named president of the Memphis Street Railway, a subsidiary. He has been president of the West Tennessee Power & Light Company for nearly two years and vice-president and attorney for the Memphis Natural Gas Company. He will retain both offices. The West Tennessee Power Company is a member of the Electric Bond & Share group with the Memphis Power & Light and the Memphis Street Railway. Thus Mr. Kyser becomes the dominant figure in the principal public utilities at Memphis. He will retain his partnership in the law firm of Wilson, Kyser, Armstrong & Allen.

Mr. Kyser has practiced law in



W. D. Kyser.

Memphis for more than twenty years. He was born in Richmond, Ala., on July 17, 1882, and received his early education there. He was graduated from the University of Alabama in 1903 with the degree of Bachelor of Arts. Later he earned an L.L.B. degree from Cumberland University.

Entering the practice of law in Memphis after leaving Cumberland, he became associated with the firm of Carroll & McKellar in Memphis, and, in 1909, formed a partnership with Mr. McKellar, now United States Senator.

Senator McKellar and Mayor Overton have retired from active membership in the law firm since entering politics. Judge Julian Wilson and Walter Armstrong only recently became partners with Mr. Kyser and Mr. Allen.

Mr. Kyser has made only one venture into politics—when he served as United States District Attorney for the western district of Tennessee from 1917 to 1921.

L. Mackinnon, general manager of Glasgow Tramways, and F. A. Fitzpone, general manager of Edinburgh Tramways, have been elected president and vice-president respectively of the Scottish Tramways & Transport Association for the ensuing year.

## H. B. Flowers Resigns from New Orleans Public Service, Inc.

Herbert B. Flowers, president of New Orleans Public Service, Inc., New Orleans, La., since 1923, has resigned as chief executive of the company, to engage in business in New York in the fall.

Mr. Flowers has been connected with utility concerns for the past 30 years. He assumed the presidency of Public Service in April, 1923, soon after the re-organization of the New Orleans Railway & Light Company, succeeding Mr. Hecht, who had been acting as president pending the selection of a head for the enterprise.

He went to New Orleans from Baltimore, where he was then vice-president and general manager of the United Railway & Electric Company. Prior to his



H. B. Flowers

Baltimore connections, Mr. Flowers had spent seven years with the electrical and transportation departments of the Detroit United Railway.

As head of New Orleans' largest enterprise, Mr. Flowers has been prominently identified with the civic and commercial life of the city, taking an active part in the work of the community chest, the Boy Scouts, and other organizations. He is also chairman of the industrial bureau of the Association of Commerce, and has actively assisted in the work of the national advertising committee of the association, having been in charge of the temporary offices opened by the organization in Chicago and in New York to establish contact with Northern industrial leaders.

## Messrs. Woodworth and Smith in New Vanadium Posts

C. B. Woodworth, who has been manager of the western division of Vanadium Corporation of America at Chicago, has been appointed manager of the railroad division of the corporation. His headquarters will continue in Chicago.

Walter Smith has been appointed assistant manager of the railroad division of Vanadium Corporation. He will also make his headquarters in Chicago.

Mr. Smith was graduated in mechanical engineering, Cornell University, 1909. He entered railway service with the Chicago,

Rock Island & Pacific, and subsequently served the Baltimore & Ohio and the Chicago & Northwestern in various supervisory capacities.

In 1916 Mr. Smith entered the service of Pyle-National Company, Chicago, leaving this company for service in the American Expeditionary Force. After the armistice, he was associated with the Inter-Allied Railroad Commission and supervised the transfer of cars and locomotives in Germany in accordance with reparations agreements.

Upon his return to this country, Mr. Smith resumed his service with the Pyle-National Company, with which he was engaged as special representative on sales and service work until his association with Vanadium Corporation of America.

## Brooklyn Man to Instruct Buenos Aires Operators

Theodore Francis Kramer, instructor of motormen for the Brooklyn-Manhattan Transit Corporation, Brooklyn, N. Y., has left for South America to take charge of the Buenos Aires Central Railroad Company's operating force. Just previous to his departure his associates presented him with a handsome traveling bag, with all the necessary toilet requisites, a fitting reminder of their good wishes for his welfare. The Buenos Aires Central Railway is getting ready to operate its newly built subway in Buenos Aires, and asked one of the engineers of Dwight P. Robinson & Company to designate a man from the Brooklyn company who could take charge of their operative force, and give them the necessary instruction on the Westinghouse Air Brake System. Mr. Kramer was the one decided upon. He was approached and accepted the post, the Brooklyn company giving him the needed leave of absence during the temporary assignment to the system at Buenos Aires.

## Giuseppe Faccioli Retires From Active Service

Giuseppe Faccioli, widely known electrical engineer, has relinquished his duties as Pittsfield works engineer and associate manager of the Pittsfield works of the General Electric Company and assumed the position of consulting engineer.

Born in Milan, Italy, Giuseppe Faccioli came to this country more than 25 years ago. He was employed by the New York Edison Company and later by the Interborough Rapid Transit Company. He then became a designing engineer for the Crocker-Wheeler Company. It was during the latter period that he met William Stanley, then wrestling with his new alternating current generator. Mr. Faccioli figured to the precise amperage which a given machine would deliver, whereas anywhere within 10 per cent would have been considered remarkable.

Soon after that he came associated with Mr. Stanley at the latter's home in Great Barrington. In 1908 he became identified with the Pittsfield works of the General Electric Company where his mathematical genius proved unusually valuable in all problems pertaining to the products of that plant, mainly transformers. Mr. Faccioli also spent considerable time at Schenectady where he was associated with the late Dr. Charles P. Steinmetz.

## H. W. Smith Succeeds Late A. E. Harvey at Kansas City

Howard W. Smith, connected with the engineering and way and structures department of the Kansas City Public Service Company, Kansas City, Mo., since 1911, has been appointed to the office of superintendent of way and structures with that company, to fill the vacancy caused by the death of A. E. Harvey.

Before his entry into the street railway business, Mr. Smith was widely known on the steam roads of the Northwest. He pioneered in the survey for the Puget Sound division of the Chicago, Milwaukee & St. Paul road. He went to the Kansas City property as an assistant engineer, and served in that capacity until the organization of the



H. W. Smith

Kansas City Railways under the direction of Philip J. Kealy when he was made assistant superintendent of way and structures, directly under Mr. Harvey.

In 1926, when the Public Service Company took over the property and a city-wide program of reconstruction was started under the direction of a construction department organized for the purpose, Mr. Smith was appointed superintendent of way and structures. The construction department was placed under the direction of Mr. Harvey.

When the reconstruction work was complete in 1928, the construction department was disbanded and Mr. Harvey was again returned to the head of the way and structures department with Mr. Smith as his assistant.

Mr. Smith was born in Grand Rapids, Mich., in 1883. There he lived until 1903 when he went to Kansas City. From 1902 until 1906 Mr. Smith was actively engaged in road survey work in Missouri and in Michigan. From 1906 to 1909 he was resident engineer in the construction of the Pacific Coast extension of the Chicago, Milwaukee & St. Paul Railroad.

W. C. Ludwig, superintendent of transportation for the United Railways & Electric Company, Baltimore, recently completed 50 years of service with the Baltimore system and was tendered a dinner by the line superintendents of the company. He became connected with the system as a hill-boy for the City Passenger Railway.



## Chairman of Toledo Control Board Resigns

W. W. Knight, a member of the board of street railway control at Toledo, Ohio, for nearly ten years, and recently the chairman of the board, has submitted his resignation to Mayor W. T. Jackson due to his change of residence. Mr. Knight helped to draft the Milner ordinance, under which the Community Traction Company operates, and has continued to serve as one of the three members of the board ever since.

## Frank E. Belleville Made Secretary at Louisville

Frank E. Belleville has been elected secretary of the Louisville Railway, Louisville, Ky., to fill the vacancy created by the resignation of Samuel Riddle. Mr. Belleville will retain his position as general auditor in addition to acting as secretary.

Mr. Belleville was born in Rutland, Vt., on Dec. 18, 1883. He was connected with the Rutland Railway, Light & Power Company from 1901 to 1907, at which time he went with the United Traction Company, Albany, N. Y. He remained with this company until



F. E. Belleville

March, 1909, when he became auditor of the Schenectady Railway, Schenectady, N. Y. In 1920 he went to Louisville as general auditor of the Louisville Railway and subsidiaries.

## J. G. Naughton in New Office With Indiana Interurban

John G. Naughton has been appointed general freight and passenger agent of the Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind., to succeed John H. Crall, resigned.

Mr. Naughton started his railway career as secretary to the superintendent of the Lake Erie & Western Railroad at Lafayette, Ind., in 1908. He entered the employ of the T. H. I. & E. several years later as chief clerk of the traffic department. In 1929, he was made assistant general freight and passenger agent and succeeded Mr. Crall on June 1 of this year.

Mr. Naughton is a member of the storage and demurrage committee of the Central Electric Traffic Association and of the Traffic Club of Indianapolis.



R. E. Cosgrove

## "Bob" Cosgrove Relinquishes Post at Springfield

Robert E. Cosgrove has resigned as superintendent of the traffic department of the Springfield Street Railway, Springfield, Mass., effective July 31. Oversight of traffic will be vested in H. M. Flanders, general manager.

"Bob" Cosgrove is known far and wide in the Springfield-Worcester district, largely because of his connection with the railways there, which began in 1906. At one time seventeen companies in the railway field were affiliated with the group with which he was identified. In his post of freight and passenger agent in charge of passenger traffic, freight traffic, tariffs, rates and other similar matters, he was for many years the contact man of the company. He has acted in the same capacity up to the present time and has made up all tariff rates and schedules of all companies with reference to fares and fare collections, and he had direct charge of trolley freight until that service was abandoned a few years ago. Mr. Cosgrove also devised and placed in operation the present system of transfers and tickets in Springfield and Worcester.

"Bob" Cosgrove was born in Winchester, Mass., Sept. 24, 1885. He was graduated from Winchester High School and Burdette College, Boston. He held a position as stenographer with the Corporation Trust Company, Boston, and entered the employ of the New England Investment & Securities Company, controlling the Springfield, Worcester and other electric railways, on Dec. 13, 1906, as stenographer and order clerk in the office of J. F. McCabe, purchasing agent.

When the Legislature of Massachusetts passed a law which forced the New Haven Railroad to divest itself of all of the electric railways in Massachusetts, the offices then in the South Station Building, Boston, were moved to Springfield. This occurred Sept. 24, 1908.

At the time of the removal to Springfield, "Bob" acted as stenographer to C. V. Wood, general traffic manager. When Mr. Wood was made vice-president of the companies, Mr. Cosgrove was appointed freight and passenger agent, in charge of passenger traffic, freight traffic, tariffs, rates, etc.

## R. L. Hermann Heavy Traction Representative

R. L. Hermann, formerly transportation manager of the Southwestern district of the Westinghouse Electric & Manufacturing Company, has recently been appointed heavy traction representative, with headquarters in New York. With the exception of three years of service in the army, he has been identified with the Westinghouse Company continuously since his graduation from the University of Illinois in 1915.

## C. J. Roggi on Journal Staff

Charles J. Roggi has joined the staff of *ELECTRIC RAILWAY JOURNAL* as assistant editor. Mr. Roggi, a recent Massachusetts Institute of Technology graduate, directed his entire collegiate training toward the field of transportation.

His work at M.I.T. began in 1925 with his enrollment in the five-year co-operative course in electrical engineering during which he obtained about 68 weeks of co-operative practice with the Boston Elevated Railway. This practice was in the nature of a student apprentice course in which he spent some time in practically every department of the company.



C. J. Roggi

Not content with that, he attended the Harvard School of Business Administration during his last year at "Tech." There, as a special student, he took courses in traffic management and public utility management. He was graduated from M.I.T. this year with B.S. and M.S. degrees. Mr. Roggi was born in Brooklyn, N. Y., in 1907.

## Major James A. Fagan Retires

Major James A. Fagan, for 31 years an engineer with the Ohio Valley Electric Railway, Huntington, W. Va., and for many years chief engineer and engineer of maintenance of way of the company, has resigned. Major Fagan is now on a vacation in the West. He went to Huntington when the railway, then in its infancy, was owned by the late Senator J. M. Camden and his associates. In his early days with the company he supervised the building of the carhouses at Huntington and at Ashland and Kenova and has since taken an active part in practically all improvements carried out by the company.

## Thomas Nicholl Will Succeed Mr. Scullin With Cleveland Road

Terance Scullin, veteran superintendent of buildings and equipment of the Cleveland Railway, Cleveland, Ohio, retired on pension July 31 under the company's retirement and benefit plan. Mr. Scullin has been in the employ of the railway for 42 years. He started under the late John J. Stanley when the latter was his father's assistant on the old Broadway & Newburgh Railway.

Mr. Scullin had been superintendent of buildings and equipment since 1909 and is responsible for many of the mechanical advances made by the company, including the development of the Peter Witt type of car.

Dr. George D. Upson, chief of the medical division of the accident department, will retire at the same time. He has been in the employ of the company for more than twenty years.

Mr. Scullin will be succeeded by Thomas Nicholl, who joined the research department of the company in 1929. Mr. Nicholl received his engineering education at the University of Michigan and until 1917 was superintendent of a utility property in Indiana operating in the power and railway fields. During the World War he was an infantry captain and later was superintendent of equipment of the Union Traction Company of Anderson, Ind. He is chairman of the committee on equipment of the American Electric Railway Association. He was also the first president of the Central Electric Railway Equipment Association, and is now chairman of that association's standardization committee.

Dr. J. G. Jones, who has been in the medical division of the Cleveland Railway since 1922, will succeed Dr. Upson.

Another Cleveland Railway promotion announced by President Alexander is the appointment of J. W. Kellison as assistant superintendent of buildings effective Aug. 1. Mr. Kellison was the first man employed by Colonel Alexander when the latter built the power plant for Tom L. Johnson's 3-cent fare line. He has been with Colonel Alexander ever since, serving in the executive department from 1920 to the present time.

### C. T. Long Succeeds J. A. Fagan at Wheeling

C. T. Long, engineer of the Public Service Company, Portsmouth, Ohio, has been appointed chief engineer of the southern division of the Ohio Valley Electric Railway. He will succeed Maj. James A. Fagan, who recently resigned. The division over which he will have supervision includes Huntington, Ashland, Portsmouth, Ironton and Wildwood, N. J.

Other changes in the personnel of the organization included the appointment of Carl J. Phipps, general superintendent to succeed Mr. Long as manager of the Portsmouth Public Service Company, a subsidiary.

Arch J. Riggell has been made assistant to the general manager in charge of transportation and Ham Adams, formerly in charge of personnel, will become sales manager.

## OBITUARY

### A. E. Harvey

Alfred E. Harvey, superintendent of the way and structures department of Kansas City Public Service Company since April, 1911, died on July 3. Mr. Harvey was appointed to the position by the late John M. Egan when Mr. Egan was at the head of the railway. He had been previously associated with Mr. Egan in the steam railroad work as an engineer. Mr. Harvey also served the Chicago, Burlington & Quincy, the Chicago Great Western and the Kansas City Southern roads.

When the present operators of the Kansas City railway took over the property following the reorganization there, a special department known as the construction department was established to



A. E. Harvey

take charge of a city-wide reconstruction program. Mr. Harvey was placed in charge of the new department. The Mill Street viaduct on the Dodson line—one of the city's most ornamental bridges—was also constructed under Mr. Harvey's supervision.

Mr. Harvey was the pioneer of present day track construction. Many of his experiments with steel and concrete in track work were nationally observed. He also developed many of the labor saving machines now in use on track work and paving projects. His first experiments were made on the Main Street track in 1912—the first concrete track laid in Kansas City. At that time the steel tie had not been fully developed and part of the Main Street work was poured over standard oak ties. Individual steel ties were, however, used in that portion of the Main Street track adjacent to the Union Station and on the viaducts and its approaches near the Station.

Another of Mr. Harvey's early experiments with concrete track construction was along Prospect Avenue from 39th to 48th Street. There track is constructed for half of its length over wood ties and for the rest of the distance over what is known as the twin steel tie. The surfacing of this track also introduced an innovation in construction work. This job was topped with crushed granite made from old paving blocks. For the crushing of these blocks Mr. Harvey designed a special crusher. Many of the practices of bonding the rails in city street track construction now in use were the outcome of experi-

ments made by Mr. Harvey in Kansas City.

Mr. Harvey was also the author of many articles on track construction, and was a frequent contributor to *ELECTRIC RAILWAY JOURNAL*.

Mr. Harvey was born at Waverly, Ill., in 1868. He was a graduate of the civil engineering school of the University of Illinois, class of 1894. In 1893 Mr. Harvey served as assistant engineer in charge of water supply and sewers at the Columbian Exposition in Chicago.

At the time of his death Mr. Harvey was president of the Kansas City chapter of the American Society of Civil Engineers and a member of the standing committee on way and structures of the American Electric Railway Association. He was a past president of the Engineers Club of Kansas City.

### B. O. Brill

Byron O. Brill, general purchasing agent of the J. G. Brill Company, died suddenly in the Presbyterian Hospital, Philadelphia, on July 21, after a short illness.

Byron Brill joined the Brill company in 1898, and with the exception of six years from 1900 to 1906, when he was with the General Electric Company, at Schenectady, he has been connected with the Brill company. After having charge of lumber purchases, which department he joined in 1908, he was made general purchasing agent in May, 1922.

Mr. Brill was born on Aug. 23, 1879, at Williamsport, Pa. He was educated in the public schools of Williamsport and Philadelphia, and was graduated from the Spring Garden Institute of Philadelphia. His father, George Brill, was one of four sons of J. G. Brill, the founder of the company bearing his name.

Mr. Brill was a charter member of the Purchasing Agents' Association of Philadelphia, a member of the Academy of Fine Arts, Manufacturers Club, C. M. Swain Lodge 654 F. & A. M., Philadelphia Consistory A.A.S.R., and Lulu Temple A.A.O.N.M.S.

### C. W. Dickerson

Clarence W. Dickerson, vice-president and secretary of the Timken-Detroit Axle Company, died on July 1 at his home in Detroit. Mr. Dickerson was born on Dec. 28, 1859, at Brooklyn, N. Y. He was educated in the public schools of Springfield, Mass., and Brattleboro, Vt. He went to Detroit in 1910 as assistant treasurer of the Timken-Detroit Axle Company. His other business affiliations at the time of his death were vice-president and a director of the Michigan Mutual Liability Company, and a director of the Michigan Industrial Bank. For twenty years previous to going to Detroit, Mr. Dickerson was associated in executive capacities with Eastern bicycle companies.

William H. McCurdy, 77 years old, one of the organizers of the Evansville & Ohio Valley Railway, Evansville, Ind., and a director in the company, died recently at San Diego, Cal.

# INDUSTRY MARKET AND TRADE NEWS

## Brooklyn Inaugurates Trolley Bus Service

On Wednesday, July 23, the Brooklyn & Queens Transit Corporation placed in service on the Cortelyou Road line the first trolley bus to be operated in Brooklyn. Operation is between Flatbush Avenue and Coney Island Avenue over a former electric railway route, and is in conjunction with a gasoline bus so that passengers can compare the merits of the two vehicles.

The trolley bus, which is supplied by the Twin Coach Corporation, is provided with leather-upholstered seats of the bucket type, with a seating capacity of 40 passengers. It is equipped with 50-hp. motors and has automatic control. A front entrance door is provided, with treadle-operated rear exit.

Operation on the Cortelyou Road line is of an experimental nature to enable patrons as well as the operating staff of the trolley company to make a practical test of this form of conveyance under actual operating conditions. Pamphlets describing the desirable features of the new vehicle are being distributed to passengers, and suggestions and criticisms are invited from the public.

## Additions to Bates Expanded Steel Corporation

The Bates Expanded Steel Corporation, recently organized, has taken over the business of the Bates Expanded Steel Truss Company. The management is making changes in policies designed to greatly strengthen the corporation's position in its field. New designs of parallel expanded poles have been produced, and the company is actively developing a division for the manufacture of high-voltage transmission structural towers.

Judson F. Stone, of Chicago, is president of the new corporation, and Albert J. Bates, Jr., is vice-president and general manager. Mr. Bates has been closely identified with all activities of the company since 1917.

The corporation's facilities include a designing and engineering department, a large

expanding and structural plant, and a galvanizing plant. Recent orders received include a large galvanized structural tower order from the Byllesby Engineering & Management Corporation for the Louisville Gas & Electric Company.

## General Electric Sales at High Volume

General Electric Company sales billed for the first six months of 1930, announced by President Gerard Swope, amounted to \$197,229,346, compared with \$194,353,308 for the corresponding period last year. Profit available for dividends on common stock for the first six months of 1930 was \$29,273,276, compared with \$30,740,768 for the similar six months last year, or equivalent to \$1.01 per share on outstanding common stock this year and \$1.07 per share for the first half of 1929.

## Valspar Expands

The Valspar Corporation has merged the Detroit Graphite Company of Detroit, Mich., and the Dominion Paint Works, Ltd., of Walkerville, Ont., with its already existing units. These two companies are wholly complementary to the other companies in the Valspar Corporation, both in the lines which they manufacture and in the location of their plants. The plans for consolidating the activities of the Detroit Graphite Company and the Dominion Paint Works with those of the other units of the Valspar Corporation do not contemplate any change in management or loss of identity in these two new subsidiaries.

The headquarters of the Detroit Graphite Company will remain in Detroit. Certain of its officers will be elected directors of the Valspar Corporation.

The Valspar Corporation now includes: Valentine & Company; Detroit Graphite Company; Cie, des Vernis Valentine; Con-Ferro Paint & Varnish Company; Dominion Paint Works, Limited; together with several subsidiary companies located both within the United States and abroad. The corporation also has plants in England and Australia.

## Active Demand for Buses Among the Electric Railways

One hundred and sixty additional Type "250" Yellow buses, for which orders were placed some months ago, have been delivered to Public Service Co-ordinated Transport, Newark, N. J. The same company also received five Mack Model AB, 25-passenger buses, and three Mack Model AB, 29-passenger buses, all for city service and all equipped with gas-electric drive.

General Motors Truck Company also reports delivery of fifteen Type Z-225 buses to the Fifth Avenue Coach Company, of New York City, and ten Type "250," 33-passenger observation coaches to the Philadelphia Rapid Transit Company. Other General Motors Truck deliveries include five Type W, 21-passenger city service buses to the Waverly, Sayre & Athens Traction Company, Waverly, N. Y.; five Type Z, 38-passenger city service buses to People's Motor Bus Company, St. Louis, Mo.; one of similar type to the Boston Elevated Railway; four Type W, 21-passenger buses, and six Type Z, 29-passenger coaches to Coast Cities Railway, Asbury Park, N. J.; and a Type W, 21-passenger coach and a Type Y, 29-passenger parlor bus to Union Street Railway, New Bedford, Mass.

Twin Coach deliveries include ten urban type buses to Schenectady Railway Company, six of similar type to Brooklyn Bus Corporation, and one to Boston Elevated Railway. Seven trolley buses were delivered to Chicago Surface Lines, and a parlor reclining bus went to the Washington Motor Coach Company, of Seattle.

Brooklyn Bus Corporation also took delivery of one Mack Model AB, 29-passenger bus and one Mack Model AC, 29-passenger bus, both of the city service type, and four Mack Model BK, 38-passenger city service buses. Mack International Motor Truck Corporation made delivery of five Model BG chassis

## Electric Locomotives for Great Northern Railroad



Three 260-ton motor-generator type single-phase electric locomotives shown above are being tested for regenerative electric braking on the test tracks of the General Electric Company at Erie, Pa., before shipment to the Great Northern Railway. Four

of these locomotives, practically duplicates of the four General Electric units that are now in operation on the Cascade Tunnel electrification in the state of Washington, are being shipped to the railroad.

to the Fishkill Electric Railway, Beacon. American Car & Foundry Motors Company delivered five 40-passenger units to Boston Elevated Railway, six 23-passenger street car type coaches to the Aurora, Elgin & Fox River Railway, Aurora, Ill., and four 21-passenger parlor type coaches to the Fort Dodge, Des Moines & Southern Transportation Company, Boone, Iowa. Illinois Power & Light Corporation received three 33-passenger street car type coaches.

Boston, Worcester & New York Street Railway, Framingham, Mass., has accepted a White Model 54A bus and four White Model 54 buses. Other White deliveries include six Model 54 buses to West Penn Electric Company; one 54A bus to Washington Motor Coach Company, of Seattle; one Model 54 bus to United Electric Railways, of Providence, and one of similar type to the Los Angeles Railway.

### G. E. Employees Favor Unemployment Insurance

More than 75 per cent of the eligible employees of the General Electric Company have voted to participate in the new General Electric Employees unemployment plan. In proposing this plan, under which the money will be raised by equal contributions from the employees and the company, it was stated that the plan would become effective upon an affirmative vote of 60 per cent of those eligible at each works.

### Westinghouse Equipments for Detroit

The Westinghouse Electric & Manufacturing Company has received an order from the St. Louis Car Company for 65 car equipments to be placed in service in

Detroit in the early fall. Forty-five of these are duplicates of similar equipment now operating in Detroit and twenty will be equipped with the Timken Model 52 truck.

### Electrical Manufacturers to Exchange Technical Information

The English Electric Company announces that it has entered into an arrangement with the Westinghouse International Company and the Westinghouse Electric & Manufacturing Company whereby there will be an exchange of technical information on steam turbines and electrical apparatus. The arrangement includes the granting of licenses for the use of patents for the manufacture and sale of various products.

This arrangement gives the English Electric Company the benefit of the results of the extensive research work carried on by the Westinghouse Electric & Manufacturing Company. The technical and manufacturing link does not carry with it any control from America.

### Ohmer Business Is Good

Some of the more important business received by Ohmer Fare Register Company, Dayton, Ohio, include: Sales of 146 fare registers to the Des Moines Railway and 105 fare registers to an Eastern transportation company.

New long term rental contracts have been closed with the Alabama Power Company for 37 fare registers; with the Northern Indiana Railway for 29 ticket-printing registers; with the East Penn Traction Company for 26 fare registers; with Atlantic City & Shore Railroad for 20 fare registers; with Lehigh Valley Transportation Company for 24 ticket-printing registers.

### Yellow Truck Reports Good Half Year

Report of Yellow Truck & Coach Manufacturing Company, for the six months ended June 30, 1930, shows consolidated net profit of \$1,437,863 after expenses and depreciation.

Consolidated income account for six months ending June 30, 1930, shows net sales of \$26,963,994 as compared with net sales of \$28,671,459 and \$24,893,447 for the corresponding periods of 1929 and 1928, respectively. Net sales for the quarter ending June 30, 1930, were \$16,233,998 as compared with \$15,749,460 for the same quarter of 1929.

Paul W. Seiler, president, says: "The marked improvement in earnings during the second quarter over the first quarter reflects in large measure the influence of orders received during the first quarter. Production on these orders was well under way by the end of the first quarter, but actual deliveries were not made until the second period."

### Bulletin on Electric Railway and Motor Coach Lighting

A new lighting bulletin, E-109 "Lighting Practice for Electric Railways and Motor Coaches" issued by the Westinghouse Lamp Company, contains Sections E 121-29, E 122-28, and E 123-29 of the A.E.R.E.A. Engineering Manual, reprinted by permission of the American Electric Railway Engineering Association.

Recommendations for motor coach and railway car lighting are presented in two sections, each dealing with general principles; lamps for interior and exterior lighting; fixtures and reflectors for interior lighting; head lights; accessory lighting; signal lights; illuminated signs; lighting loads; lighting plans; and wiring diagrams.

A third section contains recommendations for shop, office, and yard lighting with divisions on lamps; reflecting accessories; lighting intensities; foot candle intensities; shop lighting; car inspection pits; office lighting; yard lighting; distributed lighting; and flood-lighting.

All recommendations embodied in this bulletin were compiled by A.E.R.E.A. Rolling Stock Committee No. 4—Lighting, of which R. W. Cost, Westinghouse Lamp Company is chairman.

### Electric Railway Material Prices—August, 1930

Metals—New York	
Copper, electrolytic, delivered, cents per lb.	11.00
Lead, cents per lb.	5.25
Nickel, cents per lb., ingot	35.00
Zinc, cents per lb.	5.10
Tin, Straits, cents per lb.	30.125
Aluminum, 98 to 99 per cent, cents per lb.	23.30
Babbitt metal, warehouse, cents per lb.:	
Commercial grade	36.00
General service	31.00
Bituminous Coal	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	\$4.15
Somerset mine run, f.o.b. mines, net ton	1.75
Pittsburgh mine run, Pittsburgh, net ton	1.45
Franklin, Ill., screenings, f.o.b. mines	1.70
Central, Ill., screenings, f.o.b. mines	1.15
Kansas screenings, Kansas City	1.85
Track Materials—Pittsburgh	
Standard steel rails, gross ton	\$43.00
Railroad spikes, drive $\frac{1}{2}$ in. and larger, cents per lb.	2.80
Tie plates (flat type), cents per lb.	2.075
Angles bars, cents per lb.	2.75
Rail bolts and nuts, cents per lb.	3.90
Steel bars, cents per lb.	1.70
Ties, white oak, Chicago, 6 in. x 8 in. x 8 ft.	\$1.40
Hardware—Pittsburgh	
Wire nails, base per keg	\$2.15
Sheet iron (24 gage), cents per lb.	2.50
Sheet iron, galvanized (24 gage), cents per lb.	3.20
Galvanized barbed wire, cents per lb.	2.85
Galvanized wire, ordinary, cents per lb.	2.80
Waste—New York	
Waste, wool, cents per lb.	10.00 to 15.00
Waste, cotton (100 lb. bale), cents per lb.:	
White	9.00 to 12.00
Colored	6.00 to 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.	13.75
Turpentine (bbl. lots), per gal.	0.47
Putty, 100 lb. tins, cents per lb.	5.725

Wire—New York	
Copper wire, cents per lb.	12.75
Rubber-covered wire, No. 14, per 1,000 ft.	\$5.05
Weatherproof wire base, cents per lb.	14.00

Paving Materials	
Paving stone, granite, 5 in., f.o.b.:	
New York—Grade 1, per thousand	\$150.00
Wood block paving 3 $\frac{1}{2}$ x 16 lb. treatment, N. Y., per sq. yd., f.o.b.	2.50
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 $\frac{1}{2}$ x 8 $\frac{1}{2}$ x 4, N. Y., per 1,000 in carload lots, f.o.b.	45.00
Crushed stone, 4-in., carload lots, N. Y., per cu. yd., delivered	3.40
Cement, Chicago, in carload lots, without bags, f.o.b.	1.95
Gravel, 4-in., cu. yd., delivered New York	3.40
Sand, cu. yd., delivered New York	2.15

Old Metals—New York and Chicago	
Heavy copper, cents per lb.	8.75
Light copper, cents per lb.	7.75
Heavy yellow brass, cents per lb.	5.25
Zinc, old scrap, cents per lb.	2.25
Lead, cents per lb. (heavy)	4.00
Steel car axles, Chicago, net ton	\$15.25
Cast iron car wheels, Chicago, gross ton	13.75
Rails (short), Chicago, gross ton	14.00
Rails (relaying), Chicago, gross ton (65 lb. and heavier)	28.50
Machine turnings, Chicago, gross ton	6.25

### New General Electric Catalog

General Electric catalog GEA-600A, superseding all previous catalogs issued by the company, with the exception of those dealing with railway, mine and industrial supplies and merchandise products, has been issued. The book contains 1,146 pages, 8x10 $\frac{1}{2}$  in., and is profusely illustrated.

The catalog is thumb-indexed in sixteen sections as follows: Generation, wire and cable, distribution transformers, arresters and capacitors, voltage regulators, switching equipment, switchgear, meters and instruments, lighting equipment, motors, motor applications, industrial control, transportation, industrial heating, miscellaneous, and indexes. In the indexes, products are classified both by subjects and by catalog numbers.

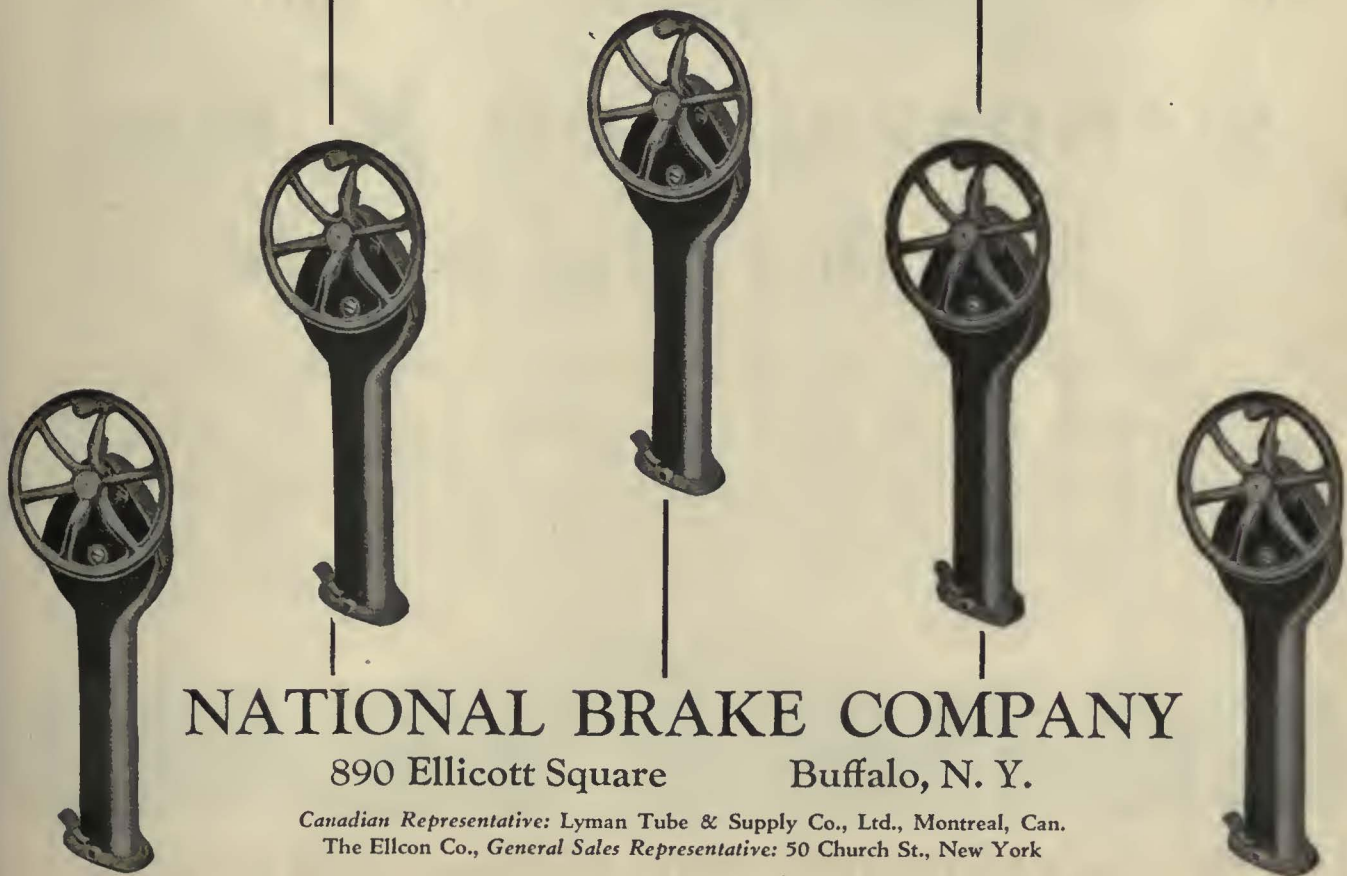
# Peacock Staffless Brakes

Light  
weight

Maxi-  
mum  
power  
(3000 LBS.)  
breaking  
point

Never  
clog  
with  
chain

Lowest  
main-  
tenance  
and  
long life



**NATIONAL BRAKE COMPANY**

890 Ellicott Square

Buffalo, N. Y.

*Canadian Representative: Lyman Tube & Supply Co., Ltd., Montreal, Can.  
The Ellcon Co., General Sales Representative: 50 Church St., New York*



*For the greater efficiency of your fleet—*

**STANDARDIZE ON K RIMS**

*With Disc Type Wheels*

Always safe on the road — locked rim assembly. Tire changes easily and quickly made. Available in all sizes. Standard equipment on many of the largest fleets throughout the country. Equip your fleet now. Specify K rims on new orders.

**GOOD YEAR**

**K RIM EQUIPMENT FOR TRUCKS AND BUSES**



**T**HE GREYHOUND LINES spread their network of coach operations through practically every state in the Union and, on the wheels of Greyhounds, Goodyear Bus Balloons travel more than four hundred million tire miles per year. New York to Chicago in 36 hours. New York to Denver in 65 hours. "Leave Indianapolis 3:30—arrive Cincinnati 8:45." That is the time table scheduling of Greyhound lines. Coaches must be on time. Connec-

tions must be met. Day, night, rain, shine, winter, summer, passengers must ride in comfort and safety—and at attractively low fares. Goodyear Bus Balloons play a tremendous part in such operations. They stand up under the heat generated by rapid travel. Their stamina enables Greyhound Lines to use roomier, all-steel coaches. They add to the comfort of passengers and by the same cushioning bring down maintenance costs. Their power-

ful All-Weather Tread holds the road with sure-footed, tight-gripping safety on hill and curve and rain-swept pavement. Serious delays due to tire trouble are now practically unknown. Here is performance that sets you thinking. Whether you carry passengers, or haul pay load in trucks, Goodyear Bus and Truck Balloon Tires offer you advantages too great to overlook... why not find out exactly what these new tires can do for you?

**GOODYEAR**

THE GREATEST NAME IN RUBBER

... *make every fare* **COUNT!**



by providing a ticket or transfer to meet every possible emergency.

Let Globe help you! Our experience with practically every Electric Railway throughout the country, many of whom are confronted with intricate fare problems, should aid materially in solving your revenue difficulties.

Write Philadelphia or our nearest Branch Manager who is trained in transportation affairs and will gladly show you how we have helped others.

# Globe

## TICKET COMPANY

**Philadelphia**

*Factories:*  
Philadelphia  
Boston  
New York  
Los Angeles  
Atlanta

*Sales Offices:*  
Baltimore  
Cincinnati  
Cleveland  
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## A Comfortable, Sanitary and Modern Seat!

**H**ERE 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.

**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



If you have not received a copy of our new Bus Seat Catalogue, write for it.



**T**HE Texas Company's introduction of low viscosity oils and the entirely new Texaco system of car-journal lubrication has revolutionized lubricating practices in the electric railway industry.

Although it is little more than a year since the first public announcement of this startling development, Texaco Lovis Oil and Texaco Oil Seals are now in use, or are being thoroughly tested out, on many of the important lines of the country.

A number of the electric railways are lubricated entirely under the new Texaco System.

Lubrication problems have been greatly simplified. Journal and bearing maintenance, waste consumption, power and labor costs have been radically reduced. Lubrication costs are actually lower in spite of the higher first cost of the lubricant.

Every electric railway executive should familiarize himself with what is being done. Valuable operating data are now available. Write The Texas Company for full details.



# TEXACO

THE TEXAS COMPANY  
135 East 42nd Street, New York City

# LUBRICANTS

# Achieving Softness with Strength in Upholstery Leather

## PUBLIC UTILITIES CHROME

\* \* \* \* \*

A genuine leather seat upholstery developed by Blanchard Bros. & Lane is now being supplied to Public Service Coordinated Transport of New Jersey.

This is the largest bus operating company in the country whose very size makes it necessary to have intimate knowledge of the modern quality and character of each material required where the maximum comfort, durability and smart appearance are paramount.

Practically all upper shoe leather is Full Chrome tanned which after many years has proven to be the strongest and toughest leather made. Public Utilities Chrome upholstery leather has been developed along the same principle and the maximum of strength, durability and softness has been exemplified to the great fraternity of discreet buyers.

\* \* \* \* \*

### We Also Offer

### OAK TANNED LEATHER

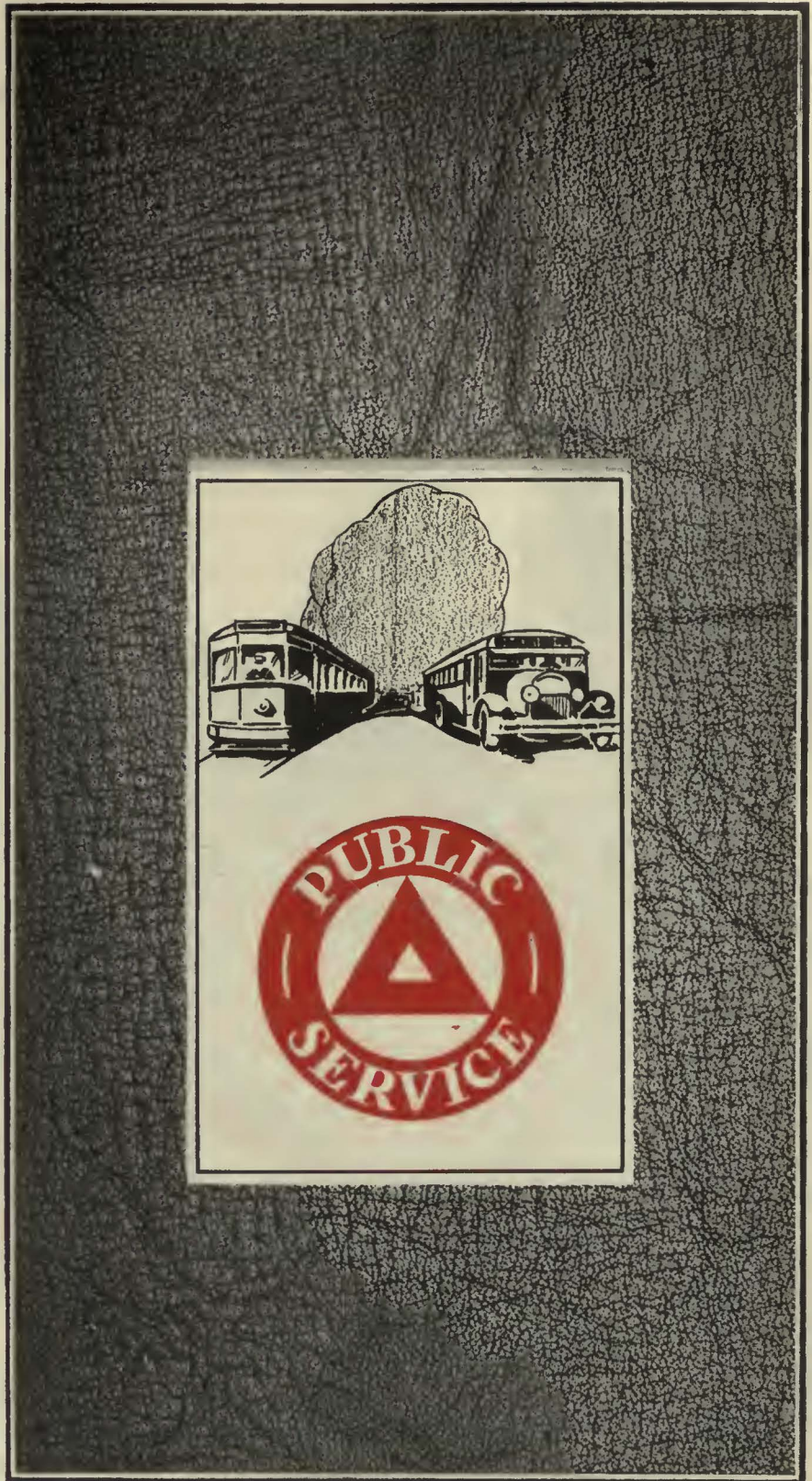
for seat upholstery—a product we have been making for seventy years, constantly taking advantage of modern chemical engineering.

Again we have studied comparative tanning agent values and the achievements of manufacturers of sole leather for shoes. We find that with certain refinements, oak bark offers the best in vegetable tanning for seat upholstery just as it does for the soles of shoes and transmission belting.

Firm, with strong texture, it is still soft and mellow retaining its shape in service. Its freedom from bagging so common to other and cheaper vegetable tannages is its greatest asset. Like the sturdy oak, Buffalo Brand has stood the test of time as it is truly a product of merit in transportation service.

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City of Detroit—Dept. of Street Railways are using Buffalo Brand full grain oak tanned leather (S. A. E. specifications) on the seats of the 130 new cars being built by the St. Louis Car Company.



Established 1860

# BLANCHARD BRO. & LANE

Tanners and Finishers  
NEWARK, N. J.

Sales Representatives

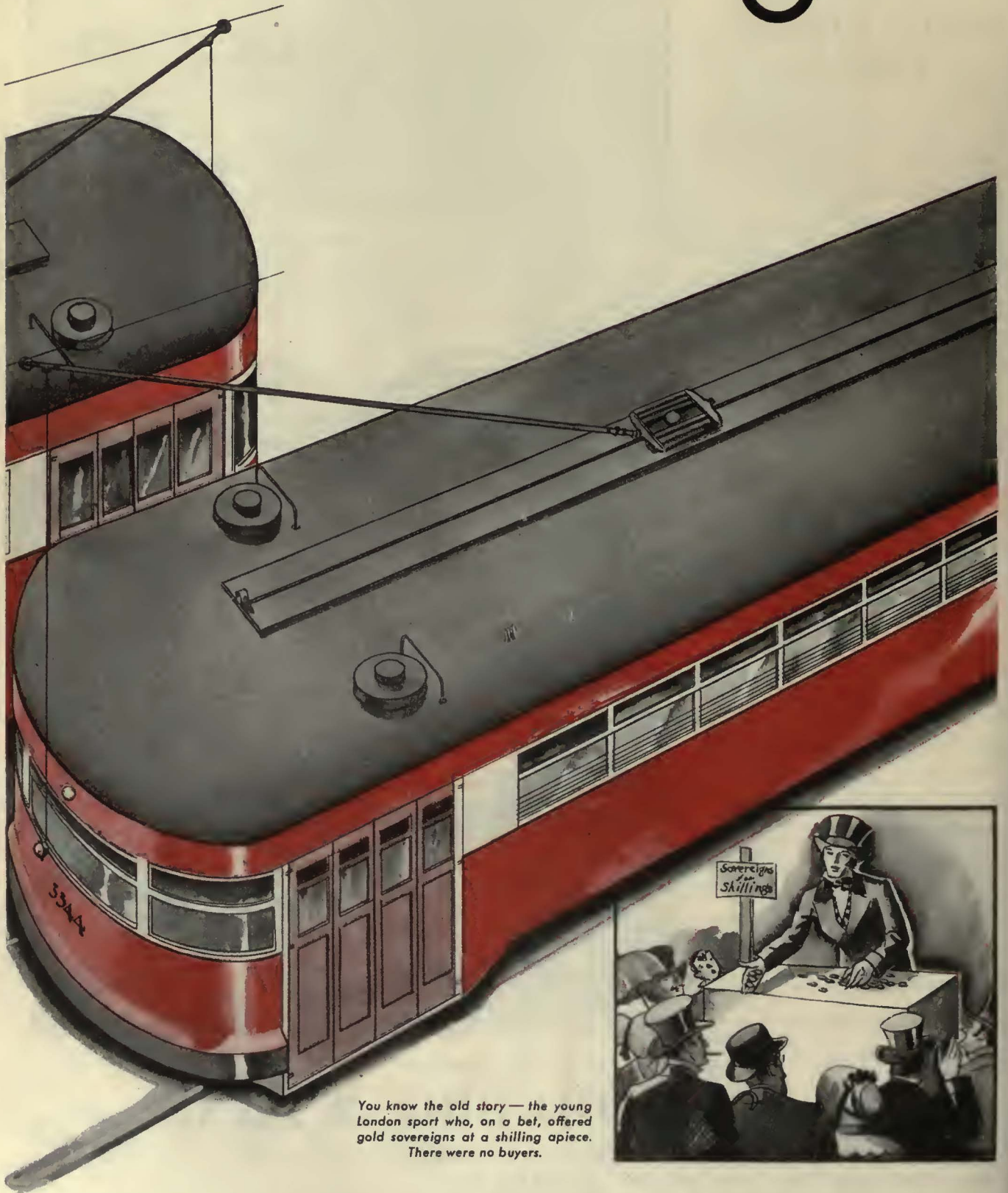
C. S. Withrow  
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Ryan Sales Engineering Co.  
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LaSalle and Wacker Drive, Chicago, Ill.

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# "Sovereigns"

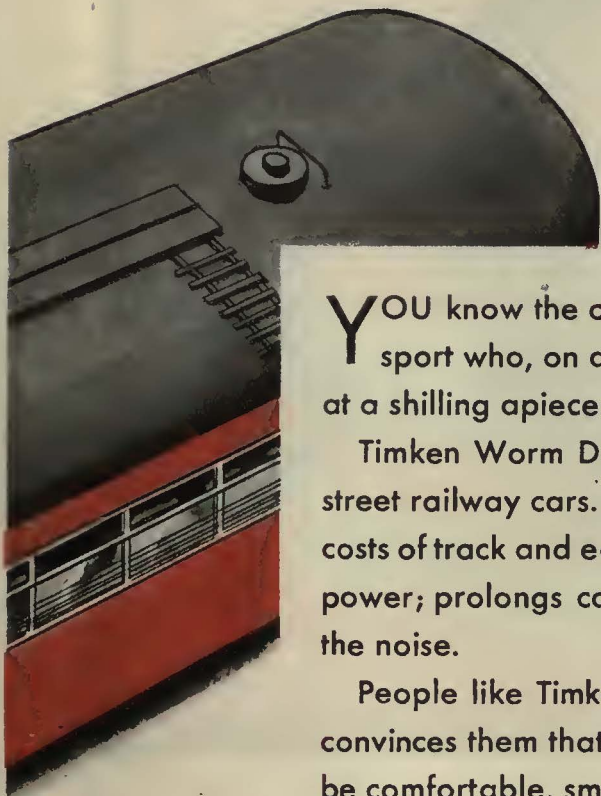


You know the old story — the young London sport who, on a bet, offered gold sovereigns at a shilling apiece. There were no buyers.



## THE TIMKEN DETROIT

# ... a shilling a piece"

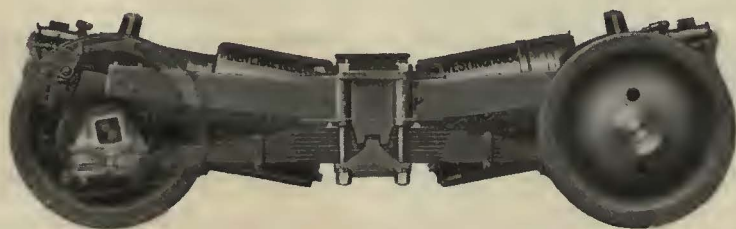


**Y**OU know the old story — the young London sport who, on a bet, offered gold sovereigns at a shilling a piece. There were no buyers.

Timken Worm Drive is logical equipment for street railway cars. It cuts down weight; reduces costs of track and equipment maintenance; saves power; prolongs car life; and eliminates most of the noise.

People like Timken equipped cars. One ride convinces them that street car transportation can be comfortable, smooth, quiet.

Go back to first principles. Bite one of the sovereigns. If it is gold, pay a shilling for it—quick!

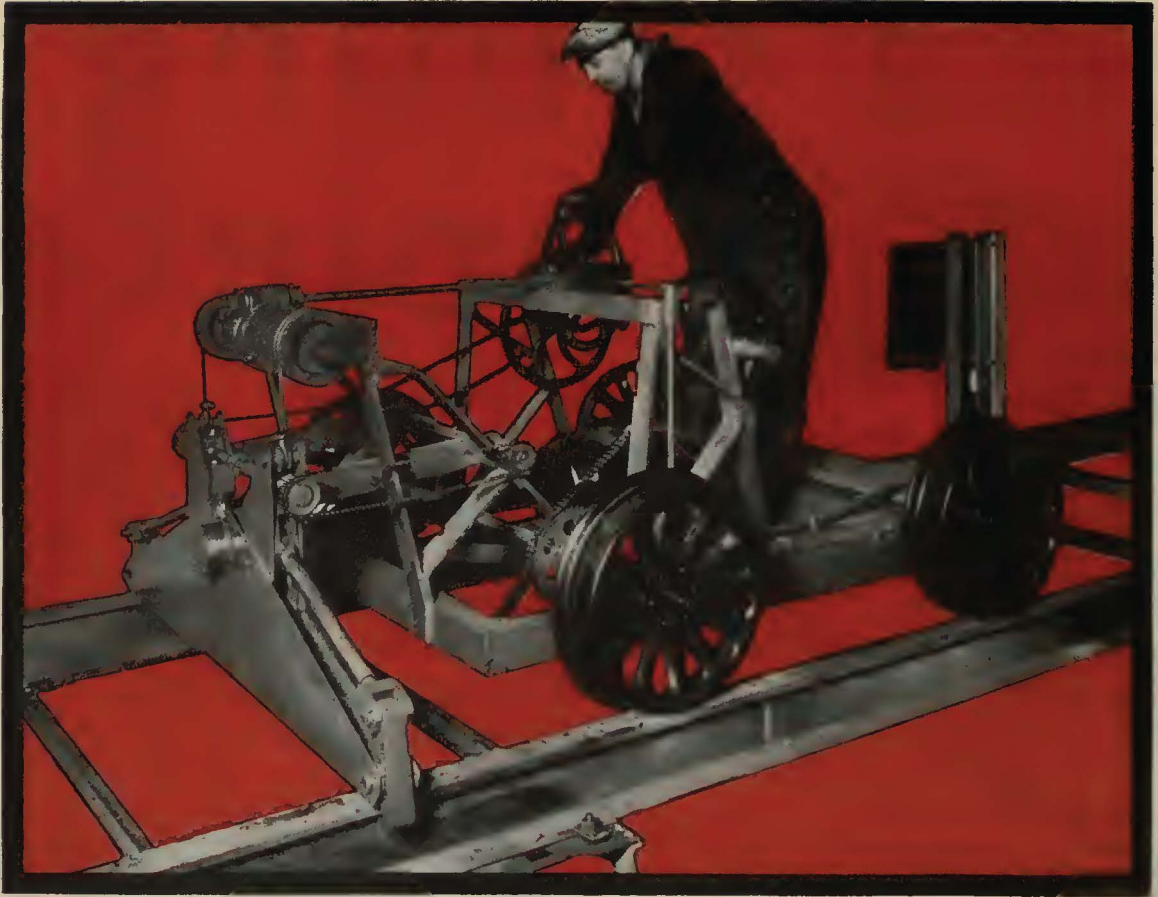


## **TIMKEN** *worm drive* **TRUCKS**

*for electric railway cars*



**AXLE CO., DETROIT, MICH.**



## For Low Cost and Long Life in Paved Track "Mix" Your Steel With the Concrete!

**T**he 7200 vibrations per minute produced by the "Mortar-Flow" Pulsator, when clamped to the track structure as concrete is being placed, are transmitted to all adjacent concrete thus causing it to flow and settle into perfect contact with all the steel of rails and ties.

The flowing action completely fills all voids with cement paste, which bonds to the steel so tightly that it is difficult to remove even when still soft; and, after setting, produces a bond twice as strong as do hand methods.

This combined flow to fill voids and bonding action completely and permanently seals the structure and, in effect, "mixes" the steel of rail and ties with the concrete as effectively as the aggregate is mixed with and covered by cement paste in the drum of a concrete mixer.

In brief, these important benefits to paved track,

where concrete is used either in paving, paving support or as foundation, are:

1. *All voids filled and we don't mean perhaps.*
2. *Strength of bond between concrete and steel increased two to three times.*
3. *The most perfect seal against water entering the structure is provided in this tight concrete-steel bond.*
4. *A denser and more waterproof concrete is produced.*
5. *Excess water is brought to the top of the slab which corrects overwet mixes and increases the strength of concrete.*
6. *Labor cost for leveling and tamping is reduced.*
7. *Maximum results are obtained with Steel Twin Ties in concrete base, but the method and machines are available for all types of paved track construction.*

*Investigate today—quick shipment—reasonable rental charge—  
low initial track costs.*

**THE INTERNATIONAL STEEL TIE CO., Cleveland, Ohio**

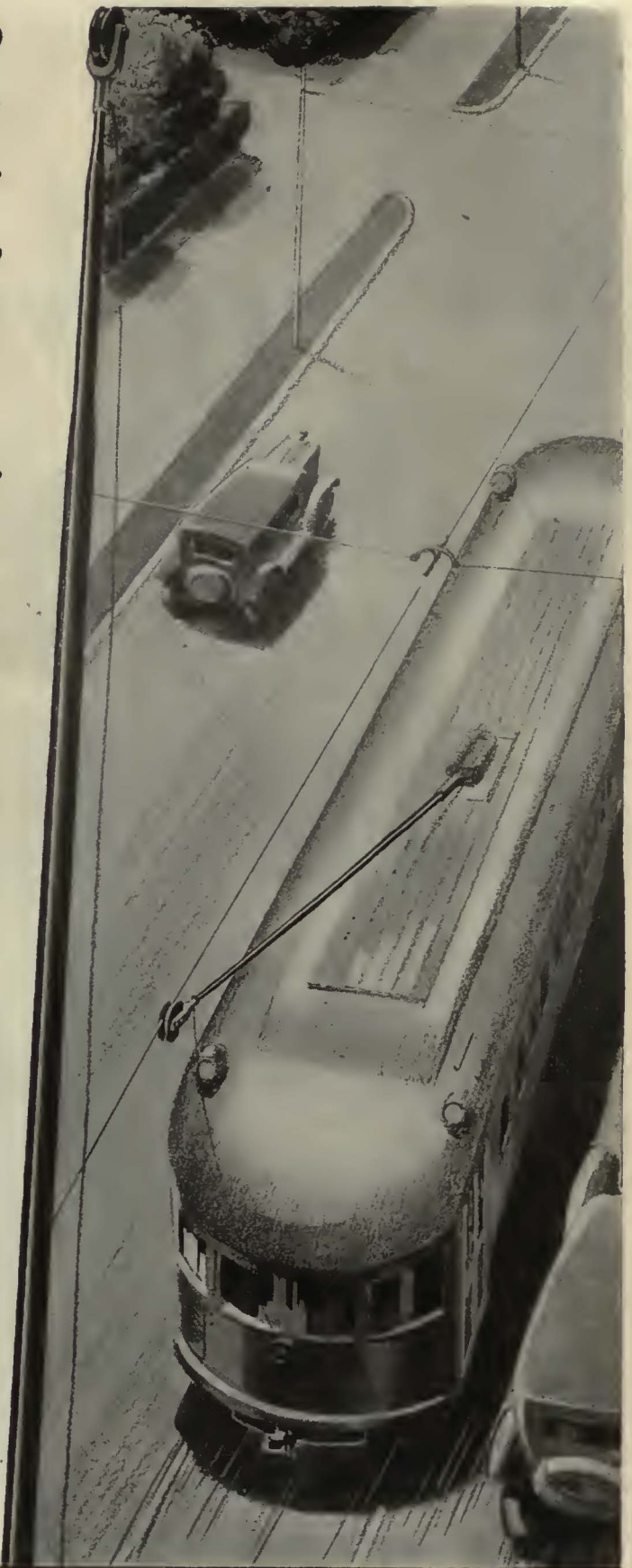
*There are also  
fewer delays  
with Trolley  
Poles that are  
Built to  
Live Long  
and Travel Far*

REGULARITY and efficiency in electric railway service are measured increasingly, today, by the ability of trolley poles to "stay put"—with few repairs or replacements.

To minimize the possibility of any defective pole being installed, every NATIONAL-SHELBY Trolley Pole is individually tested before it leaves the mill—a form of test that approximates actual service conditions. Long life and satisfactory service are assured by the use of a selected grade of steel, which is given special heat treatment prior to the last drawing operation.

NATIONAL-SHELBY Poles have a special reinforcement integral with the body of the pole and so placed as to add great strength without excess weight. Write for complete information.

NATIONAL TUBE COMPANY  
*Subsidiary of United States Steel Corporation*  
PITTSBURGH, PA.



**NATIONAL SHELBY SEAMLESS POLES**

# MASS TESTIMONY

**O**N large fleets and small . . . over good roads and bad . . . through lowlands or down the mountain trails . . . everywhere Silvertowns are "delivering the goods," establishing records for consistently long service, economy, and dependability.

The Silvertown pictured above is "mass evidence" of that fact, standing as testimony for literally thousands of buses on which Goodrich Heavy Duty Silvertowns are faithfully "doing the job" in unceasing day-in and day-out public service.

The B. F. Goodrich Rubber Co., Est. 1870, Akron, Ohio. Pacific Goodrich Rubber Co., Los Angeles, Calif. In Canada: Canadian Goodrich Co., Kitchener, Ont.

**Goodrich** HEAVY DUTY  **Silvertowns**  
SPECIFY GOODRICH ON YOUR NEW BUSES





# WHEELS

*have to stand the test  
of modern demands*

**T**RAFFIC conditions today—peak loads, rapid acceleration, emergency stopping—all these throw a tremendous burden on equipment, particularly the wheels.

Carnegie Wrought Steel Wheels are built to withstand the stress of modern traffic. Wrought Steel is obtained through rolling and forging. A 10,000 ton hydraulic press (twenty million pounds!) refines the steel—insures a homogeneous structure, free from irregularities that might cause trouble. A rolling process further refines and toughens the wearing surfaces. The result is a wheel of exceptional endurance—of exceptional safety. A wheel fit for any service.

Before you invest in new wheels, investigate the many advantages of Wrought Steel. Literature on request.

CARNEGIE STEEL COMPANY • PITTSBURGH, PA.  
*Subsidiary of United States Steel Corporation*

83



# CARNEGIE

## WROUGHT STEEL WHEELS

# Northwestern Motorbus Company



*..... and their continued use of Cities Service products tells its own story of complete satisfaction*

Northwestern Motorbus Company piled up a total of nearly a million miles in 1929. The Company's fleet of 31 buses and trucks used Koolmotor and Cities Service Gasolene, and Koolmotor Bus Oils and Cities Service Greases, exclusively throughout the year.

Northwestern's *continued* dependence on Cities Service products in 1930 tells its own story of complete satisfaction in hard, every-day service.

Users are bound to like Cities Service products because they have undergone the most conclusive of all tests—the test of actual service—in Cities Service's own fleet of more than 4000 motor vehicles.

Cities Service engineers have solved the fuel and lubrication problems of Cities Service transportation fleets. They will gladly study *your* problems and recommend the scientifically correct lubricants and fuels for your equipment.

**CITIES SERVICE COMPANY**

60 WALL STREET

NEW YORK CITY

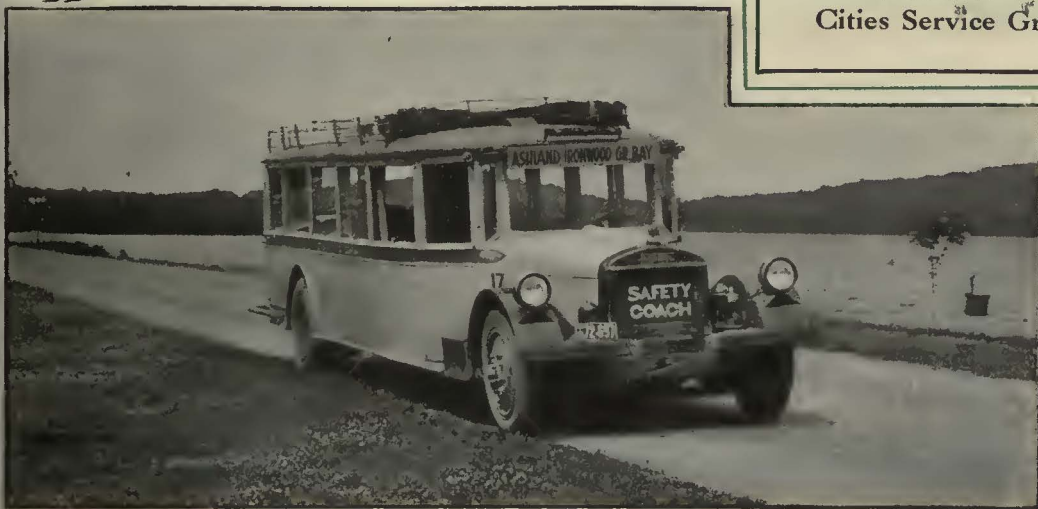


KOOLMOTOR PRODUCTS

# ran 930,750 miles in 1929—on Cities Service Fuels and Lubricants



Company: Northwestern Motor Bus Co., Bessemer, Mich.  
 Number of Vehicles: 17 Buses and 14 Trucks  
 Average Daily Mileage: 2550  
 Passengers Carried in 1929: 352,286  
 Cities Service Products Used:  
 Koolmotor Oils  
 Koolmotor Gasolene  
 Cities Service Gasolene  
 Cities Service Greases



..... so Seattle  
has just bought  
another 5

*Mack*

**Buses**



**In May, 1929, the Seattle Municipal Railway purchased five Mack Model AB 4-cylinder Buses to operate on feeder lines.**

**So successful were these buses, so well did they meet conditions, so low was the average operating cost that —five Mack Model BC 6-cylinder Buses (33 passengers) have just been delivered to Seattle, the first of this new type to be sold on the Pacific Coast.**

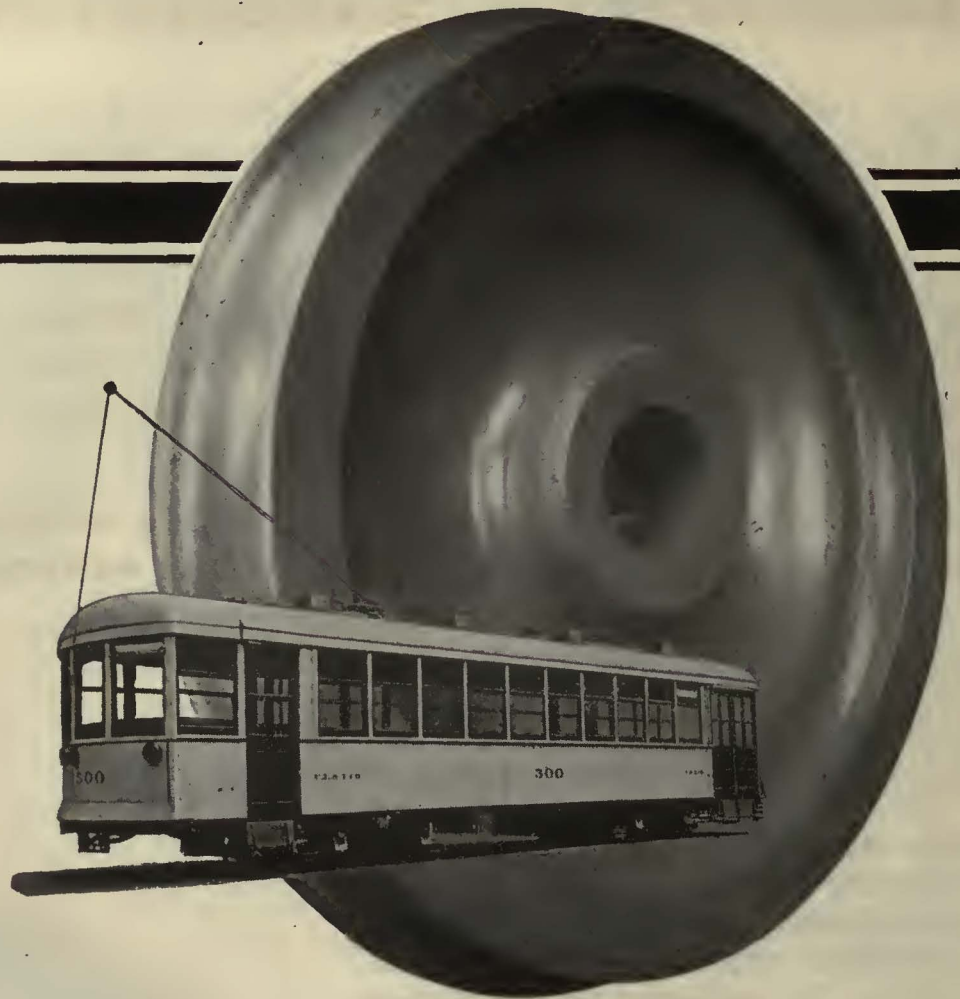
**Such repeat orders are incontrovertible evidence of passenger satisfaction, maximum bus revenue and low maintenance and operating figures.**

## **MACK TRUCKS, INC.**

**25 Broadway, New York**

**Electric Railway Companies thruout the country also use Mack Trucks for tower wagons, for wreckers, for pick-up and delivery service, for sand spreaders, for general maintenance work of every kind, because their use saves money.**





—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

General Offices and Works: Burnham, Penna.

*Sales Offices:*

New York  
Chicago

Richmond  
St. Louis

Philadelphia  
San Francisco

Portland

# Here is how Cheaply you can now Telephone to other Cities



Your customers are no further away than the telephone on your desk

THIS CHART SHOWS THE STATION-TO-STATION DAY RATES BETWEEN REPRESENTATIVE CITIES

	Atlanta, Ga.	Boston, Mass.	Chicago, Ill.	Cincinnati, Ohio	Cleveland, Ohio	Denver, Colo.	Detroit, Mich.	Indianapolis, Ind.	Milwaukee, Wis.	Newark, N. J.	New Haven, Conn.	New York, N. Y.	Omaha, Neb.	Philadelphia, Pa.	San Francisco, Cal.	St. Louis, Mo.	Washington, D. C.
Atlanta, Ga.		3.50	2.35	1.65	2.15	4.50	2.35	1.75	2.55	2.75	3.25	3.00	3.00	2.55	7.75	1.95	2.35
Boston, Mass.	3.50		3.25	3.00	2.35	6.50	2.55	3.00	3.25	1.05	.70	1.00	4.50	1.25	9.50	3.75	1.85
Chicago, Ill.	2.35	3.25		1.20	1.45	3.50	1.15	.90	.50	2.75	3.00	3.00	1.80	2.55	6.75	1.25	1.55
Cincinnati, Ohio	1.65	3.00	1.20		1.25	4.00	1.15	.60	1.50	2.35	2.55	2.35	2.55	2.15	7.25	1.45	1.60
Cleveland, Ohio	2.15	2.35	1.45	1.25		4.50	.60	1.25	1.65	1.70	1.95	1.80	3.00	1.60	7.75	2.05	1.45
Denver, Colo.	4.50	6.50	3.50	4.00	4.50		4.25	3.75	3.50	6.00	6.25	6.00	2.05	5.75	3.75	3.25	5.50
Detroit, Mich.	2.35	2.55	1.15	1.15	.60	4.25		1.15	1.25	1.95	2.15	2.05	2.75	1.85	7.50	1.95	1.70
Indianapolis, Ind.	1.75	3.00	.90	.60	1.25	3.75	1.15		1.20	2.55	2.75	2.55	2.15	2.35	7.00	1.10	2.05
Milwaukee, Wis.	2.55	3.25	.50	1.50	1.65	3.50	1.25	1.20		3.00	3.00	3.00	1.75	2.75	6.75	1.50	3.55
Newark, N. J.	2.75	1.05	2.75	2.35	1.70	6.00	1.95	2.55	3.00		.50	.15	4.00	.50	9.00	3.25	1.60
New Haven, Conn.	3.25	.70	3.00	2.55	1.95	6.25	2.15	2.75	3.00	.50		.50	4.25	.80	9.25	3.50	1.80
New York, N. Y.	3.00	1.00	3.00	2.35	1.80	6.00	2.05	2.55	3.00	.15	.50		4.25	.50	9.00	3.25	1.65
Omaha, Neb.	3.00	4.50	1.80	2.55	3.00	2.05	2.75	2.15	1.75	4.00	4.25	4.25		4.00	5.25	1.65	3.75
Philadelphia, Pa.	2.55	1.25	2.55	2.15	1.60	5.75	1.85	2.35	2.75	.50	.80	.50	4.00		8.75	3.00	.75
San Francisco, Cal.	7.75	9.50	6.75	7.25	7.75	3.75	7.50	7.00	6.75	9.00	9.25	9.00	5.25	8.75		6.50	3.50
St. Louis, Mo.	1.95	3.75	1.25	1.45	2.05	3.25	1.95	1.10	1.50	3.25	3.50	3.25	1.65	3.00	6.50		3.75
Washington, D. C.	2.35	1.65	2.55	1.80	1.45	5.50	1.70	2.05	2.55	1.00	1.30	1.05	3.75	.75	8.50	2.75	



It is your business pathway to the world . . . quick, convenient, inexpensive

THE TELEPHONE takes you "there and back" in minutes. You can transact business over thousands of miles without leaving your desk. "See" as many people as you wish. Give or receive a definite answer immediately . . . at a saving of time and money.

There are two kinds of out-of-town calls: *person-to-person*—when you ask the operator to summon a specific person to the telephone; and *station-to-station*—when you will talk with any one who answers. Station-to-station calls are cheaper. The charges can be reversed without additional cost on person-to-person calls and on many station-to-station calls.

Features of Bell Telephone service



which are of particular aid in sales work include the *Key Town Plan*, for covering territories from key cities by telephone . . . *Sequence Calling Lists*, for putting through any number of calls in rapid succession . . . *Credit Cards*, which make it possible for traveling representatives to charge their telephone calls to the home office.

Doing business by telephone widens the sphere of your activities. There have been four reductions in inter-city telephone rates during the past four years. The average Long Distance call goes through in approximately two minutes. Bell Telephone service is *Quick* . . . *Convenient* . . . *Inexpensive*.

# Youngstown Wins Coffin Award

*OK*



Basin and Federal Streets, Youngstown, Ohio

Extra heavy main line traffic. One left hand branch off and four crossings.  
Weight 134 pounds, 9 in. section.

Trilby Solid Manganese Frogs and Switches.

All on DAYTON TIE FOUNDATION.

Installation made under traffic.

Work started 12 o'clock noon on Saturday—completed, including concreting and paving at 5 P.M. Tuesday following.

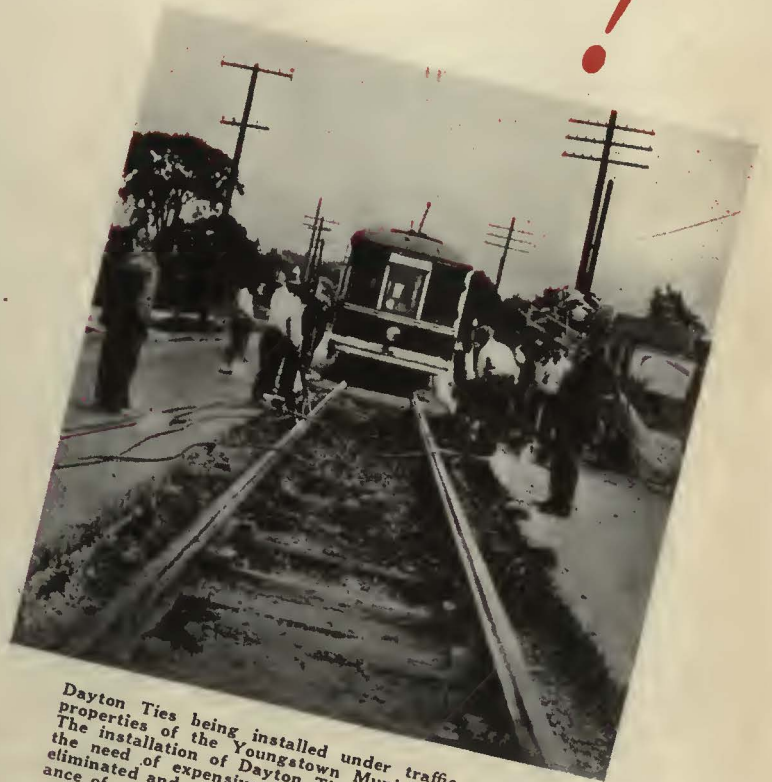
## THE DAYTON INTEGRAL SYSTEM OF



# DAYTON TIES

## *used as standard!*

Congratulations, Youngstown, upon your record . . . congratulations also upon your selection of Dayton Ties as standard construction. We predict that present as well as future records for low maintenance will be amply safeguarded and increased with every mile of track where Dayton Ties are used . . . The wisdom of your selection is reflected in the fact that three out of five other properties submitting a record of their accomplishments during 1928 and who made noteworthy contributions to the development of the electric railway industry *also standardize on Dayton Ties.*



Dayton Ties being installed under traffic on the properties of the Youngstown Municipal Railway. The installation of Dayton Ties is so simple that the need of expensive and intricate machinery is eliminated and ordinary labor used with the assurance of permanently satisfactory results.

TO THE ELECTRIC RAILWAY INDUSTRY AT LARGE  
—May we express our sincere belief that we have made our contribution to the successful and outstanding maintenance of way records at Youngstown and to many other properties where Dayton Ties are used.

**The Dayton Mechanical Tie Company**  
Dayton, Ohio

# TRACK AND PAVING STRUCTURE

# CO-ORDINATION

**N**OWADAYS any income which can be relied upon has enhanced value. The income to the electric railway companies from the rental of space to Collier Service falls into this class. It is income which does not cost the electric railway company extra effort or expense to earn, and it is equivalent to many paid fares.

Collier Service, down thru the decades, has built a nation-wide organization of experts in the highly specialized field of car card advertising. No small part of its business is developing and maintaining a car card advertising service as an asset to the electric railway companies. And it is to the mutual interest of those concerned that this asset be sustained by co-ordinate effort.



**BARRON G.  
COLLIER** INC.  
CANDLER BLD'G  
NEW YORK CITY

CAR CARD ADVERTISING ALMOST EVERYWHERE

**NEW ORLEANS SELECTS**

*After careful  
consideration*

**CINCINNATI**

**ELECTRIC  
TROLLEY  
COACHES**

# NEW ORLEANS



# CINCINNATI ELECTRIC

**T**HE New Orleans Public Service, Inc., on part of a certain route, found it advisable—after *careful consideration*—to discontinue rail service.

The route comes into the center of the city and also taps a residential district. The question arose as to what type of equipment might best be employed to provide rider sales appeal, comfort and rapid transportation, combined with economical operation.

# SOLVED A PROBLEM

*After careful  
consideration  
with*

# TROLLEY COACHES

*After careful consideration, 11 Cincinnati Trolley Coaches*  
were ordered. Because—

Based on the experience of other cities with *Cincinnati Electric Trolley Coaches*, and because of improved design and construction with minimum weight, a lower cost per mile of operation was possible.

# AGAIN A STEP AHEAD OF THE MODERN TREND



*After careful  
consideration*

## IN ELECTRIC TROLLEY COACH CONSTRUCTION

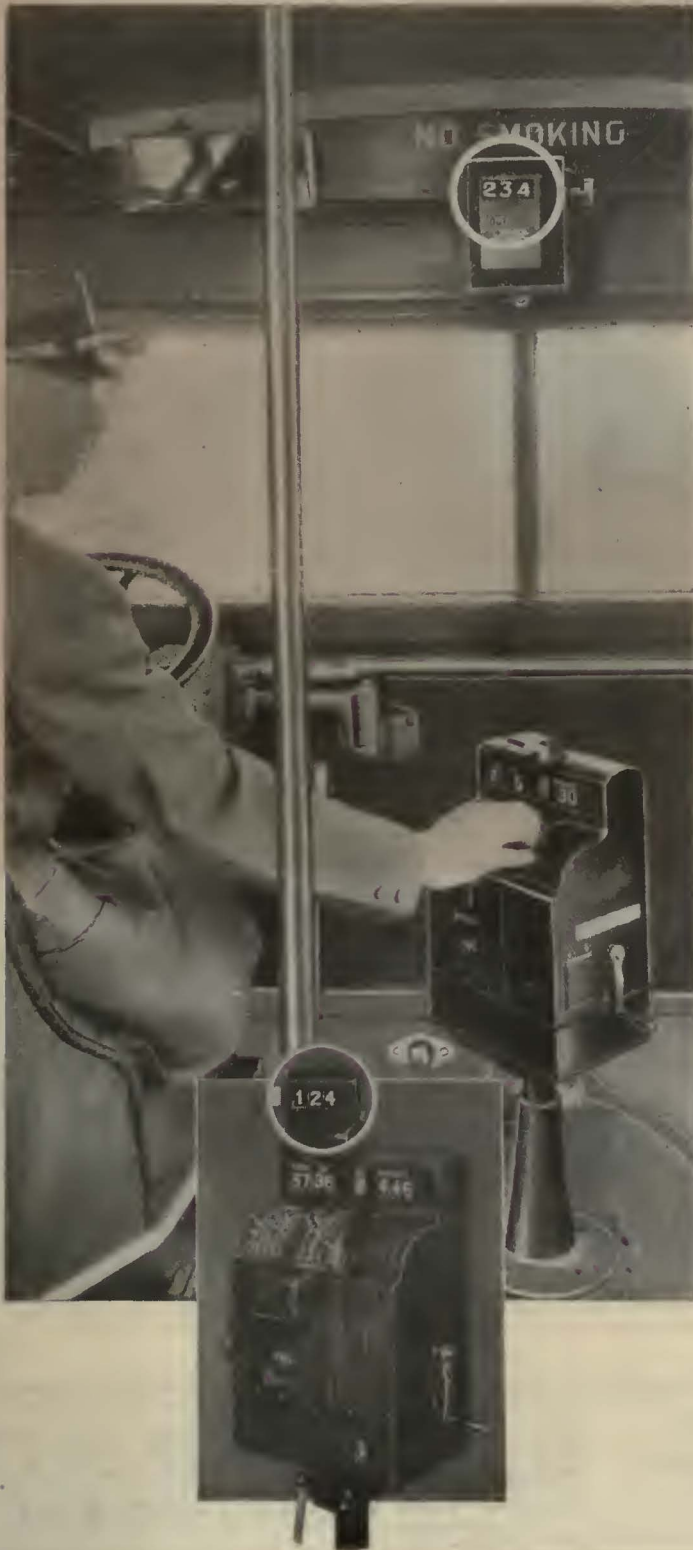
One of the *careful considerations* in the selection of Cincinnati Electric Trolley Coaches—with relation to assured economical operation—was an improved method of construction; particularly of interest to Electric Railway Operators, as conceived, designed and exclusively incorporated in the construction of

Cincinnati Electric Trolley Coaches. What Cincinnati Care, Leadership and Experience made available for New Orleans, merits your *careful consideration*.

THE CINCINNATI CAR CORPORATION  
Cincinnati, Ohio

# For 31 years

an important and exclusive feature of OHMER Fare Registers has always been the *Passenger Counter*, which gives a *visible* record of number of registrations for checking purposes.



## The Passenger Counter

is available also for the OHMER Model 80 Ticket-Printing Registers, either as a separate or integral attachment. With the Passenger Counter the OHMER "80" gives *complete* fare protection from every possible angle.

**T**HE passenger counter is a time-honored device on all types of OHMER Fare Registers designed for overhead installations. This indicator enables an inspector located in any part of the vehicle to conduct an accurate "on and off" check. With the resetting of the indicator at the end of the line the direction indication changes, enabling a positive check to be obtained on traffic in either direction.

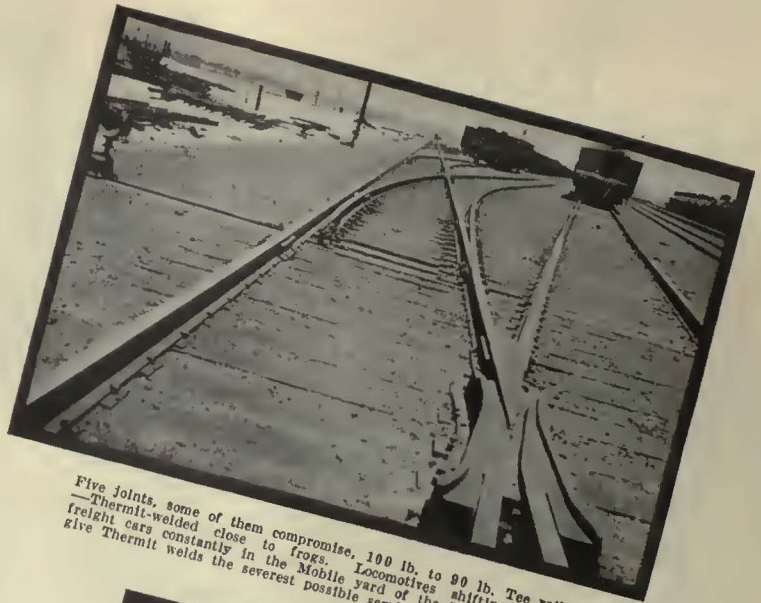
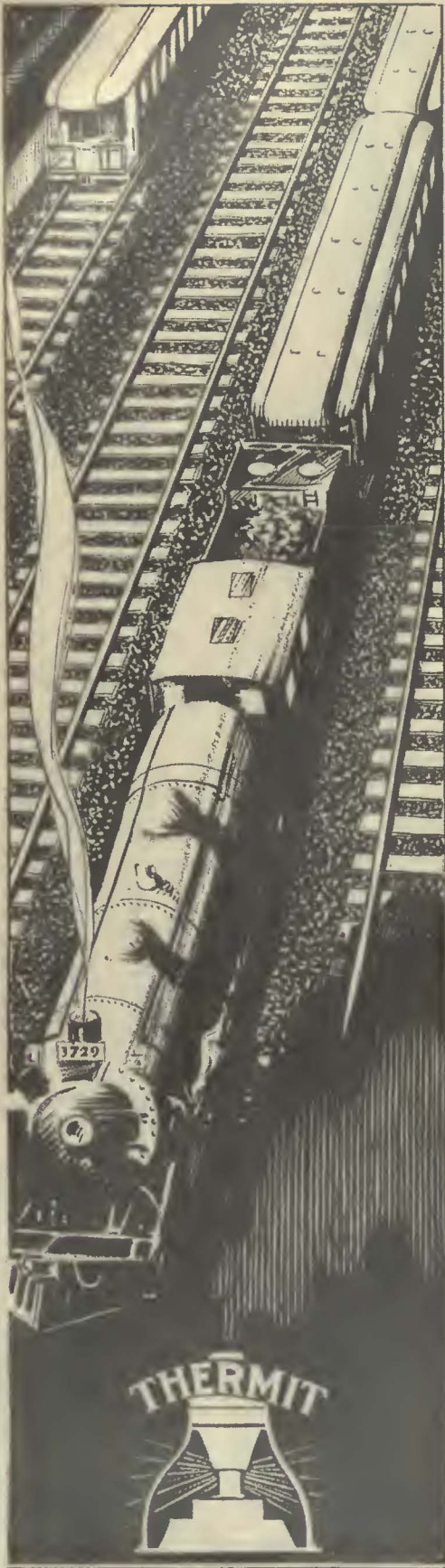
The passenger counter may be had as an attachment for the ticket-printing OHMER Model 80 in two forms. The larger illustration to the left shows it entirely separate from the register, placed overhead on the bulkhead of the car, operated automatically and simultaneously by electric connection with the operating bar of the register. Or the passenger counter can be furnished as an integral part of the register itself, adjustable to face in any direction so it can be readily checked from any part of the car, as illustrated in the insert to the left, below.

### *Affords Complete Protection*

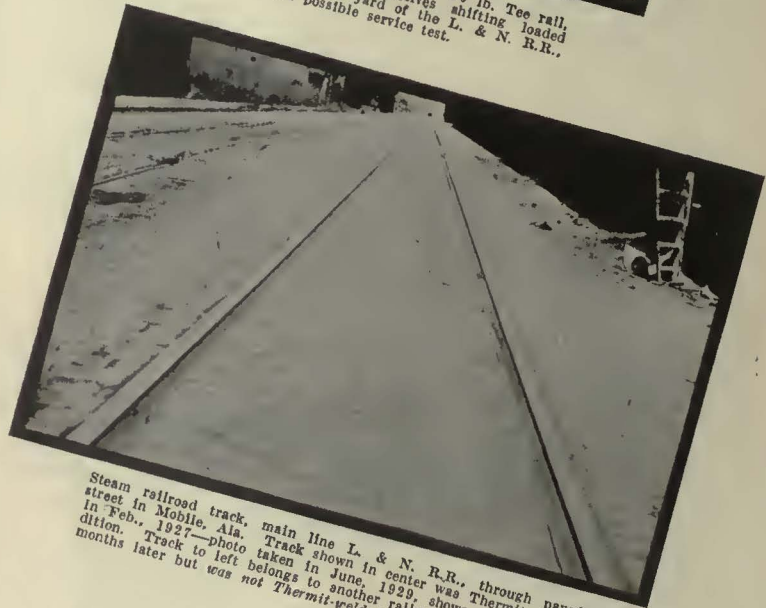
This combination Passenger Counter and latest improved OHMER Model 80 Ticket-Printing Register, with its printed detail strip, makes traffic checking thorough and effective. The Passenger Counter with its visible check enables the inspector to analyze passenger movements by zone or direction. And the printed detail strip of the OHMER "80" provides a complete analysis of every accounting detail of distance and fare paid.

Nothing less than *complete* protection is *satisfactory* protection. None but OHMER can give OHMER results. Our many years of experience are at your command.

**OHMER**  
REG. U.S. PAT. OFF. AND OTHER COUNTRIES  
**FARE REGISTER COMPANY**  
 DAYTON, OHIO, U. S. A.



Five joints, some of them compromise, 100 lb. to 90 lb. Tee rail, Themit-welded close to frogs. Locomotives shifting loaded freight cars constantly in the Mobile yard of the L. & N. R.R., give Themit welds the severest possible service test.



Steam railroad track, main line L. & N. R.R., through paved street in Mobile, Ala. Track shown in center was Themit-welded in Feb., 1927—photo taken in June, 1929, shows excellent condition. Track to left belongs to another railroad, was built a few months later but was not Themit-welded.

## THERMIT WELDS on Steam Railroad Tracks

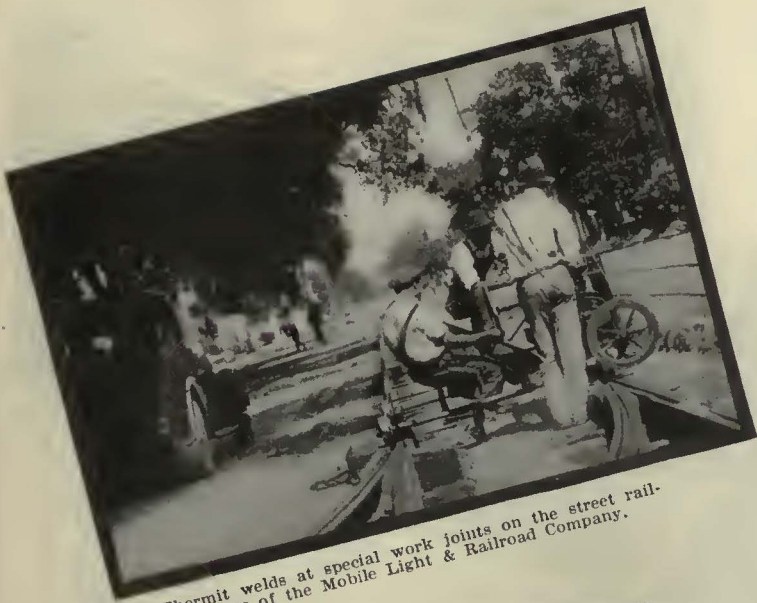
No better proof could be found of the ability of Themit welding to stand up under heavy traffic, than its growing use on steam railroad lines. Where railroad trains run through paved streets, Themit welding has been found to be a satisfactory solution of the rail joint problem. A typical example—the Louisville & Nashville R.R. Co.'s line through Mobile, is shown above. Over this track passes the Crescent Limited, New York to New Orleans, and thousands of tons of freight daily.

The world famous Twentieth Century Limited runs through the city of Syracuse, N. Y., over Themit-welded joints.

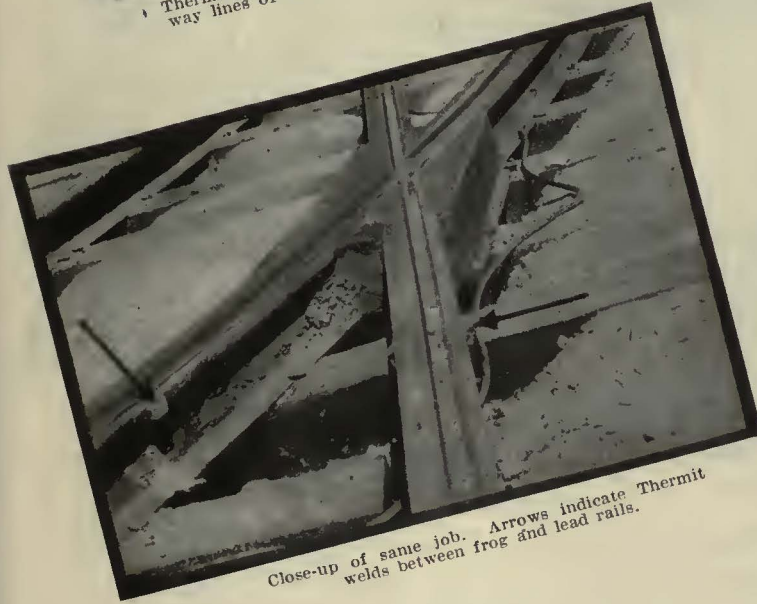
Steam railroads also are finding Themit solves their troubles with compromise joints in yards and terminals.

**METAL & THERMIT**  
PITTSBURGH CHICAGO BOSTON 120 BROADWAY





Thermit welds at special work joints on the street railway lines of the Mobile Light & Railroad Company.



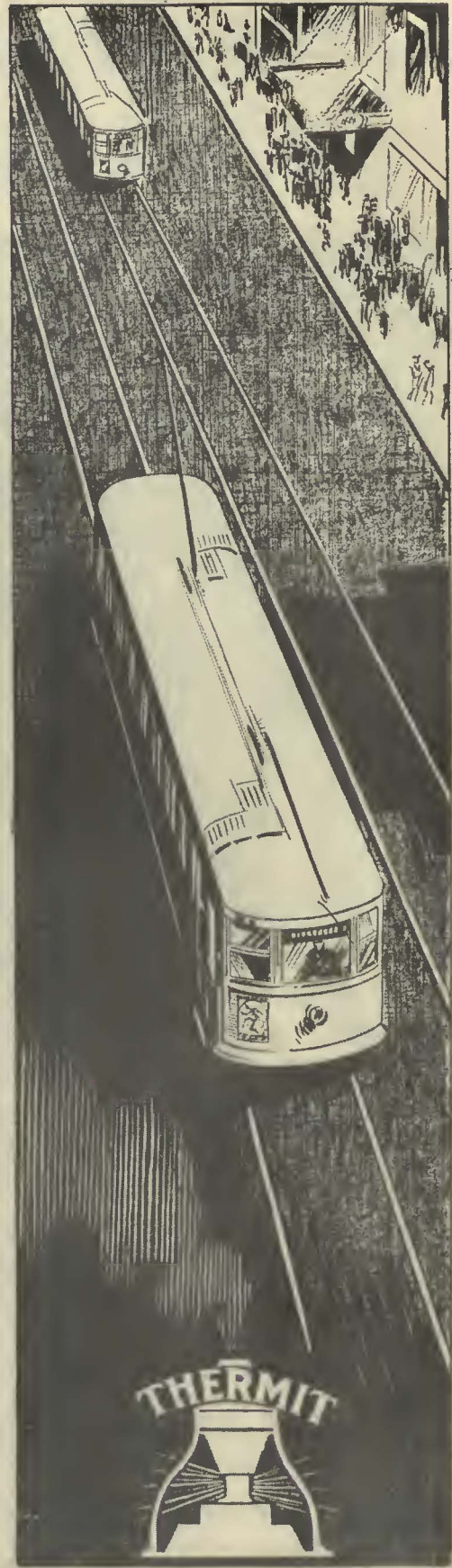
Close-up of same job. Arrows indicate Thermit welds between frog and lead rails.

## THERMIT WELDS on Electric Railway Tracks

Thermit welding of electric railway track is by no means confined to companies in the largest cities. Many systems operating fifty to one hundred miles of track, are using more and more Thermit, as the advantages of initial installations become apparent. The Mobile Light & Railroad Company is a typical example.

Other users of Thermit are to be found in every part of the United States and Canada.

The process of Thermit welding is so developed that it presents no mechanical or labor difficulties even to the smaller roads. Any reasonably intelligent trackman can be trained to make perfect Thermit Welds. The necessary apparatus can be purchased on easy terms, or rented at very moderate cost.



**CORPORATION**  
NEW YORK, N.Y. SOUTH SAN FRANCISCO TORONTO

# THE SAFETY CAR CONTROL EQUIPMENT

## Helps Youngstown Win Coffin Award

Among the principal factors that enabled the Youngstown Municipal Railway to win the Coffin Award this year are: "More riders and more revenue; friendly public; lower costs and increased reliability of service; increased safety for riders, employes and the public . . ." These improvements invariably follow in the wake of Safety Cars—used exclusively by this company and other winners of the Coffin Award.

### SAFETY CAR DEVICES CO.

OF ST. LOUIS, MO.

*Postal and Telegraphic Address:*

**WILMERDING, PA.**

CHICAGO

WASHINGTON

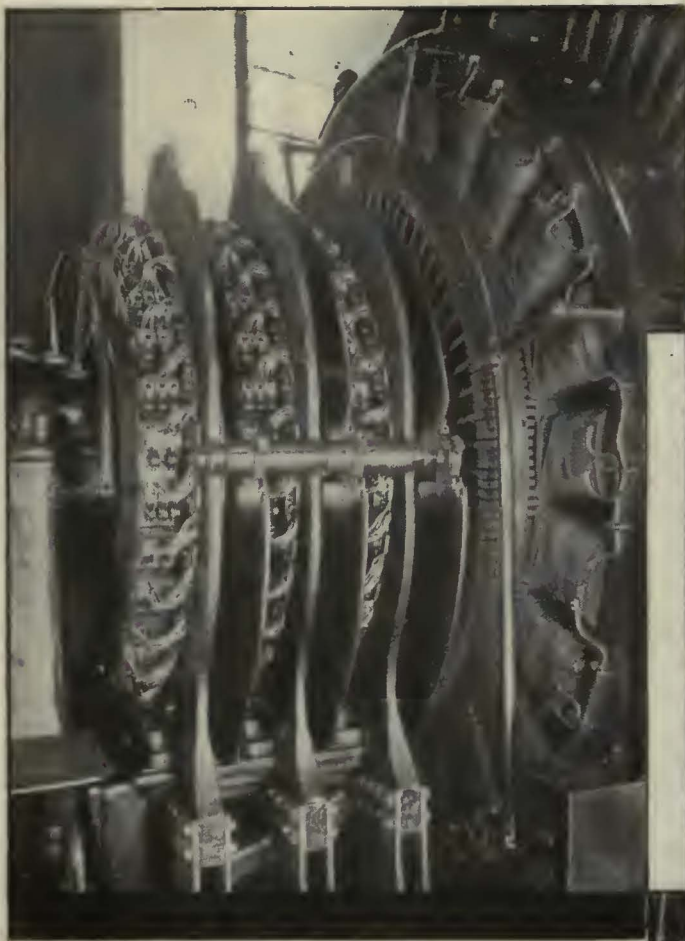
SAN FRANCISCO

PITTSBURGH

NEW YORK



# what price economy?



Slip-rings of modern 13,000-ampere, booster-type rotary converter, equipped with National Pyramid metal-graphite brushes



Slip-rings of rotary converter equipped with old-style copper-leaf brushes

The heavy loads of fall and winter are but a few weeks away. This is the time to check-up brush equipment and make sure that it is in condition to carry through the winter without interruption of service. This precaution is especially important in regard to slip-rings of large rotary converters where metal-graphite-composition brushes have superseded the old copper-leaf. Brush-springs should be set up to correct tension and accurately equalized on all the holders. Shunt connections should be clean and firmly secured. Worn brushes should be replaced.

“JUST one of the inevitable snags of the business.” That was the attitude toward the heavy expenses involved in turning, grinding, and replacing slip-rings and commutators in the days of copper-leaf, metal-gauze and early abrasive carbon brushes. Ridging and wear caused by these brushes demanded re-surfacing at frequent intervals. Maintenance costs were high.

In stepped National Carbon Company, Inc., offering its vast research-facilities for the purpose of developing better and more economical brushes. Experiments, trials, more experiments — success. Soon National Pyramid Brushes had established new standards, higher speeds had been met, heavier loads and more compact design had become possible. The new brushes kept machinery humming

for months and months *without* interruptions.

Major faults corrected, minor faults assumed new importance. Systematic inspection and timely adjustments are a small price to pay for the economical performance of modern brushes. National Pyramid Brushes insure satisfactory service and low maintenance cost in return for this care.

**NATIONAL CARBON COMPANY, INC.**

Unit of Union Carbide  and Carbon Corporation

Carbon Sales Division



Cleveland, Ohio

Branch Offices and Factories:  
New York Pittsburgh Chicago Birmingham San Francisco

# The Business Paper . . .

and

## the Open Mind

"SHOW me a business that has ceased to think" says John Moody, famous economist and investment advisor, "and I'll show you a firm that is on the down grade. Show me a concern where ideas are no longer welcome and I'll show you one that is getting ready to die of dry rot. Show me a company that has cut itself off from the stimulation of other men's thought and other men's knowledge and I will show you a firm whose days are numbered."

And on the other hand, wherever you find a healthy, progressive corporation you will find the open mind. You will sense an alertness to know and use the experience of others. Almost inevitably you will discover that executives regularly and systematically read the business papers of their own and related fields. Indeed, it is a fact, striking in the frequency of its recurrence, that outstanding firms make a policy of requiring executives to follow business papers for new ideas, new facts, new developments. From such a policy springs the perennial resourcefulness that brings success.

The business press of today does more than any other single factor to keep business on its toes. Leading thought, improving methods, continually adding to the available store of exact working information, the business press performs a very real service to the Nation.

To that service the business paper of today owes its influence with business men. To that influence it owes its position as a strong, independent organization; commanding a sound, paid circulation; court- ing no favors; truckling to no influence; earning its advertising revenue because it is the kind of publication in which advertising is both read and believed.

*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.*



John Moody is among the best known of economists and financial advisors. As a writer on business subjects he is scarcely less well known than as President of Moody's Investors' Service, investment counsel to many great financial interests. A keen analyst of businesses as investments, few men have better opportunity to evaluate progressive management as a factor in success, or to observe the outstanding part played by technical, industrial and merchandising papers in the development of modern business.



THIS SYMBOL identifies an ABP paper . . . It stands for honest, known, paid circulation; straight-forward business methods, and editorial standards that insure reader interest . . . These are the factors that make a valuable advertising medium.

**THE ASSOCIATED BUSINESS PAPERS, INC.**  
TWO-NINETY-FIVE MADISON AVENUE · NEW YORK CITY

For  
heavy-traffic  
locations

use *silico-manganese* trackwork

**T**HE 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.

#### BETHLEHEM STEEL COMPANY

General Offices: Bethlehem, Pa.

*District Offices:* New York, Boston, Philadelphia, Baltimore, Washington, Atlanta, Pittsburgh, Buffalo, Cleveland, Cincinnati, Detroit, Chicago, St. Louis

*Pacific Coast Distributor:* Pacific Coast Steel Corporation, San Francisco, Los Angeles, Portland, Seattle, Honolulu.

*Export Distributor:* Bethlehem Steel Export Corporation, 25 Broadway, New York City

**BETHLEHEM**  
Silico-Manganese  
Trackwork—Design 999



## ANOTHER GREAT TRANSPORTATION COMPANY FINDS ECONOMY IN BALANCED PERFORMANCE

The motor coaches of a midwestern transportation company travel nine million miles a year. Operating on such a large scale, the company naturally watches costs closely, and their motor coaches are run as economically as any in the country.

One of the cost-reducing methods adopted by this company was to standardize on Red Crown Gasoline and Polarine Motor Oil. A check-up of costs has shown real economy in the balanced performance these products give.

Red Crown Gasoline and Polarine Motor Oil have been refined especially to give balanced performance, to work with that harmony essential to efficient service and low cost operation. Red Crown burns clean . . . gives power and mileage. Polarine is rich and sturdy . . . supplies thorough, effective lubrication to the motor.

Try this combination in one of your motor coaches. You will find the combined operating cost of Red Crown and Polarine lower than that of any other fuel and motor oil.

STANDARD OIL COMPANY (*Indiana*)

General Offices: 910 South Michigan Ave., Chicago, Ill.

208-A

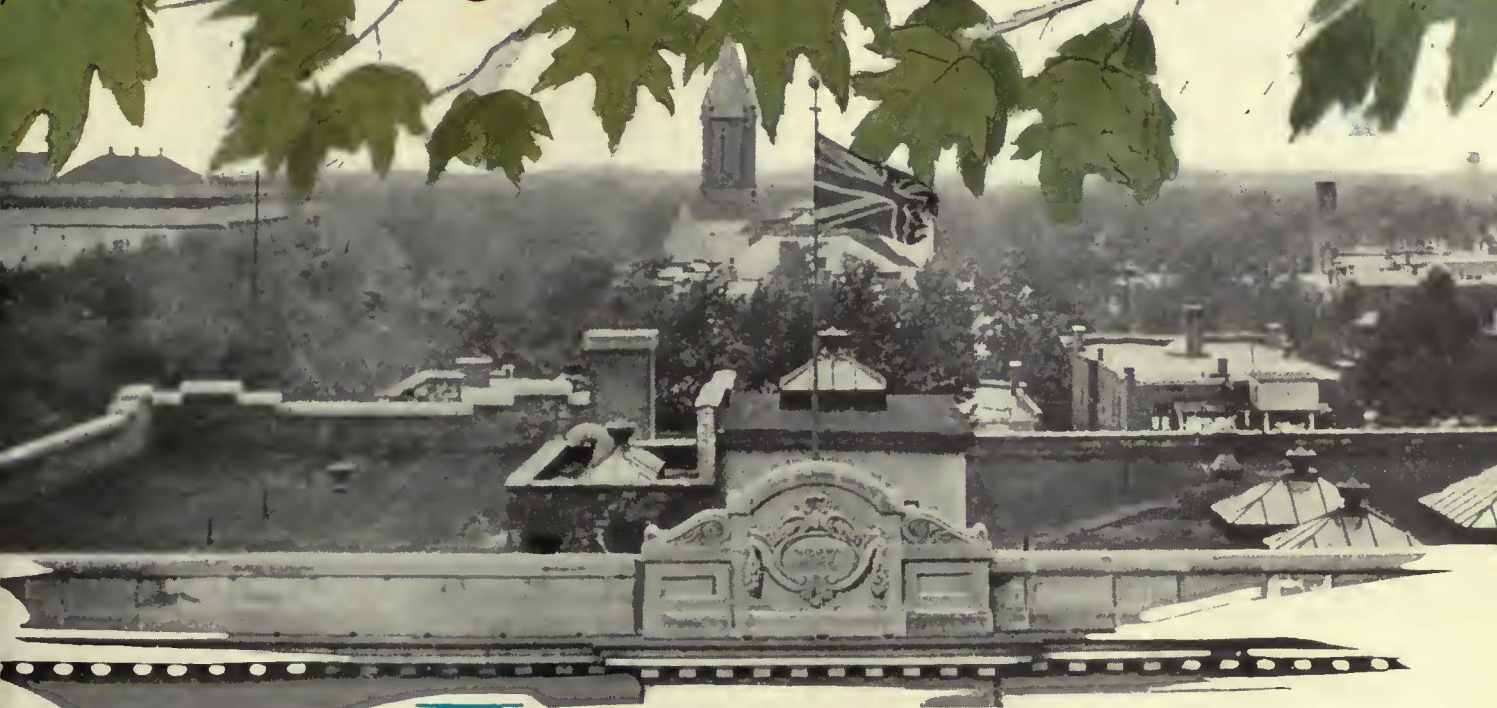


RED CROWN ETHYL GASOLINE

*New* POLARINE MOTOR OIL



# Among the Maples



## in **L**ondon-Ontario

**where-**

London Street Railway properties were faced with the identical problems facing street railway operators in scores of other American and Canadian cities.

**how-**

the progressive management of the London Street Railway is solving them with—

# **Yellow Coaches**

# *For the Plaintiffs:* **the City of London**

## **Exhibit A:**

131 years of steady growth in a city of 70,000 with thirty square miles of area, 464 manufacturing plants and congested traffic.



## **Exhibit B:**

Urgent need for a flexible comprehensive transportation system for the municipality.

## **Exhibit C:**

Transportation for the newer outlying residential and educational districts.





# For the Defendants: The London Street Railways



## Exhibit A:

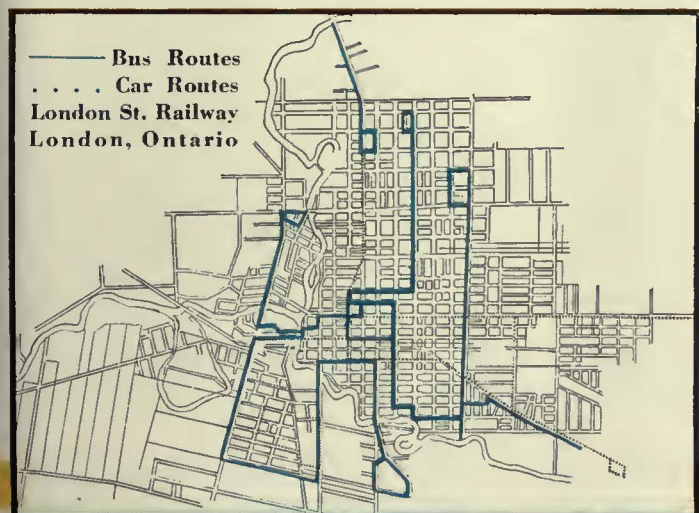
Steadily Decreasing  
Street Car Patronage

Steadily Increasing  
Bus Patronage

11,559,690	1926	954,932
11,224,135	1927	1,389,382
10,858,810	1928	1,525,076
9,634,225	1929	2,217,291
	1930 (1st 3 mo.)	759,798

## Exhibit B:

Inability to meet constantly increasing burdens of paving, repair and/or replacement of obsolete rolling stock.



## Exhibit C:

Financial impossibility of extending street car track and overhead to new residential and institutional districts.



*the*

# VERDICT

THE LONDON STREET RAILWAY COMPANY  
LONDON, ONTARIO  
CANADA

R. G. IVEY, PRESIDENT  
LONDON, ONT.

General Motors Truck Company,  
Pontiac, Michigan  
Gentlemen:

L. TAIT, MANAGER  
LONDON.

June 30th, 1930

Faced with an alarming decrease in passengers carried and with a heavy programme of track renewals the London Street Railway Company commenced bus operation early in 1928 with six Yellow Coaches. Records indicate a steady increase in bus passengers carried and in July, 1929, the Company purchased five W type Coaches and again in April, 1930, twelve additional W type Buses.

Our experience convinces us that buses of this capacity are ideal for economical operation and at the same time enable us to give more adequate service with shorter headways than would prevail with buses of larger capacity. The best evidence of the satisfactory performance of our Yellow Coach equipment are the repeat orders we have just placed for more Yellows.

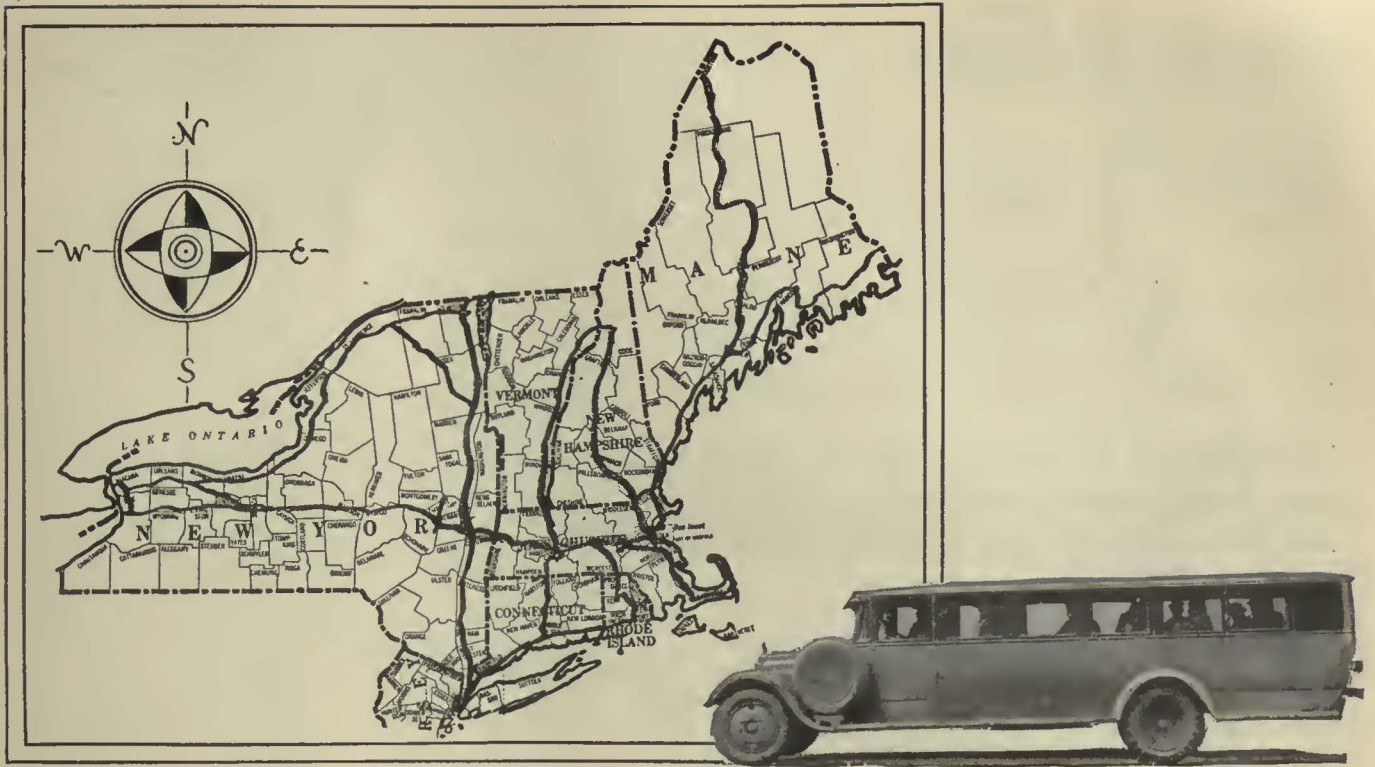
Under a new franchise effective April 1st, approximately six miles of street car lines were scrapped to make way for a general coordinated street car and bus transportation system.

MANAGER & SEC'Y-TREASURER  
*L. Tait*



## Type W. Yellow Coach

GENERAL MOTORS TRUCK CO.  
Subsidiary of Yellow Truck & Coach Mfg. Co.  
PONTIAC, MICH.



## MORE THAN A MILLION MILES with Socony Special *plus* Ethyl

NO ROAD is too rough, no grade too steep for Socony Special *plus* Ethyl—the only *premium* gasoline sold in New York and New England to which Ethyl fluid has been added. It does not knock, it starts and picks up instantaneously, it has all the power—and more—that the heaviest bus can possibly need. And it is the cheapest fuel that fleet owners can use because it cuts down shifting to a minimum and gives more miles to the gallon.

Holden's Tours and Taxi Service of Melrose, Mass., and the Beaver Tours of Boston have used Socony Special *plus* Ethyl for far more than a million miles: up into the lumber woods over practically unbroken trails, everywhere throughout the length and breadth of New York and New England.

Try Socony Special in your fleet, and check the mileage and mechanical cost. You'll find that the few extra cents per gallon that it costs are more than balanced by the additional mileage.

# SOCONY

GASOLINE • SPECIAL GASOLINE *plus* ETHYL



MOTOR OIL • AIRCRAFT OIL

STANDARD OIL COMPANY OF NEW YORK

# AIR BRAKES

have rightly become  
a part of America's  
finest transport vehicles

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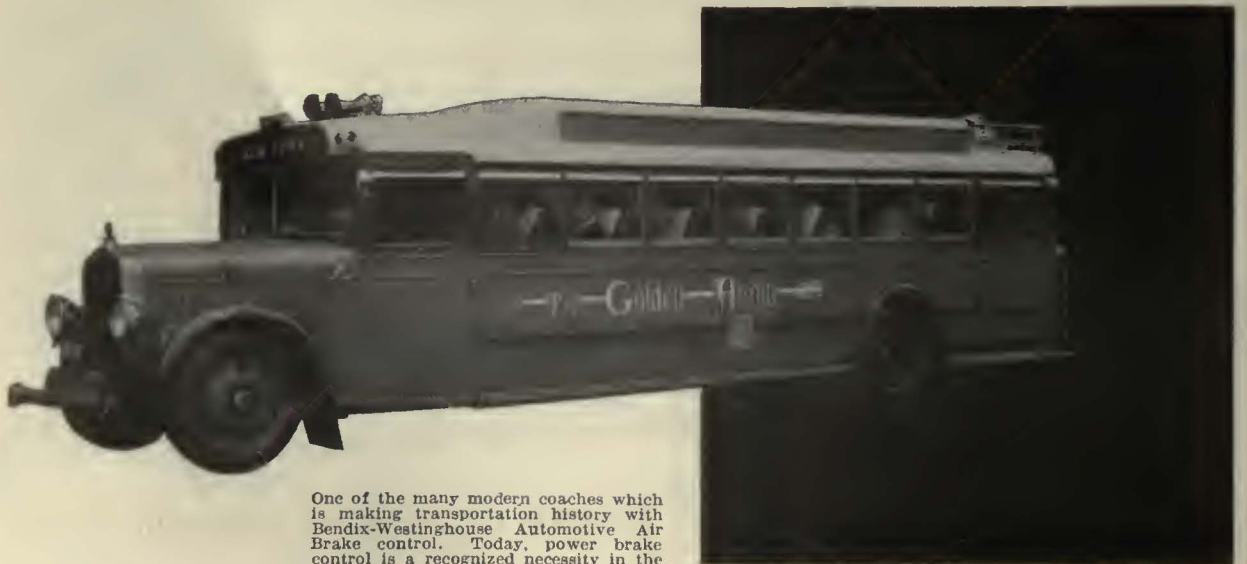
Because of their smooth, quick, powerful action, their ability to meet any emergency squarely — Bendix-Westinghouse Automotive Air Brakes have taken their place as indispensable equipment in the safe, economic operation of the modern motor coach.

Nationwide, the foremost manufacturers of heavy duty transport equipment have recognized the necessity for a positive stopping force as a perfect balance for present day speed and power. These builders have adopted Bendix-

Westinghouse Brakes as standard factory equipment, while many others are equipped to install the system upon specification.

For those coach operators who are interested in the more technical advantages of the Bendix-Westinghouse Brake, a competent staff of carefully trained brake engineers is available for consultation. This service is maintained in the interest of better brake control for the motor transport operator and its acceptance incurs no obligation.

BENDIX-WESTINGHOUSE  
AUTOMOTIVE AIR BRAKE CO.  
Pittsburgh - - - Pennsylvania



One of the many modern coaches which is making transportation history with Bendix-Westinghouse Automotive Air Brake control. Today, power brake control is a recognized necessity in the safe, efficient operation of this as well as thousands of other units of similar type.



# GARY

## WROUGHT STEEL WHEELS

*The name ILLINOIS on wrought steel wheels assures the railroads safety, dependability and long life. These three factors all contribute to the success of the Gary Wrought Steel Wheel.*

*Our Wheel Engineers are at Your Service.*



**Illinois Steel Company**  
Subsidiary of United States Steel Corporation  
General Offices  
208 South La Salle Street, Chicago



# Check your insulating need

**I**NSULATING varnishes in great variety . . . filling compounds . . . insulating papers . . . tapes! You will find them described in detail in this new bulletin.

Recommended uses for these performance-proved insulations, their characteristics and full shipping information is given. Manufacturers as well as electrical repair and maintenance men are finding this bulletin invaluable. If you have not received a copy write for one.

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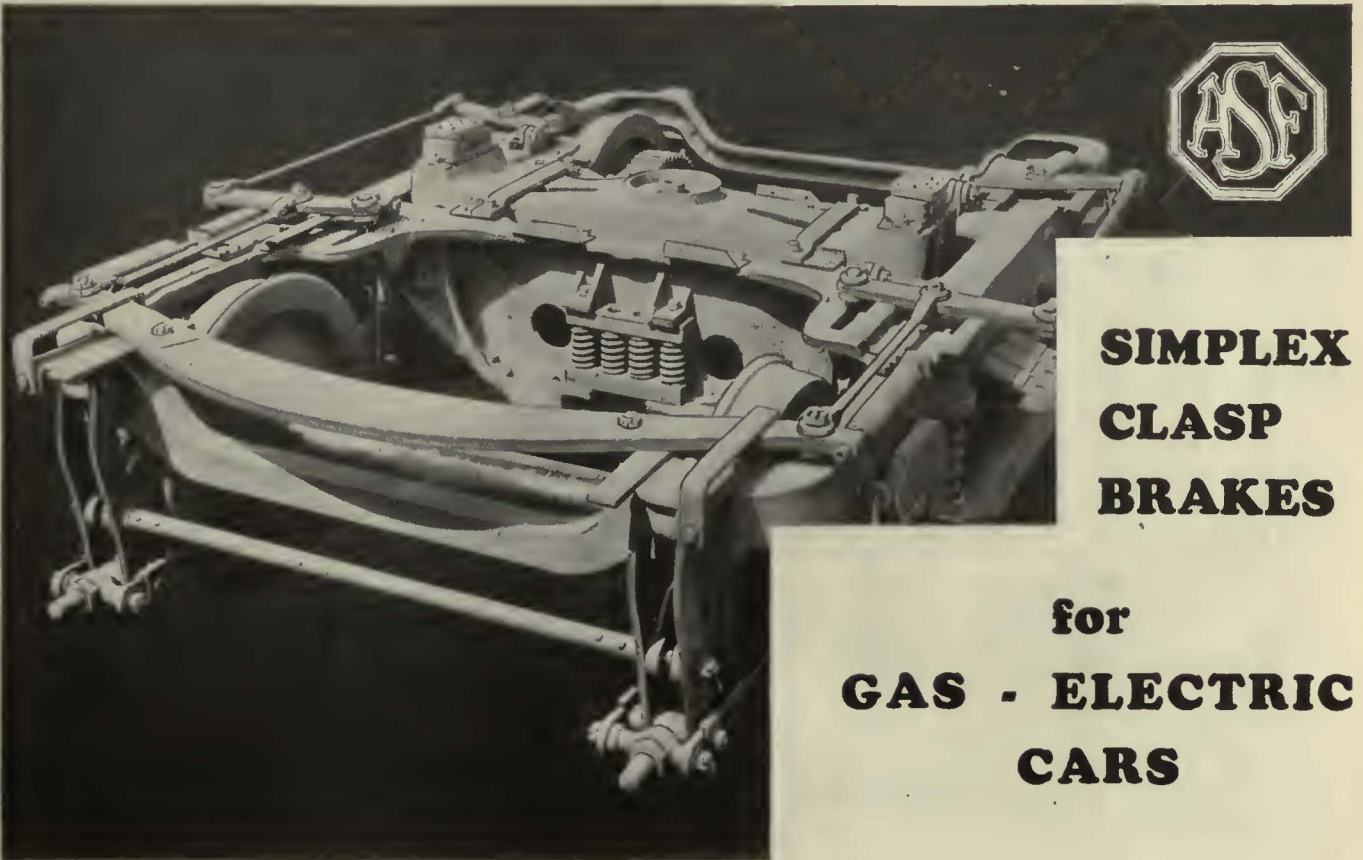
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 REG. U.S. PAT. OFF.

**Electrical**  
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MICA INSULATION

OILED CLOTH INSULATION



**SIMPLEX  
CLASP  
BRAKES**

**for  
GAS - ELECTRIC  
CARS**

**R**AILROADS of the country are using American Steel Foundries Clasp Brakes for passenger equipment.

Greater retardation; reduction in brake shoe wear; desirable balancing of braking forces—all have proved the value of Clasp Brakes.

Gas-electric cars have increased in weight and size until they now are frequently larger than standard passenger cars. For these reasons, they, too, need Simplex Clasp Brakes. Clasp Brakes are applicable to Gas-Electric Car Trucks and should be included in your specifications.

**AMERICAN STEEL FOUNDRIES**

NEW YORK

CHICAGO

ST. LOUIS

# Now Berkeley Chooses Fluted Steel POLES



Berkeley, California, is noted for its beautiful thoroughfares

REPLACING other poles and individual lighting standards, Union Metal Heavy Duty Poles have transformed the appearance of San Pablo Avenue in Berkeley, California.

These 32-foot poles perform their numerous duties safely and with a minimum of attention. Slender, straight and uniform, they represent the ideal method of carrying electrical services through city streets.

In Berkeley the Union Metal Poles are equipped with twin street lighting units, cross arms, trolley span-wire supports and concealed cable-risers. In numerous other cities they are also used for a multitude of duties — often at a great saving in cost and always to the betterment of street appearance.

If you are not familiar with this advanced type of pole write for complete information.

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GENERAL OFFICES AND FACTORY      CANTON, OHIO

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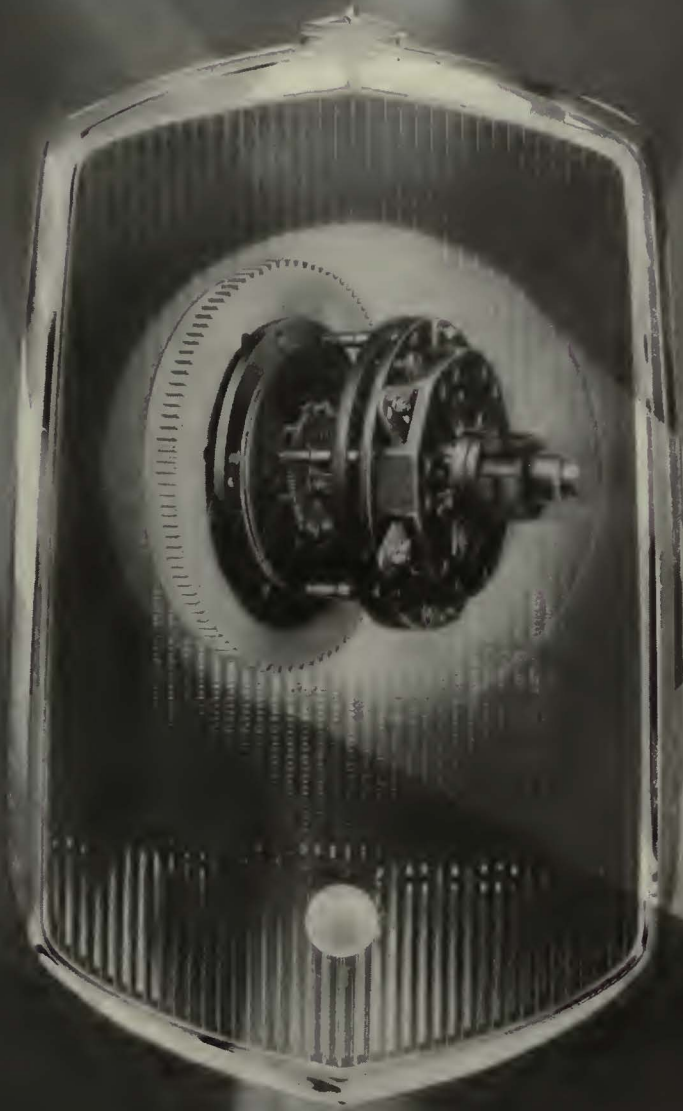
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Automotive  
Clutches  
and  
Radiators



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## Quality Crossings

A SINGLE uniform standard of quality in the three factors so important in any crossing installation—surface, alignment and splice bar fit—is always available in Lorain design, materials and workmanship.

The photograph typically records for you to see Lorain quality in every characteristic of this intricate crossing. This highgrade, interlaced trackwork was made for installation for the Virginia Electric and Power Company at Richmond, Va. It contains four solid manganese steel crossings in four pieces, 7" deep, with external arms that conform to connecting sections. Interior construction is double-web box section throughout. The area under intersections is effectively reinforced and provided with ample supporting base flanges. The internal joints are fitted with heavy angle bars and large diameter bolts.

Lorain is headquarters for complicated trackage. A Lorain special construction will be a good solution wherever a trackwork problem exists.

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*Manufactures*

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GIRDER GUARD RAILS  
PLAIN GIRDER RAILS  
RAIL JOINTS AND  
TRACK ACCESSORIES  
EXPANSION JOINTS FOR  
ELECTRICALLY WELDED  
TRACK

SPECIAL TRACKWORK  
SWITCHES, FROGS AND  
CROSSINGS

*in*

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Manganese Inset Construction,  
Chrome Nickel Steel Inset  
Construction and Built-up  
Construction of all  
heights and weights of rail.*

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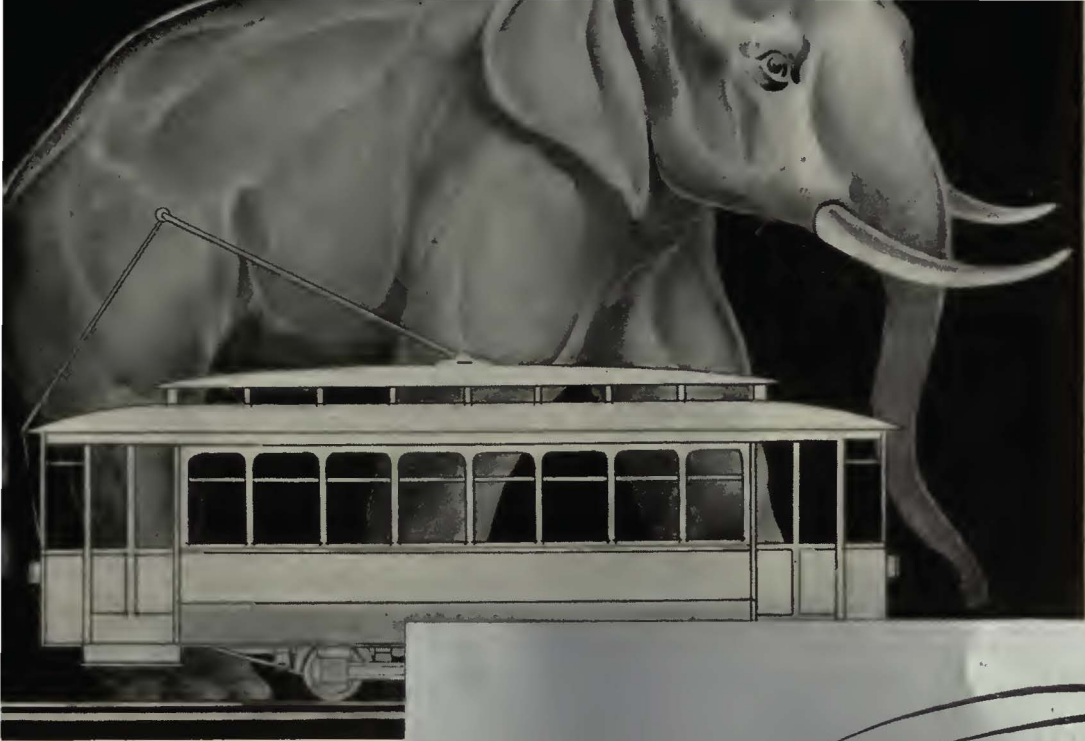
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STRIPPED OF SURPLUS DEAD-WEIGHT STREET CARS CAN GET AWAY QUICKLY.....  
ALCOA ALUMINUM



STRONG TO BEAR BURDENS  
— LIGHT TO MOVE

$$E = \frac{MV^2}{2}$$



ALCOA



## 2,300 lbs. of Alcoa Aluminum used 2,500 lbs. of dead-weight saved

Suppose you let 15 or 20 passengers ride free on every trip on every car, day in and day out. This combined weight would about equal the 2,500 lbs. removed from this street car built for the Louisville Railway Company by Cincinnati Car Company. 2,300 lbs. of Alcoa Aluminum saved 2,500 lbs. of dead-weight.

With excess dead-weight removed, street cars start and stop more easily, quickly and safely. They make speedier runs and are much more comfortable to ride in.

Light-weight cars both stimulate business and save operating costs. With light-weight cars you can either use smaller, less expensive

motors and save on power, or increase speed and get more round trips out of each car every day. These lighter cars also reduce wear and tear on tracks and road-bed. As the light, strong Alloys of Alcoa Aluminum are highly resistant to corrosion, they often outlast the heavier structural metals.

The light, strong Alloys of Alcoa Aluminum have great strength as well as extreme lightness. They have already proved their worth in cars that have been operating for a number of years.

For full particulars, address ALUMINUM COMPANY of AMERICA; 2463 Oliver Building, PITTSBURGH, PA.

# ALCOA ALUMINUM

STRONG TO BEAR BURDENS — LIGHT TO MOVE

$$E = \frac{MV^2}{2}$$





# Three long established electrical materials every railway can use to advantage

## TRANSITE... ASBESTOS EBONY... ELECTROBESTOS

THESE three Johns-Manville products are all proving their greater efficiency and added economy in an increasing number of applications on the electric railway car. For many years these durable materials, formed in combination with asbestos, have met the needs of the Electrical Industry for insulating panels and parts, for arc barriers or wherever high dielectric strength and fire-proofness are required.

J-M Asbestos Ebony is particularly well suited for electric insulating boards, spacer bars, panel boards and in many other instances where there is need for a board form of dielectric insulation. This rugged material, supplied in sheets or in moulded forms, is moisture-proof and will not warp or crack.

Wherever there is need for a highly efficient fireproof board, Electrobestos and Transite offer ideal materials for insert pieces on arc chute boxes, finger flash shields, circuit breaker boxes or any place where there is an exposed arc to capture. They are light in weight and easily handled and can be cut almost as readily as wood to fit any desired shape. Electrobestos is usually supplied in moulded form for convenience.

J-M Engineers will be glad to suggest the use of these low cost materials where they can do a job competent to meet the requirements of higher voltages and the demands for quicker service. Fill out the coupon for further information.

### J-M Friction Tape ... another J-M Product

J-M Friction Tape has a reputation earned by giving years of satisfactory service. Woven from selected sheetings, impregnated with an insulating compound and coated with a high grade adhesive rubber composition, it provides a safe covering for exposed wires.



A typical J-M Arc Chute Box of Asbestos Ebony and Electrobestos



J-M Electrobestos Finger Flash Shields



Johns-Manville Asbestos Ebony Motor Lead Spacer Bars

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Please send me particulars on J-M Asbestos Ebony, Electrobestos and Transite Electrical Parts.

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Above is shown a general view of all the DeVilbiss factory buildings. Below are shown the general office building of The DeVilbiss Company and, at the bottom, the special rubber factory building in which DeVilbiss Air and Fluid Hose is made.



# PRODUCTS OF PROGRESS

THE great factory of The DeVilbiss Company today is the product of the products manufactured within it.

Nothing less than such a factory organization can originate, design, manufacture, deliver and service the vast numbers of DeVilbiss spray-finishing outfits that are shipped from this plant to spray painters and finishers in every part of the world.

Equally is it true that such universal preference and volume of business cannot be created and maintained by any product less outstanding in its superiority or less capable of delivering to its purchaser constant and lasting satisfaction in ownership.

To the transportation industry DeVilbiss offers intensively specialized spray-finishing outfits and exhausting equipment which include the plus advantages and economies produced only by a plant and an organization affording DeVilbiss unequalled manufacturing facilities and experience. We will gladly tell you how these modern buildings and the numerous departments housed within them serve your individual spray-finishing operations. Write for catalog.

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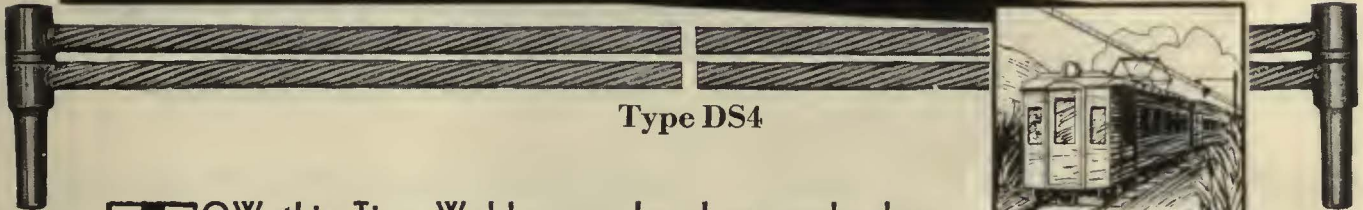
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**Power Bond with  
 Strength to Spare  
 ..Yet Capable of  
 Carrying Necessary  
 Current Loads..**



Type DS4



Look for the Double Ring  
 Mark in the center of the  
 Terminal Head. It is a  
 sign of Superior Quality  
 and Workmanship.

**H**OW this Tiger-Weld power bond was made—how American Steel & Wire Company Engineers solved the problem of strength—without sacrificing the ability to carry necessary current—is a story of achievement that you will want to know about in detail. Especially so—since its inception means increased efficiency and lower operating costs. It will pay you to write for interesting literature and detailed information.

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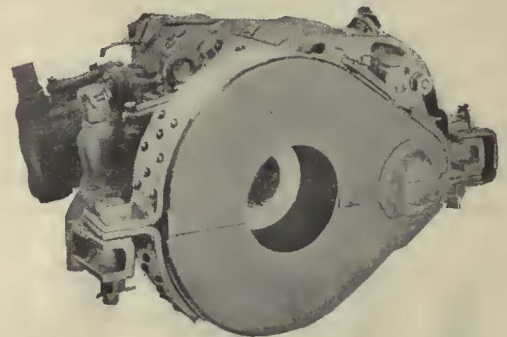
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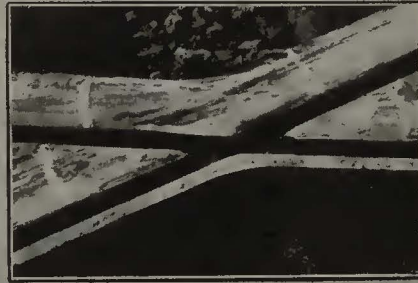
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# This MANGANESE Weld



Patent No. 1,732,202

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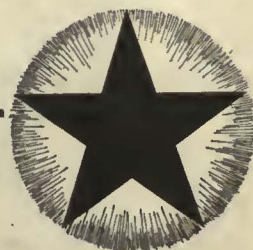
**T**HE thought contained in that old saying "All is not gold that glitters" may well be applied to trolley wheels.

It takes the finest in materials and workmanship to produce Kalamazoo Trolley Wheels. They always provide ample conductivity and resist the wear caused by pounding against trolley ears.

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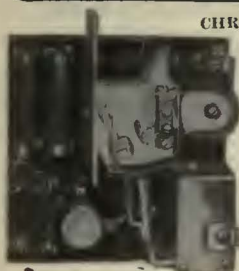
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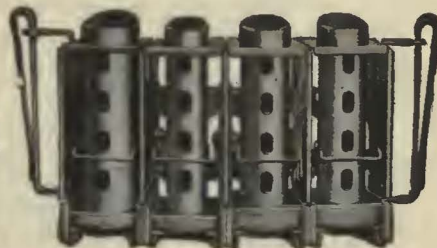
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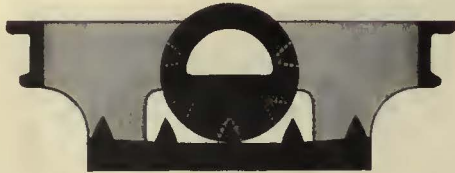
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SPECIAL CARBON STEEL  
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LARGE WEAR SURFACES  
FREE ROLLER  
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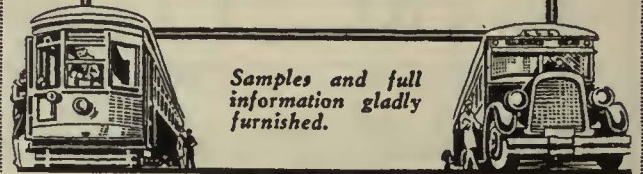
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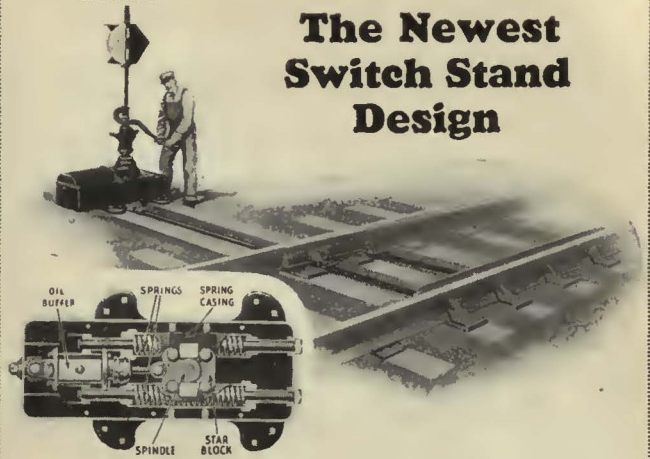
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Permissive and Absolute Single Track Block Signals, Turn-right Signals, Stub End Signals, Rear Protection Signals, Headway Recorders.



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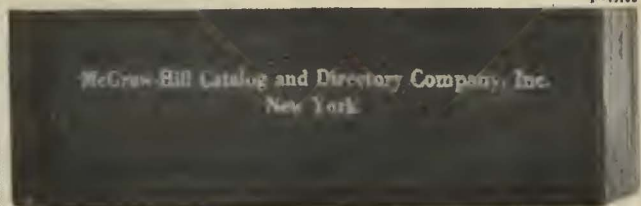
**Contents Include:**

Names and addresses of the Electric Railway Companies in the United States, Canada and the West Indies, arranged geographically by Post Office address. Names and addresses of officials and principal department heads. Names of subsidiary bus companies. Location of repair shops and power plants. Mileage of the road. Gage of track. Number and kind of cars used. Number of buses operated. Number of garages and capacity. Rates of fare. Transmission and Trolley voltages. Capacity of substations. Index of electric railway company officials, giving company connections.

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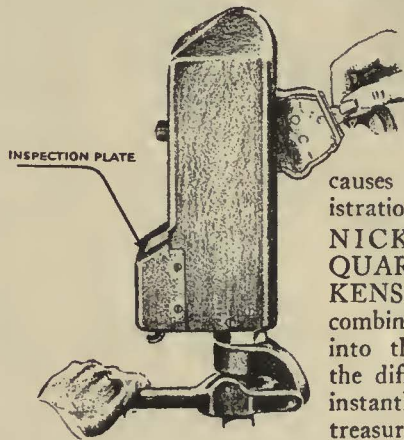
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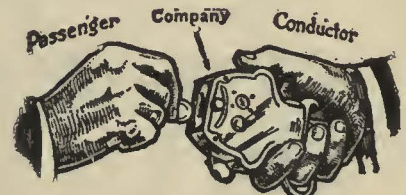


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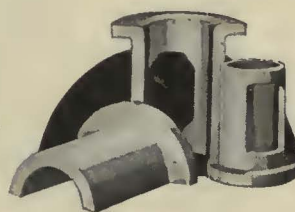
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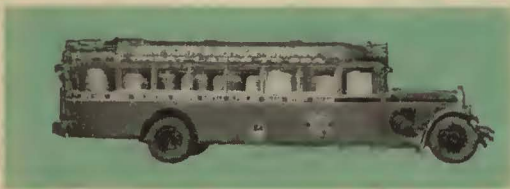


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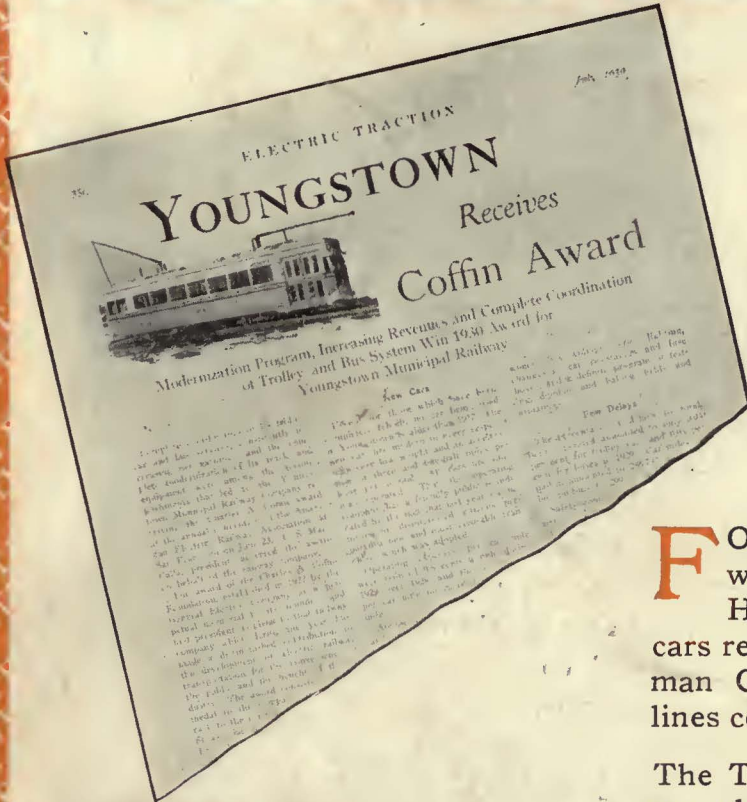
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