ELECTRIC RAILWAY JOURNAL

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Electric Railway Journal

Consolidation of
Street Railway Journal and Electric Railway Review

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Engineering Editor
GEORGE J. MACMURRAY
CLIFFORD A. FAUST
J. W. MCCLOY

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Vol. 74, No. 5 — *Pages 245-300*

PAUL WOOTON
Washington
ALEX MCCALLUM
London, England

LOUIS F. STOLL
Publishing Director

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 locsl et de Transports Publics Automebiles.

NEW YORK, *District Office, 285 Madison Avenue*
WASHINGTON, *National Press Building*
CHICAGO, *520 North Michigan Avenue*
PHILADELPHIA, *1600 Arch Street*
CLEVELAND, *Guardian Building*
BOSTON, *1427 Statler Building*
GREENVILLE, S. C., *1301 Woodside Building*
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SAN FRANCISCO, *883 Mission Street*
LOS ANGELES, *632 Chamber of Commerce Bldg.*
LONDON, *6 Bouverie Street, London, E. C. 4*

Published monthly, with one additional Convention Number during the year. $3 per year, 35 cents per copy. Entered as second-class matter, June 23, 1908, at the Post Office at New York, N. Y., under the Act of March 3, 1879. Printed in U. S. A.

Number of Copies Printed
This Issue, 6,000

Contents of This Issue

MAY, 1930

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The New US-24-A All-steel Welded Trolley Base

INCLUDING a spring buffer which effectively cushions and dampens the action of a rebounding trolley pole, the new US-24-A trolley base weighs only 77 pounds.

To embody this highly desirable feature and at the same time to hold down the weight, have meant no sacrifice whatever in strength. In fact, the all-steel construction with welded joints provides even greater strength than has been available heretofore in this item of car equipment.

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Reciprocating Grinder Car, showing one of the grinding units.

Interior view of a Reciprocating Grinder Unit installed in car.

Interior view of Reciprocating Grinder Car.

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YOU can drag out the process of removing corrugations but you can't drag out the corrugations—you have to grind them out. In other words, rigging up an old car to drag abrasive blocks over the track reduces corrugation but it does NOT and can NOT remove them altogether without costing altogether too much if you really figure the actual cost.

Corrugations, like malignant physical growths, have to be eradicated completely, otherwise the remedial effort is just so much lost motion.

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CHICAGO Overhead Trolley

View of new trolley bus for Chicago. Equipment includes O-B Dash-Illuminating Headlights, O-B Featherweight Trolley Bases, O-B Trolley Retrievers, O-B Trolley Poles and the new O-B Swivel Harp and Wheel especially designed for trolley bus service.

The new Chicago trolley bus under the special overhead construction at Naragansett Avenue, the western end of the Diversey Avenue line.

ON April 17 the first of the new trolley buses started operation in Chicago. This new extension of service by the Chicago Surface Lines, which has been under consideration for years, is by far the most comprehensive trolley bus installation to date. The decision of the engineers of the Chicago Surface Lines to institute this method of transportation will undoubtedly exercise as an important influence in the future extension and development of trolley bus service.

The installation at Chicago, when completed, will cover seventeen route miles in the West and North-west section of the city, and will require an investment of approximately $1,000,000. The first service to be installed is on Diversey Avenue, to be followed in a few days with service on Central Avenue. Photographs of the first trolley bus to operate over this new system shown above.

Forty-one trolley buses have been ordered to take care of initial requirements. The buses have a seating capacity of 40 and represent the most modern design.

Entirely in keeping with this advanced design, engineers of the Chicago Surface Lines selected, as standard equipment on all trolley buses, the O-B Dash-Illuminating Headlight, the O-B Featherweight (Form 5) 6-spring Trolley Base, O-B Trolley Retrievers, O-B Trolley Poles, and the new O-B Swivel Harp and Wheel which has been specially designed for trolley bus service.

And, because of the excellent record of standard O-B line materials, they are found represented on this installation. These materials include O-B Spring Lock Hangers, O-B Type M Curve Hangers, O-B Insulated Approaches, O-B Type DC Cross-overs, O-B Insulated Adjustable Cross-overs and O-B Spring Frogs.

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Picks O-B Equipment and Materials for Bus Service

Special overhead construction at Diversey and Harding Avenues. O-B Spring Frogs, O-B Type DC Cross-overs, O-B Insulated Approaches and O-B Spring Lock Hangers were used.

Upper photo shows the new Chicago trolley bus west bound on Diversey Avenue. Center photo, the crossing at Diversey and Crawford Avenues, with O-B Insulated Adjustable Cross-overs in place. Photo at right shows the O-B Retrievers and O-B Swivel Harps and Wheels on the new Chicago trolley buses.

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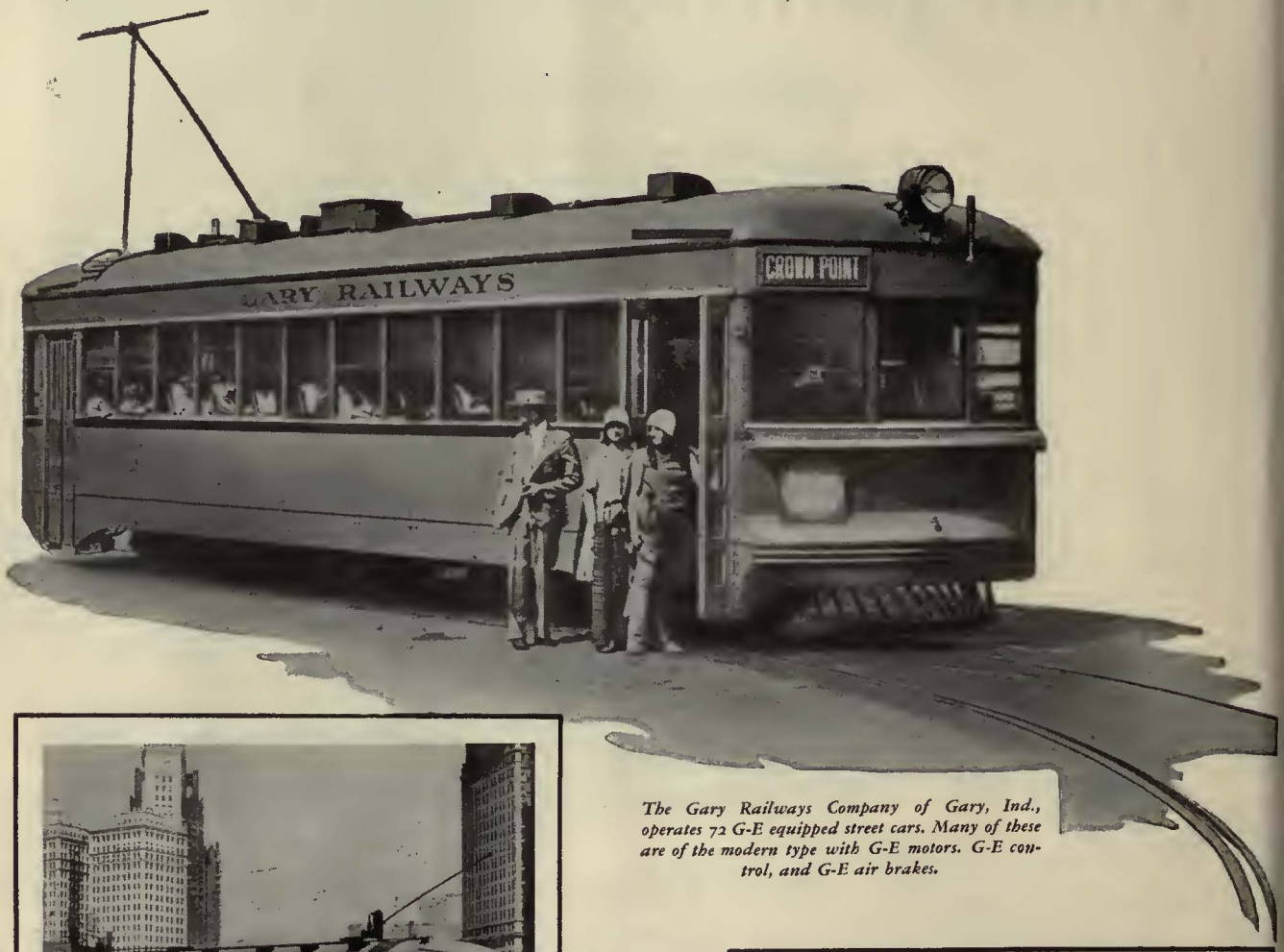

The Gary Railways Company of Gary, Ind., operates 72 G-E equipped street cars. Many of these are of the modern type with G-E motors. G-E control, and G-E air brakes.

The Chicago Surface Lines specified G-E air brakes and PCM control for 100 new cars. Forty are equipped with GE-301, low-wheel motors.

G-E equipped trolley buses are operating economically in Salt Lake City, Utah, Philadelphia, Pa., Cohoes, N. Y., Rochester, N. Y., and Manila, P. I.

PCM control, a recent development of the General Electric Company, provides automatically smoother and faster acceleration. For complete information, address the nearest G-E sales office.

GENERAL

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AMERICA'S largest bus system, Public Service Coördinated Transport, of Newark, N. J., recently purchased 180 new city-type buses which will be equipped with General Electric gas-electric drive. These buses will augment a fleet of 1150 similar units now in operation, making a total of 1330 G-E equipped gas-electric buses in the service of this company. There can be no greater tribute to the performance of General Electric equipment.

While smoothness of operation and simplicity of control have contributed much to the success of G-E gas-electric drive, these features alone were never sufficient to win a place for the more than 2000 G-E gas-electrics now on the road. Economy of operation and the ability to increase schedule speeds have always been foremost among their advantages. We invite your interest. Write us. General Electric Company, Schenectady, N. Y.

For the seventh time, Public Service specifies G-E gas-electric drive for its city-service buses.

1.	December, 1925	333
2.	April, 1926	54
3.	July, 1926	8
4.	March, 1927	108
5.	February, 1928	332
6.	February, 1929	161
7.	February, 1930	180
		1176
		154*
	Total Gas-electrics	1330

*** Public Service also operates 154 G-E equipped gas-electric buses acquired through consolidation with other companies.**

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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, May, 1930 *Number 5*

Business Prospects Brighter

MOST authorities agree that the low point in the present business recession has been reached and that an upward trend will be witnessed during the coming months. Employment in manufacturing industries in March was a little lower than in February and nearly 9 per cent below March last year. Department store sales for March were about 12 per cent below those of a year ago. Recent reports, however, show a moderate but material improvement during the first two weeks of April.

Electric railway traffic in March, 1930, showed a decrease of about 7 per cent as compared with March, 1929, while the decrease in February was only about 4 per cent and in January a little more than 1 per cent, according to figures compiled by the American Electric Railway Association. From this it appears that the decline in traffic has lagged somewhat behind the business decline and has been considerably less severe. This is in accord with predictions made last fall after the sudden stock market crash that electric railway and bus traffic was unlikely to suffer a very large recession.

Improvement in general business conditions appears to be definitely under way. Consumption of electrical energy by manufacturing plants is increasing. Construction programs of far-reaching extent are being accelerated. While it is too early as yet for the improvement to be reflected in reports of the number of passengers carried, electric railway operators are distinctly more optimistic than they were a few weeks ago. It may be expected that the upturn of electric railway traffic will follow the upturn of general business more closely than did the decline. A tendency exists to continue using public transportation for a considerable period after unemployment begins. Only after a man has been unemployed for some time does he cease to use street cars and buses. But when he goes back to work he immediately begins to use public transportation again. In other words, the period of depression in the local transportation industry will probably be much shorter than in other industries. It is not likely that normal conditions will be restored immediately, but every indication points to steady improvement continuing during the spring and summer months.

Serviceable But Not Suitable

CENTURIES ago in Egypt the slaves of the Pharaohs labored to build the gigantic pyramids which remain a marvel to this day. The Romans in their turn, with marvelous skill and care, constructed hundreds of miles of aqueducts, many of which are still in use. In the middle ages workmen labored with religious fervor to raise the lofty spires of the beautiful cathedrals which charm the modern tourists. Throughout practically the entire period of recorded history men have struggled to create monuments that would endure forever.

Today we have a somewhat different viewpoint. No serious doubt exists that modern skill can design and build structures to last for centuries, but we seldom consider it desirable to do so. A new factor, one that did not bother the ancients, has entered into our calculations—obsolescence. We have learned that a thing may remain serviceable long after it has ceased to be suitable. Hence we have very largely abandoned the idea of building for eternity.

In the field of transportation this modern viewpoint finds particularly apt application. Possibly we might be able to design a vehicle like the famous "one hoss shay" that ran a hundred years to a day before it fell to pieces. But it is impossible to believe that the public would patronize it for anything like that length of time. Possibly we might design a track structure which with proper maintenance would last for generations, but it is extremely unlikely that we would find it satisfactory as to location, line, grade, etc., for so long a period.

Obviously, then, the wise plan is to design our structures and equipment with a certain definite objective in view. If replacement is anticipated at the end of ten or fifteen years, the best design is that which will assure the desired length of life with a minimum surplus. Engineers today should pride themselves on their skill in designing to accomplish a definite purpose rather than in the creation of monuments for posterity.

Small-City Properties Appraise Their Assets and Liabilities

THERE is no magic formula for success in small-city street railway or bus operation. Decreases in traffic have been experienced by many of the properties that are found in this class. Burdensome franchise requirements, inequitable taxation, onerous paving obligations, inflexible fare structures, top-heavy financial setups, unregulated taxicab operation and, above all, the competition of the privately owned automobile, have contributed to the troubles of the small-city railways. Yet for none of these ills is there an unfailing remedy. Each property must solve it own problems by a careful study of existing conditions.

In spite of the difficulties which the small-city property has encountered and with which it is still beset, there is good reason for a continued faith in the future of organized transportation in these communities. Without question there is less demand on the part of the public for this commodity than there was a few years ago. At the same time there is a marked reluctance to see the time-tried utility reduce its service or liquidate its plant. The local transportation system, be it bus or trolley, is

still regarded as a community asset, and the extension of service into newly developed areas now, as in the past, meets with favorable public response.

The brighter side of the picture is presented by those properties which have introduced aggressive merchandising methods in the sale of their service. This has taken the form of careful study of the fare structure, balancing service to meet the requirements of the public more satisfactorily, modernization of rolling stock, cultivation of improved public relations, and energetic solicitation of patronage from potential riders.

Certain instances will be found in which local remedies, available to all, have been applied with a considerable degree of success. While there is a general lack of adequate merchandising effort there is an awakening interest in this subject. Public relations are, broadly speaking, on a better basis than in the past, and municipal authorities are listening with increasing attention to appeals for relief from unnecessary burdens.

Such, in effect, were the conclusions reached at a three-day meeting of the committee on small-city operations held recently in New York.

If the "small city" hearings demonstrated any one thing, it was that we are living in an era of change and progress, in which the transportation industry, along with many others, must change its methods to keep in step with the changing tempo of events or face serious consequences.

Rhode Island Regulates the Taxi

RHODE ISLAND has followed Connecticut in placing the taxicab under responsible state regulation. For many months now the taxi situation in Providence and elsewhere in the state has been chaotic. In the operation of these vehicles there has been neither law nor order. The new legislation has behind it the thought that the taxi has a distinct place in the transportation field as a service to which the people are entitled, but the regulatory measure was enacted to correct conditions which had become a menace to the public welfare.

Under the new law the state utility commission is empowered to fix rates, specify service and stipulate the equipment needed. This is as it should be. That the United Electric Railways, Providence, advocated the regulation in no way militates against the soundness of its contention that cut-rate competition among the carriers is inconsistent. True, the earnings of the coordinated railway and bus system in Rhode Island were affected by the unfair cut-throat taxi competition, but the railway stands to profit in no way other than the removal of this unfair competition. If it seeks to enter the taxicab business itself the railway must prove the convenience and necessity of any lines it would run.

As in Connecticut, public regulation in Rhode Island should tend to raise the standard of taxicab service and eliminate cut-rate competition destructive to the taxi industry itself and harmful to the public by injuring a necessity service. Particularly does the requirement of public convenience and necessity guard the industry from internal destruction by those who would enter the field without any regard to the extent of taxicab service already furnished. That is sound doctrine. The public may patronize an unprofitable business while it lasts, but eventually the public pays the full penalty for the folly that permits unrestrained competition. In passing the new law the Legislature of Rhode Island has protected the taxicab operators against themselves.

Much Talk But No Progress Toward Unification

LEGISLATION looking toward unification of the rapid transit lines in New York City, including the new municipal subway system now nearing completion, has failed again at Albany. Under the proposed bill the city would have had the power to acquire privately owned lines and lease them together with its own new lines for unified operation, meeting from general taxation whatever deficits might result from the preservation of the sacred 5-cent fare. This proviso to permit the city to make up deficits from taxation was primarily responsible for the defeat of the proposal.

All along, the situation has been a mixture of politics and economics, two things that do not go well together. Both sides conceded that a 5-cent fare on the unified system was not assured unless the city received from the legislature authority to pay part of the cost of operation out of taxes. The majority in the legislature stood firmly against the unification bill unless this subsidy was eliminated. The mayor, however, would not consent to the elimination of the subsidy and the law makers therefore refused to pass the enabling legislation.

Since the legislature has adjourned without action, the city will be required under the existing law to charge a fully compensatory fare on its new lines after a development period of three years. Thus it appears that the nickel fare is doomed on these lines anyway, unless, as commentators on the situation point out, privately conducted negotiations can bring about unification of the old low-cost lines with the new high-cost ones under expert non-political management which can stretch the nickel to cover the combined interest charges.

For the present the battle is ended, but it is not entirely clear who is the victor. The majority in the legislature has won its point concerning the subsidy. The mayor, however, by the failure of the desired legislation has secured an alibi in the event of future difficulties. One thing that seems certain is that the public continue to lose by the further postponement of unification.

To Protect or To Harass?

CONSIDERATION is being given at present in a number of plans to the question of creating the office of "Peoples' Counsel" to represent the public in utility hearings before regulatory bodies. In a few communities this has already been done. It is difficult to see what good is to be accomplished by this plan. Its proponents claim that the utilities employ high-priced legal talent to present their side of the case and that the public should be equally well represented.

Everyone will agree that the interests of the public should be fully protected at hearings of this kind, but that scarcely seems sufficient reason to create a new office when nearly every town, city and state already has its legal staff. These lawyers are the logical persons to represent the public interest before regulatory bodies. If they are too busy with other matters, or are not properly qualified in questions of utility law, it is an easy matter to employ special counsel to handle any particular case. This has been done in many instances with excellent results.

If a "Peoples' Counsel" is created for the express purpose of representing the public at hearings before the

regulatory commission, a question immediately arises as to what he will do to keep busy in the intervals when no cases are under consideration. To this the most likely answer seems to be that he will occupy himself prying into the affairs of the utility to see if he can find something to criticize. Such procedure is entirely contrary to the fundamental principles of American government. In this country it has always been held that it is not the function of government to delve into the affairs of individuals and business concerns on the mere chance of uncovering evidence of wrong doing. The records of the public utilities are open to public inspection, and there is little reason to anticipate that a "Peoples' Counsel" would unearth dark deeds that have long laid hidden. It is very likely, however, that he would become a good deal of a nuisance and that the answering of his questions would waste a large amount of time and energy that might much better be devoted to the operation of the property. Probably he would feel that he had to make trouble in order to show that he was earning his salary. All in all the conclusion is inescapable that the real motive underlying the creation of such an office is not to protect the public but merely to harass the utilities.

The Growing Need for Public Transportation

SO MUCH is heard these days about the growing use of private automobiles that the growing need for public transportation receives relatively little attention. Yet this need is actually increasing year by year despite the remarkable development of the automotive industry and the multiplication of two-car families and even three-car families.

Fifty years ago more than 70 per cent of this country's population was rural. Just prior to 1920 a balance was reached between urban and rural population, each being approximately 52 million. During the past decade it is estimated that urban population has increased about 16 million and rural population not more than 2 million, making the present ratio about 55 to 45. If this trend continues, as there is every reason to expect, the relationship existing in 1880 will be completely reversed by 1965 when more than 70 per cent of the total population will be urban.

Inasmuch as the largest part of the public transportation business is done in the urban communities, this shift of population is very significant. It means a steady increase in the number of potential customers. Moreover, experience has shown repeatedly that the riding habit on public transportation vehicles tends to increase as the population increases.

Thus it is evident that future demands for public transportation are likely to be greater than those existing today, rather than less. Just what form this demand will take, whether it will be for street car, rapid transit, bus, trolley bus, or taxicab service, cannot accurately be forecast. Most likely it will be for a combination of these services, each doing the work for which it is best suited. Meeting this future demand will undoubtedly present many complex problems. Public transportation agencies cannot fold their hands, sit back, and wait for their business to grow. They must be constantly alert to keep pace with changing conditions and habits of living. If they are prepared to render service when, where and as wanted, there is every reason to expect that the demand for their service will steadily increase.

Higher Accelerating and Braking Rates Bring Faster Schedules

HIGHER schedule speeds for transportation vehicles are today more essential than ever before, if the competition offered by private vehicles is to be met. Speed always is attainable—at a price. Although the original appeal of the street railway was based on speed, transportation men have been content to hold down the cost and with it the possibilities for speedy rides that will attract the public. In general the equipment has been chosen for economy rather than for the possibility of making fast schedules.

Examine for a moment the factors that determine the schedule speeds for runs such as are met in surface or ordinary rapid transit service. These principles, by the way, apply equally to electric cars, buses and steam trains. The factors are the rate of acceleration, the rate of braking, and the time consumed in stops. The last factor is determined by the location and arrangement of the stopping places, the number of passengers on and off, and the load already on the vehicle. It is influenced to a considerable extent by the design of the vehicle and the arrangement of doors and steps. Few of the older vehicles are properly arranged to permit quick loading and unloading.

Seldom is it realized that the maximum speed at which the motive power can drive the vehicle can have little effect on the schedule possibilities because the ordinary run is too short. The fastest run that can be made between any two points demands the highest possible rate of acceleration for a portion of the time, followed by the highest rate of braking for the remainder. It is only when the run is so long that it is uneconomical to keep up the maximum acceleration that the speed characteristic has any influence. In order to make a schedule practical for use day after day there must be some reserve. Ordinarily this is obtained by allowing the vehicle to coast for a certain portion of the time.

For short runs—and in this class falls practically all surface and rapid transit service—the equipment should be chosen solely from the standpoints of acceleration and braking. High braking rates ordinarily are less difficult to attain, and cost less for the equipment and for its operation, than equal rates of acceleration. The only practical limit to the rate of braking is slipping of the wheels. It is surprising that higher rates of braking are not used regularly in service. Passengers are not inconvenienced by rapid braking if the equipment is properly designed and properly handled.

Acceleration is determined by the tractive effort used in proportion to the weight of the vehicle. The horsepower is involved only indirectly. Hence reduction in the weight of the vehicle is just as valuable in getting higher accelerating rates as increasing the size of the motive power. Before deciding to use heavier motors, then, every attempt should be made to reduce the weight of the vehicle. This in turn keeps down the weight of the motors themselves, so that there is a reciprocal advantage.

Even the most recent designs of cars fall far short of reaching the practical limits of acceleration and braking. Every attempt should be made by vehicle operators and manufacturers to build designs that will give acceleration and braking rates in line with the trends of today. Otherwise the transportation business is bound to suffer.

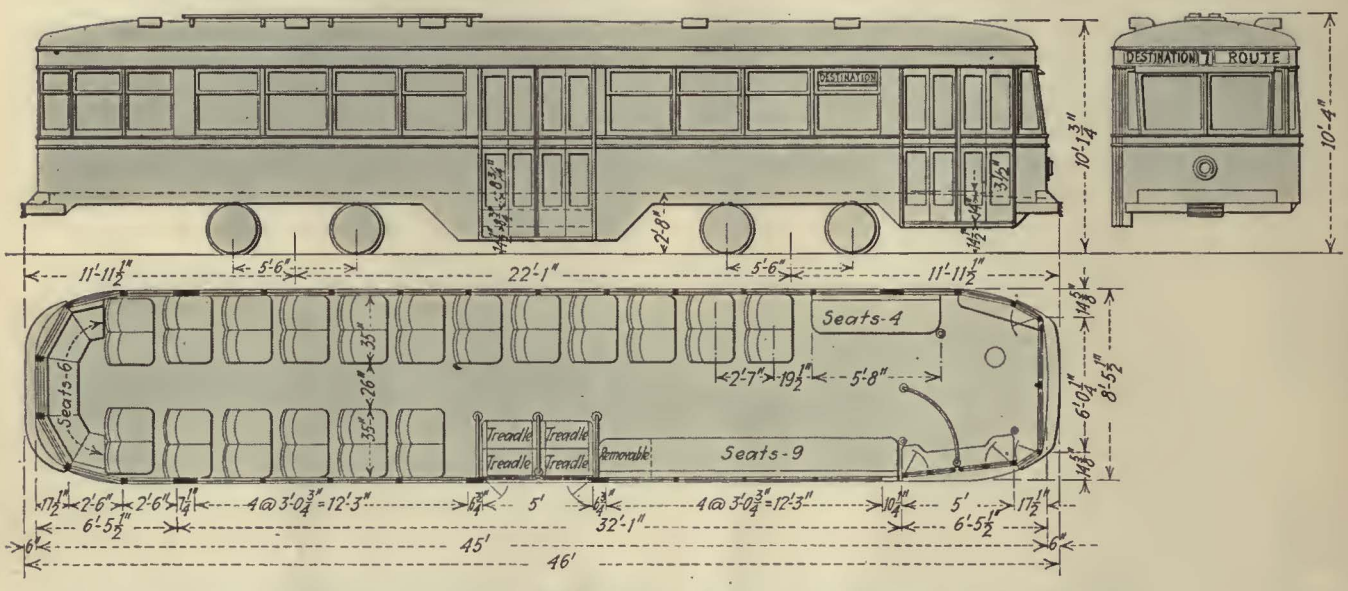
Extensive Rolling Stock Reha

By

DEAN J. LOCKE *and* A. T. CLARK

Research Engineer Superintendent of Equipment

United Railways & Electric Company of Baltimore



United Railways & Electric Company of Baltimore has recently placed orders for 150 new single-end, front-entrance, center-exit cars of this design seating 55 passengers

1930 Transportation Service for 1930

THIS is now the Baltimore motto in executive offices, shop, carhouse, power station, bus garage and "out where the rush begins." During the summer 150 new cars will be placed in operation and 262 present-type cars will be completely rejuvenated, from running gear to roof. This extensive program of rolling stock rehabilitation has been made possible by the recent favorable decision of the United States Supreme Court in the Baltimore fare case, which permits the company to charge a straight 10-cent fare for all adult passengers.

There is more to the 10-cent straight fare, however, than just "getting it" and then collecting it. That part of the problem arising from the widespread use of the automobile for personal transportation does not disappear just because it suddenly begins to cost 10 cents to take a street car ride. Automobile users don't mind paying more for transportation—they wouldn't be using automobiles if they did mind—but they want something for the money.

For a year previous to the conclusion of the "Baltimore fare case," thousands of tests of the present-type cars and of numerous remodeled cars were made, both on the specially designed test track and in regular service, in anticipation of the favorable decision, for the purpose of determining what the design and performance of new cars should be, and how the present cars could be operated more effectively.

The new cars will be of the double-truck, single-end, front-entrance, center-exit type, having an over-all length of 46 ft. All of the cars will be mounted on Brill 177-E-1 trucks with 5-ft. 6-in. wheelbase and 26-in. rolled steel wheels. Each car will have four 50-hp. motors, either Westinghouse 516-A or General Electric GE-301. Automatic control of the PCM and VA type will be used, in order to obtain a smooth acceleration of 3.25 m.p.h.p.s. The total weight is expected to be about 39,000 lb. The J. G. Brill Company will build 100 of the bodies and the Cincinnati Car Corporation will build 50.

Westinghouse air brakes will be used, designed to stop the car at a rate of 3.5 m.p.h.p.s. with a load equal to three-quarters of the seating capacity. This is made possible through use of the new Type M-33 self-lapping motorman's valve, a 12x12-in. brake cylinder, and brake rigging designed with 150 per cent ratio. Doors and brakes will be pneumatically interlocked. The trucks are designed so that track brakes may be attached should it be found desirable to do so at some future date.

While the new car is intended primarily for one-man operation, two men can be used if desired. The center exit doors fold outward and are independently controlled by two automatic treadle plates. Manual operation can

ilitation

At Baltimore

New cars quickly ordered following fare increase are designed for comfort and speed. In addition to the 150 new cars, 262 of the present cars will be rebuilt during 1930. Rates of acceleration and braking will be nearly doubled, and free running speed increased 25 per cent. Pneumatic door control and safety devices to be installed

Remodeled car is arranged for one-man operation, entrance being at the front and exit at the rear by means of a treadle door

be substituted for treadle operation on these doors, however, when a conductor is used on the car. The front entrance doors fold inward into a step well.

Seating accommodations for 55 passengers are provided. The seats are of the semi-bucket type arranged in twelve pairs on the left side of the car, with six additional pairs on the right side of the car in rear of the exit door. A curved seat at the extreme rear seats six and a longitudinal seat on the right side between the front and center doors will accommodate nine passengers. Opposite the entrance door is a short longitudinal seat for four passengers. This arrangement was adopted because it was believed to be the most advantageous for rapid loading. All seats will be upholstered in leather. Above the longitudinal seats enameled hand rails are provided for the convenience of standing passengers, while large enameled grab handles are available on the high backs of all the transverse seats. The floor will be level throughout except for a 2½-in. ramp at the front end. It will be without trapdoors and will be covered with $\frac{3}{16}$-in. battleship linoleum.

The car roof will be of plain arch type with ten ventilators arranged in two rows. There will be ten wide windows between the corner posts on the left side and eight on the right side, as well as six windows above the curved seat at the rear, and one on the left side of the front platform. The windows will be arranged in two sections, the upper sash being stationary and the lower sash designed so that it can be raised easily by a seated passenger. Sash frames will be of tubular brass. Artificial illumination will be provided by twenty dome fixtures arranged in two rows above the center line of the cross seats. Each fixture will be provided with a 36-watt lamp.

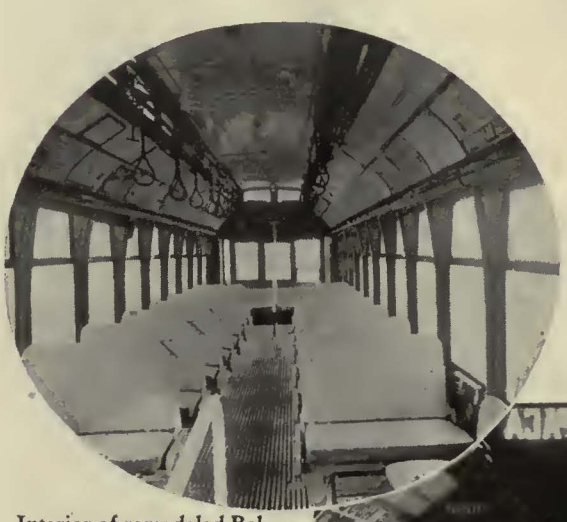
Analysis of Car Performance During Rush Hours, Fremont Avenue Line

	Old Single Truck Car	Remodeled Double Truck Car	Increase or Decrease	Per Cent Increase or Decrease
Number of stops made	71	71	0	0
Stops per mile	8.6	8.6	0	0
Slow downs	33	44	+11	+33.3
Total time in motion	47 min. 53 secs.	42 min. 15 secs.	—5 min. 38 secs.	—11.7
Total power-on time	24 min. 9 secs.	22 min. 39 secs.	—1 min. 30 secs.	— 6.2
Total coasting time	11 min. 22 secs.	8 min. 54 secs.	—2 min. 28 secs.	—21.6
Total interference time	3 min. 50 secs.	2 min. 36 secs.	—1 min. 14 secs.	—32.1
Total braking time	8 min. 32 secs.	8 min. 06 secs.	—0 min. 26 secs.	— 4.7
Average speed, excluding stops	10.3 m.p.h.	11.7 m.p.h.	+1.4 m.p.h.	+13.6
Average of maximum speeds of individual runs, excluding stops	13.1 m.p.h.	15.5 m.p.h.	+2.4 m.p.h.	+18.3
Average speed at power cut-off	12.1 m.p.h.	15.3 m.p.h.	+3.2 m.p.h.	+26.4
Average speed ten seconds after starting	11.5 m.p.h.	13.8 m.p.h.	+2.3 m.p.h.	+20.0
Average acceleration rate for first ten seconds after starting	1.15 m.p.h.p.s.	1.38 m.p.h.p.s.	+0.23 m.p.h.p.s.	+20.0
Average speed at brake application	11.4 m.p.h.	13.9 m.p.h.	+2.5 m.p.h.	+21.9
Average braking rate	1.53 m.p.h.p.s.	2.05 m.p.h.p.s.	+0.52 m.p.h.p.s.	+34.0
Weight of car	27,700	43,600	+15,900	+57.4
Seats in car	41	50	+9	+22.0
Kilowatt-hours	24	32	+8	+33.3
Kilowatt-hours per car-mile	2.90	3.87	+0.97	+33.4
Watt-hours per ton-mile	165	155	—10	— 6.1

The front end of the car will be of the so-called automotive design with comparatively little curvature. The front vestibule window will slope inward at the top, and will be divided into two sections so arranged that one section will slide in front of the other, to give the operator unobstructed vision in foggy weather. Non-shatterable glass will be used in the sliding portion. Two mirrors are provided for the operator, one showing the interior of the car and the other arranged so that he can see what is happening at the center exit doors.

Existing Cars Remodeled

Coincident with the making of plans to purchase these new cars it was decided to remodel a considerable number of the cars now in service. The cars chosen for remodeling are of the double-truck, double-end, semi-convertible, two-man type, seating 47 passengers. Besides increasing the acceleration and braking rates, the remodeling involves also the elimination of doors on the left side of the car, the removal of control at one end and the installation of pneumatic door-operating devices. A single notch controller and straight air brake will be placed at the rear end for backing up and emergency movement. The remodeled cars will have double entrance doors at the front end and single treadle-operated exit doors at the rear. So arranged, they will be suitable for one-man operation. Other plans provide for the conversion of the present-type car into articulated units.



Interior of remodeled Baltimore car, showing fourteen double cross seats, with curved seat on rear platform and longitudinal seat opposite entrance

As remodeled, the single car weighs 43,600 lb. and seats 50 passengers. It is mounted on Brill 27-GE-1 trucks and is equipped with K-35 controllers and four GE-200-I, 40-hp. motors. The accelerating rate has been increased from 1.75 to 2.70 m.p.h.p.s. by shunting the motor fields on the third and succeeding points of the controller and by improved manipulation of the controller. The braking rate has been increased from 1.75 to 3.00 m.p.h.p.s. by installation of the Westinghouse Type M-33 self-lapping motorman's valve, by substitution of a 12x12-in. brake cylinder instead of a 10x12 in., and strengthened brake rigging to give a 150 per cent braking ratio instead of 100 per cent.

The shunting of the fields increased the free running speed from 27 m.p.h. to 33 m.p.h. These changes have resulted in a decrease of 9.7 per cent in the actual running time between terminals of the Fremont Avenue line which, was equipped with twenty rebuilt cars during the latter part of January of this year. While this comparison is between services with old single-truck, two-motor cars and remodeled double-truck, four-motor cars, it is indicative of the improvement produced by the remodeling of the double-truck type of car, since the original speed of the car before being remodeled was no better than that of the single-truck car.

In making the studies preparatory to remodeling, a portable testing set was used to secure a graphical record of car performance throughout the entire day's normal operation. This set records automatically on a 7-in. moving strip of paper, superimposed graphs of car speed, line voltage, current demand and air-brake pressure, and indications of distance run in 100-ft. increments, time elapsed in five-second increments and location of stops. The set is mounted on a cross seat and is supervised by one observer, who records on the chart data pertaining to the run, with particular reference to any abnormal conditions encountered. Separate instruments record kilowatt-hours of energy consumption and power-on time.

Electric fare box for coins of three different denominations, Type M-33 self-lapping motorman's valve, motor field shunting and dead man control are features installed on the remodeled cars

In the routine procedure of analyzing a line, the set was first installed on a car which had not been rebuilt. A sufficient number of regular service runs were covered to give accurate data on peak and off-peak average operating conditions. After the data had been obtained

Comparison of Old and New Operating Schedules, Fremont Avenue Line

	Schedule		Increase or Decrease Made by New Schedule	
	Old	New	Amount	Per Cent
Average speed between terminals	7.82 m.p.h.	8.68 m.p.h.	+0.76 m.p.h.	+ 9.7
Car-hours	217.5	206.9	—10.6	— 4.9
Car-miles	1,480	1,552	+72	+ 4.9
Seat-miles	60,680	70,600	+16,920	+27.9
Capacity-miles	81,400	116,400	+35,000	+43.0
Ton-miles	25,300	37,600	+12,300	+48.6
Base headway	7½ minutes	7 minutes	—½ minute	— 6.7
Peak headway	3 minutes	3 minutes	—0	— 0.0
Cars required on peak	20	18	—2	—10.0
Cars required on base	10	9	—1	—10.0

an analysis was made of the time consumed at stops and between stops. Data pertaining to the car itself, the passengers and external influences were segregated. Similar runs were then made with a remodeled car operated on the line with old cars and from the data obtained similar facts were developed, due allowance being made for handicaps imposed by the older cars and the slower schedule. Midnight runs were then made with both old and rebuilt cars loaded to seating capacity, the cars being operated by the motorman instructor at the greatest possible speed consistent with safety and good operating practice. Stops were made as in regular rush-hour service. The data from all these runs, after being properly analyzed and summarized, indicated the running times of the rebuilt car for different periods of the day. These were incorporated in a new schedule to provide the service on the line when fully equipped with rebuilt cars. By this means the number of cars required, the operating costs and savings were determined accurately in advance, and a new schedule was made up.

With the installation of a schedule involving new operating technique, new equipment and materially reduced running times, a follow-up program was necessary to eliminate mechanical difficulties and to allow the operating force to become fully accustomed to the new conditions. In this program the car testing set was used to analyze the performance of individual operators, thus assisting the chief motorman instructor to determine which motormen had difficulties in operating the remodeled equipment.

An accompanying tabulation shows operating conditions with both old and rehabilitated cars on the Fremont Avenue line, which was entirely equipped with this type of rolling stock. It indicates the degree of accomplishments possible on other similar lines of the Baltimore system.

Public Service Suburban Bus Terminal in New York City

In the heart of the retail shopping district of New York City, a terminal has been established by Public Service Co-ordinated Transport for buses running to suburban towns in New Jersey. The location is on the south side of 40th Street, about 100 ft. west of Fifth Avenue, and opposite the New York Public Library. At this convenient spot attractive and comfortable facilities have been provided for waiting passengers. A ticket agent is on duty inside the terminal, while a starter on the street regulates headways and announces the departure of buses.

All street car and bus routes operate either to or on Main Street

Income Increased by

CO-ORDINATION *at*

ON THREE occasions within the past five years, municipal and state highway paving programs have included routes over which the Poughkeepsie & Wappingers Falls Railway operated street car service. Franchise obligations demanded the company's participation in these programs if street car operations were to be continued, and meant the expenditure of large sums of money for the rehabilitation of the track area. The only alternative was the substitution of buses for street cars. In two instances this substitution was made, while in the other it was decided to continue car operation.

The railway assumed its share of the repaving costs on Main Street and, in addition, completely reconstructed the track and overhead equipment. On the local south side line in Poughkeepsie and on the interurban route between Poughkeepsie and Wappingers Falls, car operations were abandoned and buses put into service in the community for the first time.

Particularly significant was the substitution of buses on the interurban line because of its effect on both the economic and operating conditions of the system. This substitution released approximately 7 miles of private right-of-way which was sold, the proceeds of which were used to retire all claims held by the City of Poughkeepsie for the repaving of Main Street.

The Poughkeepsie & Wappingers Falls Railway is owned by the Hinkley family, two members of which, Mrs. M. M. Hinkley and Miss Mary Hinkley, participate actively as president, and vice-president and treasurer respectively. Operation of the company is under the direction of Hemphill & Wells, consulting engineers of New York City, with John A. Nilan as resident manager. The area served has a population of approximately 40,000. One line now served by buses extends 7 miles beyond the city limits to Wappingers Falls, a town of about 3,000 residents.

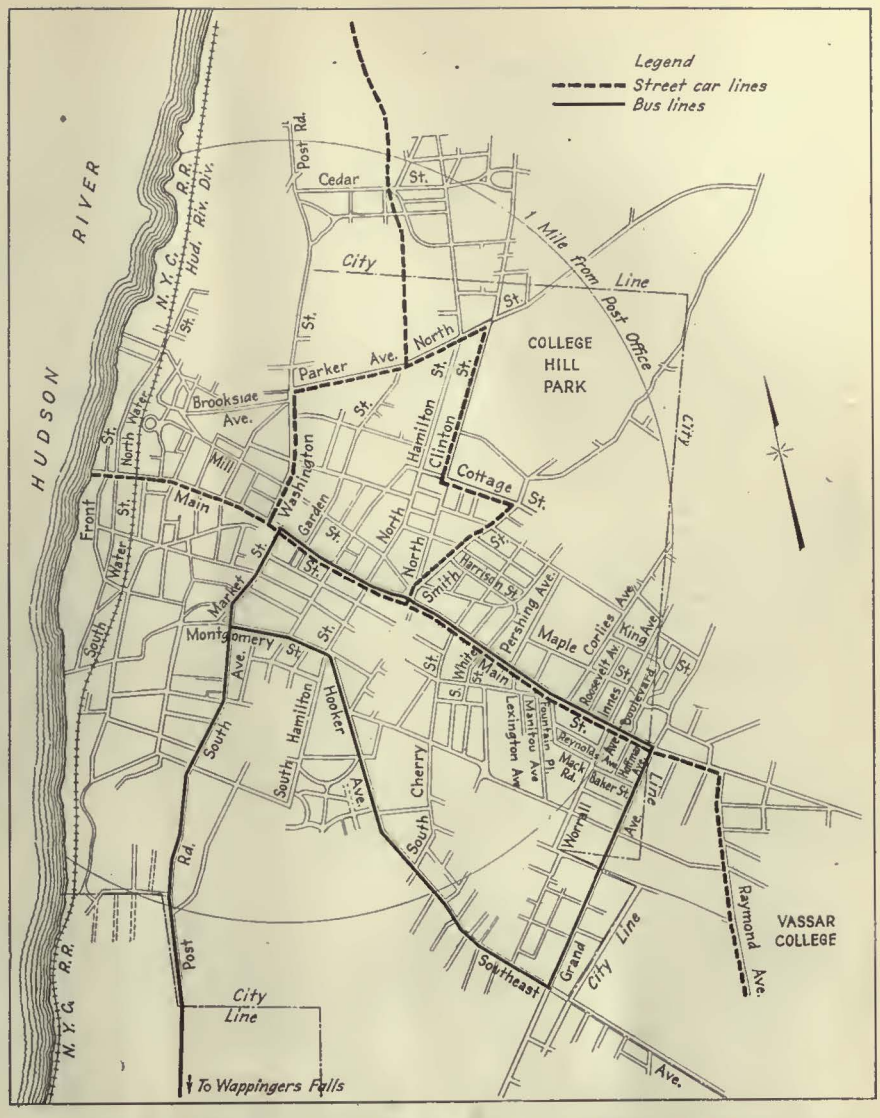
The Main Street car line, covering a route of approximately 3 miles, is the most important and profitable operation of the system. Its western terminus is at the Hudson River ferry landing from Highland, N. Y., across the river, and at the railroad station of the New York Central Lines. From that point the line runs directly through the main street of the city, on which are located all of the business, shopping and theatre districts, thence through a residential section terminating at Vassar College. Service is supplied by 32-passenger Birney cars operating on headways of eight minutes until noon, six minutes from noon until 9 p.m., with two additional trippers in the evening rush hour, and then eight minutes until midnight. Eight cars are used on the six-minute

schedule. All the cars are in good condition and are capable of many more years of service. Main Street was partially repaved in 1921 and completed in 1923, at which time complete rehabilitation of the track and overhead structures was effected. and it is estimated that no major changes will be made on them within the next ten or fifteen years. At the present time they are in excellent condition.

The Main Street line is double-tracked over its entire length with the exception of several hundred yards at

Larger revenue and lower operating expenses with material decrease in fixed charges follow partial substitution of buses for street cars. Prospects for future are good

Poughkeepsie



Reorganization of service in Poughkeepsie included rehabilitation of three street car lines and bus substitution on two others

its eastern extremity on Raymond Avenue. On this avenue the route is on private right-of-way and open track construction is used. This route connects with all other bus and street car lines in the system and is duplicated for only a few blocks in its central section by the North Side car line and by the South Side buses. These partially paralleling services do not compete to any material extent with the operations of the Main Street line but draw their patronage almost exclusively from the north and south residential districts. General riding on Main Street is by street car.

As on all the other local lines, whether car or bus, the fare is 10 cents cash or one token which may be purchased at six for 50 cents. This fare has been in effect since May 9, 1925, at which time it superseded a straight 8-cent cash fare. Gross earnings per car-mile on this line since 1925 are shown in the following table in comparison to those on the other routes.

Gross Income in Cents Per Car or Bus-Mile, 1925-1929

	1925	1926	1927	1928	1929
Main Street	49.17	49.19	49.09	47.06	47.12
North Side	24.21	25.46	26.28	26.74	28.74
Hospital	34.14	34.80	32.37	33.33	33.97
South Side	28.90	27.57	26.10	29.18	31.52
Wappingers Falls	32.10	32.65	31.11	29.31	27.48
Average	37.88	39.04	38.45	38.11	38.37

In addition to the service on Main Street, the Poughkeepsie & Wappingers Falls Railway operates two additional street car routes in the northern section of the city, the North Side line and the Hospital line. The North Side line operates in a clockwise direction on a loop including a part of Main Street, Washington Street, Parker Avenue, North Street, North Clinton Street, Cottage Street, Smith Street to Main Street. As shown on the accompanying map of the city, this line adequately serves the residential section to the north of Main Street. Birney cars are operated on this line on a twenty-minute headway until 8 a.m., a ten-minute headway to 8:10 p.m. and a twenty-minute headway until 11 p.m. Two cars are used for the ten-minute headway, and one car is used to operate a twenty-minute schedule. The Hospital line operates from the intersection of Main and Washington Streets over the same route as the North Side line as far as the intersection of Garden Street and Parker Avenue, where it branches to the north and extends 1½ miles beyond the city limits to the Hudson River State Hospital. These routes are built with single track with the exception of that portion of the route that is common to both lines on Washington Street and Parker Avenue, which has double tracks. The lines are not co-ordinated in any way, the Hospital line using one Birney car running on a half-hourly service throughout the day, and the North

Earnings and Expenses of Poughkeepsie System, 1925-1929

	1925	1926	1927	1928	1929
Gross revenue	$262,118	$269,384	$263,853	$252,367	$256,740
Operating expenses and taxes	188,120	191,227	172,755	158,362	164,052
Net revenue	$73,998	$78,157	$91,098	$94,005	$92,688
Interest charges and depreciation	109,662	109,108	106,671	106,308	89,263
Net income (*deficit*)	*$35,664*	*$30,951*	*$15,573*	*$12,303*	$3,425

Side line operating on a schedule as previously described. Service on the Hospital line, previous to the term of the present management, was rendered by heavy type cars, with two-man operation. Birney cars replaced the old cars on this line and one-man operation was put into effect. This change was one of the major economies effected by the new management.

Introduction of bus service was first made on Oct. 10, 1928, by the substitution of buses for street cars on the South Side line, shown on the accompanying map. A portion of the route on this loop was in need of repaving and it became necessary for the company to make a decision between a large expenditure for its share of this work or the substitution of buses for cars. Bus service was decided on after a careful study of the operating costs of such vehicles and the sentiment of the residents on the south side of the city. At the present time, two A.C.F. 23-passenger buses operate in both directions on this loop, maintaining a fifteen-minute headway throughout the day. The operation of modern, comfortable buses over this new pavement has proved very satisfactory from both company and customer standpoints. Since its inauguration, patronage has constantly increased. From a gross income of 26.10 cents per car-mile in 1927, the same route produced 31.52 cents per bus-mile in 1929.

In addition to the local services described, the Poughkeepsie & Wappingers Falls Railway operates an interurban bus line between the business section of the city of Poughkeepsie and the town of Wappingers Falls, located 8 miles to the south. One and one-half miles of this route is located within the city of Poughkeepsie itself and the remainder of the route is on the Post Road, which will be rebuilt in 1930. Previous to November, 1928, service on this route was carried on by light-weight, double-truck interurban cars which were doing a good business and holding patronage. The substitution of buses for this street car service was deemed desirable because a great portion of the route was included in a state highway paving program. The right-of-way from Poughkeepsie to Wappingers Falls laid adjacent to the South Post Road, which was to be widened and repaved for the new highway. From the state's standpoint, it was more desirable to acquire the private right-of-way than property on the other side of the road, since the street car line was at approximately the proper grade for the new road and was cleared of all obstructions such as trees, embankments and the like. Furthermore, acquiring this strip of land would relieve the state from the necessary condemnation proceedings of properties on the opposite side of the road. Consequently it seemed to be good business on the part of the Poughkeepsie & Wappingers Falls Railway to sell this right-of-way to be included in the new highway. The proceeds from the sale of this land materially affected the financial status of the company,

General offices, carhouse and garage are grouped in one building, centrally located on Main Street

Operating and Traffic Statistics, Poughkeepsie System, 1927-1929

	1927			1928			1929		
	Cars	Buses	Cars and Buses	Cars	Buses	Cars and Buses	Cars	Buses	Cars and Buses
Total vehicle-miles	530,577	42,842	573,419	497,110	51,687	548,797	386,687	169,326	556,013
Passengers									
Revenue	2,153,998	128,768	2,282,766	1,998,859	176,815	2,175,674	1,651,768	545,195	2,196,963
Transfer and free	194,971	16,332	211,303	178,014	20,112	198,126	138,106	44,624	182,730
Total	2,348,969	145,100	2,494,069	2,176,873	196,927	2,373,800	1,789,874	589,819	2,379,693
Cents per vehicle-mile									
Gross revenue	38.88	28.91	38.13	38.75	32.71	38.18	41.88	29.26	38.04
Operating expenses	23.16	22.40	23.10	22.33	20.57	22.16	24.90	17.14	22.54
Net revenue	15.72	6.51	15.03	16.42	12.14	16.02	16.98	12.12	15.50
Cents per revenue passenger									
Gross revenue	9.58	9.62	9.58	9.64	9.56	9.63	9.80	9.09	9.63
Operating expenses	5.70	7.45	5.80	5.55	6.01	5.59	5.83	5.32	5.70
Net revenue	3.88	2.17	3.78	4.09	3.55	4.04	3.97	3.77	3.93

as the money was used immediately to retire all paving claims held by the city of Poughkeepsie for its previous repaving of Main Street. At the present time, semi-de luxe, 29-passenger A.C.F. buses are used on this line and operate on a time-table schedule averaging a trip about every 40 minutes each way throughout the day. The through fare on this line is 30 cents cash, or 25 cents if tokens are purchased. Weekly commutation tickets of six round trips cost $1.75; school tickets of 50 trips may be purchased for $6; monthly half-way tickets from Poughkeepsie with 26 round trips are sold for $5.20; as well as half-way school tickets of 100 trips for $6. The gradual increase in riding on this line has been steady since the introduction of bus service.

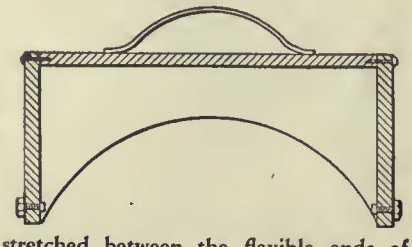
Careful study of the operating statistics and revenue tables included with this article will show a material improvement in the operating and financial structure of the company within the past few years. Most notable are the reductions in operating expenses and interest charges. The operating expenses were reduced principally in the following way: by taking off the heavier two-man cars on the Hospital line and the substitution of light-weight Birney cars with one-man operation; abandonment of a considerable amount of track and overhead and the reduction of maintenance forces; rearrangement in the office personnel and the saving of energy required due to the abandonment of heavy cars for lighter units. An unusual economy, effected at the time of bus substitution and the abandonment of track and line equipment, was the combination of garage and line forces. At the present time the garage force is trained in line maintenance and in an emergency is rushed out to take care of any breakdowns. The reduction in interest charges was the result of the sale of real estate on the Poughkeepsie & Wappingers Falls line and the paying of old paving debts from the money derived from this sale.

Within the past few years particular attention has been paid to accidents and their reduction, resulting in further economies of operation. A safety contest was started in the latter part of 1927. The crews are divided into four teams, each headed by a captain elected by the operators. The captains choose their men for the teams, which serve together for one contest period covering three months. At the first of each month a meeting is held by the captains and the manager, and every accident for the previous month is analyzed. If the accident is found to be the fault of the operator, it is charged against him and his team. At the end of the contest period a prize is awarded to the winning team, and a smaller prize to the operators on the losing teams with a "no chargeable accident" record. There is very keen competition for these prizes among the men, and the safety program has materially helped to reduce the number of accidents to a minimum. For the last fifteen years the annual average cost of accidents, including legal expenses, has been in excess of $5,000, whereas the cost for 1928 was $3,442 and in 1929 $3,075, so that in spite of the increasing number of automobiles operating over the narrow streets in Poughkeepsie, the company has been able to reduce the annual accident expenses during the last two years. The company has accrued, since 1912, 2 per cent of its gross income for accident claims.

With the present street car lines and two bus routes, the Poughkeepsie & Wappingers Falls Railway is efficiently furnishing adequate transportation in Poughkeepsie. The substitutions thus far made have strengthened the economic and operating conditions of the company, with the result that the system is operating on a profitable basis that seems likely to continue. What will become of the existing car lines when reconstruction becomes necessary in the distant future is not yet determined. Further substitution of buses could be effected without any appreciable change in riding habits or service, as bus capacities are comparable to the size of street cars now being used. With rolling stock, track and overhead structures in good condition on the car lines and comparatively new equipment on the bus lines, operations are stabilized for at least ten years.

Adjustable Commutator Sander

FOR sanding commutators of various sizes, the device shown in the accompanying illustration has many advantages. A holder is built up of three pieces of wood and a strip of sandpaper is fastened between its two ends with bolts as shown. The arrangement allows the sandpaper to adjust itself to the curvature of the commutator regardless of the diameter. When the device is pressed



Sandpaper stretched between the flexible ends of this holder adjusts itself to the surface of commutators of different sizes and bears evenly over the entire surface

against the commutator, the sanding action takes place over a much wider area than is possible with a solid block, and in the latter it is impossible to make the sandpaper bear evenly over the entire area. There are no hard spots to score the commutator as there may be when the solid block is used, and a satisfactory surface will be produced much more quickly.

Air-Magnetic Brakes Make Quick Stops

Combination of electric track brakes with standard air brakes reduces time and distance for making emergency stops as much as one-third

By H. A. Davis
Air Brake Engineering Department General Electric Company

MAGNETIC brakes of all types heretofore used can be classified in three general groups: (1) The solenoid brake, in which the armature of a solenoid transmits pressure to brakeshoes on the wheels; (2) the disk brake, in which a disk keyed to the axle is retarded by a stationary disk magnetically attracted to it; (3) the track brake, in which the shoes are electromagnets acting on the track rails and are mechanically connected to brakeshoes through a system of levers. Almost always, with each of the three forms, the current for energizing the magnet coils has been supplied by the car motors acting as generators. This has necessitated railway motors approximately 25 per cent larger than would otherwise be required and, usually, a special controller.

Recently a magnetic track-brake equipment has been perfected which consists of electromagnetic track brakeshoes, energized by trolley current and used in conjunction with and to augment standard air brakes. On a double-truck car, four, and on a single-truck car, two, electric shoe brakes are spring suspended, normally clear of the rails. When a magnetic brake application is desired they are set on the rails by means of small air cylinders. There is no mechanical connection between the electric shoe brakes and the wheel brake, and the air control for the shoe brakes is separate. It is assumed that the air brake will operate at full efficiency and the magnetic braking is additional to the best that can be obtained with air brakes alone. When the magnetic brake is applied, no weight is taken off the car wheels, so that the air brake is in no way impaired.

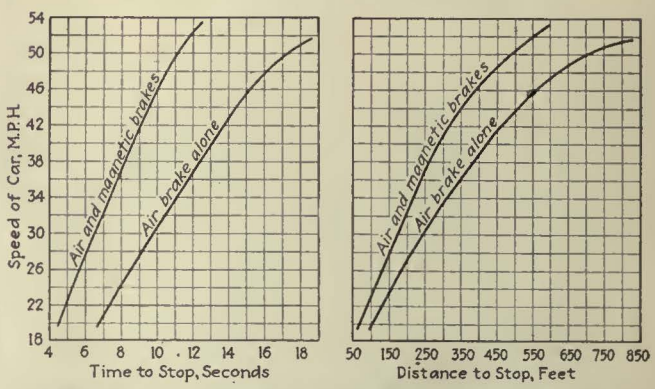
There are two distinct kinds of magnetic brake application. One is automatic and is made by an emergency application of the air brakes. The other is under the control of the operator and is for service stops. The control is so arranged that the magnets cannot stay energized indefinitely after either class of application, but the time is automatically adjusted to last longer than the time required to make these stops. The magnetic brake will, however, release immediately upon the release of the air brake after either a service application or emergency application of both the air and magnetic brake.

Magnetic track brake equipments of this type are now in operation on the following properties:

18 equipments—Buffalo & Erie Railway
41 equipments—Kentucky Traction & Terminal Company
3 equipments—Jamestown Street Railway
10 equipments—Indianapolis & Southeastern Railway
1 equipment—United Traction Company, Albany, N. Y.
1 equipment—United Railways & Electric Company, Baltimore
1 equipment—Third Avenue Railway, New York.

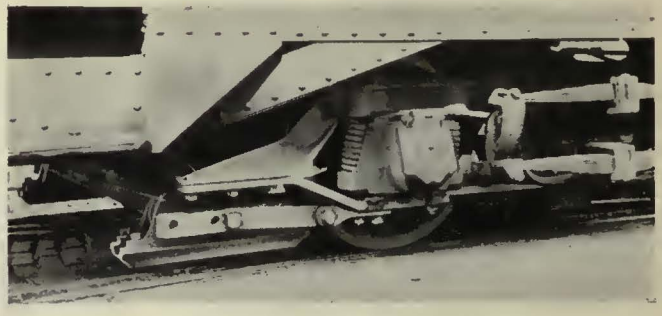
The electric shoe brakes now being built are fully saturated at approximately 20 amp. As they are connected in series, whether on a double-truck or a single-truck car, the current drawn from the line for a magnetic brake application is limited approximately to that value. The accompanying curves show the average result of tests comparing stops made with air and magnetic brakes with stops made with the air brakes alone. All the stops plotted were made by emergency applications.

Installation of magnetic brakes between the wheels of a double truck, as used on the new Albany car



Comparison of Average Results in Stopping with Air and Air-Magnetic Track Brakes

At left, relation of speed and time; at right, relation of speed and distance. The results were obtained in 28 emergency stops, 14 with air brakes alone and 14 with air and magnetic brakes. The tests were made on the Buffalo & Erie Railway on one of its double-truck cars equipped with standard air brake and safety car control equipment as well as with electric shoe brakes.



Installation of electric shoe brakes on one of the cars of the Buffalo & Erie Railway, of the type tested

Magnetic track brake equipments as described have the following advantageous characteristics:

1. Stopping time and distance are materially decreased. Companies using them have had a very satisfactory reduction in the cost of accidents.

2. As the current for energizing the electric shoe brakes is taken from the trolley, wheel sliding does not affect the efficiency of the magnetic brake. On the contrary, it is very beneficial on a slippery rail. Users have reported a decided decrease in the amount of sand used since magnetic brakes were installed.

3. The confidence of the operator is such that although he may not find it necessary to use the magnetic brake for the majority of service stops, he will know that it is available when necessary. He therefore will follow traffic much closer and take more nearly full advantage of the acceleration at his disposal than he would if his car were equipped with air brakes only.

Attaining Faster Schedules

in Rapid Transit Service

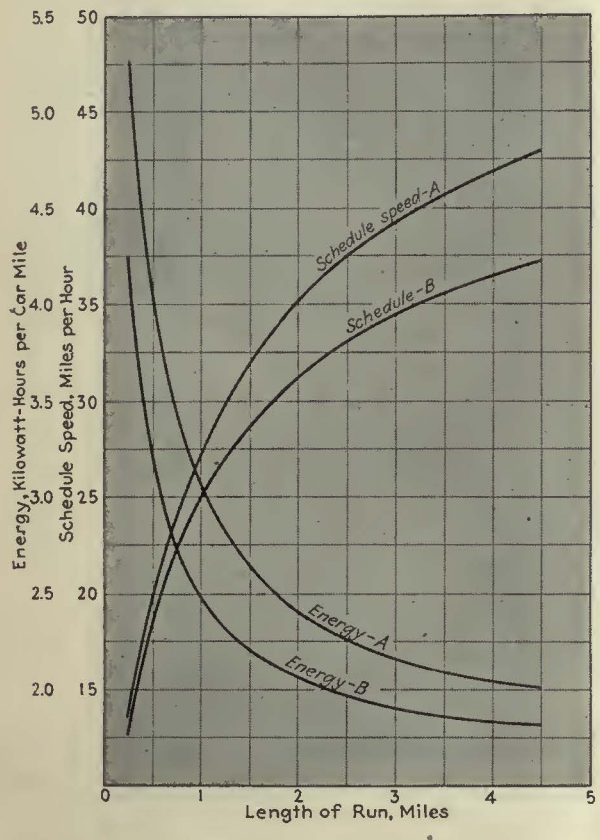


Fig. 1—Relation Between Energy Consumption, Schedule Speed and Length of Run

	Curve A	Curve B
Balancing speed with empty car on level tangent track, 600 volts, m.p.h.	60	50
Weight of loaded car, lb.	80,000	78,000
Number of motors	2	2
Rating of each motor, hp.	190	140
Rate of acceleration, m.p.h.p.s.	1.75	1.75
Rate of braking, m.p.h.p.s.	2.0	2.0
Wheel diameter, in.	32	32
Average line volts	575	575
Grade resistance, lb. per ton	2	2
Speed margin, per cent	5	5
Length of stops, seconds	20	20

Suhway train resistance formula used.

HIGHER schedule speeds are desirable on rapid transit lines if this means of transportation is to retain its leading position as a means of travel in metropolitan centers. Many lines are now working at capacity during rush hours and still are unable to provide adequate service. An increase in schedule speed permits the use of fewer trains for a given service, increasing the efficiency of operation and offering a means of reducing expenses.

A number of factors affect schedules, but higher balancing speed, more rapid acceleration and braking rates and lower car weight are among the most important means of increasing speeds. Trolley voltage usually is fixed. Time of stops is not considered in this article.

Factors that influence the speed of trains are analyzed. Lower car weight and four-motor equipments have possibilities for increasing schedule speeds at no increase in operating cost

By

W. J. CLARDY

General Engineer

Westinghouse Electric & Manufacturing Company

The average length of run in subway or elevated operation is much greater than on surface lines, thus permitting the use of higher free running speeds. For a good many years rapid transit trains have been capable of maintaining balancing speeds 35 to 40 per cent higher than are encountered on surface lines. However, rapid transit cars are only 20 to 25 per cent faster than some of the surface cars recently brought out.

Naturally, it is just as feasible to use higher balancing speeds for rapid transit service.

An increase in speed requires more motor capacity and greater energy consumption, and it is well to consider the matter from the economic standpoint. Fig. 1 compares two subway equipments, one capable of maintaining a balancing speed of 50 m.p.h. on level tangent track at normal voltage, and the other 60 m.p.h. Schedule speeds and traction energy consumption are plotted for various lengths of run. For short runs energy consumption increases very rapidly with the balancing speed with a relatively small improvement in schedule speed.

In rapid transit service, it is impracticable to segregate cars used for local and express operation. This naturally leads to the selection of a compromise balancing speed in an effort to secure maximum operating economy for the combined service. A 0.5-mile run is representative of average local service. Comparison of the data in Fig. 1 indicates a schedule speed under the conditions stated of 18.5 m.p.h. for the 50-m.p.h. car as compared with 19.7 m.p.h. schedule for the 60-m.p.h. car, while the energy per car-mile increases from 3.24 to 4.01 kw.-hr. Thus 24 per cent more energy is required to obtain a 6.5 per cent greater schedule speed by the use of a higher maximum speed.

Express runs do not present a materially different picture. If an average of 1.25 miles is considered, which is typical for metropolitan rapid transit systems, the schedule speeds with the two equipments are 27 and 29.8 m.p.h. and the corresponding energy consumed per car-mile is 2.33 and 2.83 kw.-hr., respectively. Here 21.5 per cent more energy is required to realize a 10.3 per

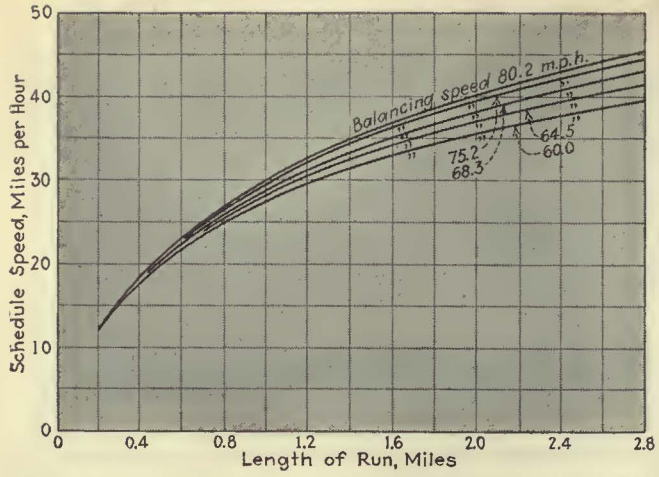


Fig. 2—Relation Between Schedule Speed, Balancing Speed and Length of Run, Three-Car Articulated Train

Weight of train, complete, lb.	243,000
Weight of passengers, rush-hour load, lb.	57,000
Total weight, lb.	300,000
Average wheel diameter, in.	35
Average volts at train	580
Equivalent grade and curve resistance, lb. per ton	3
Rate of acceleration, m.p.h.p.s.	2
Rate of braking, m.p.h.p.s.	2.25
Number of motors per train	6 or 8
Length of stop, seconds	25
Speed margin	No coast

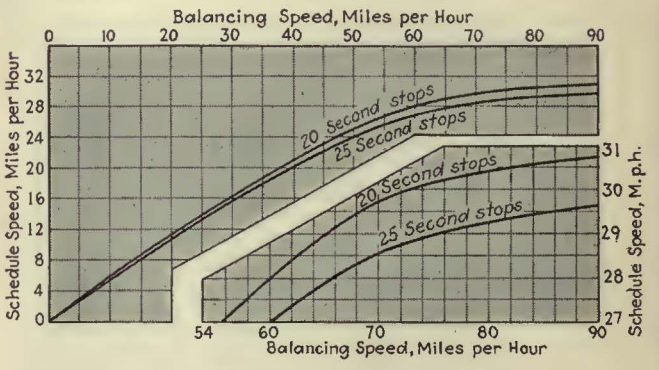
Train resistance for three 50-ton cars by Blood's formula modified

cent gain in schedule speed. With longer runs the handicap against the high speed equipment becomes less.

A further study of schedule and balancing speeds is shown graphically in Figs. 2, 3 and 4, which illustrate the possibilities of balancing speeds higher than 60 m.p.h. The relation between length of run, schedule speed and balancing speed is shown by Fig. 2. It is evident that little can be gained by operation with balancing speeds in excess of 60 m.p.h. for runs of a mile or less. When runs are as short as 0.5 mile, there is practically no difference in the schedule speeds which can be maintained.

Figs. 3 and 4 represent an analysis of a specific rapid transit service with runs ranging from 0.34 mile to 2.61 miles. The average length of run is 0.926 mile, but schedule speeds are figured on a basis of individual runs. The maximum schedule speed is almost reached with 60 m.p.h. balancing speed, Fig. 3, and there is practically no gain in schedule speed when using balancing speeds in excess of 70 m.p.h. Fig. 4 shows the upper portion of the curve in Fig. 3 on a larger scale.

An analysis of the economics of higher balancing speeds based on typical local and express rapid transit gives the results in Table I. There is a net increase in the annual total costs of energy, labor, fixed charges and maintenance amounting to $133,500 for equipment capable of maintaining 60 m.p.h. balancing speed as compared with the 50 m.p.h. equipment. This increase is entirely due to the traction energy requirements, since there is less expenditure for labor and fixed charges. The analysis illustrates the importance of energy costs in rapid transit service and indicates that runs must be quite long to make efficient use of high balancing speeds.



Figs. 3 and 4—Relation Between Schedule Speed and Balancing Speed, Three-Car Articulated Train

(Fig. 4, lower right, is an enlargement of the upper portion of Fig. 3)

Weight of train, complete, lb.	243,000
Weight of passengers, rush-hour load, lb.	57,000
Total weight, lb.	300,000
Average wheel diameter, in.	35
Average volts at train	580
Equivalent grade and curve resistance, lb. per ton	3
Train resistance for three 50-ton cars by Blood's formula modified	2
Rate of acceleration, m.p.h.p.s.	2.25
Rate of braking, m.p.h.p.s.	6 or 8
Number of motors per train	No coast
Speed margin	0.926
Average length of run, miles	

Balancing speeds based on 600 volts, level tangent track, empty train and train resistance of 40-ton cars.

Table I—Comparison of Rapid Transit Equipments for Two Balancing Speeds

	Balancing Speed 50 M.P.H.		Balancing Speed 60 M.P.H.	
	Local	Express*	Local	Express*
Length of line, miles	10.00	12.00	10.00	12.00
Distance between stops, miles	0.5	1.25 / 0.50	0.5	1.25 / 0.50
Daily time of rush service, hours	4	4	4	4
Daily time of average service, hours	20	15	20	15
Headway in rush periods, minutes	2	2	2	2
Headway, average, minutes	6	5½	6	5½
Layover in rush periods, minutes	3	3	3	3
Schedule speed, m.p.h.	18.5	25.1	19.7	27.5
Car weight complete, lb.	70,000		72,000	
Average passenger load, lb.	8,000		8,000	
Total power per car (two motors), hp.	280		380	
Car-miles per year	30,750,000		30,750,000	
Car-hours per year	1,611,000		1,492,000	
Energy consumed per year, kw.-hr.	87,000,000		107,000,000	
Cost of platform labor per year, at 40 cents per car-hour	$644,400		$597,000	
Cost of propulsion energy per year, at 1.25 cents per kw.-hr.	$1,087,000		$1,337,000	
Total cost, labor and energy, per year	$1,731,400		$1,934,000	
Annual saving in energy and labor for 50 m.p.h. cars	$202,600		.....	
Number of cars required, with 5 per cent for rush-hour spares	563		521	
Additional investment in cars for 50 m.p.h. (563 at $35,000 and 521 at $36,400)	$741,000		.....	
Additional investment in substations and d.c. distribution system for 60 m.p.h. cars	.....		$280,000	
Net additional investment for 50 m.p.h. cars	$461,000		.....	
Annual fixed charges and maintenance on additional investment, at 15 per cent	$69,100		.....	
Annual increase in cost for energy, labor, fixed charges and maintenance, 60 m.p.h. cars	.....		$133,500	

*Express for 10 miles with 1.25-mile station spacing, local for 2 miles with 0.5-mile station spacing.

Higher accelerating and braking rates and weight reduction offer promising possibilities for schedule speed improvements with maximum operating economy, and already have been adopted by trolley car operators. In this connection there also has been a departure from conventional body and truck design in an effort to provide an attractive, economical vehicle.

Similar developments might well be considered for rapid transit. Higher accelerating and braking rates naturally are of less benefit than in frequent-stop city service but a material improvement can be expected for local rapid transit runs. Weight reduction makes a direct saving in the power bill and indirectly contributes to lower car, track and roadway maintenance costs. Body weight can be materially decreased by the use of aluminum alloys, but the most promising possibility is a departure from the conventional design of truck.

The need for higher acceleration has placed the two-motor equipment in the discard for surface cars. Adhesion on all axles is necessary to accelerate rapidly. Rapid transit lines have long used the two-motor equip-

Table II—Comparative Weights and Balancing Speeds, Single and Articulated Cars

Type of Car	Motors — Number	Motors — Rating, Hp.	Balancing Speed on Level	Weight Complete, Lb.
Single cars				
A—With light-weight body and modern motors	2	140	51	70,000
B—With light-weight body, high-speed motors and new-type trucks	4	75	51.5	63,000
Articulated cars				
C—Type now operated, three bodies on four trucks	4	210	46.5	208,000
D—With three light-weight bodies and modern motors on four trucks	4	160	48.5	175,000
E—With three light-weight bodies and high-speed motors on four new-type trucks	8	85	49	152,000

Table III—Speeds and Energy Consumption of Cars of Table II in Local and Express Service

Type of Car	Local Run, 0.5 Mile — Schedule Speed, M.P.H.	Local Run, 0.5 Mile — Energy, Kw.-Hr. per Car-Mile	Express Run, 1.25 Mile — Schedule Speed, M.P.H.	Express Run, 1.25 Mile — Energy, Kw.-Hr. per Car-Mile
Single				
A	18.50	3.24	27.00	2.33
B	19.95	3.33	28.50	2.35
Articulated				
C	17.30	8.45	24.80	6.29
D	17.60	7.34	25.20	5.44
E	19.10	7.65	26.90	5.56

ment, which has real advantages with respect to first cost, efficiency and maintenance. However, four smaller motors will improve acceleration and give the space necessary to permit a change from the conventional truck design. The four-motor equipment offers the advantages of better adhesion, higher accelerating rates, reduced

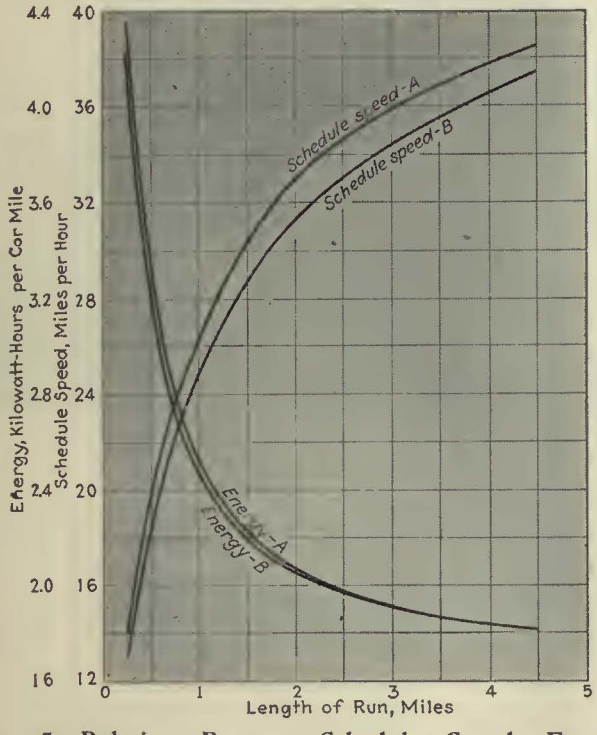


Fig. 5—Relation Between Schedule Speed, Energy Consumption and Length of Run, Single Cars

	Curve A	Curve B
Passenger load, lb	8,000	8,000
Average line volts	575	575
Grade resistance, lb. per ton	2	2
Speed margin, per cent	5	5
Length of stop, seconds	20	20
Motors per car	4	2
Horsepower per motor	75	140
Weight of car, empty, lb	63,000	70,000
Rate of acceleration, m.p.h.p.s	2.5	1.75
Rate of braking, m.p.h.p.s	2.5	2

Subway train resistance formula used

truck weight, lower track and roadway maintenance costs and less power cut out per train in case of failure. Higher schedule speeds are possible with little change in equipment operating costs, or the same schedule speed can be maintained with a substantial reduction in the power bill. A change to the four-motor equipment, such as has been made on surface systems, might prove beneficial and should be fully considered for future rapid transit operation.

A comparison of the weights of single cars and three-car articulated units with large motors and small modern high-speed motors and an improved truck design is given

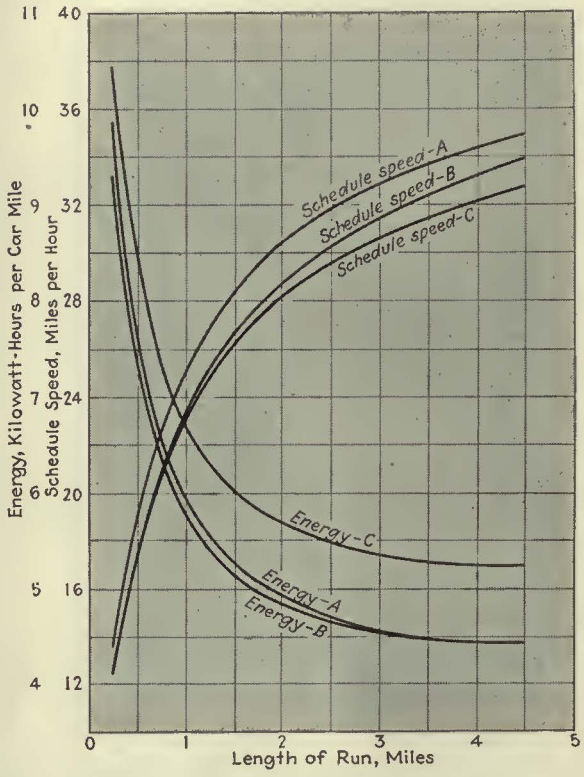


Fig. 6—Relation Between Schedule Speed, Energy Consumption and Length of Run, Articulated Cars (Three Bodies)

	Curve A	Curve B	Curve C
Passenger load, lb	16,800	16,800	16,800
Average line volts	550	550	550
Grade resistance, lb. per ton	5.25	5.25	5.25
Speed margin, per cent	5	5	5
Length of stop, seconds	20	20	20
Number of motors	8	4	4
Rating of each motor, hp	85	160	210
Weight of unit, empty, lb	152,000	175,000	208,000
Rate of acceleration, m.p.h.p.s	2.5	1.6	1.6
Rate of braking, m.p.h.p.s	2.5	1.75	1.75

Subway train resistance formula used

in Table II. It shows the possibilities of weight reduction by this means.

In making a comparison of standard equipments with those proposed using double the present number of motors per car in rapid transit service, two of the important items of operating costs, power and labor, can be readily determined. The performance of the various equipments is shown by Figs. 5 and 6, which give the relation between length of run, schedule speed and traction energy consumption. The group of curves in Fig. 5 are for single cars, while those in Fig. 6 are for articulated cars. The data give a comparative measure of the results with different accelerating and braking rates, car weights and efficiencies.

The high-speed equipments using double the number of motors per car can make a much better schedule speed

Table IV—Comparison of Standard Two-Motor Equipments with Light-Weight High-Speed Four-Motor Equipments

	Two Standard 140-Hp. Motors per Car		Four High-Speed 75-Hp. Motors per Car	
	Local	Express*	Local	Express*
Length of line, miles	10.00	12.00	10.00	12.00
Distance between stops, miles	0.5	1.25 / 0.5	0.5	1.25 / 0.5
Daily time of rush service, hours	4	4	4	4
Daily time of average service, hours	20	15	20	15
Headway in rush periods, minutes	2	2	2	2
Headway, average, minutes	6	5½	6	5½
Layover in rush periods, minutes	3	3	3	3
Schedule speed, m.p.h.	18.45	25.1	19.95	26.65
Car weight complete, lb.	70,000		63,000	
Average passenger load, lb.	8,000		8,000	
Rate of acceleration, m.p.h.p.s.	1.75		2.5	
Rate of braking, m.p.h.p.s.	2.0		2.5	
Balancing speed on tangent track, m.p.h.	51.0		51.5	
Car-miles per year	30,750,000		30,750,000	
Car-hours per year	1,611,000		1,528,000	
Energy consumed per year, kw.-hr.	87,000,000		88,900,000	
Cost of platform labor per year, at 40 cents per car-hour	$644,400		$611,000	
Cost of propulsion energy per year, at 1.25 cents per kw.-hr.	$1,087,000		$1,111,000	
Total cost, labor and energy, per year	$1,731,400		$1,722,000	
Number of cars required, with 5 per cent for rush-hour spares	563		529	
Price per car	$35,000		$36,500	
Total investment in cars	$19,700,000		$19,300,000	
Annual fixed charges and maintenance on cars, at 15 per cent	$2,955,000		$2,895,000	
Annual cost of labor, energy, fixed charges and maintenance	$4,686,400		$4,617,000	

*Express for 10 miles with 1.25-mile station spacing, local for 2 miles with 0.5-mile station spacing.

with little change in traction energy consumption, regardless of lower motor efficiency and the greater energy requirements of the higher schedule speed. This is due to the saving effected in car weight. The figures for typical local and express runs are given in Table III.

A study of the economic advantages of using light-weight equipment capable of improved schedule speeds has been made. Typical local and express rapid transit service operated with trains of single cars is considered as a basis for the analysis, as given in Table IV.

The data show an annual net saving (labor, power, fixed charges and maintenance on additional investment) of $69,400 in favor of the light-weight equipment using high-speed motors. Labor cost is reduced, energy cost is slightly greater and the fixed charges are decreased due to lower investment required.

Other benefits which will be realized by the use of four-motor equipments on light-weight rapid transit cars are difficult to evaluate and have not been considered. A more complete analysis of the possible economies on the part of operators will provide a comprehensive picture of the results which can be obtained. However, the important items considered indicate the possibilities of developments to reduce car weight in an effort to obtain higher schedule speeds without an increase in operating expenses.

New Locomotives Facilitate Freight Handling

By Walter Silvus

Superintendent of Motive Power Texas Electric Railway, Dallas, Tex.

FREIGHT handling on the Texas Electric Railway has been greatly facilitated by the construction of three electric locomotives which have been designed and built by the company at its Monroe shops. The last one has recently been completed and put in service on the 76-mile Dallas-Denison division. It is planned to build two additional units this year, one for the Dallas-Denison division and one for the Dallas-Corsicana division, to take care of the increasing freight business.

Each locomotive weighs 50 tons and is 34 ft. over bumpers. The cab is 19 ft. long, the width over sheathing 9 ft., and the height from rail to top of trolley base 14 ft. 2 in. Two swiveling trucks are used, spaced at 17 ft. 10 in. centers.

The longitudinal body members consist of four 10-in., 30-lb. I-beams and two 10-in., 25.3-lb. channels, supported by body bolsters of 1¼x12-in. soft steel plates with steel fillers. The bumpers are 1¼x10-in. soft steel secured to longitudinal members, with angles securely riveted, and with anti-climbers riveted to the outside faces. Both underframes and cab are securely tied and braced to stand the hardest kind of service. The body corner posts are made of 3x3-in. angles, the intermediate posts and carlins of 3x3-in. tees and the side and end plates of 3x3½-in. angles.

The roof and side sheets are 12 gage sheet steel riveted to posts and carlins. The metal roof is covered with felt roofing paper, cemented to prevent slipping, and this in turn is covered with No. 8 duck, held by 1¼-in. half-oval steel beads at the sides. Large windows in the front and sliding windows in the sides give a good view in all directions. The front sash has waterproof ventilators and hand-operated window wipers.

The unit illustrated is mounted on Brill 27-MCB-3X trucks with 5x9-in. journals, and is powered by four GE-73-C motors. The controllers are Type K-64-D with LB-977 line switches and a DH-124 commutating switch for placing all four motors in series. The air brakes are Westinghouse 14-EL supplied by two CP-28 air compressors suspended beneath the floor. All other equipment is within the cab and protected by wire screens. Ohio Brass Company Form 23 couplers are used. The lowest possible gear ratio was employed, the speed with all four motors in parallel being 20 m.p.h.

Three of these new 50-ton locomotives are being used for handling freight on the Texas Electric Railway

One circuit of lamps is located under the frame, one lamp being at each corner and one near the air compressors. One Golden Glow and one GE-D-15 headlamp is used at each end. Shop-made electric markers display white, red or green lights. Illuminated metal train number boxes are located at each end.

Flexible Progressive Signal System

Aids Traffic Movement

in Downtown Pittsburgh

By J. R. Stauffer
Assistant Editor *Electric Railway Journal*

with co-operation of

Burton W. Marsh
Traffic Engineer in Charge of Bureau of Traffic Planning, City of Pittsburgh

Signal lights in downtown Pittsburgh are prominently located on all four corners of an intersection

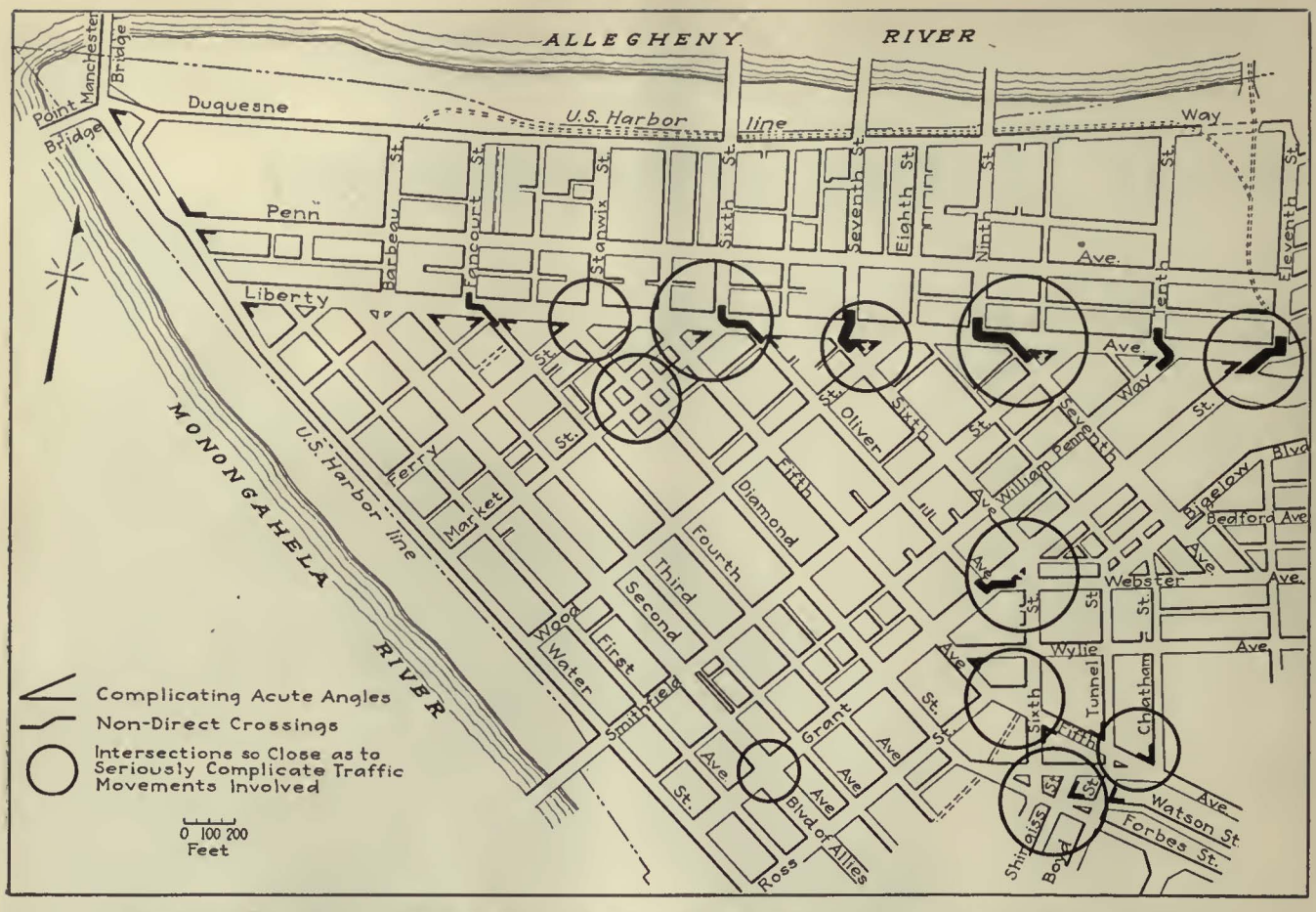
IMMEDIATE improvement in every phase of traffic movement followed the installation of an automatic flexible progressive system of signal lights in downtown Pittsburgh. Vehicular speeds in heavy hours increased at once, and as automobile drivers and street car operators become more thoroughly accustomed to the system, and as other traffic improvements are made, further increases in speed will be possible. More than 20 per cent greater volume of traffic is now moving at a speed 22 per cent faster than was possible before electrical control was put in operation on June 12, 1929.

From the standpoint of the railway company, street car operation in the downtown area has benefited particularly because of the regularity with which cars can now negotiate the various loops. Street car speeds have increased between 5 and 10 per cent on these loops. Although the speeds of street car movement for which the street car co-ordination was designed have not yet been achieved, improvement is being made as the operators become more familiar with the signals.

The equipment for the signal system was specified from the findings of an extensive engineering survey of traffic conditions covering a period of 1½ years. For ten months careful studies were made of the signal systems and traffic control methods in a number of other cities in the country, and the remaining eight months were devoted to an intensive study of traffic conditions in the central business district of Pittsburgh and to the securing of basic data necessary for scientific co-ordination and timing of signals. The thoroughness of this survey was a primary factor in the excellent results which have been obtained during the past ten months. Since the signal system has been in operation, only a few minor changes in co-ordination and timing have been necessary.

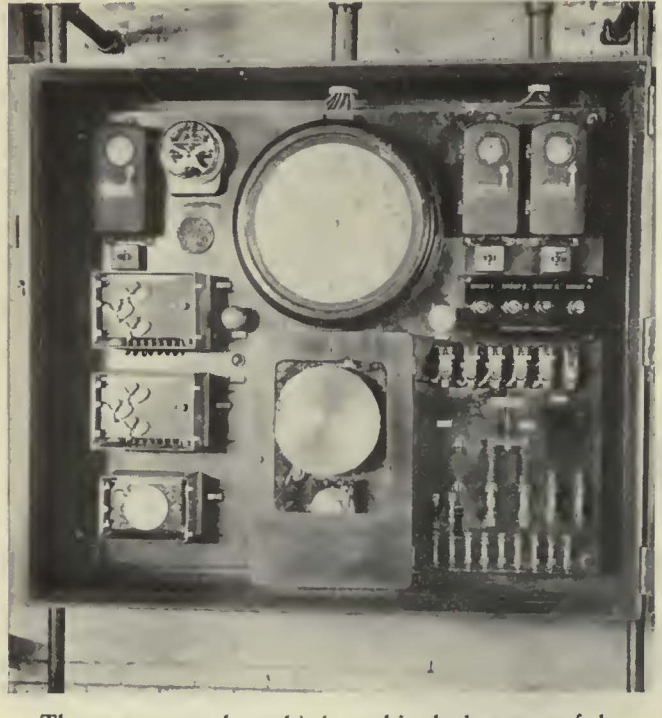
More vehicles being moved at greater speed. Railway speed also increased but major benefit is regularity. District pedestrian advantages. Complete design of specifications for flexible progressive signal system developed by an extensive survey

The type of signal control decided upon was the flexible progressive system. This system has many advantages over the other types. In fact, no other available system would have proved at all satisfactory in downtown Pittsburgh with its complex and irregular street layout, its varying but generally short block lengths, and its widely varying traffic demands on different streets. The flexible progres-



Pittsburgh's complex and irregular street layout demanded the most flexible system of electrical traffic control

sive system permits starting the main street "Go" interval at each intersection at just that part of the cycle when it will provide the best progressive movement. Furthermore, practically any desired percentages of the total cycle may be assigned to the two streets—and this cycle split may be varied with changing traffic requirements. The cycle length may be automatically varied—for example, made short to permit faster movement in light traffic hours, and longer to take account of the slower movement of peak-hour traffic. Also, once during each cycle, an automatic check-up insures that signals at all intersections are properly in step. These somewhat technical points are mentioned to emphasize the great degree of flexibility which this system embodies. These elements of flexibility are valuable tools to work with in achieving a maximum of efficiency. With the many complications encountered in downtown Pittsburgh, the lack of any of these tools would mean a most serious handicap in getting the best possible results.



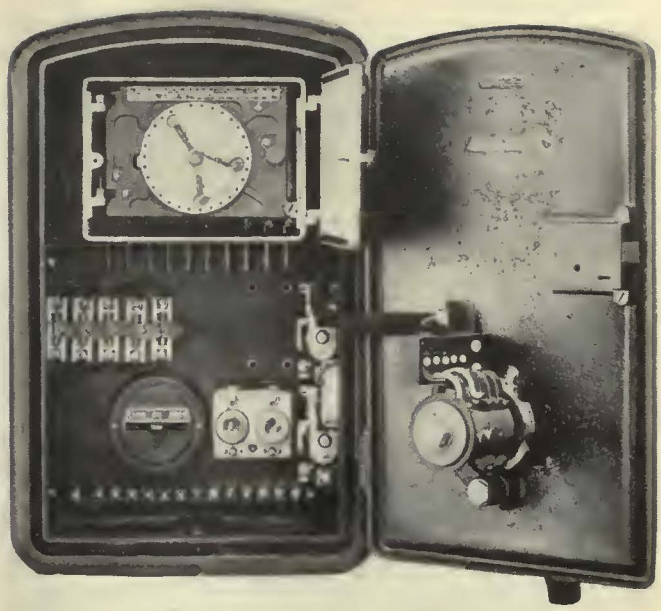
The master control panel is located in the basement of the City-County Building

Brief Description of Equipment Used

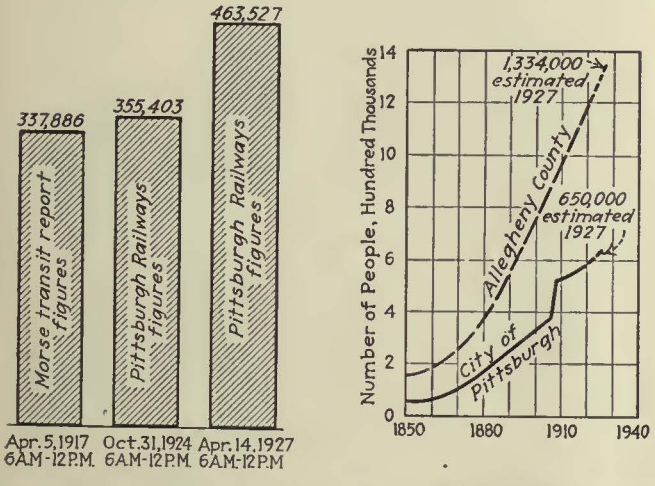
The electrical equipment of this system, designed and constructed by the General Electric Company, consists of a master controller, local controllers at each intersection, with necessary interconnecting cable and the actual signal lights with their mountings. The master controller may best be described as a transmitter of electrical impulses, and the local controllers as receivers of such. The lights at any one intersection are operated by the local controller at that intersection, but the electrical impulses which actuate and govern the speed of the local controller are sent out by the master controller located in the City-County Building on Grant Street.

These impulses are not to be confused with the electric current actually used by the signal lights. This current is supplied locally at each intersection direct to the lights from the lines of the Duquesne Light Company.

The master control equipment mounted on a single panel in the basement of the City-County Building, consists primarily of a master impulse transmitter, automatic throw-over, secondary (or spare) master impulse transmitter, program clock governing cycle length changes automatically, trouble detectors, reset switch, a time clock to turn the system on in the morning and off at night, and sign circuit time clocks. The master controller consists of a simple induction disk type motor with three actuating coils, each of which causes the disk to operate at a different speed. Only one of these coils is driving the disk at one time. Each is set to rotate the disk at such a speed as to set up a specific cycle length for the system. For this particular system, one coil controls a cycle of 48 seconds, another of 50 seconds, and a third a cycle of 52 seconds. Changes from one coil to another are controlled by the program clock. If desired, any one of the coils may, by a simple lever movement, be made to produce a different cycle length. The duplicate, or spare, master impulse transmitter is put into service almost instantly by an automatic throw-over in case the regular impulse transmitter develops trouble.



A local controller is installed at each intersection and operates all lights at that point



Increase in street car riders, shown at left, and population growth, at right, were important factors in survey studies

When the secondary master impulse transmitter is put into service, a red lamp lights on the board to show the attendant that the primary master transmitter is out of order. As a matter of fact, the spare transmitter has not been brought into operation because of trouble except in a very few instances. Nevertheless, the spare is a valuable safeguard.

Impulses sent out by the master transmitter are transmitted through four sets of relays, each controlling a section of the central business district. Although the system as a whole is operated as one unit from the master controller, the four divisions are made for aiding in the location of trouble and for emergency operation of only certain sections. In case of a fire, a parade, or any trouble in one section of the city, that district alone can be cut out of operation and the remaining three sections will continue to operate normally.

Program Clock—One of the most interesting, as well as important, automatic features of the central control is the program clock. This clock consists of a series of disks calibrated for the time of day for each day of the week. On these wheels the cycle changes are set for each particular day. After the settings are all determined and made on this clock, the entire system of lights functions at its direction, the changes in cycle being made automatically. It is this clock which changes the operation from one coil to another on the master transmitter. If any further changes in cycles are desired at any time, they can be made manually by a resetting governing the particular coil then actuating the transmitter.

The program clock for normal operation in Pittsburgh at the present time is set for cycle changes as follows:

Monday, Tuesday, Wednesday, Thursday, Friday
8:00 a.m. to 8:45 a.m.—50 seconds
8:45 a.m. to 9:15 a.m.—52 seconds
9:15 a.m. to 11:45 a.m.—48 seconds
11:45 a.m. to 1:30 p.m.—52 seconds
1:30 p.m. to 4:00 p.m.—48 seconds
4:00 p.m. to 6:10 p.m.—52 seconds
6:10 p.m. to 8:00 p.m.—48 seconds
8:00 p.m. to 8:45 p.m.—50 seconds
8:45 p.m. to 10:30 p.m.—48 seconds
10:30 p.m. to 11:15 p.m.—50 seconds
11:15 p.m. to 12:00 midnight—48 seconds
Saturday: Same as weekday until 4 p.m.

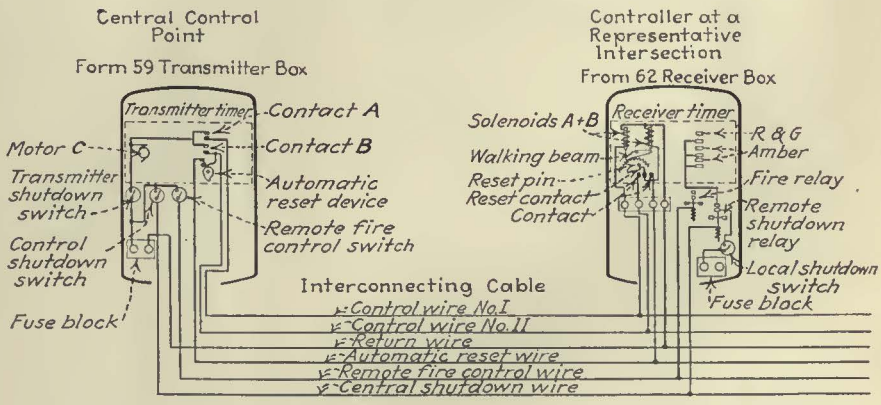
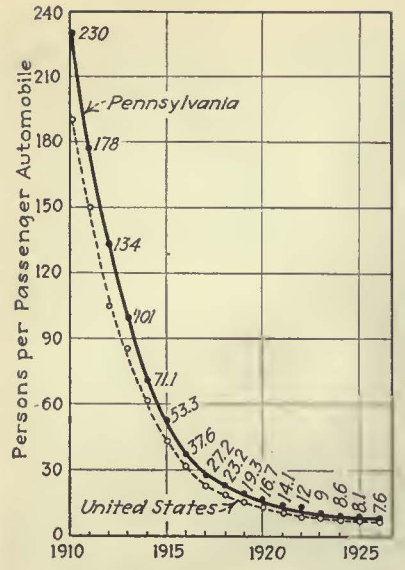
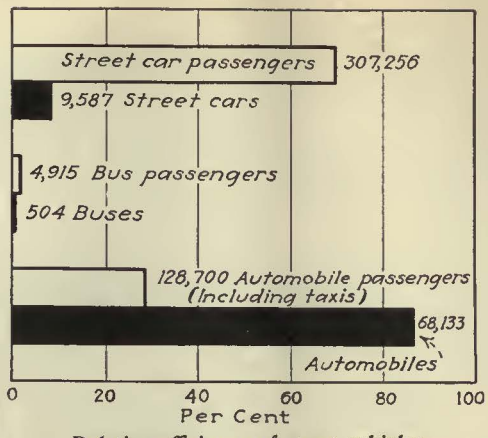


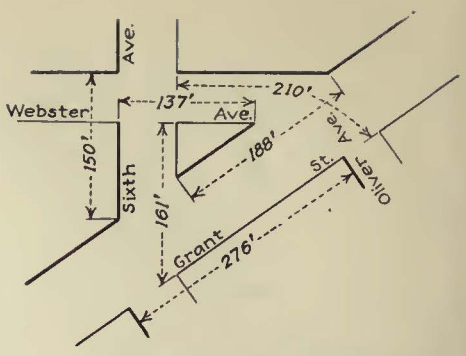
Diagram of wiring between master and local controllers



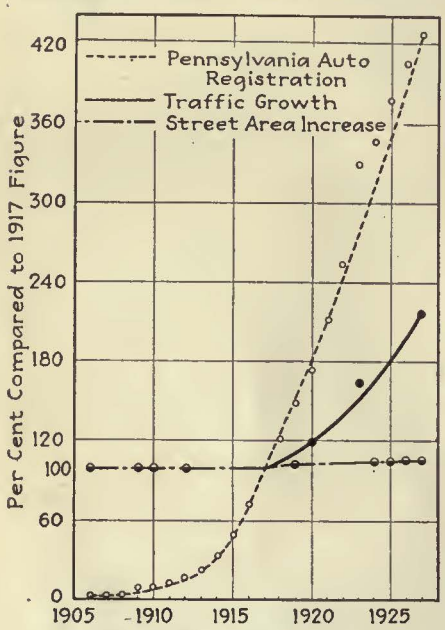
Increase in automobiles per capita



Relative efficiency of street vehicles

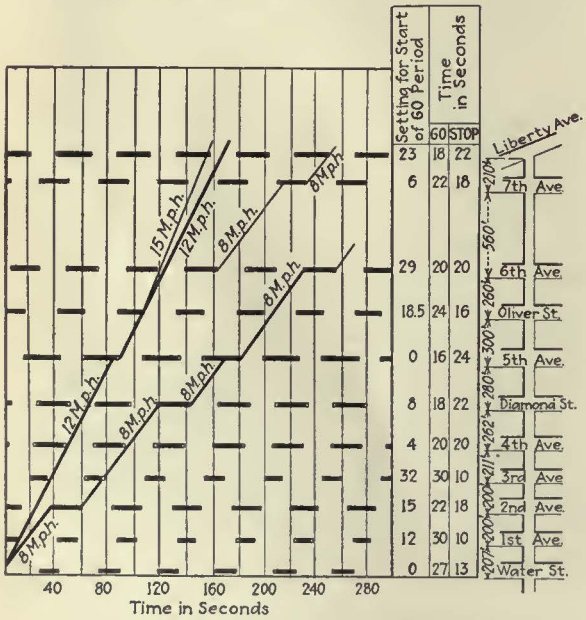


Typical complicated street intersection in downtown Pittsburgh



Increase in street area and traffic

The diagrams reproduced on this page are indicative of the thoroughness with which the many traffic studies were made



Timing diagram for Smithfield Street

4:00 p.m. to 8:45 p.m.—52 seconds
8:45 p.m. to 11:15 p.m.—50 seconds
11:15 p.m. to 12 midnight—48 seconds
Sunday: 48 seconds from 9 a.m. to 11:30 p.m.

On holidays a 50-second cycle is used all day. Greater variations in cycle length would be used were it not for the several complicated intersection groups which limit the permissible changes. Somewhat wider variations are now being tried out.

Trouble Detectors—On the master control board four trouble detectors in the form of small neon bulbs indicate when one or more local controllers in that section are out of step. Normally, when there is no trouble, each of these four neon bulbs flickers dimly with each impulse sent out, thus giving a positive signal that all is well. If one of these bulbs glows brightly, it is an indication of trouble in the corresponding section of the system. In case one of these neon lights goes out completely, the attendant knows that there is fuse trouble on the control board, and that the resynchronizing circuit is not operating properly.

Automatic Reset—This system also makes it possible to shift from one co-ordination arrangement to a second by merely throwing a switch. This is done through automatic reset apparatus. The automatic reset consists of a switch on the master control board which energizes a relay in all the local controllers at once. When the local reset relays are energized, changes in the relative start of the main green period, according to a predetermined set-up, are quickly and automatically effected. This secondary co-ordination affords the opportunity to set up a more advantageous co-ordination for the outward surge of traffic in the evening peak hours. This outbound surge, on some streets in particular, is such that a co-ordination considerably different from normal will bring greater efficiency in traffic movement throughout the system. While this secondary co-ordination has not as yet been generally used over the entire system, tests have been made on one of the main "free-wheel" arteries with satisfactory results. Further application of this reset co-ordination is being studied.

Control of Illuminated Signs—Two sign circuit time clocks complete the main equipment on the master control panel. These clocks will automatically control the operation of illuminated traffic signs which will be used throughout the central business district. These signs will indicate one-way streets, points at which left turns are not permitted, etc., and will be located on the signal light post directly under the signals themselves. These signs will be very prominent in this position because they will be at the point where all motorists' attention will be directed as they approach an intersection. One unique feature of certain of these signs—mainly those prohibiting left turns—is that when the sign is illuminated, the turn prohibition

will secure the attention of drivers, whereas when the regulation is no longer in effect a time clock will automatically cause the sign light to go out and the sign face will appear blank. Certain other signs, such as one-way street signs, will be illuminated and effective at all times.

Local Controllers—The mechanism known as the local controller, which actually governs the signal lights for an intersection, is placed on an existing pole or on a special signal post at each intersection. It consists essentially of two solenoids, alternately receiving impulses from the master transmitter, and operating a "walking beam" which rotates a toothed wheel at a controlled speed that determines the cycle length. On the face of this wheel are adjustable lever arms which, through cams, cause the various light changes at times selected to fit traffic requirements at that intersection. These times are adjustable on all lights, although the total length of cycle is constant at all intersections. Because of the simplicity and sturdiness of the local controller, relatively little trouble has arisen since their installation. The controllers are "jack mounted" so that they may be easily replaced in case of trouble. This feature also makes possible removal for periodical shop adjustment and oiling with a minimum interruption to signal operation at the intersection in question.

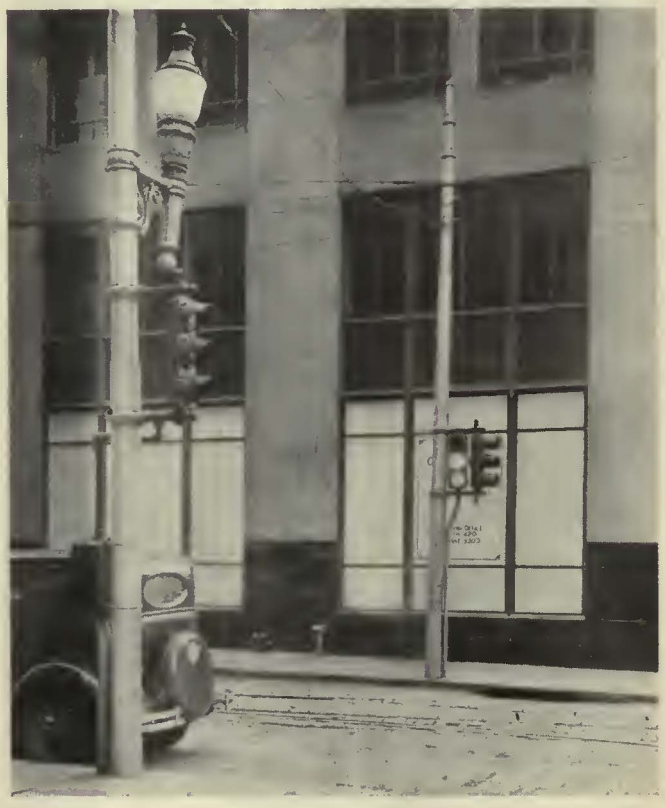
Modes of Transportation Used by Patrons and Employees of 48 Selected Stores in Entering the Central Business District, April 14, 1927

Mode	Patrons Number	Patrons Per Cent	Employees Number	Employees Per Cent	Total Number	Total Per Cent
Street car	39,477	62.5	6,435	70.3	45,912	63.6
Automobile	8,910	14.1	710	7.8	9,620	13.3
Train	7,677	12.1	1,309	14.3	8,986	12.4
Walk	4,465	7.1	558	6.1	5,023	7.0
Motor coach	2,552	4.1	140	1.5	2,692	3.7
Totals	63,081	100.0	9,152	100.0	72,233	100.0
Comparison Between Certain Modes of Transportation						
Mass Transportation Units	49,706	84.8	7,884	91.7	57,590	85.7
Passenger auto	8,910	15.2	710	8.3	9,620	14.3
Totals	58,616	100.0	8,594	100.0	67,210	100.0
Pedestrians	4,465	8.0	558	7.1	5,023	7.7
Street-using vehicles	50,939	92.0	7,285	92.9	58,224	92.3
Totals	55,404	100.0	7,843	100.0	63,247	100.0
Street-using vehicles	50,939	86.9	7,285	84.8	58,224	86.6
Off-street vehicles	7,677	13.1	1,309	15.2	8,986	13.4
Totals	58,616	100.0	8,594	100.0	67,210	100.0

The Pittsburgh Cycle

The Pittsburgh cycle differs from that recommended in the Hoover model municipal traffic ordinance in that there is a short yellow period of about two to three seconds following the red light. The main reason that the Hoover committee recommended eliminating the yellow after the red was that experience had shown that, with conditions as they then existed, many vehicle drivers tended to start on the yellow, instead of waiting for their green light. However, it is believed that this trouble, to a considerable extent, grew out of an attempt to use the yellow light for many different purposes, and out of the wide variations in length of yellow which existed in different communities. The yellow light was used as a cautionary signal, as a full stop signal, as a left turning signal, and as an exclusively pedestrian period. From a construction point of view, it was also simpler and less expensive to make the yellow following the green and the yellow following the red of the same length. Hence, the red light was often followed by a long yellow period, the need for which the public could not understand. Under different uses, the length of the yellow interval varied from a second or two, to more than fifteen seconds. So much experimentation was going on concerning its use that the public became disgusted with it, and there was a strong tendency to disregard it.

In the Pittsburgh cycle, a two to three-second yellow following the red is retained. This gives an opportunity for street car operators to shut their doors, release the air pressure on the brakes and prepare to start. It also enables vehicle drivers to get into gear ready to start. In answer to the criticism that even under a short yellow there would be a certain amount of starting before the green light showed, it is certain that the short yellow reduces both the probability and the seriousness of this violation.



Double series of lights mounted on a single arm present a neat appearance

The now generally recognized function of the yellow light following the green is to act as an intersection-clearance interval. Both vehicles and pedestrians should be given a proper opportunity to clear the intersection before cross traffic starts. The time required for the average vehicle to clear the intersection of two four-lane streets, at the relatively slow downtown speeds, is about two to three seconds. On the other hand, the time required for the average pedestrian to clear the same intersection is about nine to ten seconds. If an intersection-clearance period of two to three seconds is used, a pedestrian starting at the last second of the green light would find himself about one-third across the roadway when cross traffic starts. Such a situation is obviously unfair to pedestrians. If, on the other hand, the intersection-clearance period is made nine to ten seconds long, to give sufficient time for pedestrians to clear an intersection, and if vehicles must stop during that longer period, a serious penalty is

imposed upon vehicular traffic, especially with short signal cycle lengths.

The Pittsburgh cycle gives the pedestrian the necessary clearance interval without penalizing vehicular movement. This is accomplished by informing the pedestrian of that instant during the green period when there is no longer time for him to walk across the street before cross traffic starts. The method of accomplishment is by bringing the yellow light on with the green, nine or ten seconds before the cross street gets its "Go" signal. This green and yellow combination continues for approximately seven seconds. The green light then disappears and the yellow light alone shows for two to three seconds—and then the cross street gets its "Go" signal. In use, the cycle is simpler than it sounds. Pedestrians walk only on the green when shown alone. Vehicles, on the other hand, move on the green-alone signal, and may continue to move on the green-yellow. The green-yellow interval, plus the yellow-alone interval, gives the pedestrian clearance time. The yellow-alone is the vehicle clearance interval.

Location of Signal Lights

In practically every case, signal lights are located on the far right-hand corners of an intersection. In a number of cases where pedestrian traffic is heavy, two sets of lights are mounted on one pole. In a few cases, auxiliary nearside lights are installed where signals at the far side may not be clearly visible to the approaching vehicle driver. At three points in the downtown section, where the street layout is complicated and does not lend itself to curb-mounted signals, pedestals located in the streets are used.

The preliminary survey considered having the Duquesne Light Company furnish all the equipment, making a rental charge per signal to the city. However, it was decided to be of greater advantage to have the city furnish the signals and control equipment and the Duquesne Light Company furnish all power, cables and connections. There was general agreement that the city should have direct control over the signals and control equipment, thus enabling the city to take advantage of improvements in design which might come with the passage of time without the necessity of negotiating with the power company.

Cost of the System

The cost of the complete installation was approximately $237,000. Equipment cost amounted to $70,000; engineering and personnel $21,000; new poles and relocation of old ones, $10,500; underground work, cables, conduit, labor, etc., $136,000. The cost per intersection was about $2,500.

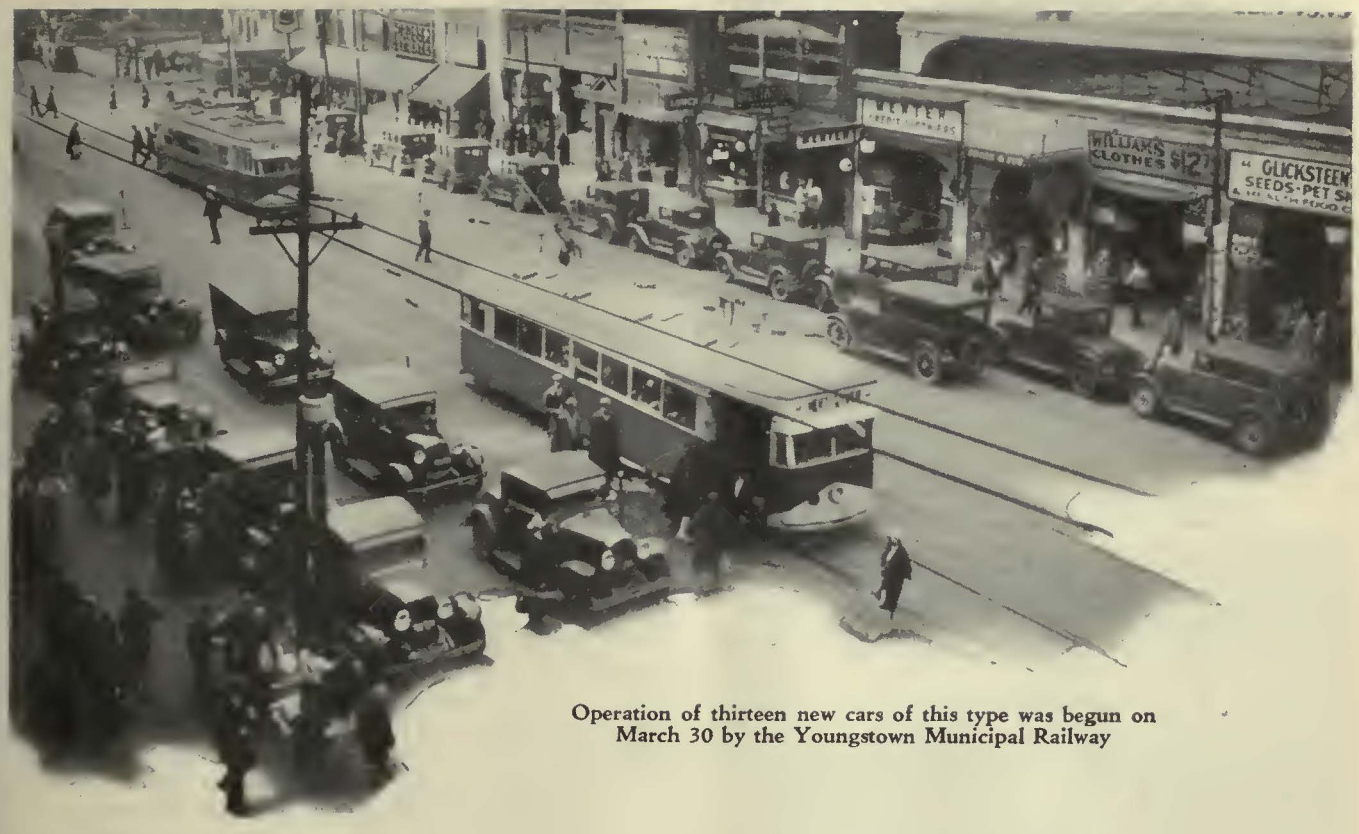
Designing an electrical traffic control system for a district such as downtown Pittsburgh necessitated a very complete engineering study of street use and of all the factors having an influence upon the volume, speed, character and distribution of vehicles and pedestrians on the street. An extensive survey authorized by the Mayor and Council which covered a period of 1½ years was made under the general supervision of the Better Traffic Committee of the City of Pittsburgh. The survey subcommittee was under the chairmanship of John M. Rice, consulting engineer. A special survey staff, assisted by the Bureau of Traffic Planning, gathered and analyzed the facts, and prepared recommendations. Traffic Engineer Burton W. Marsh was director of the survey, and Prof. Lewis W. McIntyre, street traffic specialist, University of Pittsburgh, acted as technical adviser.

Among the investigations undertaken by the survey were the following: A complete study of the traffic volume, classified according to type of vehicle and direction, including turning movement at all downtown intersections; a count of all persons entering and leaving the downtown district, including the means by which they were transported; a study of the means used by patrons and employees of a selected group of 48 stores to reach the downtown district; a study of the vehicles parking and loading on the streets, as well as the use of parking garages and private parking lots. The survey gathered accurate statistics on the hourly variation of vehicular and pedestrian traffic flow at selected intersections, including the determination of the peak period. It made a study of the daily variation of vehicular flow at a selected group of intersections as well as seasonal variations; a stop-watch study of the characteristics of vehicular flow at a selected group of intersections by ten-second periods, including an analysis of the turning movement, number of pedestrians crossing against the signals, etc.; a study of the length and effectiveness of "Go" periods used by officers in regulating traffic at a large number of intersections.

In studying the different streets and analyzing traffic conditions, the survey took into account the fact that in every street there is a critical or determining lane which by virtue of its use decides how long the "Go" interval on that street should be in relation to the "Go" interval on the intersecting street. In the Pittsburgh survey unit time figures were used for the different types of movements which took place in the lane, such as street cars or automobiles going straight through, turning left or right, etc. "Go" periods, based on time demands of the critical lanes on the two streets, were determined by the average composition of traffic in the critical lane and the unit times required for the vehicle and street car movements in those lanes. Further studies were made of the delays caused by various types of left turns of various types of vehicles at different intersections. Speeds of street car movements and loading times on all of the downtown streets, as well as the delays were studied. Data on the unit time necessary for street cars and motor vehicles of various types to clear intersections were taken to aid in determining the time necessary for composite groups to clear intersections. Streets themselves were studied with respect to storage or reservoir capacity, block lengths, traffic capacity and the like.

Analyses of some of these studies brought forth some interesting street car data. They showed that the street car in Pittsburgh carried an average of 32 passengers per car, while the passenger automobile carried in downtown Pittsburgh only 1.89 passengers per car. Other studies showed that the street car required about three times as long to clear an intersection as a passenger automobile. Therefore, even considering that in the space occupied by a street car about two passenger automobiles could be moving, from the standpoint of street capacity only, the street car was shown to be several times as efficient as the automobile in furnishing transportation to the public.

Interesting data on the conditions which led to the installation of traffic control in Pittsburgh as well as facts derived from the survey are shown graphically in accompanying charts. There are also illustrations of the master panelboard and of signal mountings on existing trolley poles. Signal equipment installed on poles or posts especially for that purpose, present a very pleasing appearance.



Operation of thirteen new cars of this type was begun on March 30 by the Youngstown Municipal Railway

Speedy, Light-Weight Cars

Placed in Service in Youngstown

Latest type vehicle of Municipal Railway seats 45 passengers and weighs only 28,800 lb. High-speed, 300-volt motors used with WN drive and 22-in. wheels. Brakes and control are foot-operated

By

R. N. GRAHAM

Manager Youngstown Municipal Railway

NUMEROUS departures from conventional practice are embodied in the design of a group of thirteen new cars just placed in service by the Youngstown Municipal Railway. They were built by the G. C. Kuhlman Car Company. Although the new car seats 45 passengers comfortably, it weighs only 28,800 lb. This low weight has been secured by the elimination of all doors except one at each end, the extensive use of aluminum in the framing and fittings, and the use of small, high-speed motors. Rapid acceleration is made possible by the relatively large amount of power available in proportion to the weight, and by automatic control. Both control and brakes are foot operated. Even during the short period these cars have been in service they have become very popular with the public.

The rate of acceleration of the new cars has been found by actual measurement to be 3½ m.p.h.p.s. This is accomplished with a setting of the circuit breakers fully protecting the motors. The control is of the General Electric Type PCM. Fast, smooth acceleration is attained by increasing the number of resistance steps so that each increment of accelerating current is small, and at the same time cutting the resistances out of the motor circuit more rapidly than is feasible with the customary K controller.

On the main controller are nine series and nine parallel notches. Its action is automatic. The master controller is foot-operated and has three positions. The first position gives a slow speed, the second full series, and the third full parallel. Normally the operator presses the pedal down to full parallel position and the control

Accommodations are provided for 45 passengers on comfortable leather upholstered seats

Brakes and controller are operated by pedals. The reverser is in a cabinet at the left of the operator's seat, while the door control is immediately in front of him. The fare box, not shown in this view, hangs on the stanchion at his right

notches up under the direction of an accelerating relay. If he desires to hold the control on any resistance notch it is done by a simple manipulation of the pedal.

Line breaker, contactors and motor resistors are located under the car, while the reverser, which includes contacts for emergency electric braking, is inside near the operator so that in case of an air brake failure it can be operated directly by hand and stop the car with dynamic electric braking. The foot controller includes a pilot valve operated by the heel plate which provides the customary dead-man's features usual with one-man operation.

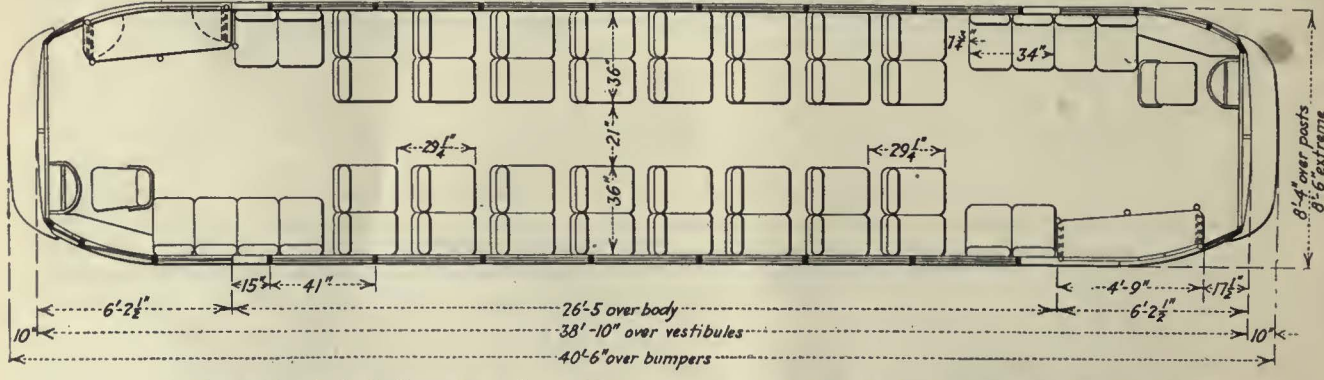
Of particular interest is the mounting of the motors and the WN drive. Brill trucks are used with certain modifications to care for this drive. The gear ratio is 7.21 to 1. A special support carries one-half of the motor weight while the other half of the motor weight and half of the gear unit weight are held by clevis castings supported by the transom. Positively-centered thermoid disk couplings are used and the link between the gear unit and the clevis casting has a ball and socket joint at each end, permitting freedom of motion in any direction to take care of the movement of the car axle. Transverse leaf springs and coil journal box springs contribute to the riding qualities of the car. The brake hangers are so constructed that noise is prevented even when the parts become worn.

This design of motors and drive has been effective in several ways in meeting the requirements of the Youngstown Municipal Railway. Chief among these is weight reduction. By utilizing a high-speed motor wound for 300 volts, high temperature insulation and a double reduction drive, sufficient clearance was obtained to permit the use of 22-in. wheels. The resulting economies in weight brought the total car weight down to 28,800 lb. or approximately 2,100 lb. less than the corresponding standard axle-hung motor, truck and 26-in. wheels.

To assure safety under all conditions, even in case of failure of air, the control being pneumatic, the reverser has been so designed that it functions through electrical

Details of New Youngstown Cars

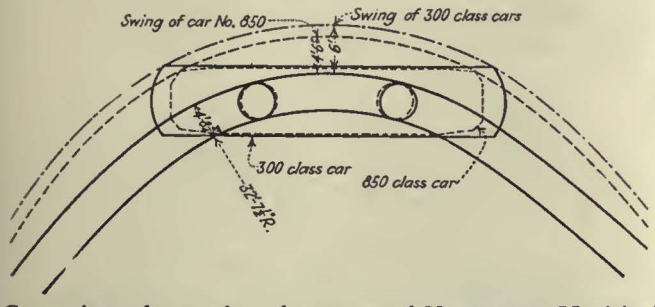
Weight	28,800 lb.
Bolster centers	17 ft. 0 in.
Length over all	40 ft. 6 in.
Length over body posts	26 ft. 5 in.
Truck wheelbase	5 ft. 4 in.
Width over all	8 ft. 5½ in.
Height, rail to trolley base	10 ft. 2½ in.
Window post spacing	41 in.
Body	Semi-steel and aluminum
Roof	Arch
Doors	End
Air brakes	Westinghouse, foot control
Axles	Brill
Car signal system	Consolidated
Compressors	Gen. Elec. C-27-B
Conduit	Duratube
Control	Gen. Elec. PCM
Destination signs	Hunter
Door mechanism	National Pneumatic
Doors	Folding
Fare boxes	Cleveland
Finish	Duco
Floor covering	Tuco
Gears and pinions	Westinghouse-Nuttall
Glass	Non-shatterable
Hand brakes	Peacock
Heat insulating material	Celotex
Heaters	Railway Utility
Headlights	Ohio Brass
Headlining	Haskelite
Interior trim	Mahogany—steel frieze and moldings
Journal bearings	Plain, 3½ x 6
Journal boxes	Brill
Lamp fixtures	Elec. Service Supplies
Motors	Westinghouse No. 1425A
Painting scheme	Tan and cream
Roof material	Wood and canvas
Sash fixtures	O. M. Edwards
Seats	Brill 210-C
Seat spacing	29½ in.
Seating material	Leather
Steps	Stationary
Step treads	Kass
Trolley catchers	Ohio Brass
Trolley base	Ohio Brass
Trolley wheels	Ohio Brass
Trucks	Brill 177-E-1-X
Ventilators	Brill
Wheels	Naco, 22 in. diameter
Fenders	Eclipse NB



Plan and principal dimensions of new Youngstown car built by The G. C. Kuhlman Car Co.

connections instead of through air. The reverser handle is located on a panel convenient to the operator; when turned to the left it exercises its usual function of reversing the motors, but when the handle is turned to the right the motors act as a dynamic brake, providing a positive retardation for the car under any circumstances, even though air is gone and there is no power.

Braking on these cars is unusually effective. In tests, retardation as rapid as 6 m.p.h.p.s. has been realized. These brakes are equipped with automatic retardation control furnished by the Westinghouse Traction Brake



Comparison of car swing of new cars of Youngstown Municipal Railway and cars of approximately the same capacity of an older type

Company, which also has supplied the entire braking apparatus with the exception of compressors, which are made by the General Electric Company. When the brake pedal is depressed the sudden retardation of the car automatically actuates a lever which cuts off the air, this process being continued until the car is brought to an easy stop.

Use of the 22-in. wheels makes possible a very low floor. However, there is a 3-in. ramp from the bolster graduated to the well step. The first step is 13 in. from the ground to the well; the step from the well to the floor of the car is 12 in. There are no bulkheads, and with the platforms on the same floor level, an extremely rigid framing for the entire floor is provided. The floor is Flexolith without trapdoors or openings of any kind. Aluminum is used freely in the framing of the car for the strength members where there are no severe stresses. Aluminum sheets are used on the exterior of the car instead of steel. It is also used on all interior fittings including metallic parts of seats.

A door-opening valve located convenient to the operator has separate positions for the front leaf of the door, the back leaf of the door, and for both doors. At the bottom of the left front sash in front of the operator a sash heater is installed to prevent frost from collecting on the window, either outside or inside. This is the standard practice of the railway. The heater has been especially designed for the purpose and bears the approval of the Underwriters' Laboratory. Above the front sash are two ventilators. The opening of these ventilators speedily changes the air in the car.

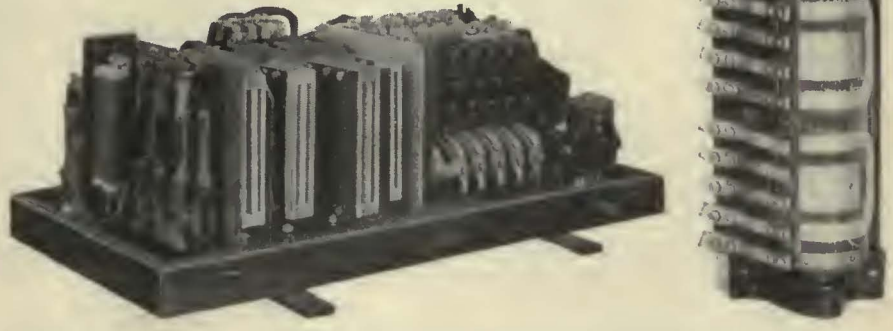
No apparatus or paneling is visible

The height of the first step is 13 in. and the second is 12 in. The ramp is 3 in.

at the front of the car with the exception of the one vestibule heater, the door-opening valve, the air gage and the emergency brake. All switches for the car operation are paneled in at the side of the operator where he has easy access to them.

The operator's seat is Brill bucket type No. 1006 and can be moved up or down, backward or forward. When the operator changes ends, the seat can be turned in a firmly fixed position to be used by a passenger. Illuminating the inspection plate of the fare box is made possible by a small aluminum-covered light located on the fare box stanchion. The passenger seats are of the deep spring type upholstered in leather.

General Electric type C-523-A foot control, weighing only 38 lb., is used on the new Youngstown cars



Main control switch group weighing 447 lb. is placed under the floor of the car. Covers are removed in this view. At right—The reverser switch, weighs 42 lb. It is housed in a cabinet at the left of the operator

Illumination is furnished by a double row of dome lights. In conformity with standard on the Youngstown property, twenty lights are in series, using 32-volt gas-filled Mazda lamps short circuiting and with short circuiting sockets. Side destination signs are placed in the roof letterboard. Destination signs in front and rear are of extraordinary size, providing visibility for many blocks. The headlight is equipped with louvers, illuminating the entire dash, thus outlining the front end of the car. This is done instead of using two headlights, as the use of two headlights tends to confuse the user of the street into thinking that the vehicle is a bus instead of a car and thus is a vehicle that can turn from its indicated course. There is a visor extending around the entire front sash to keep ice and snow off the window.

Heretofore it has been usual to install door engines over folding doors, with a door to give access to the equipment. This door is likely to rattle and is usually unsightly. In the Youngstown cars the sign molding is continued over the door engines, and slots are provided by which the door engine can be reached and adjusted through the sign molding.

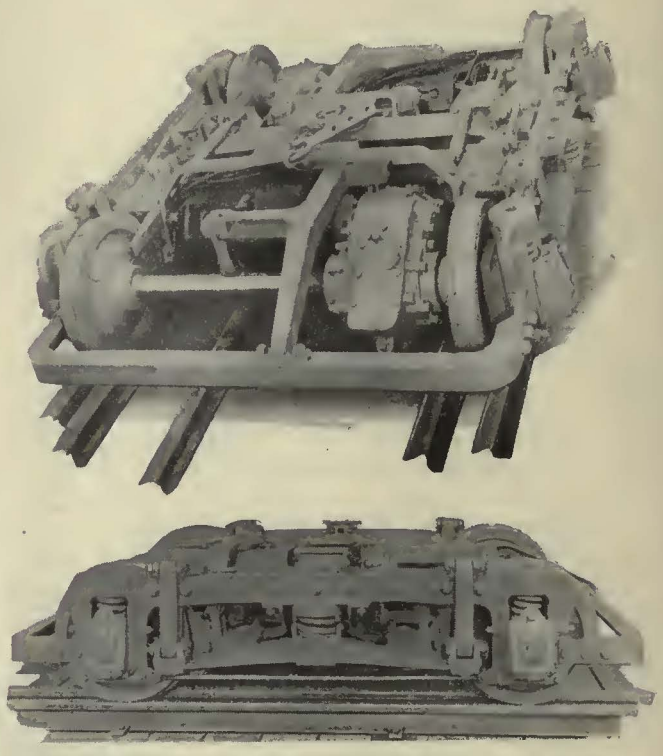
At the rear end of the car the operator's seat is swung around and made available for passenger use

These new cars are being operated on the most important route in the system, a double-track line extending from one of the largest plants of the Youngstown Sheet & Tube Company on the northwestern city limits through the southeastern city limits to another large plant of the same company at Campbell. This route runs for three-quarters of a mile on the main street through the congested district of the city. For 3 miles it follows United States Highway Route 422, the main route to Girard, Niles, Warren and Cleveland and one of the heaviest traveled highways in the United States. The new cars were specially designed for service on this line after a careful study of the route.

For a number of years the Youngstown property has been operated on a 100 per cent one-man basis, with an actual increase of schedule speed over former two-man operation. The first installation of one-man cars in the city was on the line where the new cars are now being used. This installation was made in 1923 with Birney cars. It was thought that the short headways on which the Birney cars were operated would be effective in meeting jitney competition. Experience showed, however, that on a line more than 7 miles long, extending some 3½ miles in each direction from the Central Square, the use of the small cars was not economically desirable.

As the new cars are much larger in seating capacity, the service can be given with fewer vehicles. Moreover, this change was accompanied by a reduction of ten minutes in the round-trip running time, due to the more rapid acceleration and deceleration of the new equipment. As a result it has been possible to eliminate fourteen runs from the schedule with a large saving in operating expense. At the same time this change released a number of Birney cars for use in tripper service elsewhere, thus enabling the company to retire from service twelve cars which were too heavy for economical operation.

Previous to the actual installation of service on this line approximately 70 operators had been thoroughly drilled in the operation of the cars. Since a large proportion of the operators on the Youngstown Municipal Railway have been many years in the service and consequently are comparatively old men, it was feared that some trouble might be experienced in the use of the foot control. However, the universal reaction of the men was that the new method of control was more convenient than the hand control. There has been no resentment and no criticism of this type of control from any operator. The typical reaction of the operators is shown by the report of one of the Transportation Intermediate Safety Committees, the first four of whom are car operators and the last two bus operators. Their opinion is the general opinion of the men on the property. The report reads as follows:



Brill 177-E-1-X trucks are used with Westinghouse 1425A motors and WN drive

> We, the members of the Intermediate Safety Committee of the Youngstown Municipal Railway Company, on the morning of March 18, 1930, made an inspection trip on the new 850 class car.
>
> The car was in regular passenger service on the Mosier-Campbell line.
>
> During the course of this trip we had an opportunity to examine and observe the action of all safety devices with which this type of car is equipped.
>
> The many comforts and conveniences afforded the passengers, the ease with which this type of car is operated by the foot controls, and other new features, in our opinion, places this type of car far in advance of other equipment with which we are familiar, both from a safety and an operating point of view.

The public reaction to the new cars has been entirely favorable. The quick pick-up, quietness, ease of operation and the extraordinary vision afforded the passenger have quickly popularized the car with the riders.

Single Life vs. Renewable Track

Additional opinions from way engineers concerning basic principles of track design and construction

THAT it is not worthwhile to design track with the intention of replacing worn rail with new rail on the old ties and foundation is the belief held by two way engineers whose opinions were received too late for inclusion in the article published in the April issue of the JOURNAL.

It is realized by everyone, according to W. W. Wysor, chief engineer, United Railways & Electric Company of Baltimore, that the rails on which cars operate will sooner or later have to be replaced on account of wear and deterioration from natural causes, but attempts have been made from time to time to construct a foundation which would be more or less permanent and which it would not be necessary to renew when rails were replaced. Such attempts have met with varying degrees of success depending upon methods adopted, thoroughness with which the work was carried out and local conditions. By local conditions are meant not only the conditions which prevail in any one town or community but the conditions that vary with each street location and with different sections of the same street. It can be said, however, without fear of contradiction that none of these plans has been 100 per cent successful.

Granting that it is beyond the realm of possibility to secure a rail that will in itself be permanent, since it is subjected to wear, the ideal arrangement, Mr. Wysor believes, would be to have a foundation of permanent character on which the rails would rest, so that it would not be necessary to disturb the foundation when reconstructing track but merely to unfasten the rails from their holding device and put in place a new set of rails. If the track foundation were built after the manner of foundations for our bridges and skyscrapers we might conceivably hope for a permanent sort of foundation, but even then such parts as were used as fastenings or direct support for the rail would be subjected to corrosion and wear and it would be necessary to renew them along with the rail.

However, any such foundation is out of the question from both the standpoint of cost and practicability, and since the streets are filled with other underground structures such as water pipes, gas pipes, heating pipes, sewers, conduits, etc., many of which extend directly under the track area, the roadbed supporting the track is subjected to settlements which occur at more or less frequent intervals depending upon the nature and extent of the underground structure and the frequency with which the street is opened for extensions to or repairs on these structures. In addition to that, the city reserves to itself the right to change grade and this is frequently done in connection with a change in character of paving. It would seem, therefore, that there is no practical way of securing a type of track foundation that could be considered permanent for the following reasons:

The immediate support of the rail, usually some sort of tie plate is subjected to wear and corrosion, and by the time the rails are worn out these plates are usually not fit for further service.

If tie plates are not used and the rail rests directly on ties, then the ties themselves are subjected to wear, as well as decay or corrosion, and proper bearing for the new rail on the old ties cannot be secured.

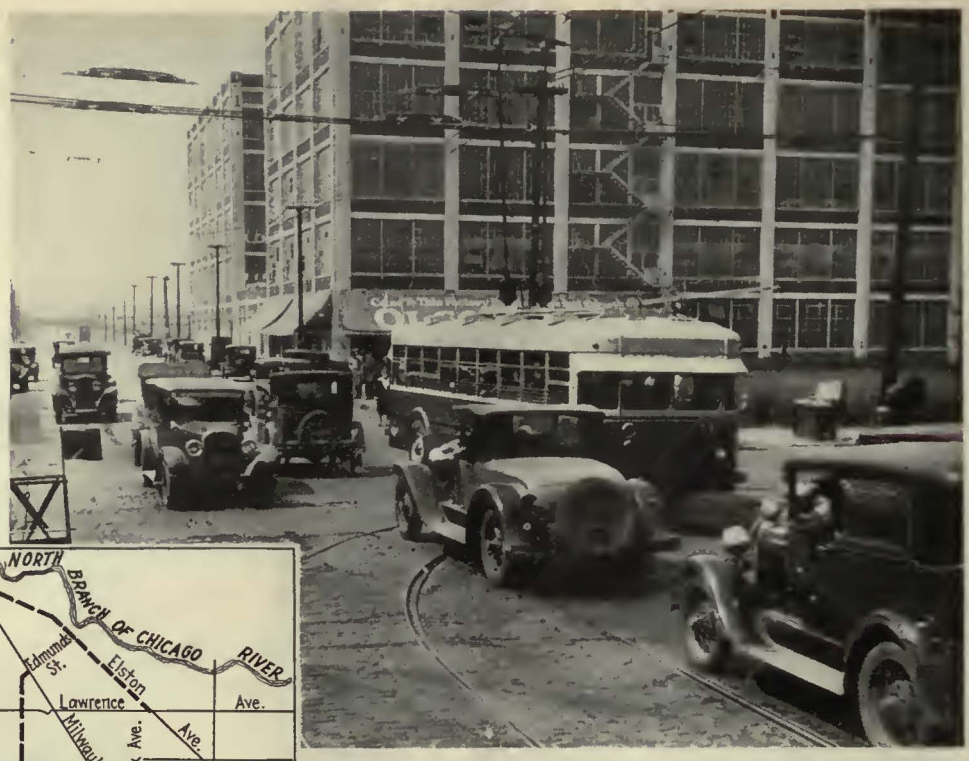
The support for the rails, whether by ties, stringers, blocks or what not, is subjected to settlement which not only throws the tracks out of surface but also frequently out of line. These settlements may be due to natural causes where the underlying ground is soft or from artificial causes where the street is built on a fill or where water leaks occur or where openings have been made for underground structures either belonging to the city or to other public service corporations, or even to private parties.

Grade of the street may be changed by the city authorities.

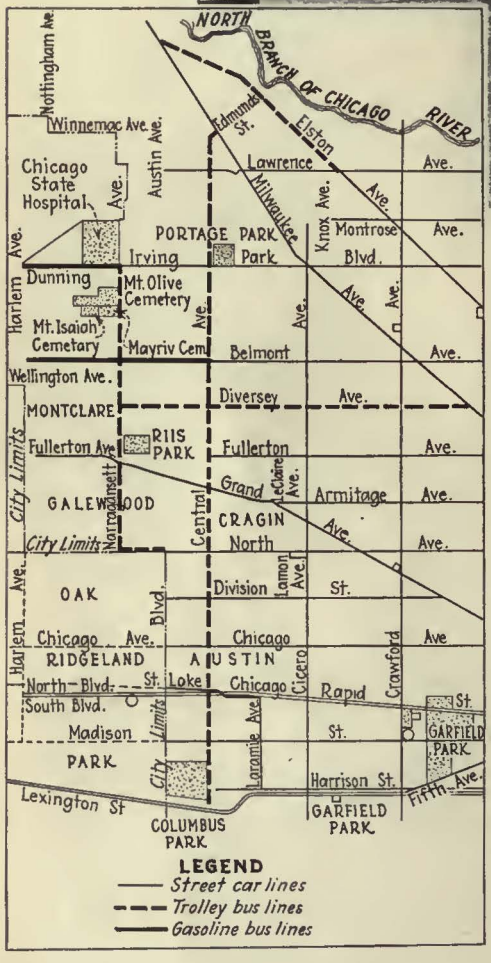
It is the opinion of Mr. Wysor, therefore, that as a general proposition tracks should be constructed with a type of foundation that will give adequate support for the rail during its entire life, but when the time comes to renew the rail that it will be necessary to also renew the supports, even though in some cases much of the supports may be salvaged and used again.

A similar opinion is held by H. E. Bean, chief engineer, New York State Railways, Syracuse, who points out that when the time arrives for the renewal of the rail on the old structure, it is quite probable that a general resurface of the whole street will occur. At such times, considerable changes occur in underground structures of other utilities or municipalities in making renewals, relocations or additions and cuts are bound to occur across the railroad area.

It is doubtful if rail could be renewed on an old structure with as good results of surface, stability and appearance as if the whole foundation were replaced. The utility might be nearly as good but the ultimate saving, everything considered, would be insufficient to merit extraordinary expenditures for this purpose alone, especially in view of the disposition to substitute buses on many of the present car lines. It is possible to construct track locally for a minimum life of 20 years and it would seem, according to Mr. Beau, that expenditures for possible life beyond that point would be purchasing possible insurance at a very high rate.



Flexibility of movement in traffic is one of the major advantages of the trolley bus



New trolley bus extensions will serve northwest section of Chicago

Chicago Inaugurates

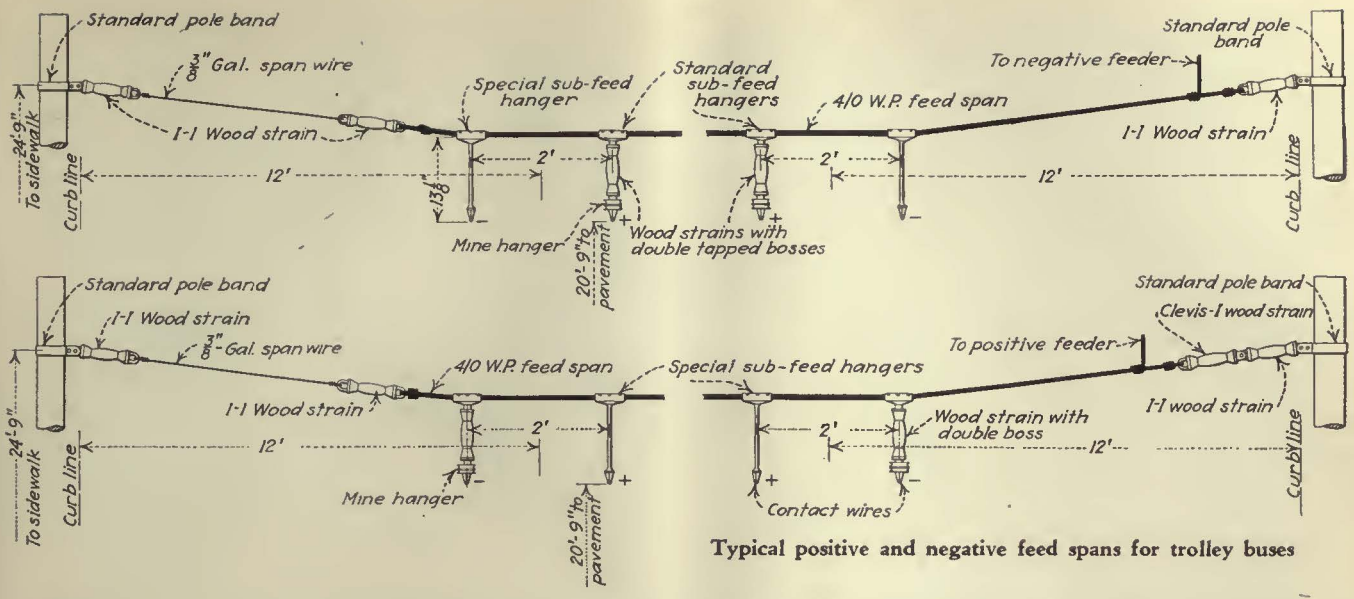
Largest Trolley

WITHIN four months the Chicago Surface Lines will be operating the largest fleet of trolley buses in the United States. Forty-one vehicles, recently purchased and embodying the latest developments in design, will serve five routes in the northwest section of the city. The total mileage to be covered, consisting for the most part of extensions to present street car lines, will be 17 miles. Service was actually begun on April 17 on Diversey Avenue, a route of 3.75 miles. Thirteen trolley buses are providing a three-minute service during the rush hours and a seven-minute headway in the off-peak hours on this line.

The inauguration of this service is the result of a decision by the Illinois Commerce Commission on March 6, withdrawing Chicago Motor Coach buses from the streets in the northwest section of the city and directing the Chicago Surface Lines to establish bus service as extensions of its rail lines in this territory. This decision is important in that it recognizes the principle that the extension of service should be provided by the utility established in the field. When the state commission in 1928 gave the Chicago Motor Coach Company permission to operate on these streets, it ignored this principle and the courts have held the order void on appeal prosecuted by organized citizens of the community. The people objected to motor coach service which required a 10-cent fare with transfers only to Motor Coach lines, and demanded bus extensions of street car lines on the basis of a 7-cent fare with transfers to the Chicago Surface Lines system.

Eight routes were included in the commission's order for bus substitution, five of which will be served by trolley buses and three by gasoline buses. The lines to be served by trolley buses, together with their mileage, are as follows:

Diversey Avenue	3.75 miles
Narragansett Avenue	3.0 miles
North Avenue	0.5 miles
Central Avenue	7.5 miles
Elston Avenue	2.75 miles



Typical positive and negative feed spans for trolley buses

Gasoline bus service will be installed on the following lines:

Belmont Avenue	2 miles
Irving Park Boulevard	1 mile
103rd Street	1 mile

Orders were placed immediately following the decision of the commission, and with the co-operation of the Twin Coach Company, the J. G. Brill Company and the St. Louis Car Company, who rushed construction of the equipment, service was begun on scheduled time and will be installed within the four-month period ordered. The total order consists of 29 Twin Coaches, 6 Brill-American Car Company, and 6 to be built by the St. Louis Car Company.

In addition to the trolley bus service on Diversey Avenue, gasoline buses were placed in service on Belmont Avenue on April 17. Four buses are being used on this line as a temporary measure. It is contemplated that this route will eventually be served by trolley buses. Bus service on 103rd Street, a route of 1 mile, will be installed early in May. Three buses will be used on this route. Only one bus will be necessary on the Irving Park extension. Twin Coaches now owned by the Chicago Surface Lines will be put into service on these three routes.

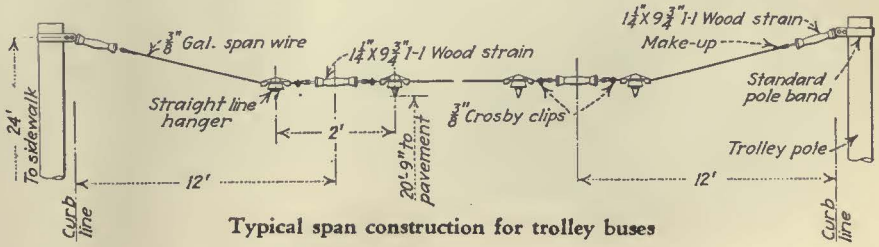
Bus System

First line in 17-mile program put into operation on April 17. Within four months 41 trolley buses will serve five routes. Important principle established by substitution decision

Listed elsewhere in this article is a table giving the specifications of the new trolley buses. However, a number of very noteworthy features should be considered separately. The Twin Coaches will be equipped with Westinghouse motors, controllers, air brakes and compressors, while the Brill and St. Louis vehicles will use General Electric design for this equipment. Each bus will be equipped with an Edison 12-volt storage battery No. B1-H10, eighteen-hour capacity, which will be charged through the air compressor circuit. Due to the fact that there are certain short stretches on the line where the polarity of the overhead will be reversed, a polarized relay is used to prevent the discharge of the battery. This 12-volt circuit is used for the operation of the treadle on the rear door, for the marker lights on both front and rear of the bus and for the two emergency lights inside the bus.

Both the brakes and controllers are foot-operated. The pedals are placed on the right-hand side of the steering column to be operated with the right foot, the control pedal on the right. They are so spaced that both cannot be operated at the same time by one foot. Pressure on the brake is proportionate to the pressure on the pedal. All buses will have the brake applied by self-lapping valves operated by the pedal. An application valve is placed near the rear wheels so that braking will take place on these wheels first. A quick release valve is placed near the front wheels so that they will release first to facilitate steering.

On the left of the steering column and so located as to be foot-operated are the button for the horn and an electric foot switch for the operation of the fare register. Also on the left of the operator and in a convenient position for hand operation is the reversing mechanism,



Typical span construction for trolley buses

as well as a push button to be used for setting the rear treadle door for automatic operation. The door-operating mechanism for the front door is controlled by a valve in front of the operator. Likewise, the various switches for lighting circuits are placed directly in front of the operator under the windshield.

The ventilating system was carefully considered. It was designed by the engineers of the Chicago Surface Lines and subsequently built by the Railway Utility Company. It is believed that the ventilators used on this new equipment have a greater exhausting capacity than any previously used. The two intake ventilators are at the rear of the bus and feed air through the body to six exhaust ventilators placed in the center and front of the bus.

Trolley Bus Specifications

Equipment	Twin Coach	Brill-American Car Co.	St. Louis Car Co.
Axle, front	Timken Detroit No. 1669W	Timken Detroit No. 1669W	Timken Detroit No. 1669W
Axle, rear	Timken Detroit Ratio 10¼ to 1	Timken Detroit No. 6536 double bowl. Ratio 10¼ to 1	Timken Detroit No. 6536 double bowl. Ratio 10¼ to 1
Battery	Edison 12-volt storage. B1-H10 18 hr. capacity	Edison 12-volt storage. B1-H10 18 hr. capacity	Edison 12-volt storage. B1-H10 18 hr. capacity
Brakes	Westinghouse air brakes	General Electric air brakes	General Electric air brakes
Buzzers	Consolidated Car Heating. Pull cord operation	Consolidated Car Heating. Pull cord operation	Consolidated Car Heating. Pull cord operation
Chassis—Framing Posts	Structural steel, bi-metal side girder 1¼x1¼x¼" steel tees	Steel—Steel sheeting on outside and panel lining inside U-shaped steel	Aluminum—Aluminum girder and lining construction U-shaped steel
Color	Red and cream with gray roof	Red and cream with gray roof	Red and cream with gray roof
Compressors	Westinghouse D.H-10; 10 cu.ft. per min.	General Electric C.P-25, 10 cu.ft. per min.	General Electric C.P-25, 10 cu.ft. per min.
Controller—Master Main	Westinghouse XM 164 WestinghouseV.A. (variableautomaticaccel.)	General Electric C-507 General Electric P.C.M. (automatic accel.)	General Electric C-507 General Electric P.C.M. (automatic accel.)
Current collection devices Swiveled Harps Trolley Poles Trolley Bases Retrievers	Ohio Brass Co.	Ohio Brass Co.	Ohio Brass Co.
Dimensions Length over all Width over all Step Riser Minimum headroom	 31 ft. 10 in. 96 in. 15 in. 13 in. 74 in.	 33 ft. 5 in. 95½ in. 14 in. 13 in. 74½ in.	 31 ft. 11 in. 96 in. 15 in. 13 in. 76 in.
Doors, front	Double passage, 44-in. minimum clearance	Double passage, 46-in. minimum clearance	Double passage, 44-in. minimum clearance
Doors, rear	Treadle operated, 30-in. clearance	Treadle operated, 33-in. clearance	Treadle operated, 30-in. clearance
Door controls	National Pneumatic air operated	National Pneumatic air operated	National Pneumatic air operated
Flooring	Brown battleship linoleum, ⅛ in. thick	Brown battleship linoleum, ⅛ in. thick	Brown battleship linoleum, ⅛ in. thick
Headlights	Type WCF dash illuminating, Ohio Brass	Type WCF dash illuminating, Ohio Brass	Type WCF dash illuminating, Ohio Brass
Heaters	Consolidated Car Heater Co. Sixteen 500-watt heaters at 560 volts One 1,200-watt cab heater	Consolidated Car Heater Co. Sixteen 500-watt heaters at 560 volts One 1,200-watt cab heater	Consolidated Car Heater Co. Sixteen 500-watt heaters at 560 volts, One 1,200-watt cab heater
Horn	Westinghouse, air operated, single tone	Westinghouse, air operated, single tone	Westinghouse, air operated, single tone
Lighting 600-volt circuit Battery circuit	 Twelve body lights in dome fixtures Three sign box lights Two step lights Two headlights One tail light Head and sign lights on separate circuit One stop light Two 25-watt interior emergency lights Front and rear marker lights	 Twelve body lights Three sign box lights Two step lights Two headlights One tail light Head and sign lights on separate circuit One stop light Two 25-watt interior emergency lights Front and rear marker lights	 Twelve body lights Three sign box lights Two step lights Two headlights One tail light Head and sign lights on separate circuit One stop light Two 25-watt interior emergency lights Front and rear marker lights
Mirrors	Three, two inside, one to treadle door, one to rear, one outside rear view	Three, two inside, one to treadle door, one to rear, one outside rear view	Three, two inside, one to treadle door, one to rear, one outside rear view
Motors	Two 50-hp., Westinghouse model 1426CT6	Two 50-hp. General Electric model, GE298E	Two 50-hp., General Electric model, GE298
Registers, fare	International R-10, electrically operated by foot button	International R-10, electrically operated by foot button	International R-10, electrically operated by foot button
Roof	Arched	Arched	Arched
Seats	Semi-bucket, leather upholstered	Semi-bucket, leather upholstered	Semi-bucket, leather upholstered
Seating capacity	40 passenger	40 passenger	40 passenger
Tires, front, rim and size	20 x 10.50	20 x 10.50	20 x 12.00
Tires, rear, rim and size	24 x 7 duals	20 x 9.75 duals	22 x 9.75 duals
Trolley pole spacing	24 in.	24 in.	24 in.
Ventilators	Railway Utility Co., Honeycomb type, two intake and six exhaust ventilators. Air movement 15 m.p.h. or 5,400 cu.ft. per hr. per ventilator	Railway Utility Co., Honeycomb type, two intake and six exhaust ventilators. Air movement 15 m.p.h. or 5,400 cu.ft. per hr. per ventilator	Railway Utility Co., Honeycomb type, two intake and six exhaust ventilators. Air movement 15 m.p.h. or 5,400 cu.ft. per hr. per ventilator
Weight	17,500 lbs. (scale)	17,700 (estimated)	16,000 (estimated)
Wheelbase	195 in.	216 in.	212 in.
Windshield	Non-shatterable glass	Non-shatterable glass	Non-shatterable glass
Windshield wipers	Two—air operated	Two—air operated	Two—air operated

Special overhead "Y" construction at Harding and Diversey Streets

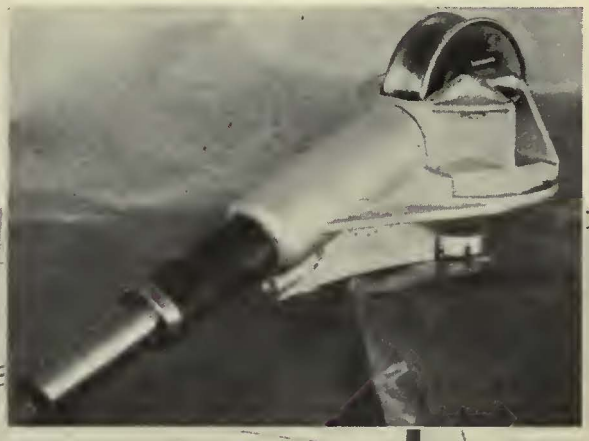
The ventilators are of the honeycomb type, and are designed to handle an air movement of 15 m.p.h., or 5,400 cu.ft. per hour per ventilator. With a bus empty the air can be completely changed every two minutes.

Special attention was given to the design of the doors, their operation and dimensions. The front doors are built for double passage, either entrance or exit, and have a minimum clearance of 44 in. They are of the double jackknife type and are mechanically operated by National Pneumatic equipment. The rear doors have a clearance of 30 in. and are treadle operated.

The lighting of the bus is arranged on four circuits, exclusive of the battery circuit. The advantage of these different circuits is that in case a fuse blows in one or the other there will always be light at the front and rear of the bus. The head and sign lights are on separate circuits for this reason and likewise the two rear interior dome lights are on a circuit with the sign lights, so that in case anything happens to the tail light these two rear inside lights will furnish sufficient illumination for the rear of the bus.

The overhead system is quite completely described in the accompanying two drawings, which show typical positive and negative feed spans and typical tangent spans. The trolley wires are spaced 24 in. apart, as are the trolley bases on the bus equipment. The wires used on the installation are the Phono-Electric, the high conductivity wire being manufactured by the Bridgeport Brass Company, and a hard-drawn copper wire by the American Brass Company. The ears were supplied by the R. R. Holden Company and are of the pressed copper underslung type. The greater part of the special overhead equipment consisting of hangers, span insulators, insulated and non-insulated special cross-overs, insulated approaches, and frogs of the standard and spring type were supplied by the Ohio Brass Company. Power is being supplied to the various lines from the existing substations of the Chicago Surface Lines, and General Electric automatic sectionalizing switches have been installed at certain points to assure the proper amount of current being supplied to any one section. These switches automatically assist in supplying current to the existing street car lines as well as to the new trolley bus lines.

An Ohio Brass swivel harp. The swivel casting is mounted on the lower casting over a 4½-in. ball bearing



Improvements in body design, comfort and speed have been important factors in the renewed interest in trolley buses

Central Master Mechanics Discuss Equipment

New and reconditioned bearings compared. Lubrication extensively discussed. Papers presented on flat top journal bearings, trolley buses and trolley wire lubrication

IMPROVED maintenance methods, new equipment, and interurban exchange practices were enthusiastically and extensively discussed at a two-day meeting of the Central Electric Master Mechanics Association in Mansfield, Ohio, April 9 and 10. Delegates from the leading railways of seven states as well as many manufacturers' representatives participated in the three business sessions.

The value of new bearings as compared to those reconditioned and the methods of reconditioning them were the principal subjects of the first session. A. B. Creelman, superintendent of equipment, Pennsylvania-Ohio Power & Light Company led the discussion by presenting a paper which pointed out the difference in service obtained from the use of new journal and armature bearings, as compared to those reconditioned in the average railway shop. Quoting from experience he told of the results obtained by using different type bearings and showed that his company had received better results with new solid bronze bearings. While emphasizing his preference for this type of bearing, he pointed out that babbitt can and is being used with success, but that the difficulty in reconditioning bearings with babbitt lies in the inadequate equipment the operators now have at their disposal for doing such work. He does not believe that in the average shop the shells can be tinned and the babbitt replaced as well as a manufacturer can do it.

One of the most interesting discussions of the convention was that of the use of flat top journal bearings. H. A. Barbero, master mechanic, Chicago, Elgin & Aurora Railroad, told of the excellent results which his company has obtained with the use of flat top journal brasses. The points he stressed in his discussion were that the additional weights and slightly additional cost were overcome by the greatly increased efficiency and considerably longer life of the flat top brasses over those now in general use.

G. M. Wood, Westinghouse Electric & Manufacturing Company, discussed at some length the renewed interest in the trolley bus and supplemented his talk with two reels of moving pictures showing trolley buses in operation in Salt Lake City. He reviewed the history of the trolley bus and pointed out the defects of the earlier equipment. He then showed how these defects had been overcome to make the new trolley buses attractive, comfortable and efficient. He quoted some figures from the installation in Baltimore, stating that the cost of operation of trolley buses in that city was approximately three-quarters of that of the gas buses. His data showed that a trolley bus could be operated for approximately 21 cents per mile, exclusive of fixed charges.

At the afternoon session, E. J. Jonas, superintendent of equipment, Cincinnati Street Railway, discussed "The Pull-in Record as an Index to Maintenance and Inspection Efficiency." He compared maintenance practice with that of manufacturing a product. He stated that the rejection volume of the inspection department of a manufacturing company is the measure of manufacturing efficiency, and that complaints from users are a reflection on inspection. Likewise he believes that pull-ins in car operation are a reflection on maintenance inspection.

Current collection by means of the trolley shoe, and trolley wire lubrication were the subjects of a talk given by W. J. Vaughn, representing Del A. Smith, general manager, Department of Street Railways, Detroit. Experiments with the use of trolley shoes and trolley wire lubrication are being extensively carried out by the Detroit Street Railway and, although not yet completed, excellent results so far have been attained. According to the reports given by Mr. Vaughn, a shoe collector running beneath a properly lubricated wire will not only eliminate arcing and subsequent burning of the trolley wire, but will treble the life of the wire itself. A lubricant composed of a graphite base has been used with success. It not only acts as a perfect conductor but builds up on the wire thus protecting it from wear. Some very interesting figures were presented. During a period of nine months there is a record of one line having withstood 265,000 car passes without showing any appreciable wear. Actual micrometer tests have been made at regular intervals.

Two other papers were read and discussed at this meeting; namely, "Application of Tool Steel Gear Drive for High Speed Motors," by E. S. Sawtelle, vice-president, Tool Steel Gear & Pinion Company; and "Naco Spun Steel Car Wheels and Their Manufacture," by J. T. Kittredge, manager, National Malleable & Steel Castings Company, Sharon, Pa.

Supplementing the morning discussion on journal bearings, President Challeen opened a discussion on the placing of responsibility for repacking journal boxes after cars had been operated through water. It was decided by the convention that the operating company handling equipment through water would be responsible for removing the waste and repacking the journal boxes before the cars so operated were put back into interchange service.

A banquet concluded the activities of the first day. Musical selections given by the Eastern Michigan Railways Quartet were much enjoyed, and Henry R. Cordell made an address which was filled with humor, although he struck a serious note in his discussion of safety.

The second day's business meeting was held in the assembly room of the Ohio Brass Company's general offices. At this session a questionnaire which had been previously mailed to the members of the association was discussed in detail. Several new standards of operation were adopted as a result of general opinion, the most important of which was the adoption of the 27-inch wheel for city service.

At the close of this business session officers for the coming year were elected. In recognition of excellent work done during the past year, A. J. Challeen was re-elected president, and E. J. Jonas vice-president. Following this meeting a luncheon was served in the cafeteria of the Ohio Brass Company. Luncheon was followed by a tour of inspection of the company's foundries and machine shops.

An auxiliary trip of inspection was made on the day before the convention opened by delegates representing thirteen railways. These men started from Cleveland in a bus chartered from the Cleveland-Akron-Canton Bus Lines, going to Sharon, Pa., as guests of the National Malleable & Steel Castings Company.

Monthly and Other Financial Reports

	Operating Revenue $	Operating Expenses $	Taxes $	Gross Income $	Net Income $
Market Street Railway, San Francisco, Cal.					
March, 1930	809,658	680,035*a*	.....	129,623	72,867
March, 1929	822,436	691,166*a*	.....	131,270	70,626
12 mo. end. Mar., 1930	9,572,827	9,016,971*a*	.....	1,555,856	858,530
12 mo. end. Mar., 1929	9,661,460	.....*a*	.....	1,394,866	655,384
Jacksonville Traction Co., Jacksonville, Fla.					
February, 1930	90,293	68,575	9,069	11,905	.....
February, 1929	96,057	76,164	9,545	8,778	.....
12 mo. end. Feb., 1930	1,132,832	923,458	108,002	95,172	*63,095*
12 mo. end. Feb., 1929	1,187,548	962,346	107,094	111,719	*50,646*
Honolulu Rapid Transit Co., Honolulu, T. H.					
February, 1930	82,620	51,782	8,819	22,968	11,141
February, 1929	84,525	48,624	12,758	24,321	13,100
2 mo. end. Feb., 1930	169,477	106,289	17,638	47,739	24,084
2 mo. end. Feb., 1929	173,132	100,216	25,620	49,696	27,255
Chicago Surface Lines, Chicago, Ill.					
March, 1930	4,792,936	4,529,014	.....	263,922	214,275
March, 1929	5,478,280	4,251,192	.....	1,227,088	222,744
United Railways & Electric Co., Baltimore, Md.					
March, 1930	1,484,031	1,001,977	147,521	349,499	81,082
March, 1929	1,460,771	979,245	151,752	347,648	66,357
3 mo. end. Mar., 1930	4,256,860	2,917,456	420,850	954,994	123,455
3 mo. end. Mar., 1929	4,135,425	2,858,033	418,457	901,495	53,345
Boston Elevated Railway, Boston, Mass.					
February, 1930	2,764,782	1,923,654	135,821	710,118	18,035
February, 1929	2,801,609	2,014,647	143,955	647,064	*53,235*
Department of Street Railways, Detroit, Mich.					
March, 1930	2,032,503	1,676,643	65,099	299,022	149,881
March, 1929	2,443,222	1,990,391	62,545	397,111	265,607
12 mo. end. Mar., 1930	25,473,102	20,331,761	758,622	4,490,703	2,781,689
12 mo. end. Mar., 1929	25,512,219	20,099,836	768,286	4,863,064	3,039,020
Twin City Rapid Transit Company, Minneapolis, Minn.					
3 mo. end. Mar., 1930	3,579,496	2,539,930*a*	.....	1,039,566	433,611
3 mo. end. Mar., 1929	3,763,826	2,666,280*a*	.....	1,097,546	463,036
Fonda, Johnstown & Gloversville R.R., Gloversville, N. Y.					
February, 1930	85,460	62,802	4,800	23,562	*7,752*
February, 1929	185,144	60,704	7,840	19,315	*12,084*
2 mo. end. Feb., 1930	180,135	130,820	9,600	50,676	*11,651*
2 mo. end. Feb., 1929	174,367	125,489	15,680	38,358	*24,657*
Brooklyn-Manhattan Transit System, New York, N. Y.					
March, 1930	5,153,556	3,243,489	353,488	1,623,550	849,685
March, 1929	4,222,986	2,638,395	292,482	1,460,286	712,816
9 mo. end. Mar., 1930*d*	45,326,553	30,068,995	2,947,461	12,964,215	5,986,172
9 mo. end. Mar., 1929	36,023,524	23,254,505	2,511,749	11,028,718	4,697,675
Brooklyn & Queens Transit System, New York, N. Y.					
March, 1930	1,970,570	1,525,494	119,617	345,543	224,761
March, 1929	2,071,507	1,687,707	113,695	292,065	164,427
9 mo. end. Mar., 1930	17,653,096	13,878,279	1,033,734	2,931,226	1,800,071
9 mo. end. Mar., 1929	17,952,129	14,880,654	967,260	2,298,088	1,140,789
Hudson & Manhattan R.R., New York, N. Y.					
March, 1930	1,078,807	531,327*a*	.....	547,480	212,760
March, 1929	1,091,214	546,208*a*	.....	545,006	208,945
3 mo. end. Mar., 1930	3,159,261	1,580,962*a*	.....	1,578,299	574,712
3 mo. end. Mar., 1929	3,144,641	1,593,934*a*	.....	1,550,707	543,728
Interborough Rapid Transit Co., New York, N. Y.					
February, 1930	5,758,313	3,530,575	201,846	2,025,891	*291,455*
February, 1929	5,569,751	3,309,333	200,690	2,059,726	267,611
8 mo. end. Feb., 1930	47,915,484	29,911,581	1,614,802	16,389,100	*1,430,964*
8 mo. end. Feb., 1929	45,313,307	28,193,370	1,603,521	15,516,415	1,121,661
March, 1930	6,436,421	3,902,136	262,622	2,271,662	*199,385*
9 mo. end. Mar., 1930	54,351,905	33,813,717	1,877,425	18,660,762	*1,630,349*
New York Railways, New York, N. Y.					
January, 1930	457,586	428,713*a*	.....	28,873	*34,242b*
January, 1929	491,959	463,064*a*	.....	28,895	*33,495b*
February, 1930	410,838	388,816*a*	.....	22,022	*39,964b*
February, 1929	446,822	417,000*a*	.....	29,822	*46,758b*
2 mo. end. Feb., 1930	868,424	817,530*a*	.....	50,894	*74,196b*
2 mo. end. Feb., 1929	938,781	880,062*a*	.....	58,719	*80,243b*
New York, Westchester & Boston Ry., New York, N. Y.					
February, 1930	189,794	109,845	24,715	55,787	*171,766*
February, 1929	173,549	121,483	19,686	33,003	*169,087*
2 mo. end. Feb., 1930	401,117	232,486	49,023	120,880	*338,261*
2 mo. end. Feb., 1929	364,384	252,335	38,480	74,914	*341,704*
Third Avenue Railway, New York, N. Y.					
February, 1930	1,138,330	885,472	85,384	185,456	*53,211*
February, 1929	1,173,098	909,000	83,206	298,882	*58,721*
8 mo. end. Feb., 1930	10,064,774	7,780,159	710,235	1,731,054	*307,063*
8 mo. end. Feb., 1929	10,223,779	7,914,433	725,021	1,734,552	*307,244*
Philadelphia Rapid Transit System, Philadelphia, Pa.					
3 mo. end. Mar., 1930	13,830,657	10,573,137*a*	.....	3,459,279	3,219,229
Galveston-Houston Electric Railway, Houston, Texas					
February, 1930	40,121	22,843	2,604	14,676	.....
February, 1929	46,575	25,045	2,567	18,961	.....
12 mo. end. Feb., 1930	572,912	324,854	32,477	215,773	*52,988*
12 mo. end. Feb., 1929	635,463	361,211	31,730	242,520	*28,523*
Houston Electric Company, Houston, Texas					
February, 1930	259,882	165,109	22,505	72,268	.....
February, 1929	264,573	168,729	25,233	70,610	.....
12 mo. end. Feb., 1930	3,360,970	2,076,664	269,119	1,033,052	635,647
12 mo. end. Feb., 1929	3,355,195	2,081,378	290,707	983,109	571,573
Pacific Northwest Traction Co., Seattle, Wash.					
February, 1930	72,097	56,359	4,050	11,685	.....
February, 1929	64,336	58,856	3,571	1,906	.....
12 mo. end. Feb., 1930	979,000	710,943	54,879	213,176	97,510
12 mo. end. Feb., 1929	878,212	746,357	51,311	80,543	*63,137*
Calgary Municipal Railway, Calgary, Alta.					
2 mo. end. Feb., 1930	181,756	107,046	.....	74,710	22,611
2 mo. end. Feb., 1929	.....	.....	.....	.....	30,020
Edmonton Radial Railway, Edmonton, Alta.					
February, 1930	75,916	45,917	.....	29,998	2,771
February, 1929	76,979	43,343	.....	33,636	5,288
2 mo. end. Feb., 1930	161,151	98,939	.....	62,211	5,098
2 mo. end. Feb., 1929	156,092	89,601	.....	66,490	8,794
Ontario Hydro-Electric Rys., Essex District, Windsor, Ont.					
3 mo. end. Jan., 1930	293,370	235,863	1,403	56,104	*35,890*
3 mo. end. Jan., 1929	.....	.....	.....	.....	27,641*c*
Saskatoon Municipal Railway, Saskatoon, Sask.					
2 mo. end. Feb., 1930	87,823	51,688	3,474	32,661	7,726
2 mo. end. Feb., 1929	.....	.....	.....	.....	15,714

a Includes taxes. *b* Before adjustment bond interest. *c* Before renewals. *d* Includes Brooklyn & Queens Transit System.

Paris Subway System Expands

EXTENSIVE additions to the Paris subway system, or the "Metropolitan," as it is better known, are under way. In order to reach certain sections in the city which have been inadequately served, some 31 km. (19.2 miles) of lines are being constructed. The program has been accelerated on account of the Colonial Exposition which will be held next year in the Bois de Vincennes. Besides these, the demolition of the ancient fortified wall has removed the barrier to expansion of the city and has created a demand for rapid transit to the centers of the adjacent communities. The Department of the Seine, by action of Dec. 24, 1929, created a transportation district enabling the extension of subway lines beyond the old limits established by the walls. In all, fifteen projects for extensions have been made, totaling 33 km. (20.5 miles), and carrying most of the existing routes beyond their present terminals at the city gates.

The Nord-Sud subway company, which originally was independent, has been merged with the Metropolitan, and on Jan. 1 of this year became an integral part of that system. In general, the routes of the Nord-Sud are non-competitive and serve to extend the network of subway lines which cover Paris. The total length of existing lines, including the Nord-Sud, is now approximately 123 km. (76.3 miles).

The principal construction within the city will be extensions of Routes 8 and 9 under the Grand Boulevards from the Opéra and Chaussée d'Antin stations, where they respectively terminate, to Place de la République, in a two-level, four-track subway. From there Line 8 will continue to the Bois de Vincennes at the entrance to the exposition.

Another important piece of construction being carried on is the extension of Route 7 from Ponte Marie, under the Seine to Place d'Italie, and thence to the borough hall of Ivry. Route 10 is being extended from the Odéon to Place Jussieu, with a connection to the extension of Route 7 at Place Monge.

The construction in general is of reinforced concrete with an arch type roof, a single tunnel containing the two tracks. The sections under the Seine and along its banks are of the cast-iron sectional type.

Careful organization and accurate scheduling of work enabled Cleveland Railway to rebuild track on Euclid Avenue in record time

Accurate Work Schedules

Permit Speedy

FREQUENTLY it happens that there is occasion for unusual speed in rebuilding track on an important business thoroughfare in the congested section of a large city. Such operations require unusual concentration of equipment and special organization of the various labor gangs required, together with a most careful scheduling and planning of every phase of the work, in order that it may be completed within the time limit set. As track reconstruction on a large scale interferes with both car and vehicular traffic, as well as the conduct of normal business, it is a matter of serious concern to the merchants on the street involved. It is to the interest of the railway, the abutting business houses and the general public that the normal use of the street be interfered with as little as possible.

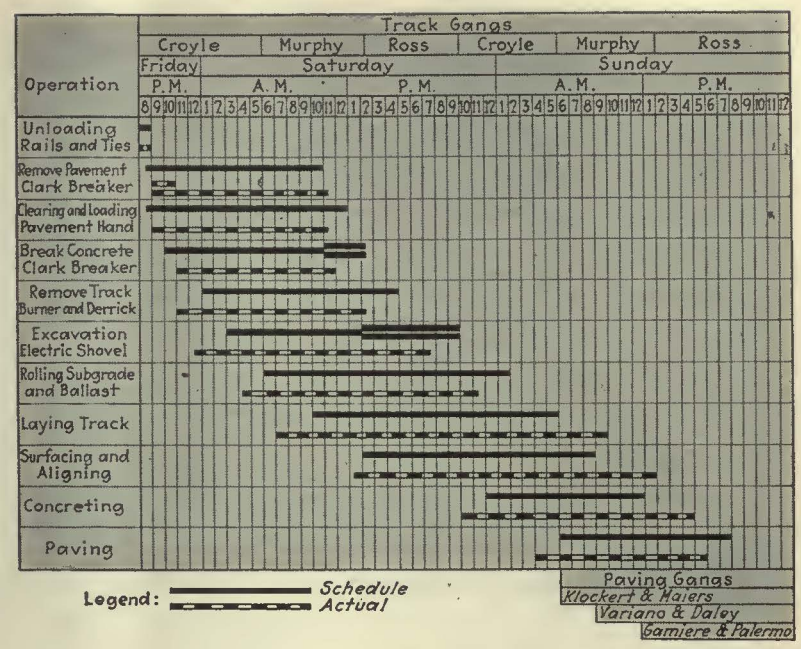
A problem of this nature recently confronted the Cleveland Railway in connection with the rebuilding of its tracks in Euclid Avenue, between East Ninth and East Fourteenth Streets. The methods that were employed in the solution of this problem were unusual but effective.

This work involved the replacement of slightly more than 1,200 lin. ft. of double track on what is probably the heaviest traveled street in Cleveland both as regards street railway and vehicular traffic. The old track was paved with asphalt and bituminous concrete pavement laid on a concrete base. It was constructed of 102-lb. T-rail on shallow steel ties. This track had itself been laid on top of an older steel tie track with concrete base, all of which had to be completely removed. The new track was constructed with A.E.R.E.A. standard 7-in. 122-lb. girder grooved rail, with joints electric welded by the carbon-arc hand-feed method. The ties were pressure-treated, creosoted red oak on 2-ft. centers, with tilted tie plates on every tie. Rail was fastened to the ties with screw spikes and clips, the ties being prebored. Tierods were installed every 6 ft., and joint baseplates were provided under every joint. The track was laid on a coarse slag base which

Track Reconstruction

Replacement of 1,200 lin. ft. of track on Euclid Avenue in business section of Cleveland was completed in 49 hours. Breakdown of equipment during work was avoided by careful inspection prior to start. Operations were arranged to follow each other in close sequence. Vehicular traffic suffered no interruption

By
H. H. GEORGE
Superintendent of Way
Cleveland Railway



Operations were scheduled to follow each other in close sequence

had been placed on a thoroughly rolled subgrade, and then this slag also rolled to a depth of 8 in. The tamping of the track and surfacing was done with 2 in. of fine slag, dampened to assist in compacting under the ties. The track was concreted between ties and to the top of the rail clips, and was paved with granite block. The blocks along the outside of the outer rail of each track were bedded directly in green concrete and also backed up with concrete to the depth required for abutting asphalt pavement outside the track area.

The main retail business stores in the territory affected were closed on Saturdays during the month of August, and plans were accordingly made to do the work during that month. The eastbound track was rebuilt first, work being started at 8 p.m. on Friday, Aug. 2, and the final pavement of the new track was completed at 9 p.m. on Sunday, Aug. 4. The work on this first track included the removal of the pavement and its concrete base in the devilstrip, but did not include the repavement of the devilstrip. The work on the second track started at 8 p.m., Friday, Aug. 9, and the last pavement of the track, including the entire devilstrip, was completed at 6 p.m. on Sunday, Aug. 11. During reconstruction, the cars were rerouted over tracks located one block south of their regular route, but the movement of vehicular traffic on Euclid Avenue was not interrupted for a single minute in either direction. A great deal of credit was due the city Police Traffic Department for its co-operation in enforcing temporary no-parking regulations and in keeping through traffic moving.

The scheduling of the various operations required the most carefuly study and consideration of the limitations of each piece of equipment. It meant a thorough check of the mechanical condition of the equipment to guard against and minimize the possibility of delay in the schedule due to breakdown of equipment. The wisdom of such a check was proved during the course of the two week-end operations, no

Electric shovel digging out the old track

Work train delivering material

Summary of Man and Equipment Time

Total cost—material	$20,845.34
—labor	12,021.66
Total	$32,867.00
Total number of feet, single track	2,403.4
Average cost of lineal foot	$13.68
Man-hours required	15,772
Motor-truck hours	280
Work-car hours	1,633
Derrick-car hours	210
Air-compressor hours	372½
Acetylene-burner hours	145
Clark concrete-breaker hours	144
Electric-shovel hours	259
Roller hours	32
Power-grader hours	28
Rail-grinder hours	120
Concrete-mixer hours	77
Welding-machine hours	394
Thermit-welding hours	51

Concentration of mechanical equipment permitted speedy work

breakdown occurring during the first week-end and only one during the second, this being the failure of a concrete mixer, which involved a loss of time of two hours in this and subsequent operations.

From a study of the accompanying schedule chart, it will be seen that each operation was scheduled to follow the preceding one in a regular sequence and in close order. Each gang was continually pressing the operation ahead of it to keep out of the way, and was constantly on its toes to keep out of the way of the gang behind it. The tabulation shows how the three eight-hour shifts were scheduled to take up where the previous gangs left off, and also how all equipment was scheduled for arrival at the job. The deviation from this schedule was surprisingly small.

Pertinent figures for these operations are given in the following table. In this connection it should be noted that, in each case, the hours given represent a 25 per cent excess over actual hours worked, this being the bonus given all hourly labor on the job as a premium both for speed and for the fact that these men worked steadily through the rain, nights and on Sunday. It was felt that the over-time allowance was fully justified and well earned. The base rate for labor was 55 cents per hour. The over-time represented an extra labor cost of exactly $1 per foot of track rebuilt. In each instance the equipment hours reported included all idle or waiting time.

Schedule of Euclid Avenue Reconstruction Work

(Westbound Track)

TRACK GANGS

Foreman	Number of Sub-Foremen	Number of Laborers	Starting Time	Starting Date	Finishing Time	Finishing Date
J. Croyle	4	60	8 p.m.	Aug. 9	6 a.m.	Aug. 10
J. Murphy	5	65	6 a.m.	Aug. 10	2 p.m.	Aug. 10
C. Ross	3	60	2 p.m.	Aug. 10	10 p.m.	Aug. 10
J. Croyle	4	60	10 p.m.	Aug. 10	6 a.m.	Aug. 11
J. Murphy	5	65	6 a.m.	Aug. 11	2 p.m.	Aug. 11

PAVING GANGS

	Pavers					
M. Klockert	8	18	6 a.m.	Aug. 11	.....	Aug. 11
J. Maiers	7	18	6 a.m.	Aug. 11	.....	Aug. 11
J. Verriana	7	13	9 a.m.	Aug. 11	.....	Aug. 11
W. Daley	7	12	9 a.m.	Aug. 11	.....	Aug. 11
D. Palermo	7	15	12 m.	Aug. 11	.....	Aug. 11
J. Gamiere	7	15	12 m.	Aug. 11	.....	Aug. 11

EQUIPMENT

	Time on Job	Start	Date	Finish	Date
Derrick (new rail)	8 p.m. Aug. 9	8 p.m.	Aug. 9	9 p.m.	Aug. 9
Derrick (new rail)	8 p.m. Aug. 9	8 p.m.	Aug. 9	9 p.m.	Aug. 9
Air compressor	8.30 p.m. Aug. 9	8.30 p.m.	Aug. 9	10 a.m.	Aug. 10
Clark breaker No. 1	8.30 p.m. Aug. 9	8.30 p.m.	Aug. 9	2 p.m.	Aug. 10
Clark breaker No. 2	8.30 p.m. Aug. 9	8.30 p.m.	Aug. 9	4 p.m.	Aug. 10
Burning car	10.30 p.m. Aug. 9	10.30 p.m.	Aug. 9	4 p.m.	Aug. 10
Derrick (old rail)	10.45 p.m. Aug. 9	10.45 p.m.	Aug. 9	6 p.m.	Aug. 10
Shovel	12 m. Aug. 9	2 a.m.	Aug. 10	9 p.m.	Aug. 10
Roller-grader	2 a.m. Aug. 10	4 a.m.	Aug. 10	1 a.m.	Aug. 11
Concrete mixer	11.30 p.m. Aug. 10	12 p.m.	Aug. 10	4 p.m.	Aug. 11

BILL OF MATERIAL

Material	Quantity	Cars	Material	Quantity	Cars
Slag, 3 in.	350 tons	19	Bolts	2 kegs	..
Fine slag for tamping	100 tons	6	Rods (tie)	204 only	..
Ties (drilled)	530 only	..	Gravel (plus outside)	400 tons	15
Ties (blank)	84 only	..	Cement	1,700 bags	..
Rail	1,211 feet	2	Block (granite)	1,250 sq.yd	13
Plates (tie)	1,142 only	..	Block, granite (headers)	105 sq.yd	1
Plates (joint)	42 only	..	Slag (fine), pavement	90 tons	5
Spikes (screw)	14 kegs	..	Sand	63 tons	3½
Clips	13 kegs	..	Special flat steel tie plates, ½-in.	20 only	..
Splices	42 pair	..			

Use of Dynamometer Successful in Stringing Trolley Wire

Experience in Cleveland shows that correct tensions can be obtained by testing when the wire is cut in. Failures experienced have been very few since this method has been used

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

ALL trolley wire on the Cleveland Railway is strung with the use of a dynamometer. Under climatic conditions in that city it has been found very satisfactory to use this method, and the appearance of the overhead indicates that the tensions obtained are very uniform.

One important point to observe in stringing wire is to have a tension sufficient to provide a good running surface for the trolley wheel, and yet not to exceed the elastic limit of the wire. Under no circumstances should the ultimate strength be exceeded, even in the most severe weather likely to be encountered in winter. In order to be sure that the tension is kept at the proper point, a table has been worked out for copper and for phono-electric wire, calculated for 85 deg. from 30 deg. F. to 90 deg. and for 10, 20 and 100 deg. Table I, which appears with this article, gives the calculated tension to which the trolley wire must be drawn when it is erected.

It will be remembered that as the temperature rises the wire will increase in length and if the temperature falls it will decrease. Accordingly, when the wire expands the tension will decrease, and when the wire contracts it will increase. The temperature-tension table included herewith has been figured to compensate for this change of tension with temperature. For instance, standard hard-drawn trolley wire, strung at 60 deg. F. should be pulled to a tension of 1,700 lb. If the temperature falls to 10 deg. the tension in the wire will increase to about 2,500 lb. If the temperature falls to zero or below, wire less than 0.25 in. in diameter or equal to the opening in the No. 00 gage furnished the line crew will pull apart and break.

When the wire is pulled to tension with the dynamometer it is necessary to exercise care to bring it to the value indicated in the table. If the tension is increased, the wire will reach its breaking strength at a higher temperature. Accordingly, wire which has been worn to a diameter of 0.25 in. would not be safe at temperatures reached in the climate of Cleveland. On the other hand, if the tension is decreased the wire will be too slack and will wear out quickly.

The dynamometer used in stringing wire is of the Chatillon spring type. This dynamometer has a small range of error, one calibrated showing 50 lb. high on a 2,500-lb. pull and increasing in a constant ratio. For convenience in handling, each dynamometer is carried in a box made for it, along with a special link having a double clevis for attaching to the dynamometer and to the clamp which is fastened to the wire. The box also contains a thermometer for ascertaining temperature at the time the tension is read.

Table I—Trolley Wire Tension to Be Obtained by Use of Dynamometer

Temperature Deg. F.	No. 00 Gage Copper	No. 00 Gage Phono-electric	No. 0000 Gage Copper
10	2,500	2,950	3,900
20	2,350	2,750	3,650
30	2,200	2,550	3,425
35	2,100	2,450	3,325
40	2,000	2,350	3,200
45	1,925	2,250	3,100
50	1,900	2,150	3,000
55	1,825	2,050	2,900
60	1,700	1,950	2,750
65	1,625	1,850	2,550
70	1,550	1,750	2,400
75	1,475	1,700	2,275
80	1,400	1,600	2,100
85	1,325	1,500	2,000
90	1,250	1,400	1,900
100	1,100	1,200	1,625

When the tension on the wire is to be tested where already in service, one side of the dynamometer is attached to the wire, using the special clamp and link which is provided for the purpose. Blocks are attached to the dynamometer and are pulled steadily until the first slack appears. The dynamometer is then to be held at this point and the scale is read. This procedure is followed whenever it is desired to ascertain if the wire is maintained at the proper tension.

When new wire is being pulled to tension, the same procedure is followed, except that care must be taken not to pull the wire far beyond the desired tension, nor to lose any of the tension while cutting in the spliced or dead ends. It also is essential not to jerk the wire while pulling it in to tension. The wire is pulled up to about 50 lb. more than the desired tension to allow for slacking off in attaching.

Since it is essential that the tension be made to correspond with the one which has been figured out for the particular temperature at which the wire is installed, particular emphasis is laid on the necessity of reading the thermometer whenever the dynamometer reading is

taken. If this is not done, the accuracy of the plan is sure to fail.

Another precaution that must be taken to insure against damage is that the wire must not be pulled to tension on curves, in intersections, or against badly worn trolley wire, until an inspection has been made. If a wire remaining in place appears to justify, the new wire may be pulled to tension. The lineman must use his judgment in doing this. For instance, it is unwise to pull No. 0000 wire to tension at the point where it connects with No. 00 standard wire. Instead, it is necessary to absorb

Table II—Relation Between Breaking Strength and Wear for No. 00 Wire, Phono-electric and Copper

Diag.	Vertical diameter of worn wire, mils	Area, sq.in.	Copper		Phono-Electric	
			Breaking strength, lb.	Condition	Breaking strength, lb.	Condition
	364.8	0.1046	5,520	New	8,200	New
	300	0.08108	4,280	Good	6,360	Above new copper
	275	0.07214	3,810	Fair	5,650	Still above new copper
	250	0.0633	3,340	Dangerous	4,960	Above good for copper
	200			Renew wire		
	200	0.0466	2,460	Down	3,650	Dangerous
	150	0.0311	1,640	Down	2,435	Must come down

Maximum life, No. 0000 wire: Breaking strength 4,400 on maximum. Vertical diameter 300 mils to 285 mils.

Maximum life, No. 00 wire: Breaking strength 2,900 on maximum. Vertical diameter 230 mils. Area 0.055 sq.in.

enough of the tension on the No. 0000 wire, by attaching the fitting before splicing it into the No. 00 wire. By following these simple instructions no difficulty has been experienced in the use of the dynamometer in stringing wire.

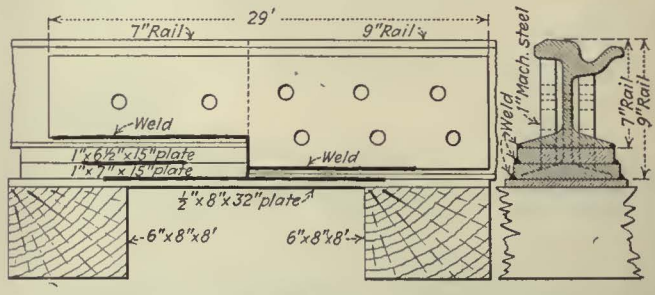
When Wire Should Be Renewed

In determining whether worn wire is to be renewed or not, reference is made to a chart which has been prepared for the purpose. This chart is reproduced herewith. It will be noted that copper wire is given four classifications: New, good, fair, dangerous. When the vertical diameter of the No. 00 wire is less than 200 mils, it must be renewed. High-strength phono-electric wire, it will be noted, has a much greater breaking strength and may be allowed to remain in the line until it reaches a considerably smaller diameter than the copper wire. Phono-electric wire of 150 mils vertical diameter must be renewed.

Built-Up Compromise Joint*

By H. Bragg
Principal Assistant Engineer
United Railways & Electric Company
Baltimore, Md.

SATISFACTORY results have been obtained in Baltimore from the use of a compromise joint made by placing a baseplate to span the space between the ties, and built up under the low rail with plates. The baseplate, liftplates and base of the rail are welded together



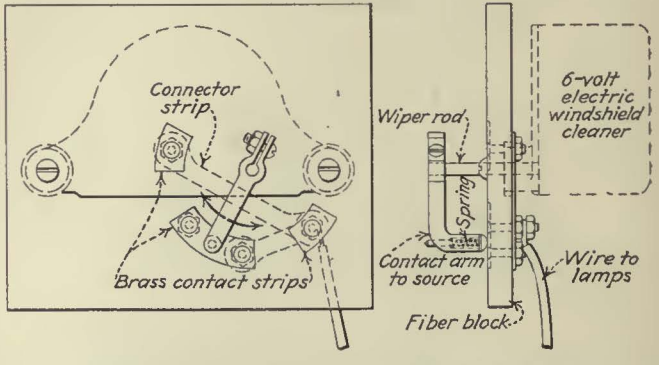
Compromise joint with baseplate spanning space between two ties and low rail supported by two liftplates

by the electric arc process. An accompanying illustration shows a compromise joint recently made where a 9-in. rail was joined with a 7-in. rail. Varying widths of plates are used to provide the necessary welding shelf.

Flashing Danger Lights on Tower Trucks*

By H. A. Brown
Foreman Return Circuit, Switch and Signal Division
Cleveland Railway

TOWER trucks of the switch and signal division of the Cleveland Railway have been equipped with a device which flashes all of the electric danger lights mounted on the vehicle. These lights are intended to prevent collisions when repairs are made at night on the overhead construction. The flasher was made from an



Electric windshield wiper is used as flashing apparatus for the red lights on trucks of the Cleveland Railway

old 6-volt windshield wiper which was provided with contacts mounted on a fiber block and placed below the wiper in such a manner that each sweep of the wiper arm makes and breaks the circuit to the red danger lights. The device is mounted in a water-tight box placed beneath the floor board, where it is out of the way. It is controlled by a conveniently placed snap switch.

**Submitted in* Electric Railway Journal *Prize Contest.*

Tilting Bench for Controller Repairs*

By E. J. Jonas

Superintendent of Equipment Cincinnati Street Railway

INSTEAD of installing a hoist to raise controllers to the overhaul bench, the Cincinnati Street Railway has devised an adjustable stand upon which the controller is placed in a nearly vertical position, and which is then tilted until the controller is in a horizontal position 40 in. above the floor. The framework consists of two triangular sides made of angle iron, with a cradle for the

Tilting controller workbench used in shops of the Cincinnati Street Railway

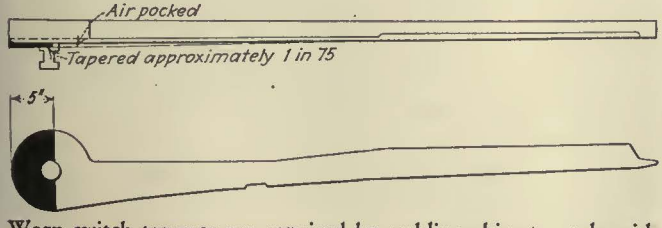
controller pivoted between the upper apexes of the side numbers. The cradle is provided with a flange at one end upon which is placed the bottom of the controller to be overhauled. The shopman then raises the controller to a horizontal position by means of a lever, and inserts a pin to hold the cradle stationary. This device has an advantage over a fixed workbench and hoist in that it can easily be moved to any desired location in the shop.

Switch Tongues Built Up by Welding*

By G. E. Picklesimer

Supervisor of Switches and Signals Roadway Department Georgia Power Company

SWITCH tongue heels of the Georgia Power Company are kept up to the surface of the rail by inserting shims as needed. When the heel is worn about $\frac{1}{4}$ in. the tongue is taken out and the under side of it built up with $\frac{3}{16}$ in. high-carbon steel, hammering the hot metal down to a taper of approximately 1 in 75, depending on the length of the tongue. The tongue is then allowed to cool, after which it is ready for service until it is worn to such an extent that this operation must be repeated.



Worn switch tongues are repaired by welding shim to under side

It will be noted that an air pocket is left under the tongue and just forward of the pin. This is done so that whole shims of the same diameter as the heel of the switch, can be used. Otherwise it would be necessary to use half shims at the heel of the tongue and this would be very unsatisfactory as they soon work out of place. If the entire heel of the tongue were built up and a whole shim used it would not give the bearing at the heel which is desired.

The Georgia Power Company has at present 300 switch tongues which have been built up by this welding method and are giving satisfactory service, not causing any trouble except for the occasional installation of shims. This method of building up was inaugurated in 1923 and until that time switch tongues had to be inspected weekly in order to adjust the shims.

Window Guard Painting Machine*

By Terance Scullin

Superintendent Buildings and Equipment Cleveland Railway

FASTER painting of wire-mesh window guards is now done in the paint shop of the Cleveland Railway by means of a simple device which both dips and brushes the paint on the screen. The window guard is pushed by hand into the right end of a trough, as shown in an accompanying illustration, down underneath the roller into the center of the tank, which immerses it completely in the bath. Further pushing brings the guard in contact with the sloping bottom, which directs it up and out of the paint between two motor-driven brushes, rotating at 120 r.p.m. From this point the guard is pulled through the rest of the way from the opposite end and

Window guards are painted at a rate of 3½ sets per hour by one man using this machine in the shops of the Cleveland Railway

then hung up to dry. Dipping alone would leave an excess amount of paint on the guard, forming beads when dry, then when the surface of any of these beads was broken fresh paint would be exposed, spotting any clothing with which it came into contact. Brushing aids in preventing damage claims from this cause. Previously, all window guards were painted by hand, one side at a time. This method was exceedingly slow and not nearly as thorough as the present system. A workman with this machine can paint 3½ sets of window guards in an hour, where formerly it required one man 2¾ hours for a set. The approximate cost of this machine is $25, exclusive of the motor.

**Submitted in Electric Railway Journal Prize Contest.*

Stand Facilitates Bus Motor Adjustment*

By Hoy Stevens

Superintendent of Maintenance Motor Coach Department Cleveland Railway

IN ORDER to facilitate motor and general repair work on heavy-duty high-capacity coaches, such as the White 54A or the Yellow Z240, the mechanic's stand illustrated has been developed by the bus division of the Cleveland Railway. The dash and front fender construction of large buses make it impossible for a mechanic standing on the floor to lean over or between the fender and body and do any work on the motor.

For making adjustments on motors of large buses a stand for the mechanic has been made in the shops of the Cleveland Railway

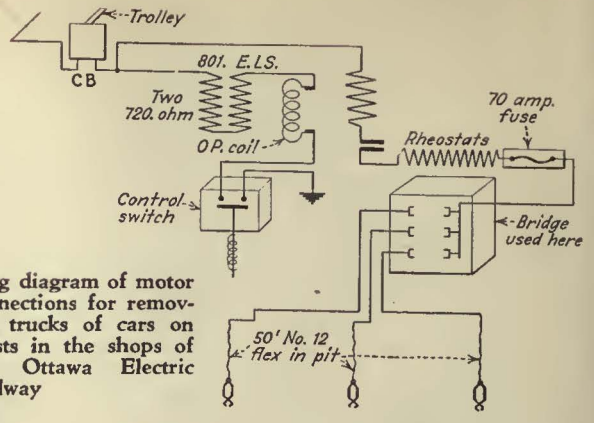
This stand is so built that it can be mounted on the front wheel over the tire. Due to its small size and the cut-out in the center for the hub cap of the wheel there is little or no danger of slipping. It makes a convenient, safe and portable stand for the mechanic while making repairs or adjustments, placing him in a position where he can reach the motor and other units with little difficulty. The step is not expensive and it has been found valuable in making minor operating repairs.

Removing Trucks from Cars on Hoists*

By J. Munford

Electrical Foreman Ottawa Electric Railway

CONVENIENT apparatus for moving trucks out under power from beneath cars on hoists in the shops of the Ottawa Electric Railway has been designed, a spare 801-E-4 line switch and some old car resistance units being used. The switch and resistance units are placed under the platform of the middle pit of the three which are in the shop. A hand-operated control is placed on a pit column where a clear view of the three pits can be had. Cable runs from the junction box in conduit sunk in the cement floor to the three pit outlets. From there a 50-ft. piece of No. 12 flexible wire is connected to the cutout lead on the motor by means of a battery clamp. A reversing switch, made from a K-10 reverse cylinder cut in half, is mounted with fingers and chairs to a portable board with an iron back, which is hooked onto the side of the truck frame to give a ground connection. Three flexible leads each 3 ft. long are provided, with battery clamps attached, connecting to the three remaining motor leads. A kick on the cross-bar, which is welded to the cylinder shaft, is sufficient to reverse the trucks. This apparatus has been in constant use in the shops for two years and has given very satisfactory service.



Wiring diagram of motor connections for removing trucks of cars on hoists in the shops of the Ottawa Electric Railway

*Submitted in Electric Railway Journal Prize Contest.

Pressure Lubrication of Overhead Trolley Wire

MARKED success has attended the use by the Eastern Michigan Railways of a new method of lubricating overhead trolley wire. The apparatus used for this purpose consists of a spray nozzle attached to the trolley harp of a line car and connected by flexible hose with a reservoir tank at one end of the car body. A pressure of 20 lb. per square inch is maintained in the reservoir by tapping the regular air supply of the car. Under the trolley harp a receptacle is provided to catch any excess lubricant. The lubricant itself, called "Lubrion," is made in the form of paste, which is mixed with water in the amount of 1 lb. to 1 gal. After being sprayed on the wire the water evaporates leaving a dry deposit, which neither collects dust and grit nor acts as an insulator, as compounds containing oil or grease sometimes do. The lubricant is manufactured by the Efficiency Products Company, Detroit.

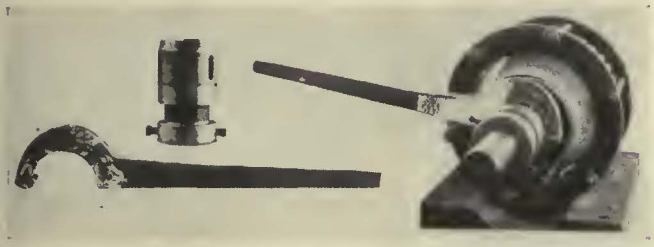
Apparatus used by Eastern Michigan Railways for applying lubricant to trolley wire, showing receptacle to catch excess liquid

Special Armature Nut Wrench

By W. R. McRae

Superintendent of Rolling Stock and Shops
Toronto Transportation Commission

A SPECIAL sleeve wrench has been designed for service in the shops of the Toronto Transportation Commission, for the removal of GE-80 armature body nuts. The top part of sleeve is cut out to fit over projections in the armature nut, and is also threaded on to the lower part, the latter being held firmly to shaft by means



Special wrench developed by the Toronto Transportation Commission for removing armature nut from GE-80 motor

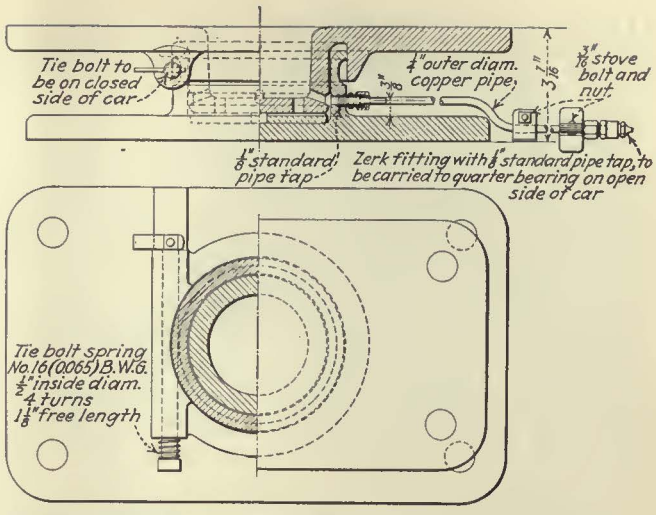
of two set screws. The thread on the sleeve has the same pitch as the armature nut, so that when the wrench grips the slots in the sleeve and turns, the top part of sleeve screws on to the lower fixed portion, as the nut loosens. The old method of removal of these nuts caused considerable breakages, whereas the method described eliminates breakage and is a great time saver.

Center Bearing Lubrication Simplified

By H. S. Williams

Assistant Superintendent of Equipment
Department of Street Railways, Detroit

LUBRICATION of center bearings of car trucks is made easy by a method developed by the Department of Street Railways, Detroit. In the type of bearing to which this method has been adapted, no king pin is used. The bearings are locked together by means of a horizontal pin of cold rolled steel which occupies a groove turn in the lower half. The purpose of this is to prevent the entrance of grit to the bearing surface as the plate has been made of case-hardened steel ground smooth. The lower half of the center bearing is provided with a copper tube which leads outward to the extreme end of the thrust bolster. This outer end of the tube has a Zerk fitting. All that is then necessary to apply the lubricant is a Zerk gun. A central chamber



Zerk fitting used by Department of Street Railways, Detroit, for lubrication of truck center bearings

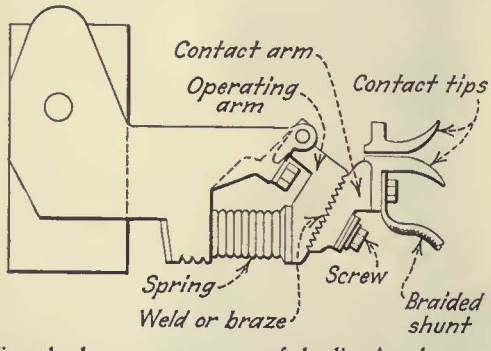
is provided with holes leading from the bearing surfaces so that any excess oil will tend to flow into this chamber, thus giving the added advantage of an oil reservoir. For this reason it is important that a groove be turned in the upper member of the center bearing opposite the oil groove opening. Unless this is done, it is possible that the oil tube will become plugged.

Preventing Loose Breaker Tips*

By E. C. McGinnis

Electrical Foreman
Dallas Railway & Terminal Company, Dallas, Tex.

CAR failures have sometimes occurred in Dallas when the lower contact arm of a line breaker came loose. In the type of breaker with which this has happened the contact arm is bolted to the operating arm to form a unit



By welding the lower contact arm of the line breaker to the operating arm, a source of failures has been eliminated in Dallas

which swings upward to close the circuit. The abutting surfaces are corrugated to make possible adjustment for wear of the contact tips, the two parts being held together with a capscrew and lock washer. Continued operation loosened the screw, allowing the contact arm to drop down and prevent closing of the circuit.

It was found that the tips wear out before an adjustment is necessary. Accordingly, it was decided to braze the contact arm permanently in place against the operating arm and dispense with the adjustment. This method has been found satisfactory, and has eliminated a source of trouble.

**Submitted in* Electric Railway Journal *Prize Contest.*

Final period of

Maintenance Contest

begins May 1

You have three more months to get in the running for the Annual Awards.

Don't delay. Send in your ideas at once.

Gun Used for Electric Track Switch Lubrication*

By H. A. Brown

Foreman Return Circuit, Switch and Signal Division
Cleveland Railway

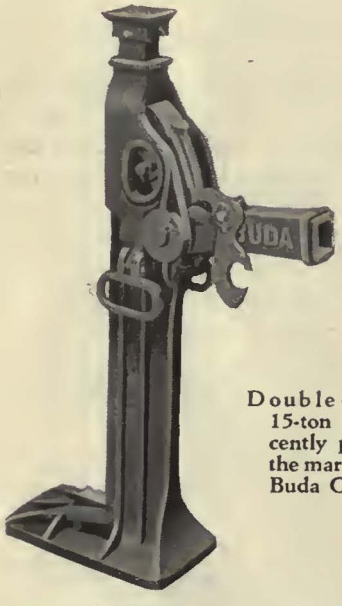
Alemite grease gun for lubricating electric track switches on the Cleveland Railway

PROPER lubrication of the electric track switch mechanism located in the ground box has been facilitated on the Cleveland Railway by use of a specially designed lubricator for the levers and bushings. The bushings are sealed at the bottom by welding them to a circular steel disk. A hole $\frac{1}{8}$ in. in diameter is drilled through the center of the lever pin and tapped on the upper end to accommodate an Alemite grease fitting. When the parts are assembled, grease is forced down under pressure through the center of the lever pin and up between the outer surface of the lever pin and the bushing in a manner similar to that followed in greasing automobile shackle bolts. This method of lubrication has proved very satisfactory in service, forcing out all collected dirt, preventing water from entering the bushing, permitting a much closer adjustment of the mechanism, and providing thorough lubrication without the removal of the various parts.

New Products for the Railways' Use

New Ratchet Jack

THE Buda Company, Harvey, Ill., has just placed on the market a new ratchet jack, known as No. 615, which replaces the old style Buda No. 6. This new jack, furnished primarily for heavy section or extra gang service, is of 15-ton capacity, double acting, 31 in. high with a $20\frac{1}{2}$ in. rise.



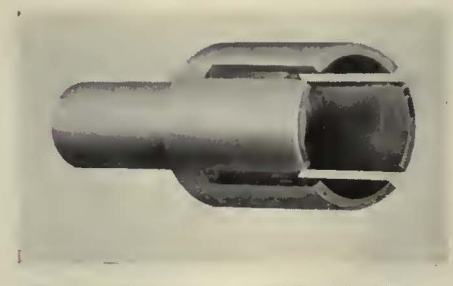
Double-acting, 15-ton jack recently placed on the market by the Buda Company

This jack weighs only 88 lb., having fewer parts than the old-style jack. The lever sockets are cast integral with the side plates. The lever socket is made of electric cast steel, heat-treated.

The new design has a special safety feature, in that the stop for the rack bar is located in the base of the jack, thereby avoiding the possibility of the operator mashing his fingers between the top of the rack and the frame.

Terminal for Brush-Holder Leads

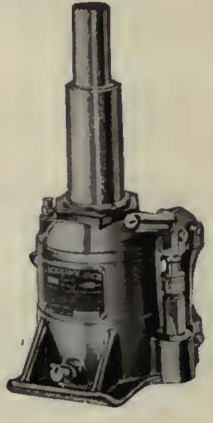
A NEW cable terminal has been developed by the Westinghouse Electric & Manufacturing Company to strengthen the leads where they enter the brush holder. The breaking of leads at this location is frequently due to the cable becoming nicked while removing the insulation. At this point stresses are concentrated and in time slight movements of the leads during service will cause failure to occur. One end of the new terminal is made large enough to fit over the insulation of the cable. This part of the terminal has four saw cuts which permit it being clamped to the cable. The bending which takes place in the lead to that part outside of the terminal is thus localized and prevents the cable from bending and breaking at its weakest point. The small end has an inside diameter sufficient to take care of the diameter of the bare cable and an outside diameter of the proper size to fit into the brush holder. It is important that the large end of the terminal be clamped to the cable so as to hold it securely, otherwise the cable will not be strengthened and the trouble with broken leads may occur.



Cable breakages are avoided with this new terminal for brush-holder leads developed by the Westinghouse Electric & Manufacturing Company

Low Jack for Raising Buses

A FIVE-TON hydraulic jack which is $7\frac{5}{16}$ in. high when collapsed has recently been placed on the market by the Blackhawk Manufacturing Company, Milwaukee, Wis. This is known as Model M-7.3. A telescopic lift of $7\frac{3}{16}$ in. gives a total height of $14\frac{1}{2}$ in. To facilitate placing and removing, the jack is provided with a sled base and with a lantern type handle which gives it a comfortable grip. The saddle is serrated and forms an integral part with the plunger. The total weight is



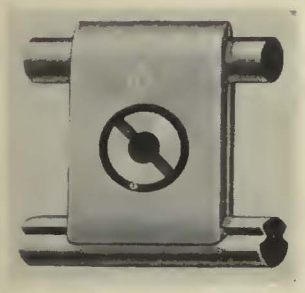
Hydraulic 5-ton jack with sled base and lantern-type handle suitable for lifting low axle buses

25½ lb. with a 34-in. two-piece handle.

A heavier type jack, the D-8.7, is designed to lift 12 tons and is 8¾ in. high. It has a single lift of 5 in. and a 3-in. handscrew extension, or a total height of 16¾ in. The carrying weight of this model is only 31½ lb.

Improved Catenary Clip

GREATER clamping power with freedom from obstruction to current collectors are features of the new duplex hollow screw catenary clip manufactured by the Ohio Brass Company, Mansfield, Ohio. This device is used to suspend the trolley contact wire from the secondary messenger wire on compound catenary systems. Screw heads do not project on either side of the clamp, affording a trim appearance, and offering no obstruction to current collectors. On sharp curves, this characteristic is of considerable value as it will clear a pantagraph or wheel at any angle.

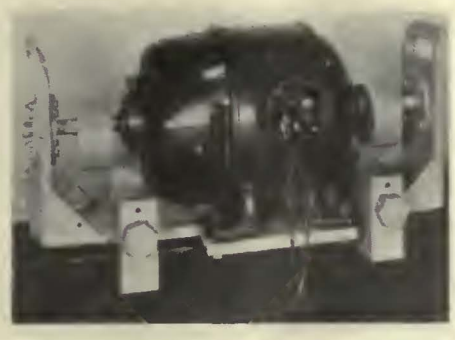


Catenary clip made by the Ohio Brass Company has countersunk screw, giving more freedom to passing collectors

Because the screw is entirely below the surface, it is possible to place it much closer to the trolley wire, thus obtaining the necessary strength with a thinner and lighter cross-section. The device is made of high-strength bronze or Flector malleable iron.

Portable Mortar Flow Pulsator

FOR use in the construction of all types of concreted track the International Steel Tie Company has brought out a new type of portable mortar flow pulsator. This consists of an electric motor, on the shaft of which are carried two eccentric flywheels. The motor is set in a U-shaped frame which is placed on the head of the rail with the armature shaft parallel to the rail. In making either limited or extensive repairs, the portable pulsator can be used to vibrate a sand-cement grout of a small-aggregate concrete, filling the voids under and around the rail base.



Apparatus designed by the International Steel Tie Company to vibrate concrete used in track construction has an electric motor with eccentric flywheels mounted on the armature shaft

Double Deck Observation Bus Developed by Pickwick

DIFFERING in many important respects from previous designs a new 53-passenger double-deck observation coach has been developed by the Pickwick Motor Coach Works, Los Angeles, Cal. The new vehicle, which has a wheelbase of 246 in., is designed for intercity service. Unloaded weight is 17,000 lb. and the loaded weight is estimated to be approximately 25,000 lb. The total length is 33 ft., width 8 ft., and height 9 ft. 10 in. Although the new vehicle has practically twice the carrying capacity of the 27-passenger Pickwick de luxe coach, the cost of operation is said to be no greater.

Upper deck of Pickwick observation coach, showing reclining seats deeply upholstered and covered with velours

A baggage compartment is provided at the rear of the lower deck. Seats are of the reclining type deeply upholstered and covered with velours. A lavatory is located just behind and below the driver's compartment. As in the Pickwick "Nite Coach," a buffet can be installed in the front entrance passage so that meals can be served on portable tables if desired.

The body is of all-metal construction employing duralumin extensively. A six-cylinder Sterling "Petrol" engine, rated at 150 hp. and at 1,500 r.p.m., is used. The engine is so mounted that it can be removed easily and a complete new power plant installed in a short time.

Double-deck Pickwick observation coach seating 53 passengers and weighing 25,000 lb. loaded

NEWS *of the Industry*

LATE NEWS

San Diego, Cal.—The San Diego Electric Railway is reconstructing double track on Market Street, between Third and Fourth Streets and will follow immediately with reconstruction on University Avenue between Florida and Thirtieth Street, as the first two units of its $300,000 1930 program.

✦

Washington, D. C.—Public works and utilities construction contracts during first three months of 1930 were the largest in five years, representing combined valuation of more than $303,000,000, an increase of 56 per cent over first quarter of 1929, according to Secretary of Commerce Lamont.

✦

New York, N. Y. — The Nassau-Broad Street link of the Brooklyn-Manhattan Transit Corporation subway is now 80 per cent completed. Bids for completion of the Fulton Street and Broad Street stations will be received on May 9. The new line extends from the B.-M.T. tunnel at the Battery to a connection with the B.-M.T. system at the Municipal Building, to serve as a short-line downtown service eliminating the need of sending trains up Broadway to the Sixtieth Street tunnel to Queens.

✦

New Haven, Conn.—The Connecticut Company has petitioned the Public Utilities Commission for authority to substitute service by bus for through railway service between Hartford and Middletown and to substitute service by bus for trolley service in Middletown.

✦

Uniontown, Pa. — When the West Penn Railways completes its new $500,000 terminal and track relocation program in Uniontown during July, there will be a community celebration. Work on the new terminal has progressed rapidly.

✦

Seattle, Wash. — Ordinances appropriating $63,000 for reconstruction of Municipal Railway tracks on Pike Street and on West Spokane Street are before the City Council. The work on West Spokane Street is to be a part of the grade separation development. It is estimated to cost $42,000.

✦

New York, N. Y. — The Board of Transportation states that the Eighth Avenue subway will be open for fully 12 miles of its main length, between Broadway and 216th Street on the north and Fulton Street on the south, by the middle of July, 1931.

✦

Niagara Falls, N. Y. — The Public Service Commission has suspended the tariff filed by the International Railway proposing increased fares here to and including Aug. 14 next, unless otherwise directed by the commission. There will be a further hearing on the schedule, which proposes an 8-cent fare in place of 5 cents, with two tickets for 15 cents, at Buffalo on April 28.

(Late News Continued on Page 290)

New Chicago Unification Franchise Almost Ready

Financial Provisions of New Ordinance Still to Be Settled Before Measure Goes to Council. Negotiations Conducted in Liberal Spirit

AMONG the important points just settled in connection with the new coordination ordinance for Chicago was agreement on the financial return to the new company, according to the plan suggested by Attorney Fisher. The section provides a "fair and reasonable return" to the new consolidated company, but during the first three years it shall not be more than the separate companies earned last year, plus the same rate on new money invested. Any excess earnings are to be used to reduce the capitalization of the company. During the three years a minimum of $65,000,000 is to be spent on extensions and betterments.

The regulatory commission is to determine the "fair and reasonable return" after the initial three-year period, and any excess shall be turned over to the transit trustee of the city. The company will be permitted to appeal to the courts from the ruling of the commission on returns.

Present fares will continue under the new franchise. This will mean a 7-cent fare on the surface lines and a 10-cent fare on the elevated roads. Three cents will be charged for a transfer from the surface to the elevated lines, with free transfers from the "L" to the street cars. Transfers between the surface lines and the feeder buses will be free, but transfers between the buses and the elevated lines will cost 3 cents.

An unexpected provision, inserted last week, obligates the new consolidated company to remove the elevated structure in the loop, Chicago's central business district, after the subways to be built by the city have obviated need of the "L" there, and when its value has been amortized.

(Continued on Page 291)

COMING MEETINGS

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

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

May 20-21—Public Utility Advertising Association annual convention, Washington, D. C.

June 16—National Association of Purchasing Agents, annual convention, Chicago, Ill.

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

June 29-July 6 — International Transport Congress, Warsaw, Poland.

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

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

$1,000,000 Oregon Project Approved

Authorization for the Oregon Electric Railway to construct its proposed extension in Linn County, and to operate in that county over the Southern Pacific company's line, has been given by the Interstate Commerce Commission.

The act of the commission opens the way for a $1,000,000 railroad development planned for many months. The proposed line would tap a great area of fine timber in the Santiam Valley, on the west slope of the Cascades.

Actual construction of track would start from Lebanon. The full project calls for steel clear to Cascadia, on the Santiam, a distance of 39 miles. There also would be the branch to a short distance above Holley in the Calapooia Valley, 14 miles; the Whitcomb branch of 8.5 miles and the McDowell Creek branch of 5.5 miles.

In addition, the Oregon Electric has an application pending for an extension into the upper Siuslaw Valley south and west of Eugene, in Lane County, that involves more than $1,000,000.

Speeding Up Central Territory Freight Service

Overnight freight service between Fort Wayne, Ind., and Cleveland, Ohio, has been started by the Fort Wayne-Lima Railroad and connecting electric railways. Through cars leaving Fort Wayne at 3:30 p.m. daily arrive in Cleveland early the following morning. The same fast schedule is maintained in the opposite direction. The schedule is arranged to make connections at Fort Wayne with fast freight runs to and from stations on the Indiana Service Corporation Lines, Union Traction Company of Indiana and connections beyond. Cars in this new service are operated over the Fort Wayne-Lima Railroad to Lima, Ohio; Cincinnati & Lake Erie Railroad to Toledo, and Lake Shore Electric Railway from Toledo to Cleveland.

Free Discussion of Problems of the Small-City Railway

With the view of obtaining a collective picture of the situation the committee on small-city operation of the Transportation and Traffic Association met in New York in a three-day session starting April 2. Chairman Spurr outlined a procedure, previously agreed upon, under which each member present took the witness stand and outlined the conditions on his property, subject to examination and cross-examination by the chairman, Leslie Vickers, economist, and the other members present. Any and all questions were admissible. The proceedings were confidential. More than twenty members and guests were present from properties under public ownership, under public trusteeship, as separate units, and as units of holding corporations.

Among the subjects discussed were past and present earnings, franchise obligations, taxation, paving requirements, public relations, fares, power rates, financial and corporate set-up, operating practices, and the place of the bus in the scheme of things. While the substitution of buses for trolley cars has in certain instances relieved companies from unduly burdensome paving and track rehabilitation work, the introduction of the bus has been accompanied by a variety of troubles peculiar to that vehicle. Some operators reported, however, that the public has taken more readily to an increase in fare where buses have been substituted. The weekly pass has been well received on a number of properties and has served to stimulate traffic and stabilize the passenger movement. From the standpoint of public relations, operators favor many riders at low fares to a smaller number of higher rates.

Members present expressed themselves as highly pleased with the procedure followed and with the results obtained. Hope was expressed that a similar series of conferences might be held in the future.

Company Would Reopen St. Louis Wage Agreement

The St. Louis Public Service Company has notified officers of the Amalgamated Association that the company desires to re-open the existing wage scale and working agreement which expires on May 20. The agreement provides that either side may serve notice of its intention to re-open the agreement within 30 days of any expiration date.

Stanley Clarke, president, says the railway has no desire to decrease wages, but merely wants to clarify certain provisions in the award made by the Missouri Public Service Commission several months ago when the state body arbitrated a dispute between the company and the union.

The executive board of the union on April 17 voted not to re-open the contract although not satisfied with the wages and working conditions fixed by the commission. This feeling is reflected in a letter by the union in which the company is asked to withdraw its request that the working agreement be re-opened at this time.

The union said that if the company insists on a reconsideration of the agreement, the workers will then request that other sections be re-opened. The union also states that the Public Service Commission is not acceptable as an arbitrator if the union and company are unable to settle matters by conference.

Here's Another Point of View

THE editor of the railway publication intended for distribution to the public is always preaching to us to park our machines at home and ride the street car. Why do not the officers of the railway do that and spend 8 1-3 cents and help their company? Notice the machines around the railway building and figure three passengers to a car; what a difference it would make in a month's time! No, no, the officials are too good to associate with the common public.—*From a letter to a daily newspaper editor.*

Sale of Seattle-Tacoma Road Ordered

The Puget Sound Electric Railway, once operating between Tacoma and Seattle, Wash., has been ordered sold at public auction on June 16, by Judge Cushman, of the federal district court. No minimum price has been fixed. Agreement between two litigants, the Old Colony Trust Company, plaintiffs, and the Puget Sound Power & Light Company, defendants, that the property should be sold free of encumbrances, is believed to have precipitated the order of sale. The light company agreed to cancel its long-term leases for power line rights in event a sale is negotiated. When the line went into the hands of a receiver, Judge Cushman ordered service maintained until December, 1928, when it was shown that the road could not be operated at a profit. Receivers' certificates are outstanding in the amount of $50,000.

Poster Competition Successful in Binghamton

Awards have been made in the poster competition fostered recently by the Triple Cities Traction Company, Binghamton, N. Y. There were two major awards, first and second, and eight honorable mentions. The contest provoked much comment favorable to the company. The contest was not altogether premeditated. For several years the company used a standard size advertising car card which fits into a frame placed on the signal box in front of the passenger as he is about to leave the car, a location also in plain sight of seated passengers. Previously this space was used for company notices, transfers, safety, red cross, and the like, but about three months ago the company put in a clever verse signed "From a Patron." Other patrons immediately wanted to see if they could not get into print. None, however, was willing to permit the use of his name. By February the supply had become so great that a change of copy became imperative every week. This led to the thought "Why not have a contest for the Binghamton Central High School?" Safety and service were suggested as the principal subjects, the results to be judged by three members of the "Panorama" staff —a High School magazine. Prizes were filled token carriers—twelve 7½-cent tokens —four carriers for first, two for second, and one each for honorable mention.

Adverse Economic Factors Keep Portland Receipts Down

W. H. Lines, vice-president in charge of transportation for the Pacific Northwest Public Service Company, Portland, Ore., attributes continued good weather this spring, coupled with the unemployment factor, as responsible for the lack of appreciable revenue increases from the 10-cent fare over 1929 figures, when the 8-cent fare prevailed.

Total receipts for the period, from March 6, when the new fare went into effect, to March 15, inclusive, were $126,802, as compared with $125,660 for the similar ten-day period in 1929 under the 8-cent fare, and $128,823 for the similar ten-day period in 1928.

Receipts for the period from March 16 to March 25, inclusive, were $118,265 under the 10-cent fare, as compared with $117,637 for the similar period in 1929 and $121,841 for similar period in 1928.

Receipts for the period from March 26 to April 4, inclusive, under the 10-cent fare were $124,129, as compared with $124,964 for the similar period last year and $126,473 for the similar period in 1928.

The unemployment factor, Mr. Lines asserted, had been responsible for an 11 per cent decrease in the number of passengers carried during the 8-cent fare period immediately preceding the new 10-cent fare.

Revenues for the March 6-April 4 periods listed total as follows: 1930, $369,196; 1929, $368,261; 1928, $377,137.

Columbia Case Before U.S. Supreme Court on May 2

A motion to advance the hearing of a case from the South Carolina courts dealing with the right of regulatory authorities to compel the operation of railway service at a loss was granted by the U. S. Supreme Court on April 21. The case has been assigned for argument on May 2.

The controversy involves the right of the Columbia Railway, Gas & Electric Company to abandon its railway in Columbia, S. C. Counsel for the railway contends railway service was abandoned because of losses sustained over a period of years. Notwithstanding the losses suffered, the South Carolina authorities sought to compel the continuance of operation.

Railway attorneys carried the case to the Supreme Court on an appeal from a mandamus proceeding instituted by the attorney-general of the state to compel the resumption of operations. The Supreme Court of South Carolina held that the railway service could not be separately abandoned, if the business as a whole is profitable.

The Broad River Power Company, which purchased the gas and electric properties, says the decision of the state court is contrary to the fourteenth amendment to the federal constitution, since it compels the operation of railway service at a loss. Exception also is taken by the company to the admission of evidence by the state court which purports to show that the railway, if properly managed, could be operated in the future at a profit. The company maintains there is no evidence to support this opinion as to future operations.

LATE NEWS

(*Continued from Page 288*)

Trenton, N. J.—Governor Larson will sign Senator McAllister's bill allowing the Bridgeton & Millville Traction Company to transform itself into a bus line without the consent of the municipalities, but with the approval of the Public Utilities Commission.

✦

New York, N. Y.—The Suburban Transit Engineering Board reports 23,000 more suburban passengers are being brought into Manhattan daily than on corresponding days two years ago. New Jersey contributed 318,100 commuters, Long Island 167,000 and Westchester 95,400.

✦

Trenton, N. J.—The Vollmer bill has failed to pass the Legislature. The bill was intended to repeal the 1929 act, which permitted electric railways to deduct from franchise taxes amounts equal to the fares of police and firemen carried without charge.

✦

Port Chester, N. Y. — Cornelius N. Bliss, New York, has been elected a director of the New York, Westchester & Boston Railway to replace the late Dr. A. T. Hadley, a director of the road for many years.

✦

Denver, Col.—After weeks of advertising, and the passing out of printed slips in the cars, the Denver Tramway rerouted many of its lines on April 1. In some cases only the number was changed, while in other cases both the number and routing was changed. In no case was there any real withdrawal of service. Thirty-four buses are well distributed over new or supplanted routes. Some of the rail lines heretofore always run with cars with two operators, are now on a one-man car basis. Twenty miles of rail route are supplanted with bus service.

✦

Rochester, N. Y. — Upon application of equity receivers for the New York State Railways, Federal Judge Adler has signed an order permitting the renewal of a labor contract between the receivers and the Amalgamated for one year from May 1, 1930.

✦

University City, Mo.—The City Council has voted to prohibit service cars between University City and Clayton, and between the Kingsland-Delmar terminus of the Delmar-Olive Street car line of the St. Louis Public Service Company and the University City High School at Balsom and Jackson Avenues.

✦

Kansas City, Mo. — George Morris, trainman for the Kansas City Public Service Company, has been re-elected by employees to represent them on the board of directors for another year. He is now starting on his third term. He was opposed by Ollie M. Brown of the mechanical department.

✦

Portland, Ore.—Frank H. Ransom, a local lumber man, has been selected by the management, and B. A. Green, attorney, by the union, to act with a third member as a board of arbitration to pass upon differences between the Pacific Northwest Public Service Company and its employees over wages. Other working conditions are acceptable.

✦

Detroit, Mich.—The Municipal Railway will discontinue service to Mt. Clemens on May 1, because patronage is dropping off. Withdrawal of service means giving up the right to use tracks of the Eastern Michigan Railways.

✦

Roanoke, Va.—A 3-cent transfer for those changing from the Vinton Street car to the Blue Ridge Heights bus line has been put into effect by the Roanoke Railway & Electric Company. Both the State Corporation Commission and the Vinton Town Council approved the plan.

✦

Erie, Pa.—The Erie Railways will reconstruct its tracks in Peach Street, from 26th Street south to the city limits, at a cost of $25,000.

✦

Philadelphia, Pa. — Operating of the Broad Street subway for the period from Sept. 1, 1928, to March 1, 1930, is estimated to have decreased earnings of the rest of the Philadelphia Rapid Transit Company system $702,820.

✦

Springfield, Mass.—The new de luxe service from Springfield to Worcester and Boston was started on April 18, with the Springfield Street Railway, the Worcester Consolidated Street Railway and the Boston, Worcester & New York Street Railway co-operating. A schedule of 3½ hours between Springfield and Boston is maintained with a limited number of stops. Three round trips are made daily.

✦

Philadelphia, Pa.—Subway trains were in regular operation on April 20, for the first time, to the South Street terminus of the extension just completed for the Broad Street subway, from City Hall southward. Beginning April 21 six-car trains were run on a three-minute headway at rush hours.

✦

Albany, N. Y.—Governor Roosevelt has vetoed the Thayer bill amending the public service commission law by providing that the attorney-general shall appoint a people's counsel.

Detroit, Mich.—Members of the Street Railway Commission have set May 1 as the day on which the Detroit Motor Bus Company must quit competing with the cars and coaches of the municipal railway on Jefferson Avenue. The department will assign its route on Vernor highway to the bus company.

✦

New Haven, Conn. — Edmund S. Wolfe, president of the First National Bank, Bridgeport, Conn., has been elected a director of the Connecticut Company to succeed the late Charles G. Sanford.

✦

Springfield, Ohio.—Albert S. Richey, Worcester, Mass., has been retained to study the Springfield city transportation situation and to help the city to solve the problem. From the city's recent advertisements for transportation proposals two bus offers were received. The Springfield Railway, now in receivership, has a franchise which extends to 1938. Through the Cincinnati & Lake Erie Railroad it made an offer some time ago, but the city rejected the proposal as unsatisfactory.

✦

St. Louis, Mo.—Effective on April 16 the average speed of cars on the Laclede Avenue division of the St. Louis Public Service Company was increased to 10.25 m.p.h., through the elimination of several unimportant stops.

✦

New York, N. Y.—Representatives of the Transit Commission, the Noise Abatement Commission and the press on April 24 attended a demonstration of a noise abatement device attached to turnstiles of the Interborough Rapid Transit Company at the Grand Central.

✦

St. Louis, Mo.—The War Department has approved the plans for the construction of the Illinois Terminal Railroad's new western approach to the McKinley Bridge over the Mississippi River between St. Louis, Mo., and Venice, Ill. The addition will connect with the elevated system through the northern part of St. Louis to the new subway under Twelfth Street.

✦

Buffalo, N. Y.—The International Bus Corporation has applied to the Public Service Commission for a certificate for a line from Niagara Square and Niagara Street, Buffalo, the route to be an extension of the Delaware Avenue bus line. City consent was granted on April 14. The same rate of fare and transfer privileges now prevailing on the Delaware Avenue line will apply to the proposed extension.

✦

El Paso, Tex.—The El Paso Electric Company follows the practice of varying the color schemes of its cars and buses in accordance with a popular modern trend. The object is to arouse greater interest in order to sell transportation service more effectively. "Color and contrast" says the company "are essential to the greatest degree of interest. This being true of life itself, it follows that the same rule applies to all contacts, including those made in efforts to secure business."

✦

Holyoke, Mass.—The Holyoke Street Railway will discontinue service on its Pelham line between East Street, Amherst and the terminus at West Pelham, on May 1.

Terms of Settlement of St. Louis Bus Strike

The Peoples' Motor Bus Company, St. Louis, Mo., on April 3 resumed operation of its 184 buses after twenty days of inactivity due to the strike of chauffeurs, conductors and shopmen. Statements issued immediately following the negotiations which resulted in the settlement of the strike, made the basis of an item in ELECTRIC RAILWAY JOURNAL NEWS for April 5, page 59, did not reflect accurately the true basis of that agreement. The really important feature was the agreement of the Amalgamated Association to foster ordinances for the elimination of service cars and for the authorization of a high-class dependable substitute service to be operated by the Peoples' Motor Bus Company, any improvements in wages and working conditions to depend on co-operation with the company towards this objective. On this question the company refused to modify its stand, the only compromise being on the length of the contract.

There was never any question about recognition of the union, because the bus company had been bought by the City Utilities Company for the avowed purpose of co-ordinating its service with that of the railway, and railway employees would not work in co-ordination with a non-union organization. The contract provides, however, that there shall be no discrimination between the union and non-union employees; that employees shall not be influenced to become members of the union other than by friendly solicitation; and that any employee attempting to influence any other employee for or against unionism by annoyance shall be subject to immediate dismissal.

The company agreed to reinstate all men who were out on strike, with the proviso that anyone arrested during the strike and subsequently convicted of assault should forthwith be dismissed.

The contract runs for two years and provides that wages and working conditions shall remain during that period as they were before the strike, unless:

1. (a) service car competition shall substantially cease, and (b) the company shall be authorized to operate a de luxe express service at a fare not exceeding 25 cents; or,
2. (a) service car competition shall substantially cease, and (b) the company's earnings shall be so increased thereby as to warrant an increase in wages.

In the event of either of these two conditions occurring, the union may on thirty days' notice elect to re-open the matter of wages and working conditions. If re-opened and fixed, there shall be no further re-opening until the expiration of the agreement. The wages and working conditions in existence prior to the strike, including the rates for overtime and the allowance of one day a week off without pay if and when operating conditions permit, are set out in detail as a matter of record.

Richard W. Meade, president of the bus company, issued a statement in which he said in part:

The regretable delay in settling the strike was due solely to the unwillingness of the union to adhere to the basis on which negotiations were originally opened; namely, that our existing scale and working conditions must continue until the unfair service car competition had been eliminated and the company authorized to operate a new class of service in substitution for it, thereby providing additional earnings necessary before increased wages could be paid.

We insisted upon a contract that embodied our existing wages and working conditions, so that there should be no dispute about them, and in placing these conditions on record we went out of our way to be liberal in construing practices that had been subject to some variation.

During the conferences for the settlement of the strike it was very clearly demonstrated that, beyond the natural desire of our employees to secure the exceedingly liberal wages and time allowances enjoyed by the employees of the St. Louis Public Service Company doing similar work, there was little or no discontent among our men.

The strike being settled and all differences adjusted, we now want to give the maximum of good service to the people of St. Louis and to extend our system in a new field where it can supplant the irregular and irresponsible mediums that have grown up like Topsy because provision never has been made for a real scheduled, dependable service of rapid mass transportation.

Indiana Commission Rejects Merger Proposal

Receivership for T. H. I. & E. and Indianapolis Street Railway Follows Disapproval of $70,000,000 Insull Utility Consolidation Petition

THE proposed $70,000,000 merger of the Insull-controlled Central Indiana Power Company properties with the Terre Haute, Indianapolis & Eastern Traction Company has been denied by the Public Service Commission of Indiana on the grounds that the merger was based on an unsound financial set up and that it would not serve the public interest.

Coincident with the rejection of the merger petition, insolvency suits were filed in two courts by the Westinghouse Electric & Manufacturing Company against the Terre Haute, Indianapolis & Eastern Traction Company and its subsidiary, the Indianapolis Street Railway. George C. Forrey, Jr., president of the Fletcher American Company, Indianapolis, was appointed receiver of the local railway by Judge Chamberlain of the Marion Circuit Court.

Action against the T.H.I. & E., was dismissed when the company sent a check to the Westinghouse company in settlement of the claim. A new receivership suit against the T.H.I. & E. was then filed in the Superior Court by the Consolidated Collieries Company, Indianapolis. Following the hearing on this petition, Elmer W. Stout, Indianapolis, was made receiver by Judge Milner.

The receivership suits were not unexpected in view of evidence presented during the merger hearings that the T.H.I. & E. had borrowed more than $2,000,000 in short term loans on the hope that the merger, if approved, would provide a way out of its financial straits. While The Indianapolis Street Railway was not involved in the merger proposal, its common stock is owned by the T.H.I. & E. and the improvement of the parent company would have helped the subsidiary.

The insolvency proceedings are expected to result in the reorganization of the two properties and the probable abandonment of several weak and losing divisions of the T.H.I. & E. The merger was proposed as a solution of these difficulties, but when it was denied, receivership proceedings were adopted as the only logical course of conserving assets, protecting creditors and providing an orderly procedure for reorganization.

It has been estimated that $7,000,000 of new capital will be needed to modernize the Indianapolis Street Railway, provide new cars and rebuild track.

In denying the petition the commission held the expected earnings were not sufficient to support the projected capitalization and that there was no adequate assurance of increased earnings to improve the financial situation of the consolidation.

"Anticipation of a substantial improvement in the net earnings of the consolidated properties for the future is a matter involving too much speculation and uncertainty for sound financing of utility property," the commission declared.

Plans for the merger first were announced in 1925 by Samuel Insull of Chicago and the late J. Randal Morgan of Philadelphia. A merger contract was approved in the summer of 1928, however, and the petition was filed Aug. 27 of that year. The first hearing, for organization, was held Oct. 9, 1928. Taking of testimony was begun on Dec. 2, 1929, and was adjourned on Dec. 10 until March 16. The hearings were concluded March 21. From the standpoints of time consumed in reaching a decision, mass of evidence presented and scope of properties involved, it was the largest case in the history of the Indiana commission.

Chicago Franchise

(*Continued from Page* 288)

Although reference to a merger of the surface and elevated lines with the Chicago Motor Coach Company was omitted from the franchise, the text neither permits nor prohibits this.

The powers of the transit trustee who will take over the city's $61,000,000 car fund and receive and disburse the city's compensation of 3 per cent of the gross annual receipts of the new company have been defined. The ordinance as now written provides that he shall not be empowered to buy city tax anticipation warrants. His investment of the transit fund must be in city, county, state and federal bonds or in securities acceptable at the federal reserve bank for rediscount, according to one of the conferees.

Plans for the subways have not yet been completed. Another month will be required before the drafting of the special assessment features of the subway ordinance will be finished. After this a public hearing must be held to conform to the statutes, the assessments spread and a confirmation of the plan obtained from the courts.

The work on the financial plan for the consolidation of the surface and elevated lines is yet to be finished, but Frank O. Wetmore, leader of the group of financiers, predicted that, with the ordinance out of the way, negotiations with the various bondholders' protective committees, will be resumed and the financial agreement will be reached without further delay.

Accident Figures Reported by 171 Interstate Lines

The Interstate Commerce Commission has compiled a report on accidents occurring in interstate electric railway operations during 1929 based on returns from the 171 carriers under the commission's jurisdiction. A report on casualties on interstate electric lines formerly was included in the commission's annual accident bulletins, but this was abandoned a number of years ago. The request that the electric carriers furnish such information for 1929 is the result of a demand for bringing together all information that may have any bearing on the subject of street and highway safety.

The number of car-miles traveled by interstate electric carriers last year totalled 256,849,500. Casualties per 1,000,000 car-miles averaged 1.45 persons killed and 11.95 persons injured. In a total of 2,675 train and train service accidents, 373 persons were killed and 3,070 injured. Collisions with automobiles at highway grade crossings constituted the principal cause. They numbered 617 and resulted in the death of 175 persons and the injury of 832. Collisions with persons at highway grade crossings numbered 218 and resulted in the death of 80 persons, 59 of whom were pedestrians, and the injury of 141. Collisions with automobiles not at highway grade crossings ranked third in the number of resulting fatalities. In 231 accidents of this kind, 50 people were killed and 295 persons were injured. The 225 persons killed in collisions with automobiles were the occupants of the automobiles. Collisions with persons elsewhere than at highway grade crossings numbered 97, killing 24, 22 of whom were pedestrians.

Collisions with other electric cars numbered 69, with four killed and 216 injured. Seven collisions with steam trains killed two and injured sixteen. Collisions with other vehicles numbered 15, resulting in 4 deaths and the injury of 15 persons.

Only seven passengers carried by the interstate electric railways last year were killed; five in boarding or alighting, an average of .03 per 1,000,000 car-miles. The number of passengers injured was 1,346; 702 in boarding or alighting, an average of 5.24 per 1,000,000 car-miles. Casualties among employees on duty numbered 24 killed and 425 injured. Fifty derailments resulted in the death of three persons, two of whom were employees and one the occupant of an automobile. Sudden stopping, starting or lurching resulted in the injury of 135 persons, 126 of whom were passengers, and nine trainmen.

Non-train accidents numbered 2,207, and caused the death of sixteen and the injury of 2,198 persons.

Evansville, Ind.—Fire on April 1 destroyed the substation on the Boonville, Ind., division of the Evansville, Suburban & Newburgh Railway, located 8 miles east of Evansville.

Conspectus of Indexes for April, 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	Last Five Years Low
Street Railway Fares* 1913 = 4.84	April, 1930 7.91	Mar., 1930 7.88	April, 1929 7.75	April, 1930 7.91	April, 1925 7.26
Electric Railway Materials* 1913 = 100	April, 1930 140.2	Mar., 1930 141.6	April, 1929 145.0	Dec., 1926 159.2	Feb., 1928 139.5
Electric Railway Wages* 1913 = 100	April, 1930 231.7	Mar., 1930 231.7	April, 1929 230.1	Feb., 1930 231.7	April, 1925 221.6
Electric Ry. Construction Cost Am. Elec. Ry. Assn. 1913 = 100	April, 1930 203.0	Mar., 1930 203.0	April, 1929 200.9	Nov., 1928 205.7	July, 1929 199.0
General Construction Cost Eng'g Newe-Record 1913 = 100	April, 1930 207.1	Mar., 1930 206.8	April, 1929 203.4	Jan., 1927 211.5	Nov., 1927 202.0
Wholesale Commodities U. S. Bur. Labor Stat. 1926 = 100	Mar., 1930 90.8	Feb., 1930 92.1	Mar., 1929 97.5	Nov., 1925 104.5	Mar., 1930 90.8
Wholesale Commodities Bradstreet 1913 = 9.21	April, 1930 11.18	Mar., 1930 11.22	April, 1929 12.87	Dec., 1925 14.41	April, 1930 11.18
Retail Food U. S. Bur. Labor Stat. 1913 = 100	Mar., 1930 150.1	Feb., 1930 153.0	Mar., 1929 153.0	Nov., 1925 167.1	Mar., 1930 150.1
Cost of Living Nat. Ind. Conf. Board 1914 = 100	Mar., 1930 157.4	Feb., 1930 158.8	Mar., 1929 159.8	Nov., 1925 171.8	Mar., 1930 157.4
Industrial Activity Elec. World, kw.-hr. used 1913-25 = 100	Mar., 1930 125.0	Feb., 1930 123.5	Mar., 1929 135.7	Feb., 1929 140.4	Aug., 1925 94.3
Bank Clearings Outside N. Y. City 1926 = 100	Mar., 1930 94.3	Feb., 1930 96.5	Mar., 1929 103.9	Oct., 1929 111.8	Nov., 1926 94.0
Business Failures Number	Mar., 1930 2093	Feb., 1930 2150	Mar., 1929 1704	July, 1929 1581	Sept., 1928 1348
Liabilities, Millions of Dollars	73.82	69.13	36.42	102.09	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.

Work on New Portland Ordinance to Start

An ordinance has been passed by the City Council of Portland, Ore., providing for retention of Carey & Harlan, consulting engineers, to appraise the railway property and prepare a service-at-cost franchise. The stated consideration for this work is $18,000.

The franchise is to be drawn in collaboration with the city attorney. It must be ready for submission to the voters in the general election in November. Chief among contemplated changes are that the Portland Electric Power Company be relieved of various imposts such as bridge tolls, franchise tax and possibly others.

One councilman offered as a counter proposal that the city call for bids to supply mass transportation by street car, trackless trolley or buses, or a combination of all three. Carey & Harlan will report on this proposal.

Increased Operating Allowance Before Cleveland Council

The Cleveland Railway on April 21 made public its executive officers' payroll in deference to requests by members of the City Council who are considering the increase in the company's operating allowance from 29 to 31 cents a car-mile. The president receives $42,500 a year; one vice-president $22,000; another vice-president and the assistant to the president, $17,500 each. The company's chief surgeon is paid $11,000, while salaries of $10,800 each go to superintendent of stores and materials, treasurer, superintendent of the accident department, civil engineer, superintendent of personnel, and superintendent of buildings and equipment.

The auditor and three other superintendents receive $9,600 each and three other executives $8,400 each. Salaries of fourteen others range from $6,600 to $4,200. The annual payroll of executives is $308,400.

In making public the payroll, President Alexander declared that it represented only a fraction of the cost of operating the company and that the City Council itself controls operating costs to a large degree by reason of its control of the service. He says that if the operating allowance is not increased the railway would have to cease insurance and pension payments for employees or reduce wages, or both.

Competition between the Hanna Building Company and the Midland Bank Building for the privilege of housing the offices of the Cleveland Railway continues to grow in intensity. The Hanna Building has offered the same amount of space as the Midland Bank Building offered at a reduction of $45,000 a year in the rent now paid. The Midland building is in the Van Sweringens' Terminal group.

In the midst of the councilmanic flurry the railway received word from Washington that the United States Supreme Court had refused to review its appeal from the decision of the lower courts holding that federal income taxes can be levied on the company's interest fund.

PERSONAL MENTION

Messrs. Palk, Blodgett and Dahl Made Vice-Presidents

Winnipeg Officials Advanced in Recognition of Their Long and Valuable Services, Publicly Proclaimed by President Anderson

AT THE annual meeting of shareholders of Winnipeg Electric Company, Winnipeg, Man., held on April 7, Lawrence Palk, W. E. Blodgett and C. H. Dahl were elected vice-presidents of the company. Mr. Palk is now vice-president in charge of executive matters, Mr. Blodgett is vice-president in charge of finances and accounting, and Mr. Dahl is vice-president in charge of operation. Each was formerly head of the particular department named. Mr. Blodgett was comptroller of Winnipeg Electric Company. He is also treasurer of Manitoba Power Company, Ltd., and of Northwestern Power Company, Ltd., associated companies, and Mr. Palk is also secretary of Winnipeg Electric and associated companies.

L. F. B. Palk

W. E. Blodgett

C. H. Dahl

In speaking of the new appointments, President Anderson said:

> I am glad to be able to announce that at the organization meeting of the board of directors the following executive appointments were made: W. E. Blodgett, vice-president in charge of finances and accounting; C. H. Dahl, vice-president in charge of operation; Lawrence Palk, vice-president in charge of executive matters.
>
> Mr. Blodgett has been the company's comptroller for some years. Mr. Dahl has been assistant general manager in charge of operation, and Mr. Palk has been assistant general manager in charge of executive matters, and in recognition of their long and valuable services rendered to the company their appointments with these titles were confirmed at the above-mentioned meeting.

Lawrence Frederick Betts Palk formerly was secretary and assistant general manager in charge of executive matters of Winnipeg Electric Company, Manitoba Power Company, Ltd., and Northwestern Power Company, Ltd. Mr. Palk was born in Winnipeg on Aug. 14, 1885. He commenced his career as a stenographer for the Winnipeg Electric Company in October, 1904. He was made secretary, secretary and assistant to president, assistant general manager in charge of executive matters and finally vice-president in charge of executive matters. He is also secretary of Winnipeg Electric and associated companies. He is a member of many societies in Winnipeg.

For a number of years Charles Henry Dahl has been assistant general manager in charge of operation. The Winnipeg Electric Company is the parent company of Manitoba Power Company, Ltd., and Northwestern Power Company, Ltd., which operate electric railway, light, power and gas utilities in Manitoba. Mr. Dahl was born in Appleton, Minn., on Feb. 12, 1888. He was educated at Marinette high school, Marinette, Wis., and Oshkosh Teacher's College. He is a B.A. of Wisconsin University. He went to Canada in November, 1919, and started with the Winnipeg Electric Company as statistician. In that capacity he familiarized himself with the operations of the various utilities to such an extent that he was rapidly promoted. He was president of the Winnipeg Lions Club in 1926 and 1927, and in 1929 was elected president of the Canadian Electric Railway Association.

William E. Blodgett, comptroller of Winnipeg Electric Company and treasurer of the Manitoba Power Company, Ltd., and the Northwestern Power Company, Ltd., has had long experience with public utilities. Previous to his start with the Winnipeg Electric Company in September, 1920, he was secretary-treasurer of the Utah Light & Traction Company. Mr. Blodgett is a native of Wisconsin and learned accounting in business institutions of Wisconsin and Minnesota. He was accountant for the Twin City Rapid Transit Company when he accepted a position with the Utah Light & Traction Company. He filled the positions of paymaster, statistician, chief clerk, assistant secretary and chief clerk to the general manager. In 1914 when the Utah Light & Railway Company was consolidated with the Salt Lake Light & Traction Company he continued as chief clerk to the manager of the new company, and in 1916 he was elected secretary and treasurer and was placed in charge of the accounting department. He held that position until his appointment as comptroller of the Winnipeg Electric Company.

✦

W. F. Miller Made Comptroller at Spokane

W. F. Miller, who has been auditor of the Washington Water Power Company, Spokane, Wash., for several years, has been elected comptroller. In his new position the duties of auditor will be merged with those of comptroller, calling for closer contact with the financial affairs of the company, in addition to the regular departmental accounting.

L. E. Morse, formerly secretary and assistant treasurer, has been elected secretary-treasurer.

The Washington Water Power Company controls the Spokane United Railways.

✦

R. M. Feustel Heads South Shore

Robert M. Feustel has been elected president of the Chicago, South Shore & South Bend Railroad, and Samuel Insull, Jr., has been elected chairman of the executive committee. Samuel Insull is chairman of the company, and the vice-presidents include William A. Sauer, Charles W. Chase, Morse DellPlain and Ralph H. James.

The members of the newly created executive committee are: Samuel Insull, Samuel Insull, Jr., Robert M. Feustel, Britton I. Budd, Bernard J. Fallon, Charles E. Thompson, and Hal M. Lytle.

The stockholders of the company voted at the annual meeting to increase the number of directors from nine to thirteen. Samuel Insull, Jr., Hal M. Lytle, E. Van Arsdel, and L. B. Andrus were elected new directors.

✦

Engineers Complete Boston-Worcester Rehabilitation

Cyrus B. Buchanan and Jerome Rich of the Buchanan & Lang Company, have concluded their connection with the Boston, Worcester & New York Street Railway. Mr. Buchanan went to Framingham after the receivership of the railway to take charge of its reorganization. Under his direction many changes and improvements were brought about. The entire roadbed between Boston and Worcester has been improved, obsolete equipment and property done away with, and new service started, not only on the original line but through the establishment of a bus service on the Post road from Boston to Worcester and New York. Messrs. Buchanan and Rich leave to undertake other work for the company which they represent.

N. J. Scott Heads New England Operators

In some respects N. J. Scott, the new president of the New England Street Railway Club, is a law unto himself as manager of the Connecticut Company at Hartford. True, that city is only one of the many in which the company operates, but it is one of the most important, if not really the most important. Let others contest that point.

Mr. Scott is known far and wide in his community and favorably, too. The Hartford division is largely Mr. Scott and Mr. Scott, with due respect to others, is largely the Hartford division. If by chance one address him by letter, back comes a reply on company paper, and the sole name on it is N. J. Scott, manager. That's the recognition Mr. Scott gets from his company. It is well deserved.

If Mr. Scott were politically ambitious he could probably be mayor, unless perchance to attain that office one must be a native of Hartford County. That would let Mr. Scott out. But to all intents and purposes he is a native. Hartford beckoned to Mr. Scott when he was twenty years old. He acknowledged the salute by entering the employ of the Hartford Street Railway as a conductor. That was in July, 1896. This he did after he was graduated from the Knowlton High School. He was born and educated in Canada.

A mathematician would discover that was 34 years ago, but Mr. Scott has not stopped to count the years. He has been too busy to ruminate much, too busy serving successively as carhouse foreman, dispatcher, superintendent of transportation and, lastly but not finally, as manager of the Connecticut Company, Hartford division, the successor to the Hartford Street Railway. Incidentally he has established himself firmly in the hearts of all the men and women of the division by his warm human understanding, and now his associates in the industry in New England have publicly acknowledged their appreciation of the man by electing him to the highest office within their power to bestow.

✦

H. S. Whiton in New Byllesby Post

Herbert S. Whiton has been appointed acting chief mechanical engineer of the Byllesby Engineering & Management Corporation, to succeed H. Boyd Brydon, who resigned on March 15.

Mr. Whiton received the degree of Bachelor of Science in Mechanical Engineering from Harvard University in 1901. Early in 1905, he entered the employ of Stone & Webster as chief engineer of the power station of the Ponce Railway & Light Company at Ponce, Porto Rico. At the end of about two years he was made manager of the company and in July, 1909, he was transferred to the Minneapolis General Electric Company as superintendent of power. In June, 1923, he was transferred to the Chicago office of Byllesby Engineering & Management Corporation.

✦

M. C. Burritt Named to New York Commission

Maurice C. Burritt of Hilton, Monroe County, N. Y., has been confirmed as a member of the Public Service Commission to succeed Commissioner William R. Pooley of Buffalo, whose term expired more than a year ago. Mr. Burritt is a Republican. Colonel Pooley has held over in office more than a year. This has been due to the fact that last year's Senate adjourned without confirming the Governor's appointment of Davis C. Adie, Buffalo Democrat, to the commission. Mr. Burritt was formerly the head of the extension service of Cornell University; in addition, he was vice-dean of the New York State Agricultural College, and has been the treasurer of the G. L. F. Exchange, having charge of the finances of this very large business organization. Furthermore, he has been president of the New York State Horticultural Society, and for the past year and a half has served as a member of the Governor's agricultural advisory commission.

Messrs. Hutcheson and Thornton in New Offices in Montreal

Lieut.-Col. J. E. Hutcheson

J. E. Hutcheson, vice-president of the Montreal Tramways, Montreal, Que., was named managing director, and Kenneth B. Thornton, formerly assistant general manager, made general manager at a meeting of the board of directors which followed the annual general meeting of the shareholders. Julian C. Smith, president, who has held the office of managing director has relinquished that office.

Intimation that the company was working on plans for an underground railway for Montreal, was offered by Mr. Smith during the course of his supplementary remarks. The company, he said, was very much alive to the transportation needs of the city, and had been investigating the possibilities of an underground system.

K. B. Thornton

Lieut.-Col. Hutcheson began his business career as a telegraph operator with the Grand Trunk Railway in Brockville in 1878 and six years later was appointed trainmaster, a position he held for six years, to 1890, when he became manager of the Ottawa Electric Railway. In 1912 he went to Montreal as general manager of the Montreal Tramways, and in 1924 was appointed vice-president and general manager.

Mr. Thornton was formerly general manager of the Canadian Light & Power Company; Quebec & New England Hydro-Electric Corporation, and consulting engineer to the Montreal Tramways. He was connected with the Montreal Light, Heat & Power Company from 1893 to 1904, when he joined J. G. White & Company, of New York and London. Upon severing his connection with the latter firm in 1911 he became associated with the Montreal Tramways.

Montreal Tramways is a subsidiary of Consolidated Securities, Ltd., which in turn is controlled by United Securities, Ltd., a company jointly controlled by Shawinigan Water & Power Company and Montreal Light, Heat & Power Consolidated. Incorporated in 1911, the company serves the city of Montreal and suburbs. It has a contract with the city of Montreal which runs to 1953, when the property may be purchased by the city or the contract is automatically extended for five-year periods.

✦

Officers Elected for Calumet Railways

Directors of the citizen-owned Calumet Railways, Inc., have elected Samuel Insull, Jr., Chicago, as chairman of the board and Morse DellPlain, head of the Northern Indiana Public Service Company, as president of the organization formed to rehabilitate the former Hammond, Whiting & East Chicago Railway. The other officers include:

Walter J. Riley, banker, East Chicago, vice-president; Henry P. Conkey, head of the Conkey Printing Company, Hammond, secretary; Walter E. Schrage, president of the Bank of Whiting and former Mayor of Whiting, Ind., treasurer; John C. Horn, president of the Washington Lumber Company, East Chicago, auditor; D. H. Mitchell, Hammond, comptroller and assistant treasurer, and D. O. Schrader, Hammond, assistant secretary.

✦

Charles E. Thornton, Bronxville, N. Y., has been appointed senior assistant utilities engineer of the Maryland Public Service Commission, Baltimore. He succeeds Edgar R. Shepperd, now with the Bureau of Standards.

D. E. Watson Heads City and Interurban Systems

David E. Watson, elected recently to the presidency of the Terre Haute, Indianapolis & Eastern Traction Company, has been acting president of that company and the Indianapolis Street Railway, Indianapolis, Ind., since May, 1929, when he assumed the duties of the late Robert I. Todd.

Mr. Watson became connected with the Terre Haute, Indianapolis & Eastern Traction Company in 1911 as local attorney at Martinsville, Ind. In June, 1929, he was transferred to the legal department of the company at Indianapolis, where he served as trial lawyer for more than ten years. He was appointed general attorney of the Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis Street Railway, and power and light company subsidiaries in 1923 and has represented these

D. E. Watson

companies in all cases before the state Public Service Commission since that time. In addition to his duties as president he will continue in charge of all general corporation work for these properties.

Mr. Watson was born in Cloverdale, Indiana. After he was graduated from the law school of DePauw University at Greencastle in 1896, he went to Martinsville and started a law practice. During the memorable presidential campaign of William Jennings Bryan in 1896, he attained considerable local repute as a public speaker. While a member of a successful law partnership in Martinsville, he was elected, several years later, to the office of public prosecutor of Morgan County.

Mr. Watson has been in charge of the legal interests of the Terre Haute, Indianapolis & Eastern Traction Company and subsidiary companies in the proposed merger of these companies with the Central Indiana Power Company operating subsidiaries, now before the Indiana Public Service Commission.

He is a member of the Marion County, Indiana and American Bar Associations and of several leading clubs in Indianapolis.

✦

Carl D. Henry, Sherman, Tex., has been appointed commercial agent for the Texas Electric Railway, with headquarters at Sherman. He succeeds Compton A. Huguely, who at his own request was made freight and passenger agent for the same line at Sherman, succeeding V. E. Jones, resigned. Mr. Henry is a former employee of the Missouri-Kansas-Texas Railroad, having been with the railroad in Sherman for several years. Later he was chief clerk to the division freight agent of the steam railroad at Waco. He resigned the latter position to accept a place with the Texas Electric Railway.

✦

A. E. Ferguson Vice-President of National Creosoting Company

Joshua S. Logan, president of the National Lumber & Creosoting Company, Texarkana, Ark.-Tex., announces the election of Albert E. Ferguson as vice-president and member of the board of directors of that company. Mr. Ferguson will maintain offices at the general offices of the company at Texarkana, Ark., and also at St. Louis, Mo. Mr. Ferguson is a graduate of Washburn College, Topeka, Kan., and holds a commission as captain of Field Artillery Reserves, United States Army. In 1920 he entered sales work as an associate of John J. O'Fallon with whom he was prominently identified for several years. Prior to his election to the position of vice-president of the National Lumber & Creosoting Company, Mr. Ferguson held the position of general sales manager of the company.

✦

William A. Prendergast, who recently resigned as chairman of the Public Service Commission of New York, has become a general partner of the banking and brokerage firm of W. C. Langley & Company, specialists in public utility securities. Mr. Prendergast has had wide business and financial experience. From 1899 to 1904 he was secretary-treasurer of the National Association of Credit Men. He is a well-known writer on business subjects.

✦

Arthur L. Rae, for the past three years assistant comptroller of the American Water Works & Electric Company, has succeeded A. A. Adams as comptroller. Mr. Rae was born in Holyoke, Mass., on March 17, 1891; graduated from Williams College in 1911 with a year of graduate work in the Harvard School of Business Administration. Mr. Rae's early experience with the American Telephone & Telegraph Company has given him a broad training in public utility work, but his later connections enabled him to obtain a more generalized knowledge of financial affairs and business administration.

✦

C. P. Couch has resigned as vice-president and general manager of Southern Ice & Utilities Company, at Dallas, Tex., to become vice-president in charge of operations of the Louisiana & Arkansas Railway at Shreveport, La. Mr. Couch formerly was vice-president and general manager of the Mississippi Power & Light Company, at Jackson. While in this position he developed an interconnected system supplying electric power to more than 100 cities and towns of Mississippi hitherto dependent upon isolated plants of small capacity, including many municipally-owned and operated light plants purchased by the Mississippi Power & Light Company. In association with his brother, H. C. Couch, he had a large part in developing the interconnected power systems of the present Louisiana, Arkansas & Mississippi Power & Light Companies.

"Neb" Grover Succeeds the Late C. A. Kincade

"Neb" Grover has been appointed to succeed the late C. A. Kincade as superintendent of electrical distribution of the Kansas City Public Service Company, Kansas City, Mo. Mr. Grover became connected with the Kansas City organization in 1916. This was immediately after he had finished high school, so the whole of his business life has been devoted to the Kansas City Public Service Company. First, he served in the capacity of a lineman, then as substation operator, a wireman, a light and telephone repairman, and electric switch inspector, and, in fact, nearly every job in the department. In 1918, he became assistant to Mr. Kincade, serving for a time as general foreman of all maintenance work in the department and later became supervisor of overhead line.

His actual experience in nearly every job in the department has fitted him especially for his new position as de-

"Neb" Grover

partment head. He first came officially before the public in a 1916 issue of the *Railwayan,* company house organ, in a poem entitled, "When the Smokestack Smokes at 8th and Woodland."

"Neb's" father, Charles Grover, occupied a similar position 30 years ago. Under his father's direction, the change was made from cable to trolley lines and much of the overhead and underground system was built. Another coincidence is that Charlie Grover, Jr., at present occupies a position similar to "Neb" with the Kansas City Power & Light Company.

✦

J. R. Lotz, Stone & Webster Construction Manager

J. R. Lotz has been appointed senior construction manager of the Stone & Webster Engineering Corporation. Mr. Lotz was educated at the University of Illinois and, after six years in railroad work on the Lackawanna and the Chicago & Joliet systems, joined the Stone & Webster organization in Seattle building construction activities. In 1912 he was transferred to Boston as assistant construction manager and had charge of construction on many large industrial plant projects and educational buildings. In 1919 he was appointed a construction manager and in 1928 became a vice-president of the Stone & Webster Engineering Corporation.

A. H. Wood Takes Up Commercial Department Duties

A. H. Wood, appointed to succeed "Bert" Sanders in charge of the commercial department of the Kansas City Public Service Company, Kansas City, Mo., has entered upon his new duties with all the enthusiasm characteristic of the man. True, Mr. Wood is very young, but no man undergoes the strenuous course of training which he completed so successfully as a cadet engineer in utility work unless he is a born "doer," or the seeds of the "doer" are firmly planted in him.

That he happens to be the son of an illustrious father has in no way militated against Mr. Wood. He would have to go far to outstrip his father, but certainly young Wood is headed in the right direction. His work with the Public Service Corporation of New Jersey and with Barron Collier, Inc., New York, was exacting, but it has taught him how to walk among kings and not lose his head.

Mr. Wood knows. He put in time on

A. H. Wood

the front end of a trolley car, behind the wheel of a bus, in the receiver's cage, on the line gang truck, at tamping ties, road checking, inspection work, overhauling motors in the pits, in the supervisor's office and in the traffic and time-tables departments on the New Jersey system.

To him the many little duties handled in the commercial department at Kansas City are more of a hobby than a job. He gets real pleasure out of this work, but of all he expects most to enjoy the editing and publishing of the *Railwayan*, official publication of the company at Kansas City. He is at all times a close observer, and incognito he has been riding the Kansas City railway and bus lines familiarizing himself at first hand with the service, the public's need and the reactions of the riders. He has been more than favorably impressed, and he has not failed publicly to acknowledge his enthusiasm to the personnel.

✦

North Shore Has New Assistant General Manager

Samuel A. Morrison has assumed his duties as assistant general manager of the Chicago, North Shore & Milwaukee Railroad, with offices at Highwood, Ill. At the time of his appointment to this new post, Mr. Morrison was serving as assistant general superintendent of the South Shore Line.

Mr. Morrison brings to the "Road of Service," as the high-speed interurban

S. A. Morrison

line between Chicago and Milwaukee is known, a wealth of railroad experience, having devoted his entire life to the transportation industry. He started his career as an operator on the Chicago & North Western Railroad in 1899, working his way up through various stages of promotion until he was made a division superintendent in 1918. During the eight years he served in this capacity he worked on seven different divisions of this railroad.

Joining the Chicago, South Shore & South Bend interurban line in October, 1927, Mr. Morrison served as superintendent of freight service for one year, his ability winning him promotion to the post which he was holding at the time of his joining the North Shore Line.

✦

A. A. Adams, comptroller of the American Water Works & Electric Company, Inc., since 1920, has retired from active business. Mr. Adams has been in the employ of the company for 28 years. He was born in Pittsburgh on Sept. 2, 1884, and received his schooling and early business education there. In 1914, when the home office of the American moved to New York, Mr. Adams went there, but now will return to the city of his birth.

✦

Vine W. Burley, general manager of the Triple Cities Traction Company, Binghamton, N. Y., and former commissioner of public works there, has been named by Mayor Norman A. Boyd as a member of the board of managers of the Binghamton City Hospital, to fill the vacancy caused by the expiration of the term of Mrs. Renna Z. Spaulding. Large construction projects are ahead for the hospital and the Mayor said in appointing Mr. Burley he felt it highly desirable to place on the board one, who by reason of previous experience and judgment in construction, would not only be able to offer advice to the other members but who would be capable of valuable assistance of a supervisory character.

✦

J. A. Horner has been made assistant comptroller of the British Columbia Electric Railway, at Vancouver, B. C. Mr. Horner has been in the service of the company since 1908. From that time until 1918, he was employed as a clerk in the comptroller's department. On Feb. 1, 1918, he was promoted to accountant in this department, and now becomes assistant comptroller of this vast system.

Dr. Otto Gressens With Chicago "L" and Interurban

Dr. Otto Gressens has assumed his duties as assistant to Britton I. Budd, president of the Chicago Rapid Transit Company, operating the elevated lines in Chicago, and the Chicago, North Shore & Milwaukee Railroad, operating between Chicago and Milwaukee, a position to which he was appointed on March 5.

Previous to joining these two companies, Dr. Gressens was assistant to the president of the Public Service Company of Northern Illinois, operating a vast network of power lines serving the Chicago suburban district for light and power, and this position he still holds in addition to his new duties. He entered the employ of the Public Service Company in September, 1927, being assigned to the office of George R. Jones, vice-president. On Sept. 26, 1929, Dr. Gressens was transferred to Mr. Budd's office and appointed assistant to the president.

Dr. Otto Gressens

Before becoming affiliated with the Public Service Company, Dr. Gressens was chief statistician with the bureau of business research of the University of Illinois. Dr. Gressens was born in Sterling, Ill., and was graduated from the University of Illinois with the class of 1921.

✦

His Former Associates Honor "Bert" Sanders

Before he left Kansas City, Mo., to take up his new work as head of the branch office of the Barrows Advertising Agency at Cleveland, Ohio, E. B. (Bert) Sanders was royally fêted and banqueted at the Kansas City Athletic Club by officers of the Kansas City Public Service Company and other friends, and was presented with a handsome traveling bag as a token of friendship and esteem.

There is more to the story about Bert Sanders than was contained in the brief item about him in ELECTRIC RAILWAY JOURNAL for April. "Bert" went to the Kansas City Public Service Company just ten years ago, in 1920, to take over the publicity and advertising work as manager of the commercial department. Prior to that, he was associated with the Wichita Beacon of Wichita, Kan. as sports editor. This is the paper which became so well known under the direction of Henry Allen.

Not only did "Bert" excel in advertis-

ing and journalistic work, but broadened his training through the study of law. He attended and graduated from the Kansas City School of Law. In 1920 he passed the bar examination and became a full-fledged attorney. He was born in Washington, D. C., went out to Amarillo, Texas, spent some time in Colorado, Kansas and Missouri, and now has gone back east to Ohio.

In line with his work in the commercial department at Kansas City, "Bert" probably knew and was known by more employees and townspeople than most any other member of the company. By his work in all its various branches at Kansas City "Bert" Sanders made a national name for himself in public relations and publicity work among the utilities.

OBITUARY

Nicholas F. Brady

Nicholas F. Brady, chairman of the board of the New York Edison Company and director of half a hundred corporations, died on March 27. He had been ill since last September of arthritis. He was 51 years old.

A modest man, Mr. Brady kept himself in the background whenever possible. Nevertheless he was a man of strong convictions and striking initiative and courage. He was thoroughly trained from early manhood in large affairs, and was clear-visioned and straight-thinking. He was intensely loyal to his friends and business associates, and was generally respected, admired and loved.

N. F. Brady

The humanitarism of the man was best reflected by his work with the National Civic Federation and in connection with the so-called Brady awards, a great stimulant to careful operation in the electric railway industry. These awards were established in 1914 by the family of the late Anthony N. Brady, but were revived in 1927 largely through the good offices of Nicholas Brady himself after having been allowed to lapse during the war-time period.

Nicholas Frederic Brady was a son of the traction and public utilties magnate, Anthony N. Brady, who died some fifteen years ago leaving an enormous fortune. He was a brother of James Cox Brady, who died suddenly a year ago. Nicholas Brady was born at Albany, N. Y. He received a preliminary education in Albany and attended the Albany Academy until 1895. He then entered Yale and was graduated with the class of 1899. He began his business training immediately after he left the university and within a few years occupied an important place in the councils of the New York Edison Company, becoming its vice-president, and then, on the retirement in 1913 of Anthony N. Brady, its president.

Mr. Brady was chairman of the board of the New York Edison Company and dominated also the Consolidated Gas Company and various other important enterprises including the Brooklyn Rapid Transit Company, the United Electric Light & Power Company, the Brooklyn Edison Company, the Consolidated Telegraphical & Electrical Subway Company, the United States Cast Iron Pipe & Foundry Company and the Yonkers Electric Light Company.

✦

Dr. Thomas Addison

Dr. Thomas Addison, who served for 31 years as Pacific Coast manager of the General Electric Company, with headquarters in San Francisco, until his retirement in 1923, died suddenly in Berkeley, Cal., on April 8, at the age of 76. Educated originally as a physician, Dr. Addison was graduated from Bellevue Medical College, New York, in 1877, but after eight years gave up his practice to enter the employ of the United States Electric Company of Chicago. In 1888 he became an apparatus salesman for the Thomson-Houston Company in Chicago, and when in 1890 the Western branch of the company was reorganized, he was sent to San Francisco as local manager. Two years later he became Pacific Coast manager of the General Electric Company. When Dr. Addison went to the Pacific Coast the first electric railway of California was under construction at San Jose, and he had charge of the installation of the Thomson-Houston equipment.

After 33 years of distinguished service, Dr. Addison retired on Sept. 1, 1923. So intimately had he been connected with the electrical development of the Pacific Coast that his name will stand close to the top of the list of those pioneers whose efforts laid the foundation of the electrical industry.

✦

J. F. Sullivan

James F. Sullivan, industrial leader, financier and art patron of Philadelphia, is dead. Born in County Cork, Ireland, eighty-four years ago, Mr. Sullivan came to the United States with his brother, the late Jeremiah Sullivan, at the age of 14 years. For forty years they were associated in a wholesale dry goods business before entering the local railway field by becoming stockholders in the Frankford & Sothwark Passenger Railway. James Sullivan became a vice-president of the Market Street National Bank in 1899 and its president in 1910. During the war he devoted much of his energy in developing the armor plate and projectile business of the Midvale Steel Company. For many years he had been a director of two of the companies included in the system of the Philadelphia Rapid Transit Company.

✦

R. J. Davidson

Robert J. Davidson, one of the founders of the American Brake Shoe & Foundry Company and of the Ramapo Iron Works, predecessor to the Ramapo Ajax Corporation, died at Daytona Beach, Fla., on April 3.

Mr. Davidson was born in the town of Blooming Grove, Orange County, N. Y., on June 18, 1850. Living near Craigville, he attended the public school of that place until about fourteen years of age, when he took the position of clerk in the village store. There he remained three years, and then went to Ramapo in the same line of business. In 1872 he accepted a position with the Ramapo Wheel & Foundry Company of Ramapo, N. Y., as shipping clerk. He held this position only a short time, when he was advanced to bookkeeper and later became correspondence clerk.

R. J. Davidson

In 1881 the Ramapo Iron Works Company elected him to the office of secretary. He, however, continued to fill his position with the Ramapo Wheel & Foundry Company until 1883, when he resigned that position and took an active part in the control and management of the Ramapo Iron Works, as secretary of the company.

He was instrumental with others in organizing the Ramapo Foundry Company, and when the latter was merged with the American Brake Shoe & Foundry Company he became a director, a member of the executive committee and chairman of the finance committee, which position he held until his death.

His main activities, however, were in connection with the Ramapo Iron Works, later the Ramapo Ajax Corporation. He was treasurer of this company at the time of his death and for 47 years he has been active in its management. He was equally interested in the village of Hillburn and was a leader in all church, school and community activities.

✦

J. B. Sheridan

John B. Sheridan, former director of the Missouri Committee on Public Utility Information, died at St. Louis, Mo., on March 15, following a nervous breakdown. Mr. Sheridan terminated his active connection with the committee

in 1928, shortly after he attracted nation-wide attention through testimony given before the Federal Trade Commission at Washington concerning the activities of his organization.

Prior to entering the public utility publicity field, Mr. Sheridan had worked on newspapers in St. Louis for 30 years. He was one of the first journalists to add life and color to the account of a baseball game. To his credit were many classic efforts in dramatic and musical criticism and in covering other assignments. He was the author of several books on sporting subjects. Mr. Sheridan was a native of Ireland.

✦

William A. Moberly, an employee for about thirty years of the Kansas City Public Service Company, Kansas City, Mo., died on March 13. Mr. Moberly entered the service of the railway in Kansas City in April, 1889, and was retired on a pension July, 1927, having been in the company's service continuously during that period. He started out as a cable splicer for the old Grand Avenue Cable Line. Thereafter he held various positions as driver, motorman, assistant superintendent and superintendent of various divisions of the company before entering the general office. He was in charge of the schedule department there, his office being a clearing house of railway information.

✦

John J. Borger, superintendent of electrical distribution for the Springfield Gas & Electric Company, Springfield, Mo., which controls the Springfield Traction Company, died on April 9. He was untiring in his devotion to the work assigned him, and did much work of an experimental nature outside the line of his regular duty. He was particularly active in his study of the problem of the effect of railway surges on radio reception.

✦

William F. Needles, former division superintendent of the Cincinnati Street Railway, Cincinnati, Ohio, is dead. He had retired from active service on account of illness. Mr. Needles began as a conductor in 1878, joined the Mount Lookout dummy line two years later and became an engineer on that crude old steam engine that towed two uncomfortable passenger cars, or at times freight cars, up what is now Delta Avenue. In 1898 he became a motorman on the East End line. From 1899 to 1903 he worked as carhouse foreman. On April 1, 1903, he returned to the transportation department as an inspector. On Oct. 1, 1905, he was promoted to the superintendency of the Avondale division, which position he held up to the time of his retirement.

✦

Fred M. Locke, inventor of the porcelain insulator and oven glass, is dead. He was 69 years old. Mr. Locke retired from business in 1904, devoting all his time to laboratory work and leaving the management of the Victor plant to a son, Fred J. Locke, who died on March 7.

✦

Charles William Woeber, of the Woeber Carriage Company, Denver, Col., died on March 16, aged 73. For a number of years the Woeber company manufactured and sold street railway cars all over the United States, but supplying principally companies in the West, particularly in Denver.

INDUSTRY MARKET AND TRADE NEWS

New Car Orders Show Encouraging Trend

Orders actually placed for city and interurban cars since the first of the year added to orders now pending total approximately 460 units, and substantiate early estimates to the effect that 1930 would see an encouraging revival in new purchases. Some fourteen properties have either placed orders or called for bids, in addition to which, two electrified steam railways have signed contracts for the construction of a total of 78 cars for extensions to their services. Thus in four months, in spite of a nation-wide business depression, the electric railways have indicated their intention of purchasing nearly one half as many cars as were ordered during the entire year of 1929.

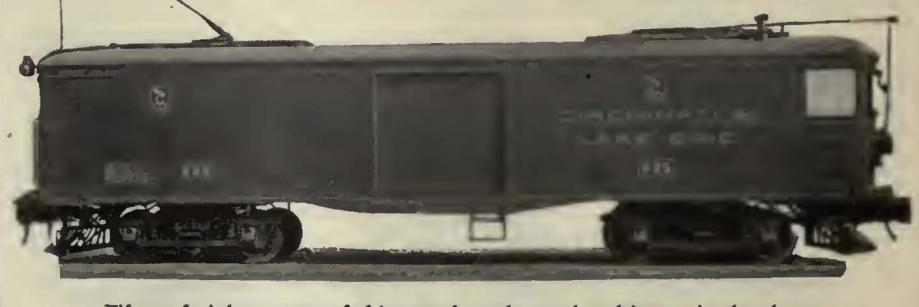
Conspicuous among the orders of cars for city service is that of the United Railways & Electric Company, of Baltimore, for 150 units, the particulars of which are described elsewhere in this issue. Pending orders in large volume include that of the Detroit Department of Street Railways for 130 cars for city service. The North Shore Line is receiving 25 cars for high speed interurban service, while its companion line, the South Shore route, is soon to place orders for 20 additional units. The Youngstown Municipal Railway has received 13 cars of an advanced type for service on its city lines, and the Northern Indiana Railways, of South Bend, is having ten attractive interurban cars built.

Cincinnati & Lake Erie Railroad Receives New Freight Cars

Fifteen double-end, all steel motor freight cars were recently delivered to the Cincinnati & Lake Erie Railroad, Dayton, Ohio, by the Cincinnati Car Corporation. The car bodies are 50 ft. long, 8 ft. 10 in. wide, and 13 ft. 3 in. from rail to top of trolley board. They have a capacity of 80,000 lb. of freight, and the weight, including equipment, is given at approximately the same figure.

While the bodies are new, the motors (of which there are four of the Westinghouse 303-A type), the control, and the MCB trucks with 37 in. wheels were taken from heavy interurban passenger cars which have been retired from service, soon to be replaced by lighter cars. Double-end Westinghouse H.L. control and Westinghouse Traction Brake Company's air brake equipment is provided.

The freight motors are designed to make schedule speeds up to 30 miles per hour, pulling trains of from five to fifteen box cars. They will operate over the system, which extends from Cincinnati to Toledo, and will also be available for interchange service.



Fifteen freight motors of this type have been placed in service by the Cincinnati & Lake Erie Railroad

Ten New Cars for South Bend

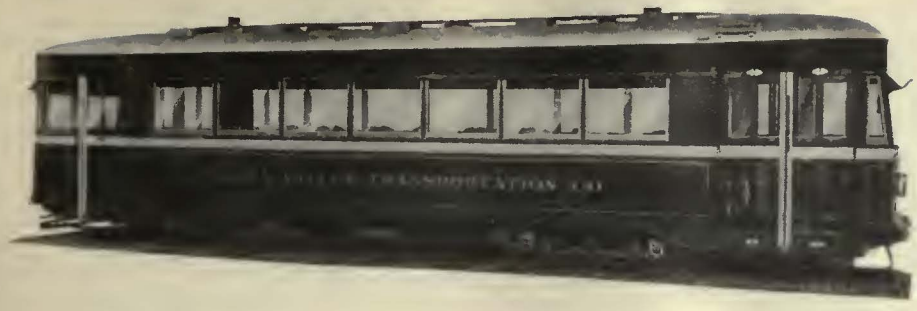
Northern Indiana Railway, Inc., of South Bend, Ind., has placed an order with the Cincinnati Car Corporation for ten double-end, double-truck street cars for city service. Delivery is to be made about May 1.

The new cars, which are designed to seat 44 passengers, will have a length over the body posts of 41 ft. 6 in., and an over all width of 8 ft. 6 in. Bodies are to be of steel and wood, with walnut interior finish. They will be provided with Westinghouse air brakes, Westinghouse K-75-E control, and with four 35 hp. Westinghouse motors, mounted on trucks supplied by the Cincinnati Car Corporation. Davis steel wheels, 26 in. in diameter, are supplied.

Other detailed specifications of the new cars are as follows:

Air brakes	Westinghouse
Axles	Cincinnati standard
Buffers	Corrugated face for use as anti climbers
Buzzer	Faraday high voltage
Car trimming	Bronze, light RR finish
Conduits	Duratube
Couplers	Standard
Destination signs (front and side)	Hunter
Door operating mechanism	National Pneumatic Company front door; treadle exit at rear
Fare boxes	Johnson
Fenders and wheel guard	Standard
Gears and pinions	Nuttall
Hand brakes	Drop type
Heaters	Consolidated, Thermostat control
Headlights	Ohio Brass WP—No. 29416
Journal boxes	Cincinnati standard
Lightning arresters	Westinghouse K-3
Lighting fixtures	Dayton
Paint	Outside, enamel, inside, varnish and stain
Sanders	Ohio Brass Co.
Sash and fixtures	Adams and Westlake
Seats	Hale & Kilburn—392
Seating material	Cleveland Tanning Company genuine leather
Slack adjusters	Brill
Springs	Combination coil and semi-elliptic
Step treads	Oskelite
Trolley catcher	Ohio Brass
Trolley base	Ohio Brass, lightweight
Ventilators	Nichols-Lintern

New Cars for Yakima Valley Company



A green color scheme contributes to the attractive appearance of new cars for a western property

Three double-end double-truck cars of the Master Unit type have been delivered to the Yakima Valley Transportation Company, Yakima, Wash., by the American Car Company division of the J. G. Brill Company.

Designed for one-man operation in city service, the cars have seats for 40 passengers and weigh, complete, 36,900 lb. Over-all length is 40 ft. 10 in., with a length over the body posts of 27 ft. 5 in. Over-all width is 8 ft. 5½ in., and height from rail to trolley base is 10 ft. 5 in. Bodies are of all steel construction, and the roof is of the arch type. Trucks are of the Brill No. 177-E-1-X type, with wheelbase of 5 ft. 4 in., and are provided with cast iron wheels, 26 in. in diameter, supplied by the American Car & Foundry Company.

Other features of the new cars are as follows:

Air brakes	Westinghouse Traction Brake Company
Armature bearings	Ball type
Axles	Hammered steel
Car signal system	Consolidated Car Heating Company
Compressors	General Electric Company's C.P.-28
Conduit	Flexible
Control	Westinghouse K-75
Curtain fixtures	Rex, all-metal
Curtain material	Pantasote No. 84/84
Destination signs	Hunter
Door Mechanism	National Pneumatic Company
Doors	Folding
Finish	"Old Dutch" enamel
Floor covering	Flexolith
Gears and pinions	Helical
Glass	Libby-Owens plate
Hand brakes	Brill Vertical
Heaters	Consolidated Car Heating Company
Headlights	Crouse-Hinds
Headlining	¼ in. Agasote
Interior trim	Mahogany
Journal bearings	Plain
Journal boxes	Brill
Lamp fixtures	Electric Service Supply Company No. 27901
Motors	Westinghouse No. 510-E, inside hung
Roof material	Wood, canvas covered
Safety car devices	Westinghouse Air Brake Company
Sash fixtures	Dayton
Seats	Brill No. 201-D
Seat spacing	3 ft. 5 in.
Seating material	Leather
Slack adjusters	Brill "Mechanical"
Steps	Stationary
Step treads	Kass
Trolley retrievers	Ohio Brass Company No. 13120
Trolley base	U.S. No. 13
Trolley wheels	U.S.
Ventilators	Brill "Exhaust"
Wheelguards	Hudson Bowring trays

Wide aisles, spacious plate glass windows, comfortable seats and well-diffused lighting are features of new cars for the Yakima Valley Transportation Company

C. H. Jensen has joined the engineering staff of the Copperweld Steel Company, Glassport, Pa. He was formerly with the Pittsburgh branch of the Byllesby Engineering & Management Corporation. Mr. Jensen was graduated from Washington State College in 1917. After leaving college, he was employed by the Westinghouse company as a graduate student, later entering the supply engineering and transformer engineering departments. In 1924, he entered the distribution engineering department of the West Penn Power Company in Pittsburgh, and in 1926 transferred to the Duquesne Light Company. When the Pittsburgh branch of the Byllesby Engineering & Management Corporation was formed in 1927, Mr. Jensen was transferred to that organization, and has since been associated with it.

Speer Carbon Company Enters Railway Field

The Speer Carbon Company of St. Marys, Pa., has recently announced a new and complete line of railway brushes. This company is one of the oldest carbon manufacturers in the United States, having been organized in 1899. The new Speer line of brushes includes grades suitable for all types of railway motors, whether of the ventilated or enclosed types, and for operation on all voltages of alternating or direct current.

South Shore Line to Have New Shop

The Chicago South Shore & South Bend Railroad has started work on a new shop building to be erected at a total cost of $235,000 at Michigan City, Ind. Grading operations are now well under way and are expected to be finished in a month. Actual construction will be started in May, and the building is expected to be completed by August 1. It will be constructed of steel, concrete, brick and glass and will be fireproof throughout. The walls will be largely of glass and the roof will be saw-toothed with windows facing north to provide daylight inside. The new shop will have two traveling cranes, of 5- and 10-ton capacity. Cars will be taken in and out of the shop over a transfer table.

The contract for the construction of the building has been let to P. H. Lorenz. Arthur U. Gerber, of Chicago, is the architect.

Bus Deliveries Continue at Steady Rate

Greater stability in the use of buses as a means of transportation in local districts and for intercity service is indicated by the absence of new names among recent purchasers listed below. Deliveries reported during March and April, both for replacements and for extensions of present services, appear to be confined almost entirely to operations established several years.

Twin Coach deliveries include ten units of the urban type, including one gas-electric, to the Youngstown Municipal Railway, which already had ten buses of this general type in service. The Boston Elevated Railway and the Portland Electric Power Company, of Portland, Ore., each added one urban type Twin Coach to its present bus fleet, while the Milwaukee Electric Railway & Light Company added three Twin Coaches of the parlor car type, equipped with reclining chairs. The San Diego Electric Railway has placed orders for three 40-passenger buses to supplement its present fleet and take care of increasing travel on its established routes. Two of the buses will be supplied by the Twin Coach Corporation, and one by the American Car & Foundry Motors Company.

Tri-City Railway, of Davenport, Iowa, has received one Mack Model AB 29-passenger city type bus, and the Iowa Southern Utilities, of Centerville, has accepted delivery of seven Model AB 25-passenger city type buses from the same manufacturer. The Connecticut Company and the Denver Tramway Corporation have also increased their equipment by the addition of five and two Mack Model BC 29-passenger buses respectively.

General Motors Truck Company reports deliveries to electric railway properties of its Type U city service units as follows: Five to the Ft. Madison Street Railway; two to Oklahoma Railway; five to Pittsburgh Motor Coach Company; and one to the Beaver Valley Motor Coach Company, of New Brighton, Pa. Six Type Y coaches for intercity service were delivered to the Dayton & Columbus Transportation Company, of Springfield, Ohio, and the Potomac Edison Company, of Cumberland, Md., accepted three additional Type W buses for city service. Canadian deliveries include twelve Type W city service coaches to the London Street Railway Company, and a Type Z coach to the Toronto Transportation Commission.

A.C.F. deliveries during the month include ten 40-passenger coaches of the metropolitan type to the Boston Elevated Railway, and eleven chassis to the North Coast Transportation Company, of Everett, Wash. Of this last order three have a 264-in. wheelbase and eight a 240-in. wheelbase. The chassis will be mounted with bodies of the Newell type and will be used in intercity service.

Conspicuous among recent White de-

liveries are to be noted four Model 53 buses to the Cia. Forca Nordeste de Brazil, and nine buses of similar model to the Pernambuco Tramways & Power Company. White has also recently delivered four Model 65A buses to Montreal Tramways, three Model 54 buses to Los Angeles Railway, three Model 50B buses to the Middlesex & Boston Street Railway, and one Model 54 bus to the Lewistown Transportation Company of Lewistown, Pa. Fourteen White buses ordered early in the year have been delivered to Public Service Co-ordinated Transport, of Newark, N. J.

General Motors and Leyland Buses for Toronto

Engines of 150 hp. are to be installed in ten of the twenty new buses which are now being built for the Toronto Transportation Commission, Toronto, Ont. The highest horsepower hitherto in use in the city fleet has been 110. The engines are part of the new chassis being secured from General Motors. The other ten chassis, imported from the Leyland works in England, will have 100-hp. engines.

The bodies for the new buses are being built at the Hillcrest shops as a measure of unemployment relief. The new vehicles will be used on existing city routes.

The bodies for the General Motors chassis will seat 29 passengers, but will have no treadle door. Those for the Leyland chassis will seat 27 and will be equipped with the treadle.

Okonite Company; Okonite, Callender Cable Company, Inc., and the **Hazard Insulated Wire Works Division of the Okonite Company,** announce that they will presently move their Chicago offices to suite 2828 of the 20 North Wacker Drive Building in that city.

Price of Copper Reduced to 14 Cents Per Pound

Just a year to a day after the price was pegged at 18 cents, Connecticut delivery, the price of copper was cut to 14 cents a pound, this constituting one of the most abrupt declines in commodity prices that has been recorded in recent years. In well-informed quarters the reduction was not unexpected, as it had been known for some weeks that small producers had been shading the price to certain customers.

The quotation of 18 cents a pound, established on April 15, 1929, followed a swift advance that had carried the price of the red metal to a maximum of 24 cents, which was attained during March of last year. This peak followed a heavy wave of buying, but it is believed that comparatively little copper changed hands at the high levels. Cautious buying, following the reduction to 18 cents, continued until it assumed the proportions of a buyers strike. This, however, was of short duration, and gave way to well-sustained purchases that continued until the collapse of the stock market and the resultant slump in business.

General Cable Reorganizes District Sales Offices

A new field sales policy has been made effective by General Cable Corporation, by the establishment of eighteen district and territorial sales offices, and the assignment of the entire district sales personnel of Dudlo, Rome, Safety and Standard Underground Divisions to these new territories.

Until this change, the sales organizations of the four Divisions had functioned in parallel, maintaining the industry contacts which each had established over many years of service. This reorganization of sales forces further consolidates these facilities and makes them more readily available.

The identities of the thirteen companies comprising the four operating divisions will be continued as manufacturing and shipping units, and all present trademarks will be continued. Resident engineers will be located in the district and territorial sales offices, where they will represent locally the headquarters consulting engineering staff.

TRADE NOTES

Edwin N. Hazlett has recently joined the sales engineering department of the Copperweld Steel Company, Glassport, Pa. Mr. Hazlett was graduated from the University of Pittsburgh in 1928, and then completed the apprentice engineering course with the Duquesne Light Company. He has been connected with the distribution department of the Duquesne Light Company at McKeesPort, Pa., on transmission work.

✦

DeVilbiss Company, Toledo, Ohio, announces that the expansion of its overseas business has called president Allen Gutchess and Export Manager Rex Wells to Europe, where they will be engaged for several weeks working with the executives in charge of the London and Paris factories and sales offices of the company. Increasing industrial activity in Europe is reflected in greater demands upon the DeVilbiss organization serving overseas markets.

✦

Consolidated Car-Heating Company, Inc., Albany, N. Y., announces its new Chicago address as the Buckingham Building, 59 East Van Buren Street.

✦

American Steel Foundries announces appointment of F. A. Lorenz, Jr., as general manager of the Indiana Harbor and Pittsburgh works, in charge of sales and production. Mr. Lorenz has held the position of manager of sales for Davis Wheels; assistant to the fourth vice-president; works manager at Indiana Harbor, and now leaves the position of assistant vice-president in charge of operations.

✦

Roller-Smith Company, 233 Broadway, New York, announces the appointment of Henry N. Muller Company, First National Bank Building, Pittsburgh, Pa., as its district sales agent in western Pennsylvania, eastern Ohio and West Virginia.

✦

Continental Brake Shoe & Equipment Company, New York, has opened a Cleveland office in the Terminal Tower, in charge of Paul Zens, who has been elected a director and vice-president of the company.

✦

George H. Palm, for the past six years engineer with the new development division of the Yellow Coach & Manufacturing Company, Pontiac, Mich., a division of General Motors, has become connected, as engineer in charge of radiator construction and equipment, with the Young Radiator Company, manufacturers of truck, bus, power unit and engine cooling radiators, as well as heating units, located at Racine, Wis.

✦

Twin Coach Corporation announces the removal of its New York offices to the new Chrysler Building, 405 Lexington Avenue, corner 42nd Street.

Electric Railway Material Prices—May 1, 1930

Metals—New York

Copper, electrolytic, delivered, cents per lb.	14.00
Lead, cents per lb.	5.50
Nickel, cents per lb., ingot	35.00
Zinc, cents per lb.	5.15
Tin, Straits, cents per lb.	36.75
Aluminum, 98 to 99 per cent, cents per lb.	24.30
Babbitt metal, warehouse, cents per lb.:	
Commercial grade	41.00
General service	31.00

Bituminous Coal

Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$4.35
Somerset mine run, f.o.b. mines, net ton	2.00
Pittsburgh mine run, Pittsburgh, net ton	1.40
Franklin, Ill., screenings, f.o.b. mines	1.70
Central, Ill., screenings, f.o.b. mines	1.45
Kansas screenings, Kansas City	1.85

Track Materials—Pittsburgh

Standard steel rails, gross ton	$43.00
Railroad spikes, drive ⅞ in. and larger, cents per lb.	2.80
Tie plates (flat type), cents per lb.	2.08
Angles bars, cents per lb.	2.75
Rail bolts and nuts, cents per lb.	3.90
Steel bars, cents per lb.	1.85
Ties, white oak, Chicago, 6 in. x 8 in. x 8 ft.	$1.40

Hardware—Pittsburgh

Wire nails, base per keg	$2.30
Sheet iron (24 gage), cents per lb.	2.60
Sheet iron, galvanized (24 gage), cents per lb.	3.30
Galvanized barbed wire, cents per lb.	2.95
Galvanized wire, ordinary, cents per lb.	2.90

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.	14.6
White lead in oil (100 lb. keg), cents per lb.	14.25
Turpentine (bbl. lots), per gal.	0.59
Putty, 100 lb. tins, cents per lb.	5.725

Wire—New York

Copper wire, cents per lb.	15.50
Rubber-covered wire, No. 14, per 1,000 ft.	$5.30
Weatherproof wire base, cents per lb.	15.25

Paving Materials

Paving stone, granite, 5 in., f.o.b.: New York—Grade 1, per thousand	$150.00
Wood block paving 3½, 16 lb. treatment, N. Y., per sq.yd., f.o.b.	2.70
Paving brick 3½x8½x4, N. Y., per 1,000 in carload lots, f.o.b.	50.00
Paving brick 3x8½x4, N. Y., per 1,000 in carload lots, f.o.b.	45.00
Crushed stone, ¾-in., carload lots, N. Y., per cu.yd., delivered	3.40
Cement, Chicago, in carload lots, without bags, f.o.b.	1.95
Gravel, ¾-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.	10.75
Light copper, cents per lb.	10.00
Heavy yellow brass, cents per lb.	6.50
Zinc, old scrap, cents per lb.	2.00
Lead, cents per lb. (heavy)	4.00
Steel car axles, Chicago, net ton	$16.25
Cast iron car wheels, Chicago, gross ton	14.75
Rails (short), Chicago, gross ton	16.75
Rails (relaying), Chicago, gross ton (65 lb. and heavier)	28.50
Machine turnings, Chicago, gross ton	7.75

ter-City Travel Prove Cities Service Quality

Company: Great Lake Stages
Number of Vehicles: 57
Yearly Bus Mileage: 3,806,872
Number of Passengers Carried: 1,570,252

Cities Service products used:
- Koolmotor Oil
- Cities Service Gasolene
- Koolmotor Grease

The Combined Experience of Many Industries

DeVilbiss Spray Painting Equipment is so outstandingly successful in transportation industries because DeVilbiss specialized installations are designed in the light of a vast and comprehensive experience in all industries.

DeVilbiss Spray Finishing Equipment is constantly used in an almost infinite number of industries. Numerous widely varied operating conditions, production methods and finishing materials must be served.

DeVilbiss engineers are thus enabled to bring to the specific task a measureless wealth of proved knowledge and to apply to each individual case the composite experience of many.

Every day, almost, new knowledge becomes applicable to spray finishing operations in industry. It will pay you to learn what study and use have recently revealed to help you to put a bigger measure of economy and speed into your own finishing operation. It costs you nothing to talk to us about it.

Look to DeVilbiss For

Spray guns of various types and sizes

Pressure feed paint tanks and containers

Spray booths, exhaust fans, and approved lighting fixtures

Air compressing equipment

Air transformers and accessories

Air and fluid hose and connections

Complete outfits from the smallest hand-operated units to the largest industrial installations

DeVilbiss
Spray-PAINTING FINISHING System

THE DEVILBISS COMPANY · 272 PHILLIPS AVENUE · TOLEDO, OHIO

Sales and Service Branches

NEW YORK · PHILADELPHIA · CLEVELAND · DETROIT · INDIANAPOLIS · CHICAGO
ST. LOUIS · SAN FRANCISCO · LOS ANGELES · WINDSOR, ONT.

Direct factory representatives in all other territories

Heavily loaded Union Metal Poles serve Wheeling, W. Va.

For Heavy Duty Work on City Streets

UNION METAL POLES have become widely known as the finest equipment for combination street lighting and distribution line systems. Such installations are usually ornamental and carry only a light load.

For extremely heavy loading, Union Metal Poles are just as practical and economical. While doing the job of the ordinary pole, they also improve the street appearance and build good-will for themselves.

In Wheeling, W. Va., one set of Union Metal Poles carries light and power circuits, railway feeders, fire-alarm circuits, trolley span wires, street lighting fixtures, traffic signals and street signs. This installation decreased the number of poles along the curb and substituted a straight, attractive fluted pole for the unsightly equipment of the ordinary type.

No matter what your strength requirements, Union Metal can supply poles to fill the need.

THE UNION METAL MANUFACTURING COMPANY
GENERAL OFFICES AND FACTORY • CANTON, OHIO
SALES OFFICES: New York, Chicago, Cleveland, Boston, Los Angeles, San Francisco, Seattle, Dallas, Atlanta

DISTRIBUTORS
Graybar Electric Company, Inc. General Electric Supply Corp.
Offices in all principal cities

Distributed by Graybar

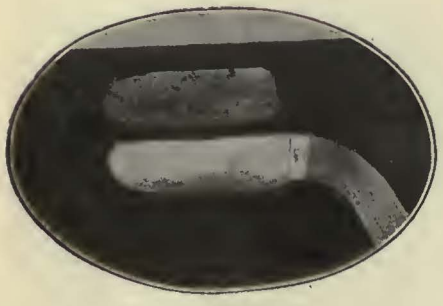
UNION METAL DISTRIBUTION POLES

Merchandise Distributor

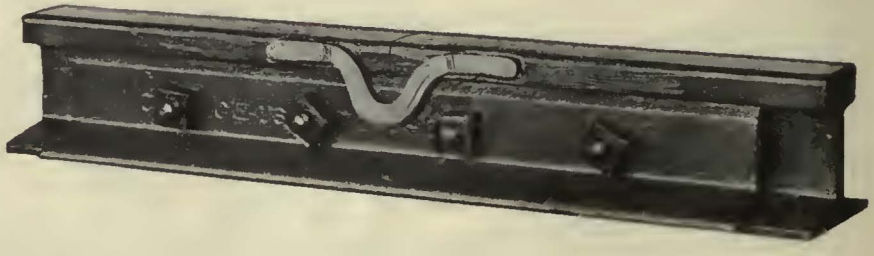
IT TAKES FROM 10 TO 15 TONS TO REMOVE THIS BOND

Though easily and quickly brazed to the rail, an Erico Brazed Bond is there to stay.

It becomes an integral part of the rail—making and keeping, under all conditions, the perfect contact that maintains voltages and reduces power costs.



As evidence of Erico bond and bonding efficiency, over 30,000 lbs. were required to shear this brazed bond terminal from the rail. Permanency is guaranteed. The area of copper left on the rail was just 8 times the cross-sectional area of the bond conductor. This ratio of copper to steel assures maximum bond conductivity.



No amount of service—heavy pounding traffic or accelerated speed—will loosen it. In fact it takes from 10 to 15 tons' shear pressure to remove it from the rail.

Whether you choose steel arc weld or copper arc weld, Erico bonds provide a sure track return with the simplest method of application. They mean permanent installation at low cost, help you get the most from your bonding dollar.

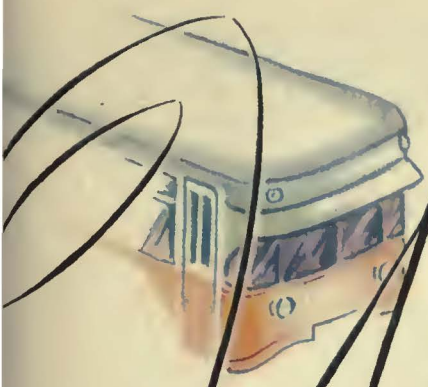
Let us send you samples for inspection and test.

The Electric Railway Improvement Co.

2070 East 61st Place Cleveland, Ohio

ERICO

RAIL BONDS AND BONDING OUTFITS



What's wrong with urban transportation?

CAN WE PICK THE FARES OFF THE CURB

Urban transportation

The walk-up-one-flight-and-save-ten customer you are sure to get—the necessity rider.

But the well-dressed men and women of a push-button age who like tone, character and dignity just aren't dodging autos any longer to get to your place of business in the center of the street.

Progressive business houses always move-up-town. Why don't you move up-to-the-curb.

Curb loading with rail-less units, either bus or trolley bus, is here to stay along with radios, electric ice boxes, oil-burners.

MUST MOVE

therefor

Investigate the three-year proven and tested Twin Coach capacity body design for bus or trolley bus—with standardized inter-changeable parts for each.

Guaranteed against OBSOLESCENCE!

There has always been an unknown quantity — in every transportation tangle — sort of an algebraic "X".

The "X" for most managements has been how to reduce the electric transportation investment — to clear the way for rail-less equipment.

Most managers would long ago have moved up-to-the-curb if they could have found the way.

Gentlemen, it is time to sit up and take notice — the trolley bus bids fair to be that "X" — the missing quantity in the tangle.

Segregate your modern rail car equipment on your route trackage, which is still in good shape — replace the expensive obsolete equipment with trolley buses, which can be advantageously bought on a car trust plan.

Under this plan you lay down a definite programme for getting moved over to the curb where the most business exists; you get rid of those money-eating, customer repelling old cars and save the investment in over-head and power facilities.

You slash the track maintenance expense; you relieve yourself of many taxes; you add equipment which operates for considerably less than the trolley car it replaced, and at a fare which permits a profitable inter-change of transfers, with the remainder of your system. You increase your system speed.

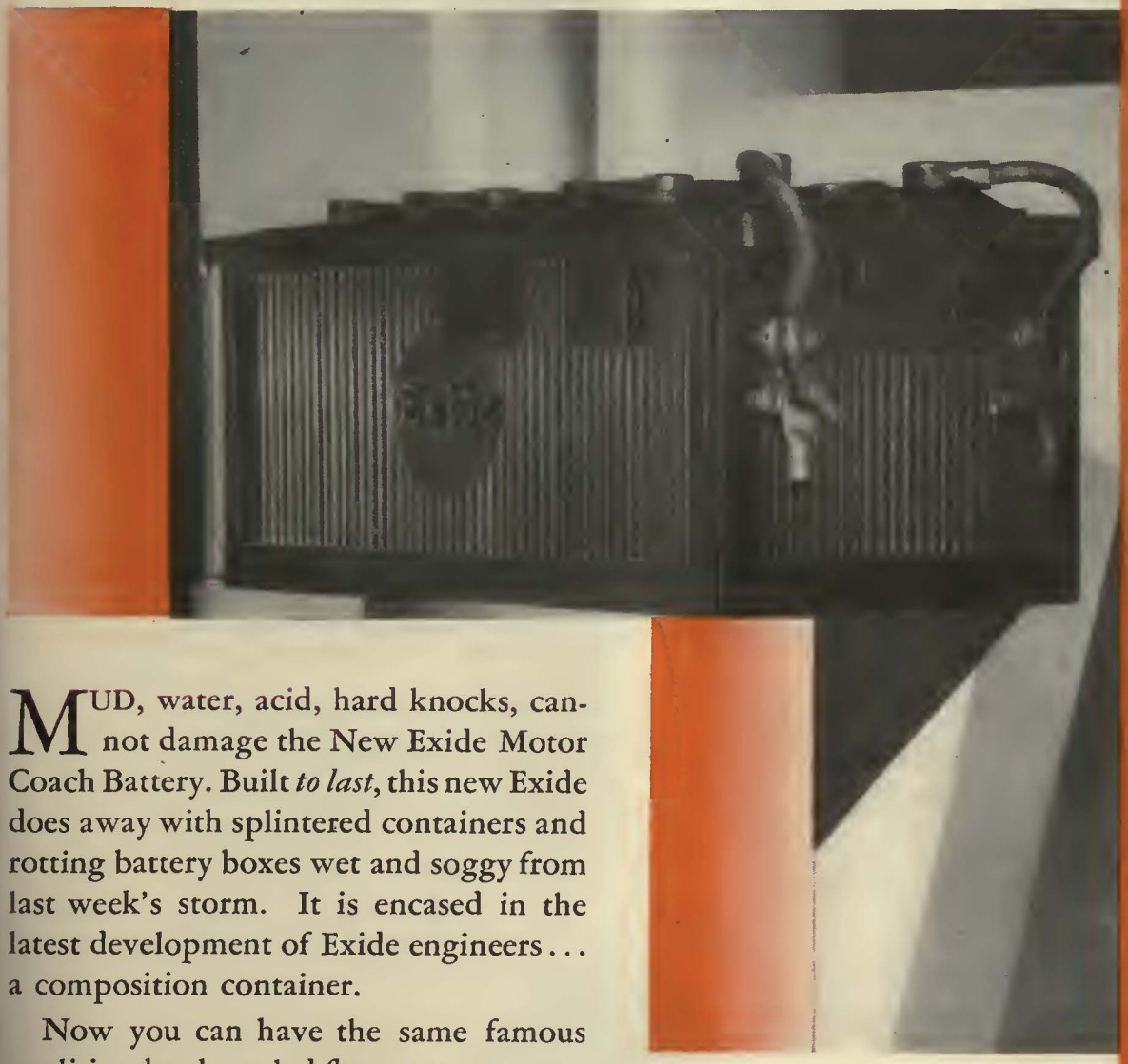
Set your auditor to work on a tentative programme of this kind, based on your own situation; send your equipment Superintendent to Chicago to see their great new trolley bus programme in actual operation — and if you feel a re-occurrence of your old time pep, take the train yourself. If New Orleans or Salt Lake City is handier — visit one of their trolley bus operations.

Gentlemen, something is happening!

Write Ross Schram at Kent, Ohio, for news of the latest developments.

HERE'S LOTS OF BUSINESS AT THE CURB

The Toughest Bus Service WON'T BOTHER this NEW EXIDE BATTERY



Latest development of Exide engineers for improved bus battery service

MUD, water, acid, hard knocks, cannot damage the New Exide Motor Coach Battery. Built *to last*, this new Exide does away with splintered containers and rotting battery boxes wet and soggy from last week's storm. It is encased in the latest development of Exide engineers . . . a composition container.

Now you can have the same famous qualities that have led fleet owners everywhere to standardize on Exides, *plus* increased economy and dependability.

Write for information on the New Exide Motor Coach Battery. Let us show you how it can save you money . . . cut your maintenance costs.

Exide
MOTOR COACH BATTERIES

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia
THE WORLD'S LARGEST MANUFACTURERS OF STORAGE BATTERIES FOR EVERY PURPOSE
Exide Batteries of Canada, Limited, Toronto

Carnegie Wrought Steel Wheels fulfill every requirement of the perfect wheel for electric railway service. They are safe—as only *rolled* steel wheels can be. 10,000 ton hydraulic presses impart to the steel a tough, dense structure, free from irregularities that might cause failure. They are durable—rendering long and continuous service. In addition to forging, they are thoroughly rolled, further refining the wearing surface. Mileage is forged in and rolled in—extra mileage that makes Carnegie Wheels the outstanding value in the wheel market today.

In city service these wheels have an added advantage in that cars may be speeded up with safety over special track work at crossings—an important factor in rush hours.

Carnegie Wrought Steel Wheels have satisfactorily answered the wheel questions of many prominent electric railways. Let them answer yours. Your inquiry will receive prompt attention.

CARNEGIE STEEL COMPANY

Subsidiary of United States Steel Corporation

PITTSBURGH, PA.

70

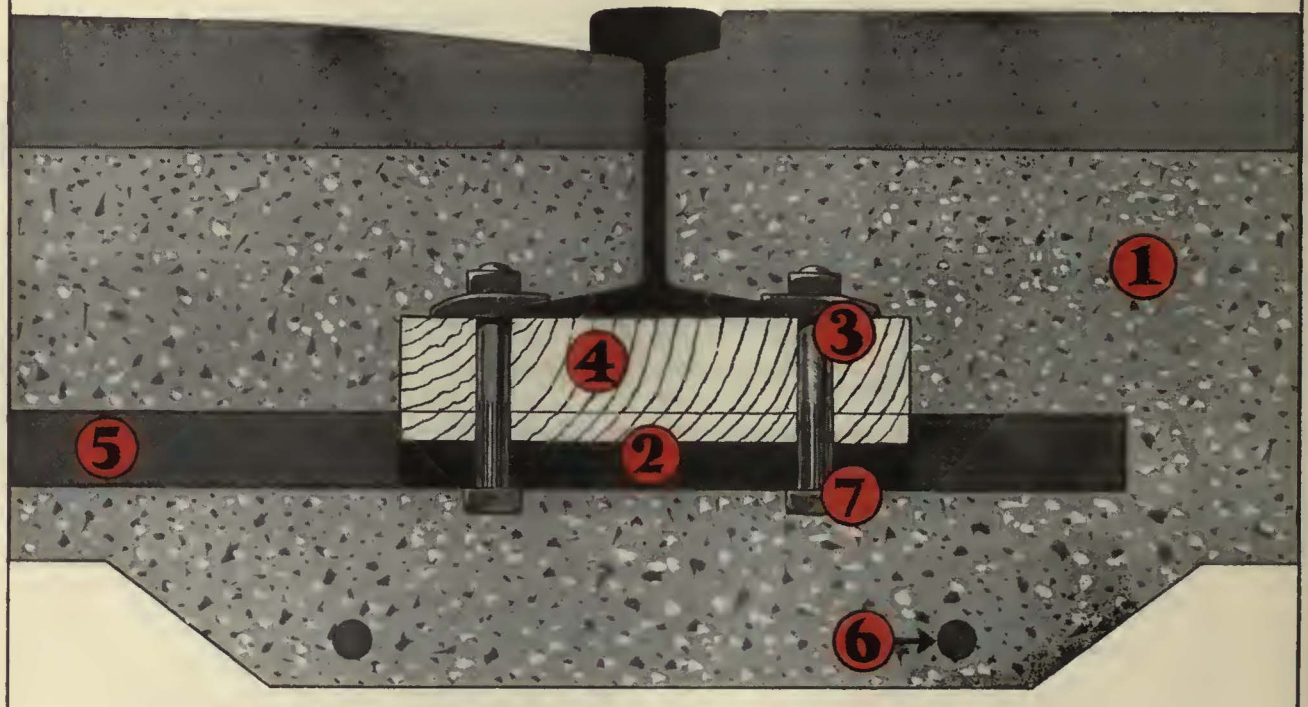
CARNEGIE WHEELS

CAROLINA COACH COMPANY, 510 EAST DAVIE STREET, RALEIGH, N. C., USES GOODYEAR TIRES EXCLUSIVELY ON ITS COACH FLEET

THE TRACK

must be more than

Dayton Ties are the only ties that achieve for concrete in track foundations the permanence it was meant to give, for Dayton Ties are the only ties that absolutely dissipate rail vibration and prevent "VIBROLITION."



Dayton Ties require no major maintenance at all. Their condition, after 15 years of service under every conceivable burden of traffic, points conclusively to real and genuine permanency.

"The Better Tie Without An Alibi"

THE DAYTON INTEGRAL SYSTEM O

Bethlehem Silico-Manganese Weldable Crossing and turnout at 10th and Arch Sts., Philadelphia, Pa.

For heavy-traffic locations use *silico-manganese* trackwork

THE new Bethlehem Silico-Manganese Weldable Trackwork has high resistance to impact and abrasive wear. The extremely fine-grain and dense structure of silico-manganese steel becomes more firmly set under constant impact. These qualities combined with weldability make Bethlehem Silico-Manganese the logical trackwork to install at all heavy-traffic locations.

Bethlehem Silico-Manganese Trackwork is readily weldable by any of the standard methods, such as electric-arc, oxy-acetylene 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, as well as for finest quality automobile springs, and for parts subject to 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

No. 327-M Special seats are in use by the Virginia Electric and Power Company, which was awarded the Charles A. Coffin medal for 1928.

DESIGNED FOR INTERURBAN USE

THE 327-M Special is a popular Heywood-Wakefield electric railway seat. The deep, double spring construction of the cushion and the restful pitch of the spring-filled backs make this attractive style one of the most comfortable interurban seats ever offered.

The 8M5 Special is a de luxe interurban type with spring-filled seats and backs. It has been purposely designed and built to withstand the most severe use and abuse, while delivering trouble-proof service year after year.

Our car seating experts will be glad to assist in solving your equipment problems. This service is yours without cost or obligation. Just write to the nearest Heywood-Wakefield sales office.

HEYWOOD-WAKEFIELD COMPANY

Boston, Massachusetts

516 West 34th St., New York City
439 Railway Exchange Bldg., Chicago, Ill.
J. R. Hayward, Liberty Trust Bldg., Roanoke, Va.
A. W. Arlin, Delta Bldg., Los Angeles, Calif.
H. G. Cook, Hobart Bldg., San Francisco, Calif.
The G. F. Cotter Supply Co., Houston, Texas
The Railway and Power Engineering Corporation
133 Eastern Ave., Toronto; Montreal; Winnipeg, Canada

A NEW TREND in railway lubrication

Texaco Lovis Oil is made in two grades 38 and 70 sec. Saybolt viscosity. The new Texaco Oil Seals are easily inserted in the dust guard slot back of the journal box and form a perfect seal that will give years of service, preventing both oil leakage and the entrance of abrasive dust and dirt.

The electric railway industry is spending *more* for lubricants. It is spending *less* for lubrication. Texaco Lovis Oil and the new Texaco System of Lubrication have effected surprising economies. Electric railway lubrication is on an entirely new basis.

The Texaco System, of which a specially designed Texaco Oil Seal is a vital element, has for the first time in the history of rail transportation made it possible to use a really efficient car journal lubricant.

Operating results with Texaco Lovis Oil show a marked reduction in bearing troubles, substantial power savings and incidental economies in waste consumption, time and labor that are remarkable. The cost for lubrication is actually less.

Engineers of The Texas Company will gladly present the facts to any railway official. Tests are being made on many of the country's leading roads and much valuable data on the new Texaco System is becoming available. Write The Texas Company direct.

TEXACO

THE TEXAS COMPANY
135 East 42nd Street, New York City

TEXACO LUBRICANTS

Greyhound selects Yellow

America's largest and most experienced Transcontinental Bus Operator

after millions of miles of operating experience with all types of equipment

the new 33 passenger Parlor Coach, with the 150 h.p. Yellow "616" Engine

Type 250

YELLOW COACH

GREYHOUND LINES

Equipped with comfortable, widely spaced double de luxe reclining chairs with individual backs and head rests. The chair arms fold into the aisle to provide 7 additional seats. Full headroom. Big interior luggage racks.

Type 250

another great

Greyhound has just ordered 300 Type 250 Yellows — the largest parlor coach order ever placed by a motor carrier

In announcing to the industry Type 250, Yellow gratefully acknowledges the valuable aid given by Greyhound in the development of this new transcontinental-type parlor coach.

For Type 250 is definitely the result of cooperative effort—the result of combining the practical cross country operating experience of this great transcontinental operator with Yellow's engineering and manufacturing experience.

This coach therefore is destined to meet the demand for a modern parlor coach that will stand the most severe and exacting requirements of de luxe long distance motor coach travel.

It has tremendous power and quick driving response with a rate of acceleration astonishing in a vehicle of this size.

It has unusual hill climbing ability, complete absen of vibration and irritating valve noise and surprisin ly small fuel consumption for so powerful an engin

Ease of handling is comparable only to that of passenger car. The 4-wheel air brakes are by far th biggest Yellow has ever designed for a coach—th service brakes alone have 698 square inches braking area. Maximum safety. Maximum brakin capacity to take care of sudden emergency stop Instant response to the slightest touch of the brak pedal. Quick, sure, *smooth* retardation.

Yellow Coach !

nother outstanding feature is its easy steering and lity to hold the road at any speed—a direct result the balanced distribution of weight on the tires.

thout exceeding legal over-all limits there is more ssenger space in the Yellow 250 than in any other nventional large capacity intercity coach. Seats 40 inches wide—as wide as those in a railroad . They are spaced on 34 inch seat centers to e passengers room to stretch and relax.

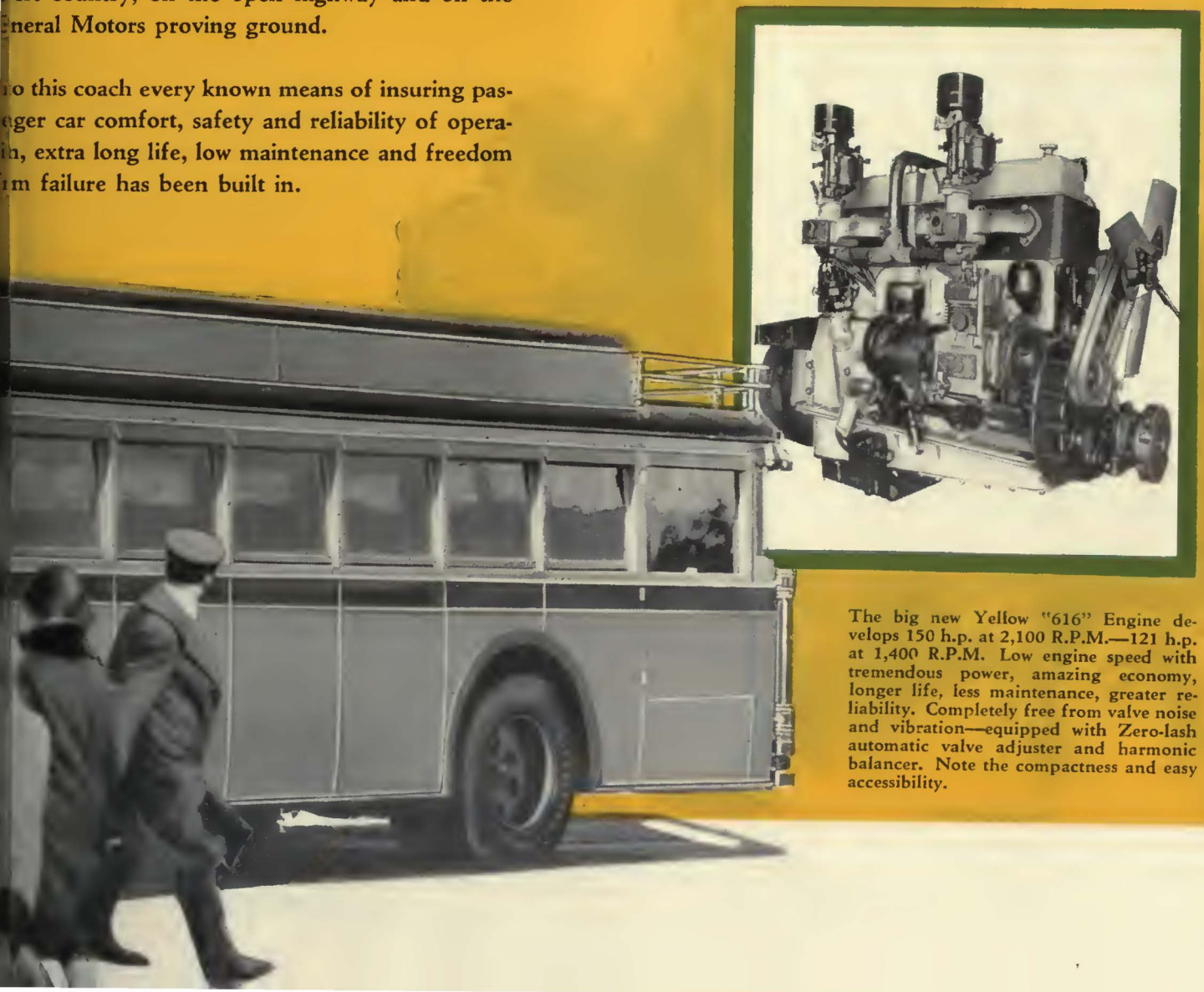
e Yellow 250 has been thoroughly tested in busands of miles of service, over mountains and sert country, on the open highway and on the eneral Motors proving ground.

o this coach every known means of insuring pas-ger car comfort, safety and reliability of opera-n, extra long life, low maintenance and freedom m failure has been built in.

Everything that Yellow Coach engineers could do, everything that transcontinental operating experience could suggest, has been included to make it an outstanding achievement in large capacity coach design.

You too will say when you test it—

"A new standard of performance. A new mechanical excellence approaching perfection . . . amazing economy of operation . . . a new conception of earning power."



The big new Yellow "616" Engine develops 150 h.p. at 2,100 R.P.M.—121 h.p. at 1,400 R.P.M. Low engine speed with tremendous power, amazing economy, longer life, less maintenance, greater reliability. Completely free from valve noise and vibration—equipped with Zero-lash automatic valve adjuster and harmonic balancer. Note the compactness and easy accessibility.

The amazing growth of the Greyhound System.

The present great nation-wide network of Greyhound lines had its modest beginning in 1924, less than six years ago. Today, passengers may travel from New York to Los Angeles, from Port Arthur, Canada, to Monterey, Mexico, or to practically any point in America on this one great system.

Greyhound is operating over one hundred million bus miles annually, is providing safe, dependable transportation at economical rates to many millions of travelers, has contributed in a major way to the sound progress and public acceptance of highway transportation and ranks as an outstanding pioneer in the development of vehicle design suitable for continuous and reliable high-speed cross-country service.

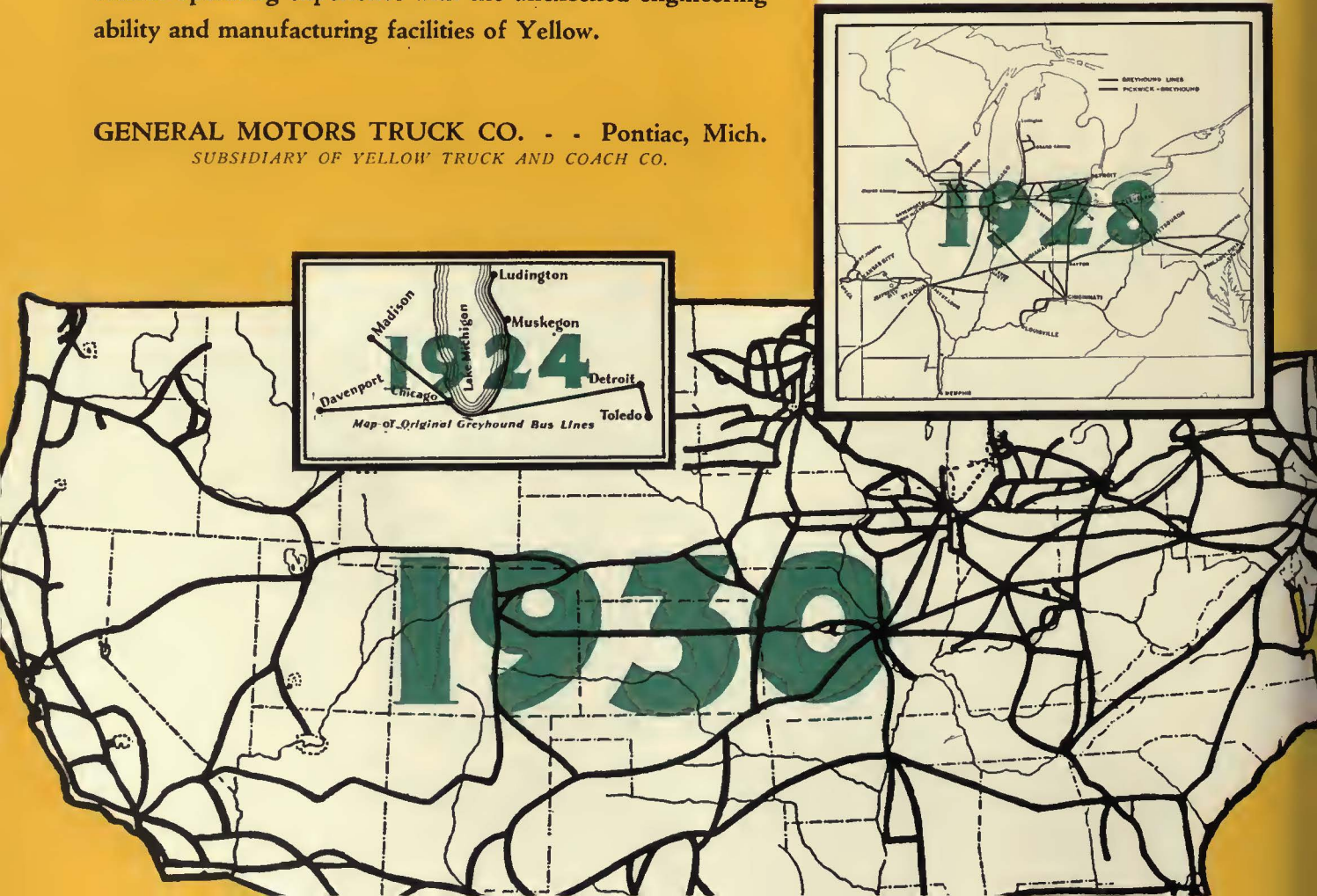
The new Yellow transcontinental parlor coach, Type 250, is definitely the result of combining Greyhound's years of successful operating experience with the unexcelled engineering ability and manufacturing facilities of Yellow.

GENERAL MOTORS TRUCK CO. - - Pontiac, Mich.
SUBSIDIARY OF YELLOW TRUCK AND COACH CO.

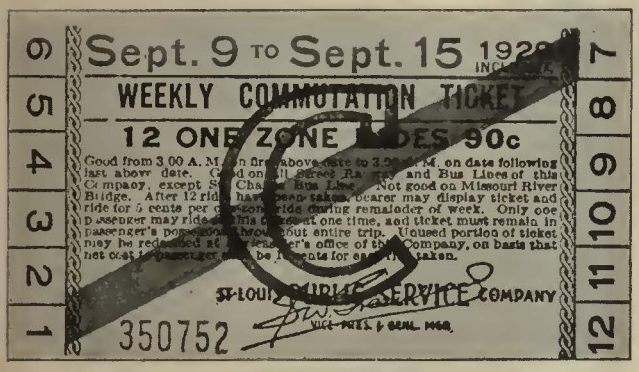
Interesting Facts About Greyhound (1929)

Miles of route	36,000
Revenue bus miles operated	101,000,000
Passengers carried	19,000,000
Gross revenue	$32,000,000
Gasoline consumed, gallons	19,000,000
Salaried employees	3,650
Ticket agents, over	4,000
Garages	102

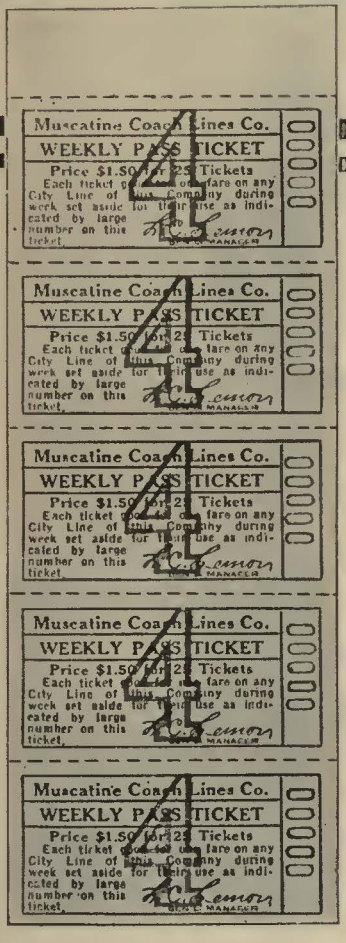
The route maps of the Greyhound lines in 1924 and in 1928 and in 1930 illustrate more graphically than words the amazing growth of this great transportation system.



Salvation—or salvage?



your fare system may determine the answer



Quoting from the recent address of a P. S. C. official in the Middle West:

"Some means must be found to retain the railway. The problem of service at a reasonable cost that at the same time gives the operators a fair return on the value of their property, is one which has confronted every community in this country during the past ten or fifteen years. It still confronts most of them."

Globe-designed Weekly Passes are largely responsible for the jumps into the black by a number of marginal companies. In one case recently made known, the adoption of the Weekly Pass Ticket has actually increased off-peak riding over 400%, and Sunday riding 600%. These figures will be verified if you desire.

Two principal forms are used by various properties. The card type, punched by the operator, and the book tear-out type. Both accomplish the main object—cash in advance, and incentive for the prospective rider to economize by quantity buying.

The book type sells in books of twelve or twenty-five tickets at a substantial reduction in price. It can be *(and is)* used by all members of the family. Tickets left over Saturday are almost invariably used up on Sunday. The riding complex or psychology of this method is highly profitable to the operator.

Let us explain this subject in detail. Write or phone nearest office.

Globe TICKET COMPANY

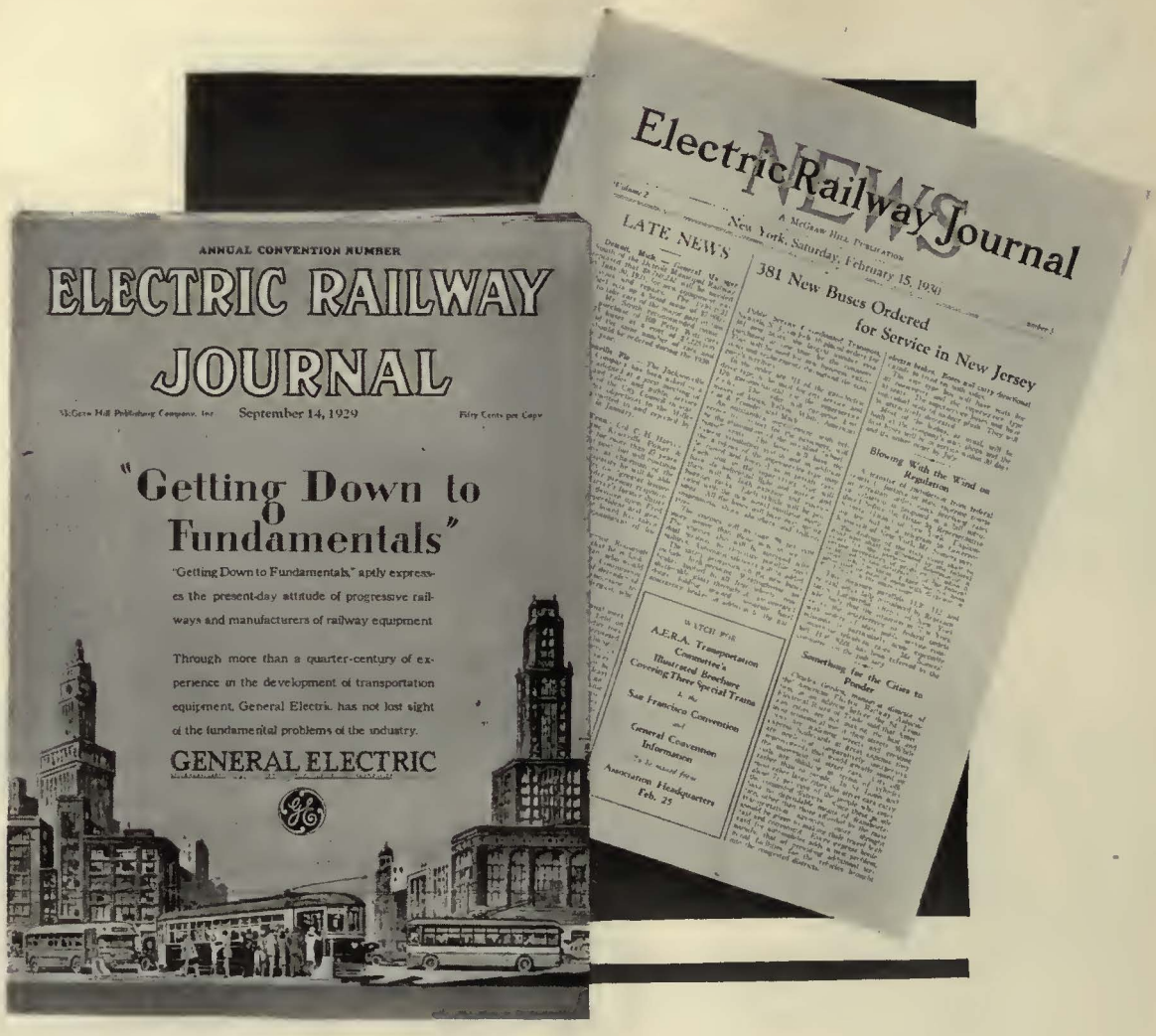
PHILADELPHIA

Factories:

Philadelphia Los Angeles Boston
New York Jacksonville

Sales Offices:

Syracuse Cincinnati Pittsburgh
Baltimore Cleveland



You need *both*—
The Journal *plus* The News

THE monthly edition of *Electric Railway Journal* gives you comprehensive articles on changing trends, technical advances and broad problems facing the industry.

And the E.R.J. *News*—the newspaper of the field—presents terse, accurate news dispatches of fare changes . . court decisions . . financial and corporate notes . . new legislation . . association meetings . . personal notes . . all the vital news of the industry.

You need BOTH for a complete picture of the electric railway field. If you read only the monthly magazine, you miss the current news of the industry . . accurate, vital, fresh . . gathered by telegraph with newspaper speed. If you read only the *News*, you don't receive the benefit of the interpretive editorials, the authoritative articles, the maintenance and operating data of the *Electric Railway Journal* monthly magazine.

Subscription price of the E.R.J. *News* is low—only $2 for the complete year's service of thirty-nine issues (it appears on thirty-nine Saturdays during the year). Foreign rate, $4 a year. Sold in combination with the monthly edition of *Electric Railway Journal* for $5 a year domestic and $9 foreign.

Send no money now. Simply fill out the coupon below—and mail it today! Give yourself a bird's-eye view of the entire electric railway field.

Just tear off, fill in and mail this coupon today!

ELECTRIC RAILWAY JOURNAL
10th Ave. at 36th St., New York

Check one:

☐ Enter my subscription to the Electric Railway Journal NEWS and send me a bill for $2. (Foreign rate: $4 year).

☐ Enter my subscription to both the Electric Railway Journal monthly magazine and the separate NEWS service. Bill me for $5.

Are you receiving *The Electric Railway Journal* NEWS?

—the Newspaper of the Electric Railway Field

When *Electric Railway Journal* was changed from a weekly to a monthly magazine, electric railway men everywhere asked us to continue to supply the current news of the field.

For that reason, a supplementary service was started, known as the *Electric Railway Journal* NEWS. It appears as a separate newspaper on thirty-nine Saturdays during the year. On the other thirteen Saturdays, the magazine itself appears with current news.

The *Electric Railway Journal* NEWS keeps its readers posted on court decisions . . recent bus developments . . current legislation enacted concerning electric railways . . changes in fare rates . . news of purchasing activities . . financial and corporate notes . . editorial interpretation of vital news . . personal items on men in the field. This newspaper constitutes the most complete guide to new developments in the field.

Subscription price is low—only $2 for the complete year's service of thirty-nine issues. Foreign rate, $4 annually. Sold in combination with the monthly edition of *Electric Railway Journal* for $5 a year, domestic rate. Send no money now—simply fill in and mail the coupon today!

ELECTRIC RAILWAY JOURNAL
. 10th Ave. at 36th St., New York

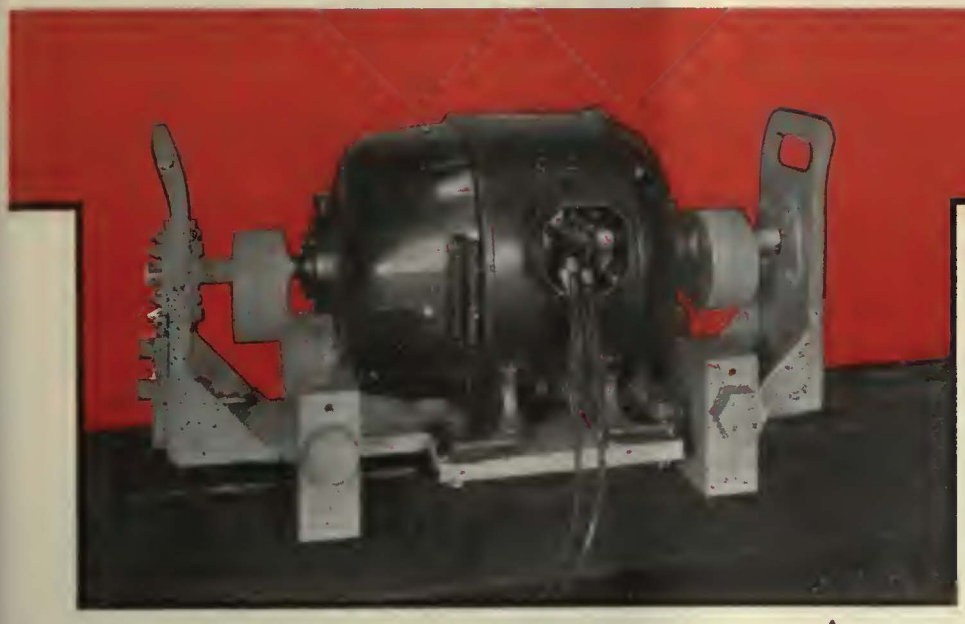
Enter my subscription to *Electric Railway Journal* NEWS. Bill me for $2.

Name .....

Address .....

City ..... State .....

Company .....



NEW
THE PORTABLE "MORTAR-FLOW" PULSATOR

A practical, compact, convenient machine for use under traffic conditions and for repairs.

It is quickly and easily moved. Repairs can be made on all types of paved track, and the entire area about the repair *perfectly sealed*. Investigate the "Mortar-Flow" repair method.

THESE PROPERTIES ARE CERTAIN *that with Steel Twin Ties and the "Mortar-Flow" Principle their new track is the best ever laid*

Perfect *uniformity* of construction results from the use of Steel Twin Ties and the high frequency vibrations imparted by the "Mortar-Flow" Pulsator.

Initial costs are as low as with any other design. The obvious quality of modernized Steel Twin Ties—with Precision Rail Clips and Heat Treated Bolts—makes certain that no better paved track was ever laid by such representative properties as:—

1. International Railway Company, Buffalo, New York
2. Washington Railway & Electric Company, Washington, D. C.
3. Capital Traction Company, Washington, D. C.
4. Boston Elevated Railway, Boston, Massachusetts
5. Mitten Management, Inc., Philadelphia, Pa.
6. Cincinnati Street Railway Company, Cincinnati, Ohio
7. Georgia Power Company, Atlanta, Georgia
8. Public Service Coordinated Transport, Newark, N. J.
9. Department of Street Railways, Detroit, Michigan
10. Kansas City Public Service Company, Kansas City, Mo.
11. Tacoma Railway & Power Company, Tacoma, Washington
12. Virginia Electric & Power Company, Norfolk, Virginia

Ask them, if convenient; or make inquiry direct to us about catalog, quotations, rental charges or sales prices on special track laying machines. Write today.

THE INTERNATIONAL STEEL TIE CO., Cleveland, Ohio

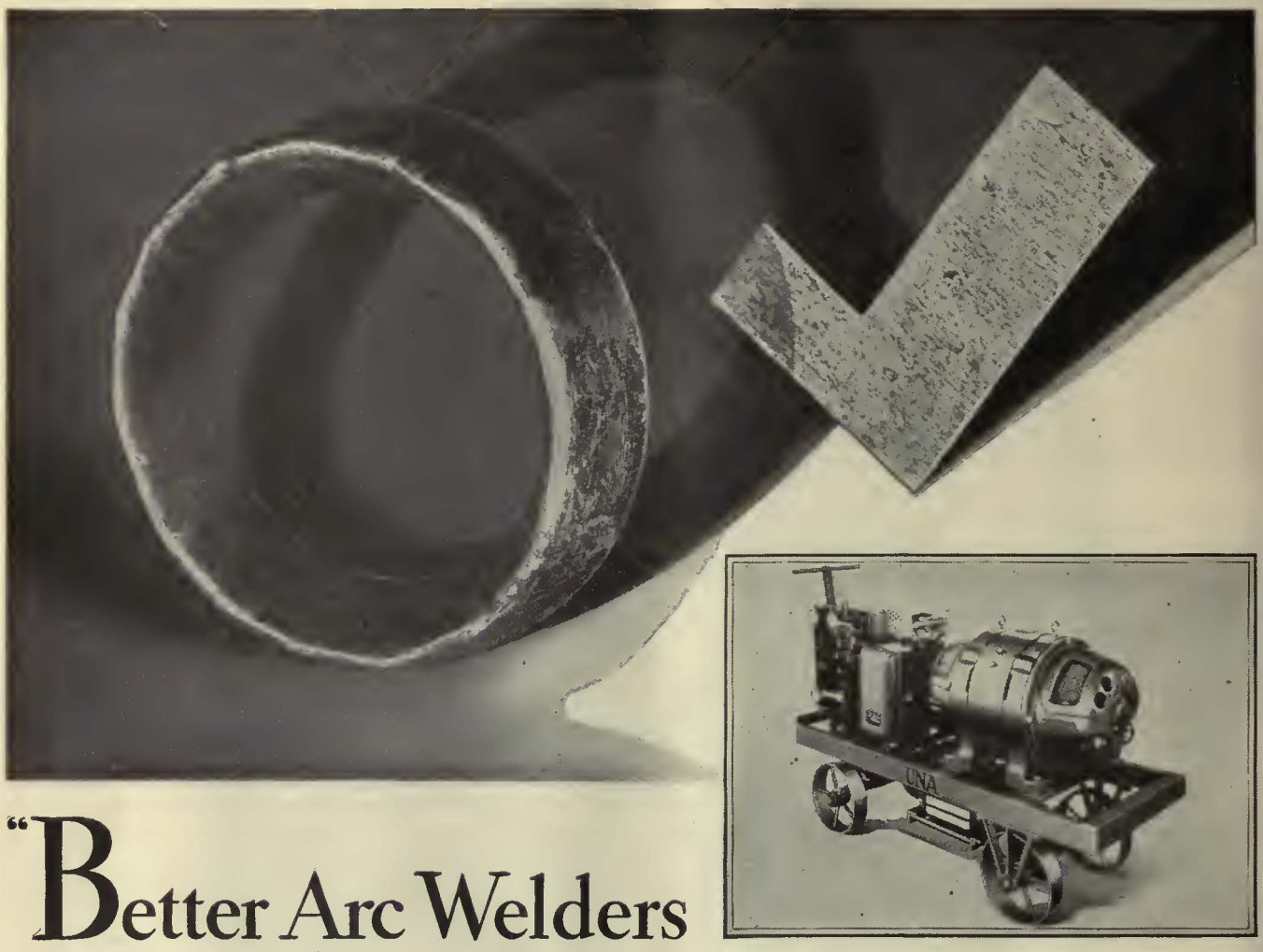
International "Mortar-Flow" Pulsators, single or double end, may be leased at nominal cost for all types of paved track construction. Write for rates.

How Much Should a Wheel Weigh ?

ENOUGH metal must be put in a car wheel to give adequate strength and wear resistance. How much of it is necessary to fulfill these conditions depends upon the kind of metal used. By reason of its special heat-treated composition the Davis "One-Wear" Steel Wheel can secure a given result with a minimum weight. It's the special metal that makes the difference.

AMERICAN STEEL FOUNDRIES

NEW YORK CHICAGO ST. LOUIS



"Better Arc Welders are made with Super Micanite"

HERE insulation is one of the most vital factors in performance. Only the best will do. That's why Una Arc Welder commutators are insulated with Super-Micanite.

Super-Micanite contributes unfailingly to the results for which the machine is designed and built. Higher dielectric strength . . . greater surface resistivity . . . the absence of injurious decomposition products, and the fact that Super-Micanite does not carbonize makes it unique among built-up mica insulations.

If you have never tried Super-Micanite send for a sample. Subject it to the most rigorous tests. Then we feel certain you will agree that it is the outstanding electric insulation of its kind.

MICA INSULATOR COMPANY

New York: 200 Varick St. Chicago: 542 So. Dearborn St.
Cleveland Pittsburgh Cincinnati San Francisco Seattle
Birmingham Los Angeles Montreal and Toronto, Canada
Works: Schenectady, N. Y. London, England

PERFECT MICANITE INSULATOR
REG. U.S. PAT. OFF.

Electrical INSULATION

PERFECT EMPIRE INSULATOR
REG. U.S. PAT. OFF.

MICA INSULATION OILED CLOTH INSULATION

3 Years Hard Service.. LONG HAULS.. SHORT RUNS.. Prove Goodrich Values

FRANK MARTZ *finds Silvertowns highly satisfactory on great fleet of buses.*

Route map of FRANK MARTZ COACH CO., INC., Wilkes-Barre, Pa. *showing the far-reaching bus service rendered.*

7 Superior Specifications Built Into Every Heavy Duty Silvertown

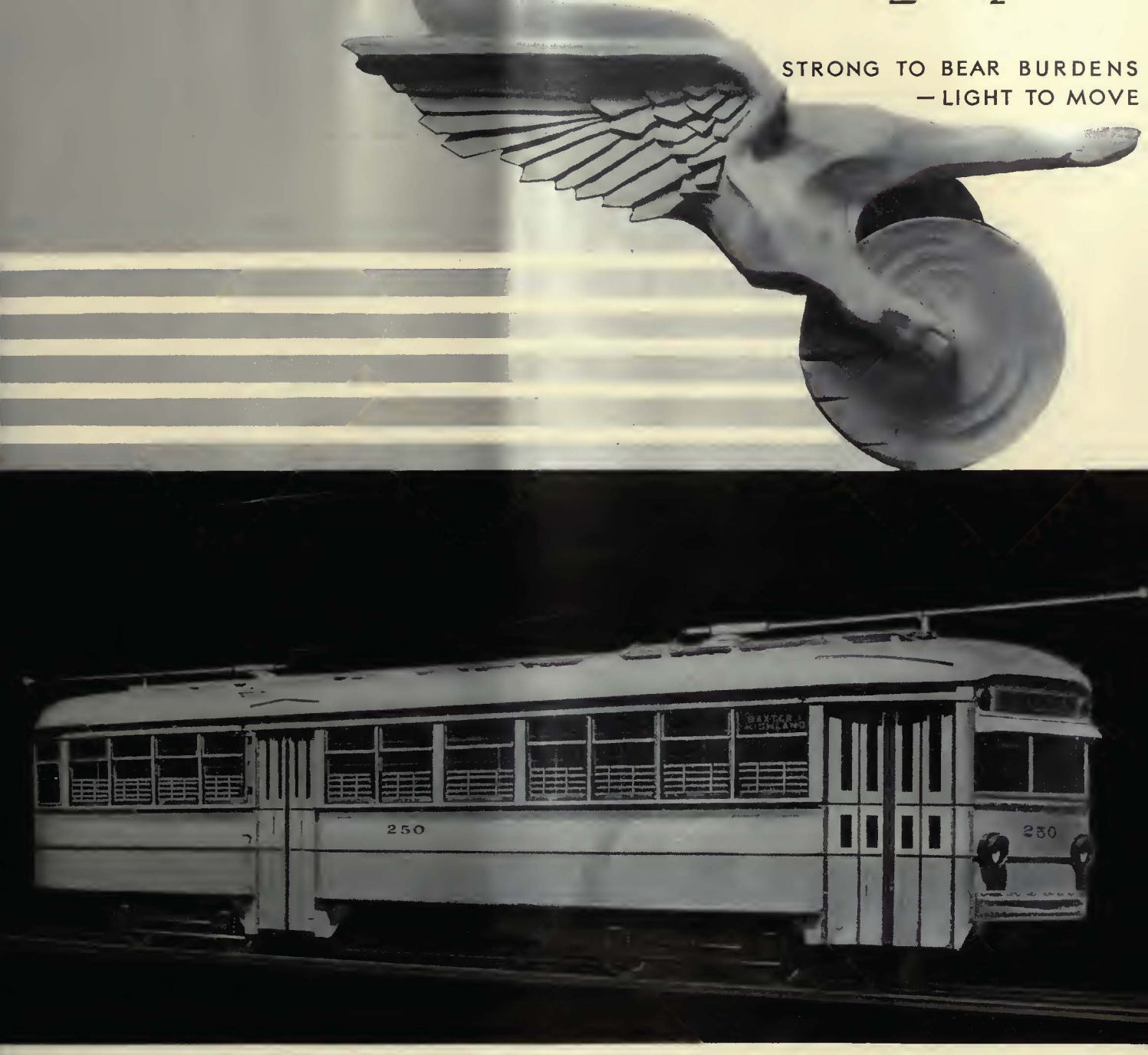
1. Heavily insulated stretch-matched cords.
2. Additional adhesion—from greater insulation between outside plies.
3. Extra twin beads for better rim seating.
4. Extra gum fillers between plies for longer tire life.
5. Heat-resisting, interlocking cord breakers.
6. Tread designed correctly for heavy duty service.
7. The whole tire tonghened by the famous Goodrich "water cure."

OPERATING 90 *through service* buses between New York, Philadelphia (and points on the Atlantic Seaboard) to Chicago, Mr. Frank Martz, President, Frank Martz Coach Co., Inc., has totaled over 4,000,000 bus miles in three years. ■ The extent to which Goodrich "did the job" is seen in the fact that they were specified on 50 new buses recently purchased. The objective for 1930 is 125 buses operating 3,000,000 miles. ■ Meeting every conceivable road condition, Goodrich Silvertowns on Mr. Martz's fleet have proved themselves, in Mr. Martz's own words, to be "exceptionally satisfactory in their performance." ■ The B. F. Goodrich Rubber Co., Established 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 ◆

STRONG TO BEAR BURDENS
—LIGHT TO MOVE



Car built by Cincinnati Car Company for Louisville Railway Company. Structural weight was greatly reduced by use of Alcoa Aluminum and its Alloys.

The light, strong Alloys of Alcoa Aluminum make possible light weight rolling stock that retain structural strength and safety.

ALCOA ALUMINUM

Car built by Cincinnati Car Company or United Traction Company of Albany. Alcoa Aluminum and its Alloys used for practically all metallic parts except wheels, axles, springs, bolts, rivets and nuts.

Dead weight pays no fares

It costs you money to move excess dead weight. But you get no fares in return.

Strip surplus structural dead weight to the minimum, replace it with live weight that pays as it rides. Cars built almost entirely of the light, strong Alloys of Alcoa Aluminum are lighter by several thousand pounds. And all the needed strength is there.

Being tons lighter, these cars make possible faster schedules, quicker acceleration and deceleration—service that results in added convenience to the riding public, which attracts more passengers.

Wherever aluminum cars have been installed they have quickly proved profitable. They stay out of the shop longer; reduce wear on road bed and track; save power.

Our nearest office will gladly send a representative to talk with you about the use of Alcoa Aluminum and its strong Alloys in transportation. Address ALUMINUM COMPANY *of* AMERICA; 2463 Oliver Building, PITTSBURGH, PENNSYLVANIA.

ALCOA ALUMINUM

OK'd by the Railroads and every industry . . .

Johns-Manville Building Materials protect your property investment

Depreciation and maintenance are minimized wherever Johns-Manville Building Materials are used. Millions of dollars' worth of J-M Building Materials in use by the railroads and every industry, are giving year upon year of free maintenance. Wherever permanence is the first requisite these J-M Materials should be specified.

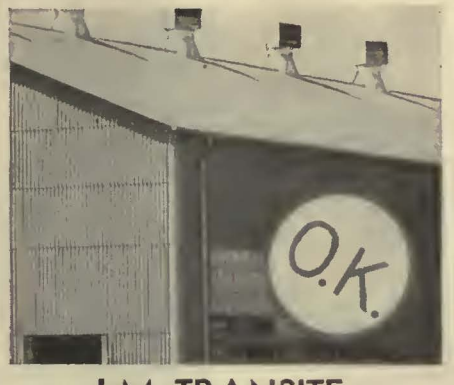
J-M Built-up Roofs—Buying a J-M Roof is buying exemption from fire, leaks, care and expense. Once your buildings are covered with J-M Built-up Roofs, your roofing problems are ended.

More than twenty distinct types of J-M Roofs are available for your selection. J-M Roofs include not only asbestos roofs—the ultimate in protection—but also asphalt roofs, smooth and gravel topped.

J-M Roofs are applied only by experts known in each community as J-M Approved Roofers. Every J-M Bonded Roof is guaranteed by Johns-Manville and the National Surety Company for an agreed upon term of years.

J-M Transite—For skeleton frame structures, large or small, J-M Transite provides a material which is fireproof, rot-proof, and permanent. It is made of asbestos fibre and Portland Cement, combined under great pressure. It needs no painting, no maintenance whatever. It will actually outlive the steel structure it covers. J-M Transite is by far the most economical material for all but temporary structures. Transite is adaptable to a thousand and one uses—particularly in electrical application.

J-M BUILT-UP ROOFS



J-M TRANSITE

J-M FLOORING

J-M Flooring—Waterproof, crack-proof, hard to injure, easy to lay, easy to repair, easy to clean, J-M Industrial Flooring has all these desirable maintenance characteristics. J-M Floors are made in several types to fulfill the requirements of different kinds of service.

On passenger platforms, in machine and car shops and garages, on the car floor itself, a J-M Floor will do a real job for you. And not only is the initial cost low, but records prove that maintenance costs are lower on a J-M Floor.

Other J-M Building Materials

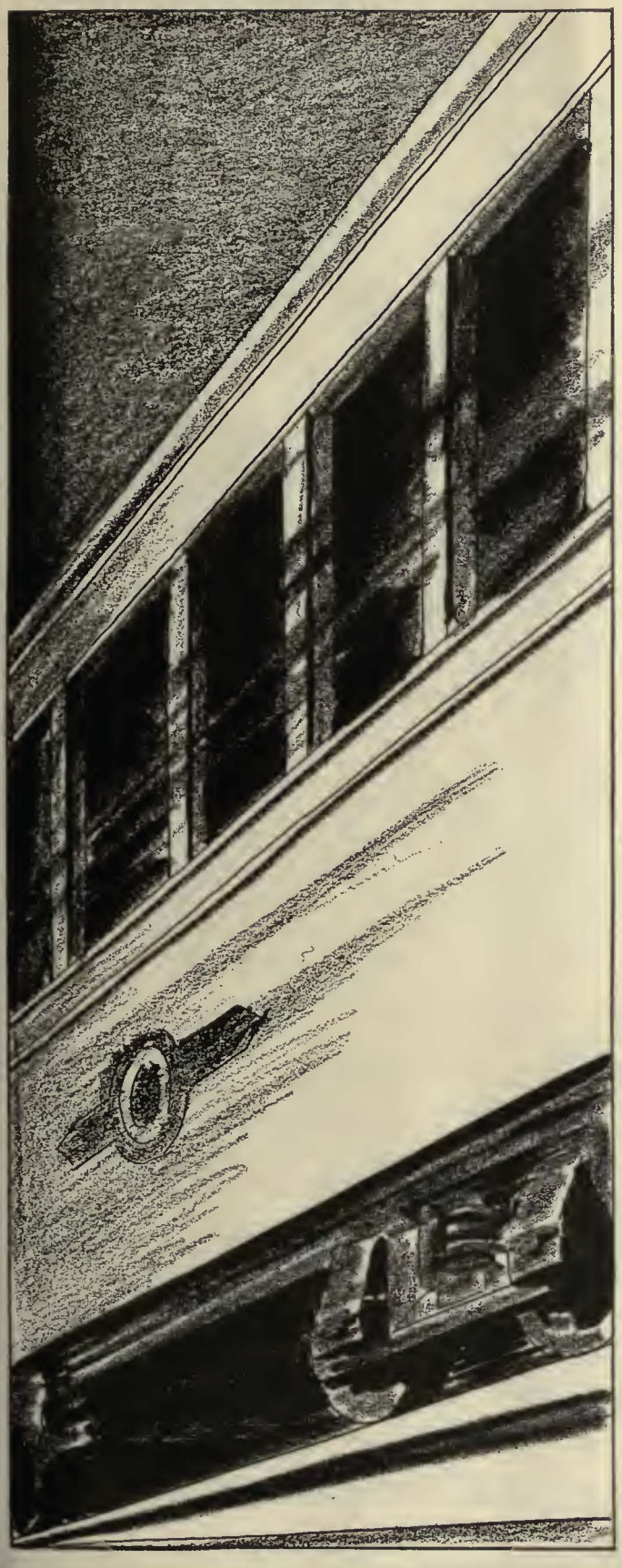
Johns-Manville Asbestos Shingles and Asphalt Shingles find use on the railway property wherever beauty and permanence must be combined. Johns-Manville building material accessories, waterproofings, Celite for Concrete and mortar, J-M Insulating Board, all contribute to low maintenance. J-M Engineers are at all times ready to advise you as to the advantageous use of any of these building materials.

Johns-Manville
SERVICE TO TRANSPORTATION

Tile Flooring, Transite, Packings, Asbestos Shingles, Fibre Conduit. Masticoke & Truss Plate Flooring, Asbestos Exhaust Pipe Covering, Bus & Car Insulation, Brake Blocks and Linings, Built-up and Ready-to-lay Roofing, Electrical Insulating Materials, Refractory & Insulating Cements.

Address JOHNS-MANVILLE
At nearest office listed below
New York Chicago Cleveland San Francisco Montreal
(*Offices in all large cities*)
Please send me complete information on the following building materials.

.....
.....
.....
Name.....
Address TS-115-5



OR CLEAR TRACK ALL THE WAY

Perfect alignment . . . evenly-surfaced track . . . smooth-riding . . . better speed. No repairs required for rail or pavement . . . permanent! That's the modern way of railroading with Thermit-welded track.

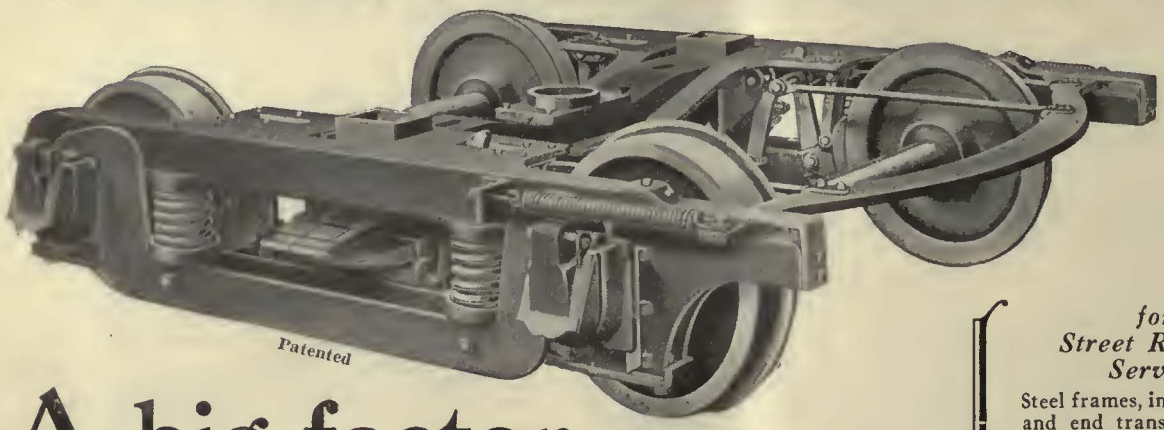
Thermit welding rails both for maintenance and new construction is the recognized standard on hundreds of systems. Information and cost data on request.

THERMIT

CORPORATION

NEW YORK, N.Y. South San Francisco Toronto

Commonwealth Trucks



A big factor *in economical operation*

for Street Railway Service

Steel frames, including cross and end transoms, cast in one strong unit.

Pedestals cast integral with frame are machined and protected from wear by renewable, hardened spring steel liners.

The design, material, and workmanship of Commonwealth Trucks are all the fruit of mature engineering experience. They combine to make a simple, rugged truck that gives years of service without maintenance cost. That's why so many leading railways have adopted them as standard.

GENERAL STEEL CASTINGS CORPORATION

EDDYSTONE, PENNSYLVANIA *GRANITE CITY, ILLINOIS*

Street Railway Officials!

The MERGOTT CARFARE CARRIER

A Great Help to You and Convenience to Your Riders

Sell the Mergott Carfare Carrier at cost to your riders or distribute them complimentary. This handy token container eliminates making change; saves time and confusion and prevents mistakes. The Mergott Carfare Carrier produces good will, and, on the reverse side, can carry your advertising message to every patron. These carriers are used by Traction Companies in twenty-six states and provinces.

Write now for full particulars; samples and quotations.

Note the space on the reverse side—Suitable for your good will or an advertising message.

The J. E. MERGOTT COMPANY

Manufacturers

318 to 368 Jelliff Ave. Newark, N. J.

ENGINEERS *and* CONSULTANTS

SEARCHLIGHT SECTION

LEGAL NOTICE

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912

Of Electric Railway Journal, published monthly—12 regular and 1 special, at New York, N. Y., for April 1, 1930.

State of New York } ss.
County of New York }

Before me, a Notary Public in and for the State and county aforesaid, personally appeared C. H. Thompson, who, having been duly sworn according to law, deposes and says that he is the Secretary of the McGraw-Hill Publishing Company, Inc., publishers of Electric Railway Journal and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, McGraw-Hill Publishing Company, Inc., 10th Ave. & 36th St., N. Y. C. Editor, None. Managing Editor, John A. Miller, Jr., 10th Ave. & 36th St., N. Y. C. Business Manager, Louis F. Stoll, 10th Ave. & 36th St., N. Y. C.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member must be given.) McGraw-Hill Publishing Company, Inc., 10th Ave. & 36th St., N. Y. C., Stockholders of which are: James H. McGraw, 10th Ave. & 36th St., N. Y. C. James H. McGraw, Jr., 10th Ave. & 36th St., N. Y. C. James H. McGraw, James H. McGraw, Jr., and Malcolm Muir, 10th Ave. & 36th St., N. Y. C. Trustees for: Harold W. McGraw, James H. McGraw, Jr., Donald C. McGraw, Curtis W. McGraw. Curtis W. McGraw, 370 Seventh Ave., N. Y. C. Donald C. McGraw, 10th Ave. & 36th St., N. Y. C. Harold W. McGraw, 383 Madison Ave., N. Y. C. Joseph H. Bragdon, 10th Ave. & 36th St., N. Y. C. Anne Hugus Britton, 10th Ave. & 36th St., N. Y. C. Mason Britton, 10th Ave. & 36th St., N. Y. C. Edgar Kobak, 10th Ave. & 36th St., N. Y. C. Grace W. Mebren, e/o Bankers Trust Co., Fifth Ave. & 42nd St., N. Y. C. J. Malcolm Muir & Guaranty Trust Co. of New York, 140 Broadway, N. Y. C., Trustees for Lida Kelly Muir. F. S. Weatherby, 271 Clinton Road, Brookline, Mass. Edwin S. Wilsey, 10th Ave. & 36th St., N. Y. C. Goldman, Sachs & Co., 30 Pine Street, N. Y. C.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the six months preceding the date shown above is (This information is required from daily publications only.)

McGRAW-HILL PUBLISHING COMPANY, INC.
C. H. THOMPSON, Secretary.

Sworn to and subscribed before me this 21st day of March, 1930.

[SEAL] H. E. BEIRNE.

Notary Public N. Y. Co. Clk's No. 91, Reg. No. 1B84. Kings Co. Clk's No. 646. Reg. No. 1080. (My Commission expires March 30, 1931.)

POSITION VACANT

ENGINEERING draftsman having street railway track experience. Capable of making surveys and designs. P-207, Electric Railway Journal, 520 No. Michigan Ave., Chicago, Ill.

POSITIONS WANTED

MASTER mechanic, with broad experience in the electric railway field, desires change; successful record long on the job. Excellent references. Will go anywhere. PW-212, Electric Railway Journal, Tenth Ave. at 36th St., New York.

RESEARCH engineer with technical training and broad railway experience, qualified to organize research and statistical activities or assist executive on operating, equipment, valuation, franchise, fare and related matters. PW-211, Electric Railway Journal, Tenth Ave. at 36th St., New York.

(Continued on the following page)

SEARCHLIGHT SECTION

EMPLOYMENT and BUSINESS OPPORTUNITIES—USED and SURPLUS NEW EQUIPMENT

UNDISPLAYED—RATE PER WORD:

Positions Wanted, 5 cents a word, minimum $1.00 an insertion, payable in advance.

Positions Vacant and all other classifications, excepting Equipment, 10 cents a word, minimum charge $2.00.

Proposals, 40 cents a line an insertion.

INFORMATION:

Box Numbers in care of our New York, Chicago or San Francisco offices count 10 words additional in undisplayed ads.

Discount of 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED—RATE PER INCH:

1 inch $6.00
2 to 3 inches ..... 5.75 an inch
4 to 7 inches ..... 5.50 an inch

Other spaces and contract rates on request.

An advertising inch is measured vertically on one column, 3 columns—30 inches—to a page.

R.J.

POSITIONS WANTED

(Continued from preceding page)

YOUNG man, with ten years' experience, would like position as assistant superintendent transportation. Will go anywhere. PW-209. Electric Railway Journal, Tenth Ave. at 36th St., New York.

AGENTS WANTED

Agents Wanted

For a portable high efficiency electric welder for street railway circuits. Portability such that one man can easily handle the machine on the street. Machine is provided with pneumatic tires and springs so that it can be towed for long distances at high speed. Current consumption from five hundred volt trolley is twelve amperes for two hundred amperes in the arc circuit. Normal welding capacity two hundred amperes; maximum capacity three hundred amperes. Write to the Economy Electric Products Co., 2400 Woodland Ave. Cleveland, O.

FREE BULLETIN

JOSEPH HYMAN AND SONS, Tioga, Livingston and Almond Sts., Philadelphia, Pa., have issued their new catalog, containing specifications, with quotations, of stamping presses, rebuilt in their shops and sold under their guarantee. This catalog is a valuable source of information to buyers and copy is available upon request.

New and Relaying Rails

All Weights and Sections

We specialize in buying and dismantling entire railroads and street railways. Also industrial and public service properties which have ceased operation. We furnish expert appraisals on all such properties.

May We Serve You?

The Perry, Buxton, Doane Company

(Capital $1,000,000.00)

Rail Department, Philadelphia, Pa. General Department, Boston, Mass.

Pacific Sales Office—Failing Building, Portland, Oregon

Wanted to Purchase

Electric Railways in Their Entirety

HIGHEST PRICES PAID

DISMANTLING DONE BY US

The Allite Corporation

636-638 Broadway, New York, N. Y.

HIGHEST PRICES PAID FOR ELECTRIC RAILWAYS FOR—

DISMANTLING

M. K. FRANK

15 Park Row New York, N. Y.

FOR SALE

1000 K. W. and 500 K. W. Westinghouse modern type Synch. Motor Generator Sets

D.C. Volts 575/600 A.C. Volt, 3 ph., 60 cy., 2200 comp'd. w'd. interpole Generators 80% P. F. Motors with Direct Conn. exciters. Speed 1000 Kw., 900 r.p.m., 500 Kw., 1200 r.p.m., complete A.C. and D.C. control switchboards.

Condition Strictly First Class

For Particulars Apply

JOHN D. CRAWBUCK CO.

Empire Bldg., Pittsburgh, Pa.

MAKE YOUR SELECTION

FROM 173 BIRNEY CARS

(60 May Be Sold)

Built by J. G. Brill Co.; Brill 79 E-1 Trucks; Full Safety Devices.

Either Westinghouse No. 508 or Gen. Elec. No. 264 Motors.

Complete with all appurtenances.

Now in Operation *Splendid Condition* *Low Price*

MORE THAN 20 YEARS AT YOUR SERVICE

For Complete Information Write:

W. M. McKEE CO.

601 Commonwealth Bldg., PHILADELPHIA, PA.

FOR SALE

All equipment and supplies of the
Auburn & Syracuse Railroad Company,
Auburn, New York

We have purchased all the physical property of this road and now offer at very attractive prices, the following:—

Light Weight Double Truck Cars
Double Truck Interurban Cars
Snow Plows and Sweepers
Freight Cars
Rotary Converters
Caldwell Wheel Press
Wheel and Engine Lathes
Boring Mill
Peter Smith Car Heaters
Johnson Std. Coin Counting Machine

Motors:
76—12-A
101B—264-A
121 —200-J
Controllers:
K-6 K-10
K-35G2 K-30
Compressors:
D I EG
D H 25
Fare Boxes
Johnson
Cleveland

Let us have your requirements for materials and supplies. Write or Wire

H. E. SALZBERG COMPANY, INC.

225 Broadway — Estd. 1898 — New York City, N. Y.

Watch the
SEARCHLIGHT SECTION
for Equipment-Opportunities

G-3A

New "SEARCHLIGHT" Advertisements

must be received by 5 P.M. the 20th of the month to appear in the issue out the following month.

Address copy to the Searchlight Department
Electric Railway Journal
Tenth Ave. at 36th St., New York City

FOR SALE

1—42-in. Putnam Double End Car Wheel Turning Lathe.
1—150-ton Niles Hydraulic Car Wheel Press.
1—300-ton Niles Hydraulic Car Wheel Press.
Several Niles & Putnam Axle Lathes and Car Wheel Boring Machines.

CENTRAL ILLINOIS EQUIPMENT CO.
Springfield, Ill.

Operation discontinued put this equipment in the bargain class . . . all of it was in operation until March 31, 1930.

We know that you can get many years of profitable operation out of the equipment listed here. Every item is in good condition. Must he seen to be appreciated.

As for prices, we will let you pass judgment. However, we don't believe you can get the same value at twice the prices we ask.

Substation Equipment

3—Rotary Converters, G.E., Serial Nos. 416420, 416451 and 416470, Type TC6, Form P, 300 kw., 60 cycles, 600 volts, 1200 r.p.m., 500 amp., with transformers, reactance coils, and panels complete.

4—Rotary Converters, G.E., Serial Nos. 146388, 146389, 146487 and 140488, Type TC6, Form P, 200 kw., 60 cycles, 600 volts, 1200 r.p.m., 333 amp., with transformers, reactance coils, and panels complete.

3—Transformers, 150 kva., G.E., Type H, Form KD, 60 cycles. 11,000 / 22,000 to 2200 volts. Ontside type. Serial Nos. 2120537, 2181781 and 3191513.

4—Transformers, 145 kva., G.E., Type H, Form RP, 60 cycles, 11,000 / 22,000 to 2200 volts, single phase, oil cooled, step-up.

1—Automatic Switching Equipment for reclosing the service on D.C. circuit, G.E. Catalog 196600 combined stud end and multiple feed. Wiring arrangement P2199183, v. 600 amp. 450, summary K2639317, requ Sye 77023. (Practically new.)

Oil Switches and Panels, Rotary Converter Panels, D.C., Feeder Panels, Starting Panels, Lightning Arresters and Choke Coils, Disconnecting Switches.

Cars

3—Birney, each with 2 G.E. 264 Motors, K-63 Controllers, 27-B-7 Compressor.

4—With G.E. 258 Motors, K10A Controllers.

6—Double end operation, 8 wheel, steel I beam underframes, each with 4 G.E. 87 (60 hp.) Motors, Type M (multiple unit) Control, Westinghouse Air Brakes, with SME emergency. Trucks, standard C-55. Heating, hot water. Cars 48 ft. long, seating capacity 52.

1—Work Car, 48 ft. long, MCB couplers, same motors, etc. as last item.

1—Snow Plow, on four wheels.

Track

3500 Tons

80-lb. A.S.C.E. Section Steel T Rails, 33-ft. lengths, uniform drilling, rail drilling 2x7 in. for ⅞ in. track bolt. Full quota angle splice bars.

34 Turnouts, complete, No. 8 Frogs 15 ft. long, 15-ft. Switches, 8 ft. 3 in. Guard Rails, Ramapo Stands.

Selected Track Materials. Almost as good as new.

Note: *This is but a partial list of all the equipment purchased by us from the Elmira, Corning and Waverly Railway.*

Write today for complete listing and details.

E. C. SHERWOOD
50 Church St., New York, N. Y.
Telephones: Cortlandt 3322-3

AGED IN WORTH

OUR BACKGROUND . . .
Years of intelligent fruitful experience

OUR FOREGROUND . . .
Modern—scientific—progressive methods

WE PURCHASE and DISMANTLE RAILROADS

THE JOSEPH SCHONTHAL CO.
Columbus, Ohio

References:

The Chase National Bank, New York
The Marine Trust Co., Buffalo
The Huntington Nat'l Bank, Columbus

It

IN just six weeks the A.E.R.A. Convention meetings will be under way in San Francisco but the exhibits will be found only in the Convention and Exhibit Number of *Electric Railway Journal* that appears June 14th.

The editorial pages will tell of the trend and developments in equipment that are contributing, toward greater comfort, safety, speed . . . better appearance, operation and maintenance. The advertising pages will show what each manufacturer has to contribute toward these ends.

For the thousands who have to stay at home (unfortunately everybody

A. E. R. A. CONVENTION

San Francisco

JUNE 23-26

won't be long now!

can't go to San Francisco!) the Convention Exhibit and Convention Report Numbers of *Electric Railway Journal* will represent the exhibits, meetings, new developments, new business relationships, all the interest and enthusiasm that go to make up these annual meetings.

The fact that there will be no Convention Exhibits this year places a larger responsibility on *Electric Railway Journal*, but we feel certain of the whole-hearted support of manufacturers in our effort to place before the whole industry as complete a picture as possible of this year's Convention.

More than a million dollars a day is budgeted to be spent this year. Advertising should bring better results than ever before!

Some of the discussions planned for the Convention Number

Industry leaders are planning to discuss the following subjects in the Convention Number of *Electric Railway Journal:*

Developing Better Cars, Increasing Speed of Operation, Providing Greater Comfort, Reducing Vibration and Noise, Building Better Track, Making Cars More Attractive in Appearance, Improving Riding Qualities of Trucks, Promoting Safety, Progress in Trolley Bus Design, Modern Machinery for Improving Maintenance, Better Equipment for Freight Handling, Meeting the Power Demand, Facilitating Fare Collection, Improving the Bus to Increase Its Usefulness, Advancement in Structural Design of Vehicles, Increasing the Efficiency of Rapid Transit, Serving the Suburban Commuter.

All, you will admit, pertinent to the editorial theme, "Improving Design to Improve Transportation Service."

Electric Railway Journal

CONVENTION and EXHIBIT NUMBER

(FORMS CLOSE JUNE 4)

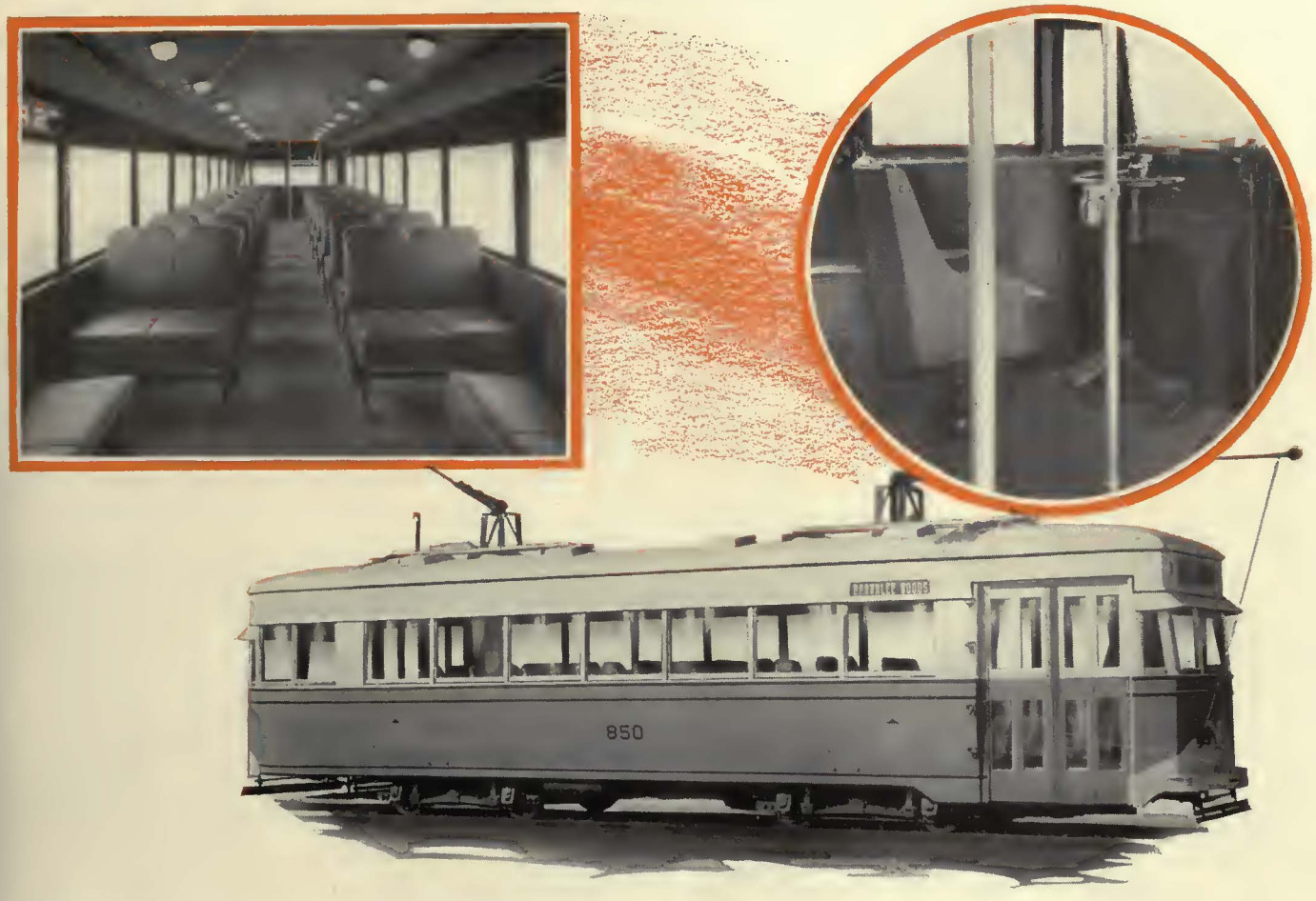
CONVENTION---REPORT NUMBER

(FORMS CLOSE JUNE 24)

ALPHABETICAL INDEX

This index is published as a convenience to the reader. Every care is taken to make it accurate, but *Electric Railway Journal* assumes no responsibility for errors or omissions.

Searchlight Section—*Classified Advertising*



Youngstown Turns to

Brill MASTER UNIT Cars

Youngstown needed new equipment. And it was only logical that cars "up-to-the-minute" in design and equipment would be selected. The distinctive and particularly attractive stream lines of the Brill MASTER UNIT design appealed, and the purchase of thirteen of the double-end city type resulted.

A combination of light weight, 35 H.P. high-speed motor equipment with W-N double reduction gear drive, foot control, and automatic foot braking makes possible unusually high rates of acceleration and deceleration accomplished in a smooth and comfortable manner.

Faster schedules with equipment possessing necessary passenger appeal, particularly designed with wide single sash, low ceiling, automotive type front and with every consideration given to passenger comfort on Brill No. 201-C leather-upholstered seats prompted the selection of these new cars. They are 40 ft. 6 in. long over platforms, and seat 45 passengers.

The ever popular Brill 177-E-1-X Trucks assure long and satisfactory service with minimum maintenance. Complete details furnished upon request.

THE J. G. BRILL COMPANY

PHILADELPHIA

American Car Company
St. Louis

The G. C. Kuhlman Car Co.
Cleveland

Wason Manufacturing Company
Springfield, Mass.

Pacific Coast Representative
Rialto Bldg., San Francisco