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ELECTRIC RAILWAY JOURNAL

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Increases Profits on Many Electric Lines

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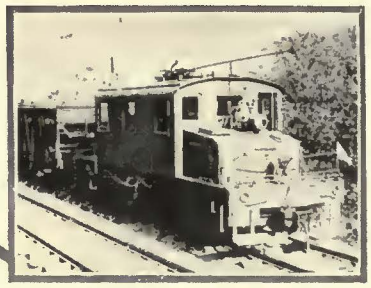

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Vol. 69
No. 14

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Making Precedent

"MEET the Judge" is occasionally fraught with consequences as dangerous as "Meet the Wife." However, the former introduction often leads to a reawakening of learning and a reorientation in the changed status. Through court decisions, actions become more clearly defined and carefully hidden motives are revealed in all their glory or grimness.

In the first issue of each month ELECTRIC RAILWAY JOURNAL carries a feature page of "Legal Notes." These are carefully selected from recent outstanding court decisions affecting the railway and bus industry. An up-and-doing railway executive should know why that bus operator in Oshkosh was held liable and a motorman in New Jersey was exonerated. The JOURNAL puts this information on his desk regularly in convenient form for reference.

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He Knows It's Right!

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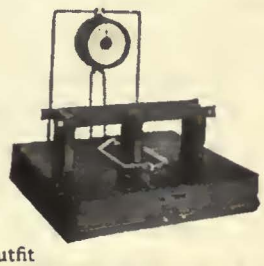

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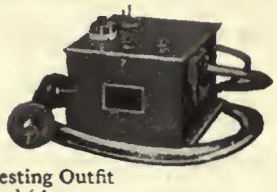

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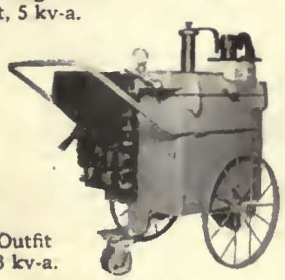

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A REPAIRED armature or any other piece of electrical apparatus should be tested—electrically—to insure against defects.

The machine illustrated above detects open and short circuits in the coils of an assembled armature. Other outfits are used to test separate coils for defective insulation by impressing a high voltage between the winding and ground. Whatever may be your testing requirements, there is a Westinghouse outfit to meet each class of service—developed for use in the Westinghouse factories.

At the left are a few of them—those that meet the usual needs of a railway motor repair shop.

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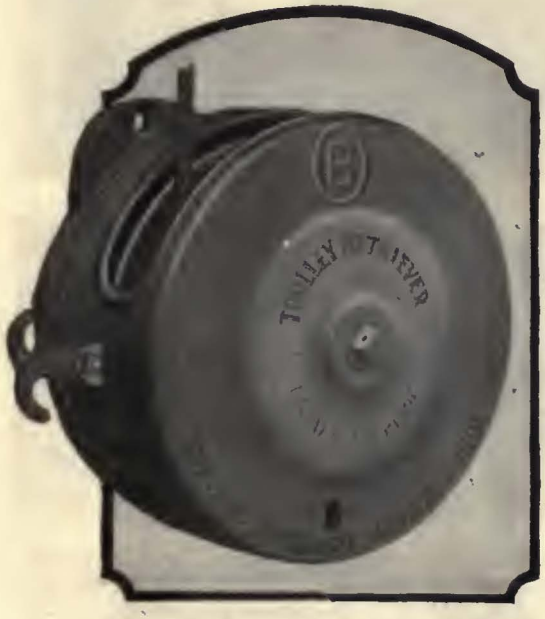
Electrical Testing Outfits

Setting the Standards For Efficiency and Low Cost

The O-B Trolley Catcher instantly and positively catches and holds a flying pole without danger of "stepping up". Regardless of the rebound of the pole and resultant slack rope, it does not let go. Requires lubrication only at long intervals.



The O-B Retriever quickly atops and pulls down a flying pole clear of the overhead. It is positive and powerful enough to overcome the heaviest trolley rope tension. It is your assurance against broken trolley poles and a damaged overhead.

YOU SEE O-B Trolley Catchers and Retrievers on city and interurban cars the world over. Make a point of investigating their records of service. You will find thousands that have been in use from five to ten years. And by far the greatest percentage have given continuously reliable, efficient service with practically no expense for repairs or replacements.

Simplicity, accuracy, and strength in every detail of design and construction are the reasons for such records of service. Both O-B Catchers and O-B Retrievers are made with the fewest possible parts—the minimum that will insure automatic operation. These parts are accurately machined in jigs and given individual inspections, thus insuring interchangeability. All the materials used are sufficiently sturdy to insure a large factor of safety above the most severe service requirements.

In every emergency, O-B Catchers and Retrievers act positively and promptly, even after years of use and abuse. This fact plus their exceptional economy from the maintenance standpoint certainly makes it worth while to use them as standard on your cars.

May we arrange a demonstration? Address

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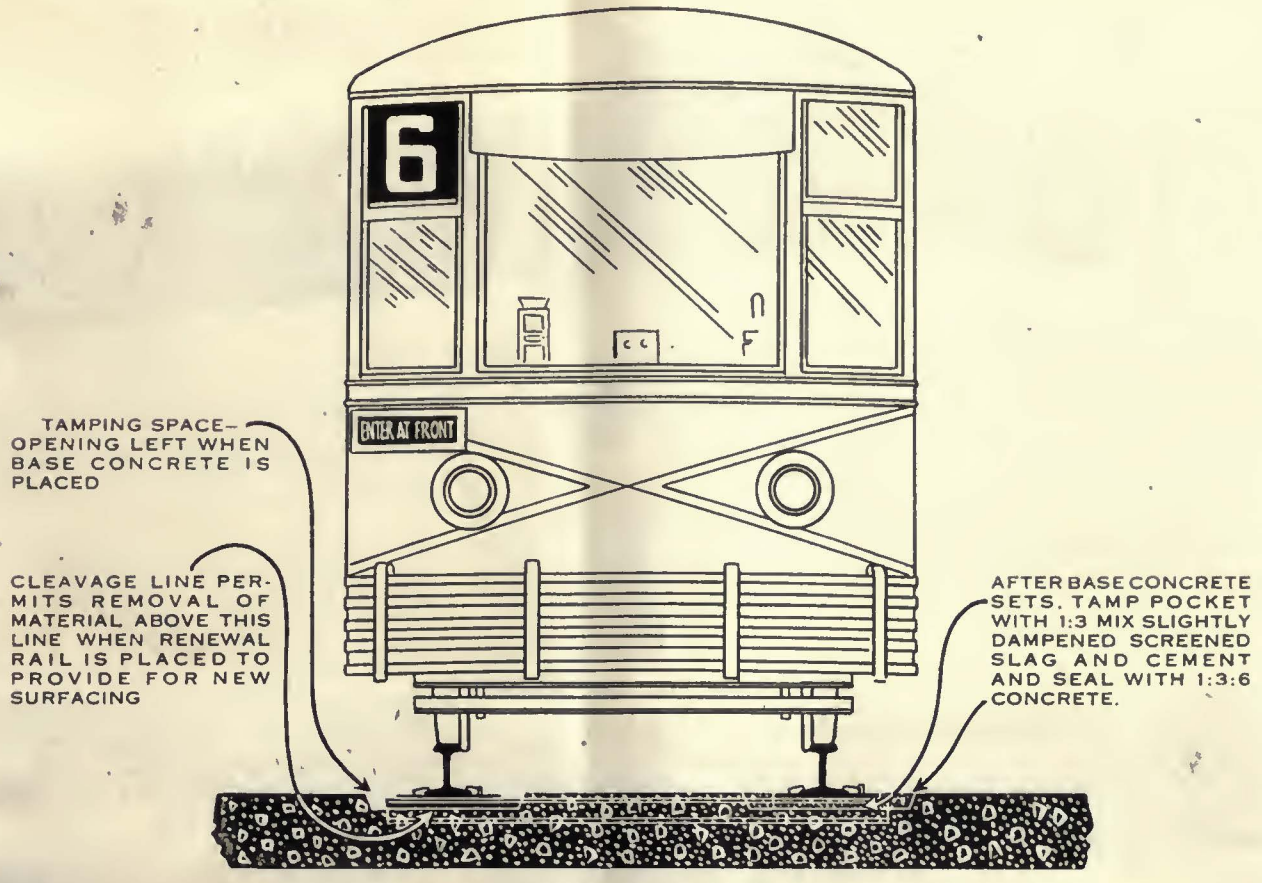

"Street Cars" are passé— so is rough and bumpy track

THE new term is "Electric Rail Coach" —New paint—new seats—new and lower costs per car mile and, what is more important from both an operating and selling standpoint—New Track.

To get the same money-saving possibilities in track construction as you get from the new equipment, lay Steel Twin Tie Track on your 1927 paved street work.

Using the delivered price on Twin Ties with the man-hour detailed estimate sheet which comes with the quotation, will give a close estimate on the money-saving possibilities under your local conditions.

The INTERNATIONAL STEEL TIE COMPANY, Cleveland, Ohio

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Look it up in your "Paved Track Note Book"

Steel Twin Tie Track

Photos courtesy of G. C. Kuhlmon Car Co.

KEYSTONE EQUIPMENT
on each of Wheeling's new cars.

Type RR 128 Golden Glow Headlights.
Hunter-Keystone Signs.
Ivanhoe Miller Light Fixtures.
Faraday Passenger Signal System.

For further information about the complete line of Keystone Car Equipment—get ESSCO Catalog No. 7.

Wheeling Public Service sells their service by means of modern cars

There's no question where this car is going—Elm Grove—the destination sign settles that.

The headlight looks business-like—as if greater safety at night were desired. And it is.

Take a look inside the car. The lights are well arranged and scientifically designed to illuminate the whole interior.

The signal system within easy reach of passengers is another convenience that creates public good will.

Those are the touches that Keystone Equipment give to the fifteen modern one-man two-man cars recently put in service by the Wheeling Public Service Company.

We can help you sell YOUR service too.

ELECTRIC SERVICE SUPPLIES CO.

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gives Uniform Braking with Varying Load

STABILIZED STOPABILITY throughout the entire range of car-loading means—

—safe and swift car movement, through congested districts;

—ability to hold traffic position with other moving vehicles, inasmuch as peak speed can be held longer between stops;

—a precise and systematic movement of shopping and business crowds;

—seconds saved, that may collectively be counted as dollars;

—stimulation of public good will, through a gratifying on schedule record over the entire system.

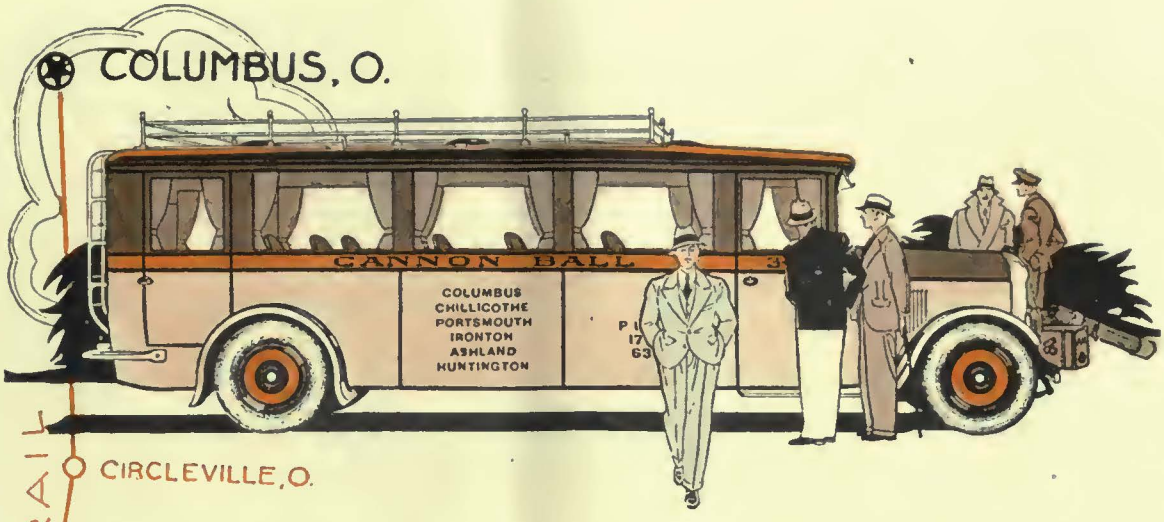
Many traction companies, recognizing the auspicious part Westinghouse Variable Load Brakes can play in effecting these far-reaching advantages, are specifying this new type equipment for their new modern light weight cars.

Information regarding Westinghouse Variable Load Brakes may be obtained upon application to our nearest district office—

Ask for Descriptive Catalogue T-2045.

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

WESTINGHOUSE TRACTION BRAKES



Bucking competition – and winning in the face of cut rates with YELLOW COACHES

The CANNON BALL

YELLOW KNIGHT

A direct case where YELLOW COACHES were purchased especially to meet stiff competition

TWELVE Yellow Type X Coaches operate 3,000 miles a day for The Cannon Ball Transportation Company of Portsmouth, Ohio, over their 150-mile route from Columbus to Huntington, W. Va.

This equipment was not purchased lightly. It was selected with great care to meet severe transportation competition by appealing directly to passenger comfort; to give, as this company expresses it, *"what we consider the most comfortable riding equipment that money can buy."*

Notwithstanding the fact that other lines were cutting their fares in half, the rider appeal of Yellow Coaches is accomplishing what was expected, building the route and justifying in every particular the purchase of Yellows.

Eight Yellow Coaches were placed in service in August, 1926, and four others began operating a few months later. Each Yellow Coach averages 250 bus miles per day (a daily total of 3,000 miles for the fleet) at the profitable operating cost of 17.51 cents per mile, broken down as follows—

Maintenance of plant and equipment	5.50
Operating Garage Expenses	4.21
Transportation	5.70
Traffic Promotion	.60
Administration and General Expenses	1.50
Total	17.51 cents

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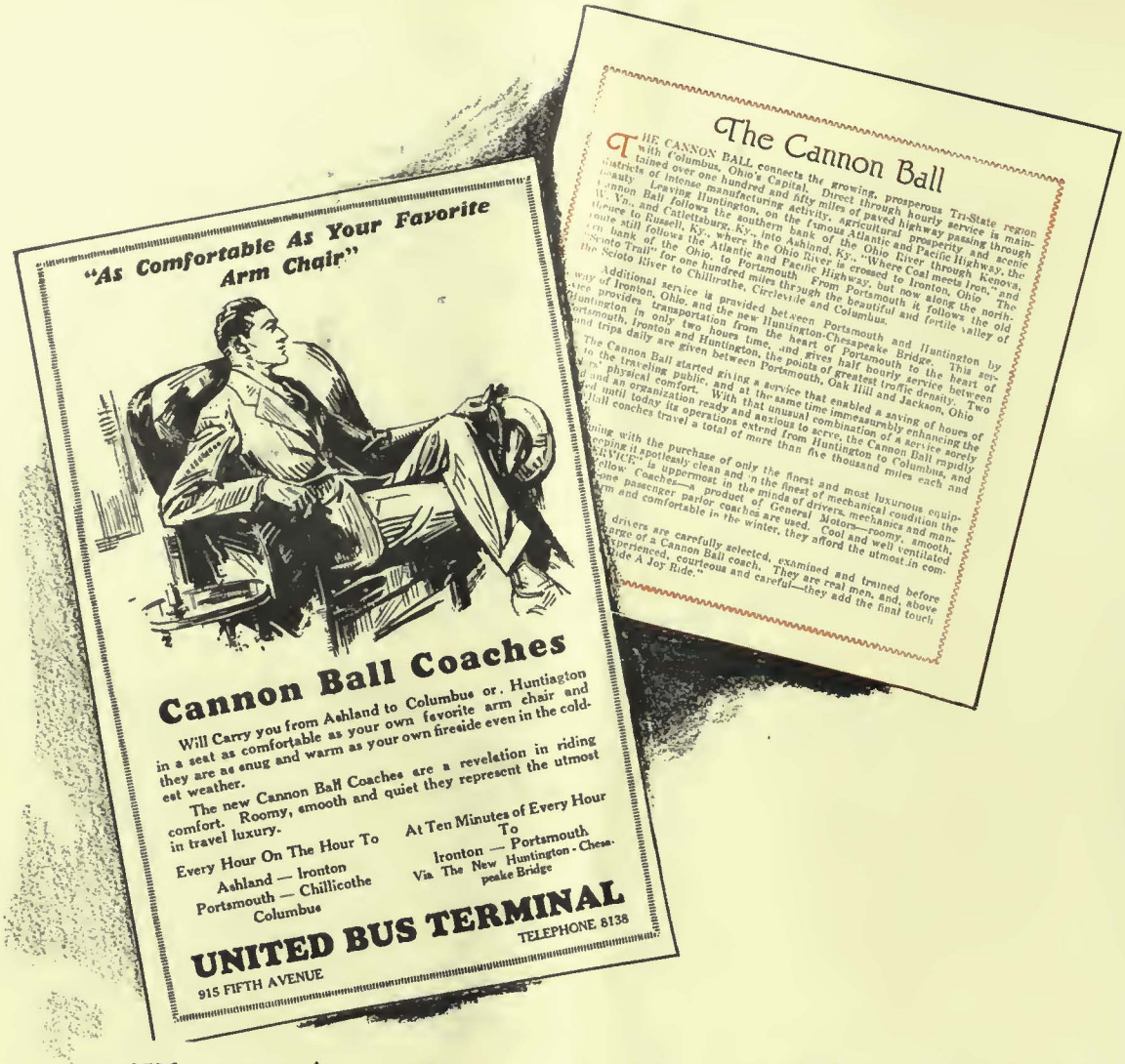


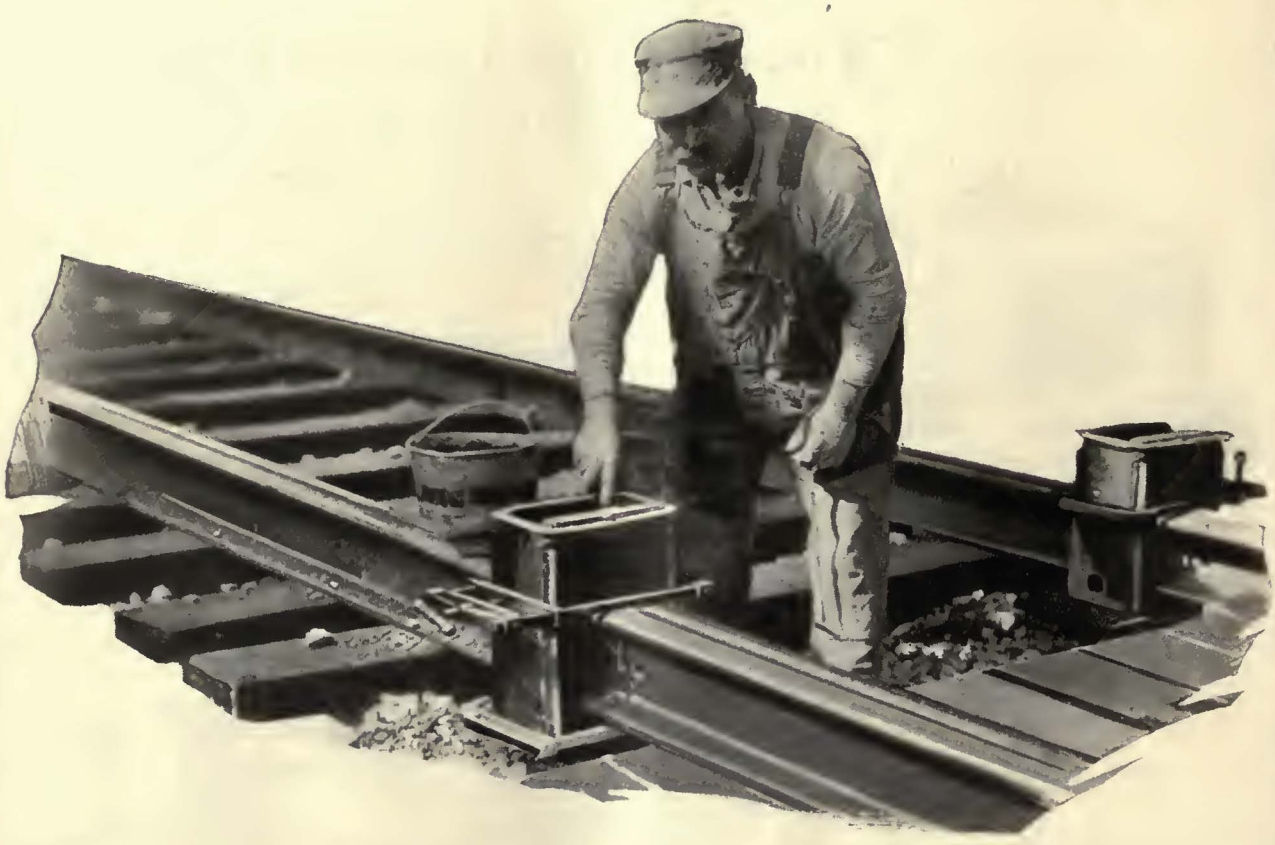
How the Cannon Ball advertises YELLOW COACHES *to build business*

"Beginning with the purchase of only the finest and most luxurious equipment and keeping it spotlessly clean and in the finest of mechanical condition, the ideal of SERVICE is uppermost in the minds of drivers, mechanics and management. Yellow Coaches—a product of General Motors—roomy, smooth, quiet, twenty-one passenger parlor coaches are used. Cool and well ventilated in summer, warm and comfortable in the winter, they afford the utmost in comfort and luxury."

Yellow Coach *plus* General Motors, through combined transportation, research and manufacturing experience, stand ready to apply these resources to your problems.

YELLOW TRUCK & COACH MANUFACTURING CO.
SUBSIDIARY GENERAL MOTORS CORPORATION
5801 WEST DICKENS AVENUE, CHICAGO, ILL.

Thermit—
so easy to install!



Thermit-welding holds no terrors for the small company, with limited engineering and construction facilities. Dozens of small properties are numbered among the regular users of Thermit.

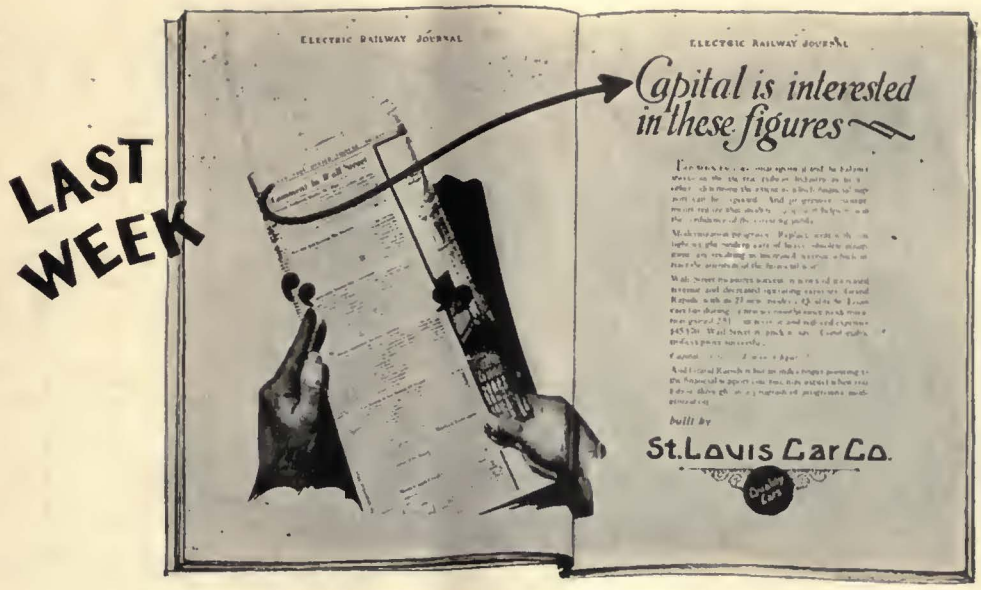
The apparatus is simple and inexpensive. You can buy it or rent it—as you choose.

Thermit experts come on the first job. Your own men are shown the process and methods—they're easy to learn. The service of these experts is also available at any time to help you in making the process meet your requirements. Any foreman of average intelligence can handle the job after it's demonstrated to him.

Let us tell you of roads near you which are using Thermit. Visit them and find out how easy it is.

METAL & THERMIT CORPORATION
120 BROADWAY, NEW YORK, N.Y.

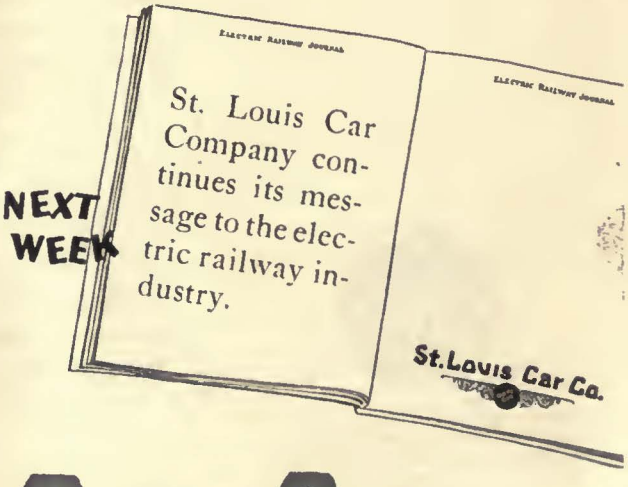
PITTSBURGH CHICAGO BOSTON SOUTH SAN FRANCISCO TORONTO



Every week,

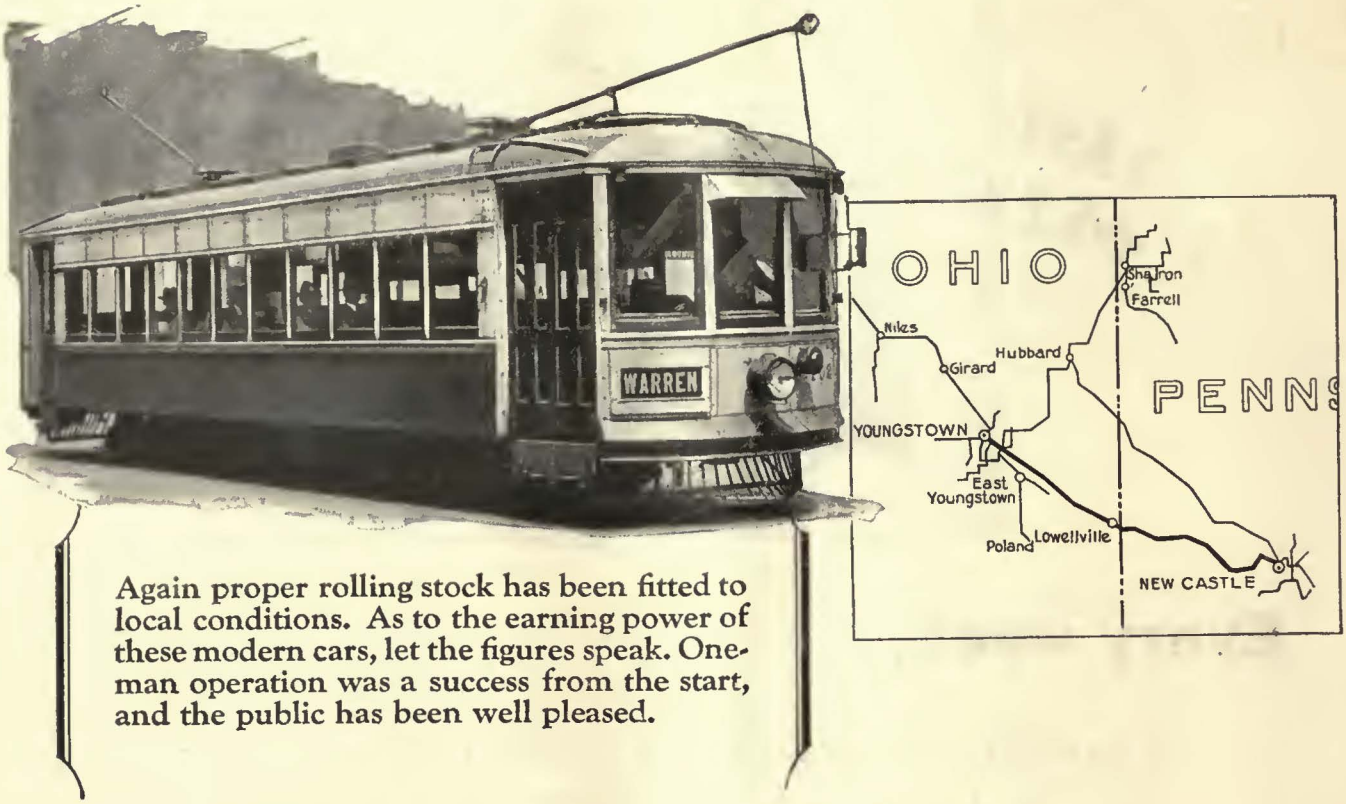
yes every hour, with every tick of the clock, the St. Louis Car Company has pledged itself to co-ordinate its every resource in fostering modernization programs, so as to expedite the already apparent "come back" of electric railways.

We realize keenly our responsibility to the industry, and are equipped with every manufacturing facility to fulfill our obligations.



St. Louis Car Co.

Quality Cars



Again proper rolling stock has been fitted to local conditions. As to the earning power of these modern cars, let the figures speak. One-man operation was a success from the start, and the public has been well pleased.

Light-weight cars have cut costs on the Penn-Ohio System

Ey replacing 54,000-lb. cars with modern one-man cars on its Youngstown-New Castle line, the Pennsylvania-Ohio Electric Company has effected savings that amount to a gross return of more than 40% on the new-car investment —sufficient to pay for the cars in three years.

The new 37,000-lb. cars, which are G-E equipped, consume 2.76 kw. hr. per car-mile at the car as compared with 3.83 kw. hr. for the old cars—a 28% reduction. They have made a total reduction of 30% in the accounts they primarily affect: Equipment Maintenance, Power, and Platform Expense. Their modern equipment includes GE-265 Motors, K-35 Control, and CP-27 Compressors.

Improved car design can do much to attract more patronage and promote public good-will. The motive power must keep up schedule speeds and keep down maintenance costs. Bear in mind the success of G-E Car Equipment on many roads that are modernizing, and let G-E equip your lines.

Comparative Operating Costs
Per Car-mile

	Old Cars (1922)	New Cars (1925)	Saving
Equipment	5.44 cents	2.65 cents	2.79 cents
Power	7.51	5.46	2.05
Platform	6.21	5.27	.94
Total	19.16 cents	13.38 cents	5.78 cents

330-22

GENERAL ELECTRIC

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

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review
Published by McGraw-Hill Publishing Company, Inc.
CHARLES GORDON, *Editor*

Volume 69 New York, Saturday, April 2, 1927 *Number* 14

An Alligator Meant Motion to the Pharaohs

STRANGE is the concatenation of events. Change is often kaleidoscopic. Even at the risk of seeming to be overzealous the urge is irresistible to call attention again to a week's news that brought forth the stories of the new Springfield car, the new cars for the Washington, Baltimore & Annapolis Railroad, the new car truck for the Chicago & Joliet Electric Railroad and in another field the announcement of a new type of sleeping car containing fourteen rooms with a bed in each.

Surely the world of motion seems to be emerging rapidly from the era of utility to that of luxury, and maybe that is as it should be. No longer does the phrase *magnum vectigal est parsimonia* hold true. It is just the other way around. Economy is no longer a great revenue. Money can be made by spending money. And the transportation industry is finding it out. People want comfort. An alligator is just as good as he was in the days of the Pharaohs for riding upon. That was the affair of the Pharaohs. But the terms good and bad indicate nothing positive considered by themselves. Just because reverence is due to Noah and his ark is no reason why the effort should be made to emulate him today. Yet unconsciously this has been done too often in the case of rolling stock.

The present day Sophists notwithstanding, times do change. Reasoning *à posteriori* from these and other events, the conclusion is inescapable that the railways in their equipment advance are crossing the Rubicon. One must still live before one can philosophize. But in transportation today one must philosophize if one is to live. In the light of recent events it does not seem sacrilegious to chant *te Deum laudamas*.

It Has Penetrated to the Roots of American Life

HE WAS just a little chap, not more than twelve years of age. He was standing in the middle of one of the busiest streets in New York City. He represented the conglomerate type that is an integral part of our city life. On his face was an expression of responsibility far beyond his years. He was directing traffic at a critical time, and traffic was obeying every motion of his hand. There was no confusion. Rattling trucks, screeching taxicabs, clanging street cars, halted at his whistle. In his alert gestures and frail little body was the fruition of one of the greatest movements mankind has ever undertaken. He proclaimed better than all the screaming posters and reams of propaganda that the safety movement has penetrated to the very roots of American life.

Now let us glance Westward. Take the recent case of Albert Frick, the young salesman for the Public Service Company of Northern Illinois, whose life was prolonged for 108 hours through the devotion of more than a score of his co-workers who had been trained in the art of artificial respiration; their skill was made possible because safety had been sold to the company for which they worked. Did Albert Frick die in vain? Certainly not. His death set up another beacon that will dispel the gloomy idea that corporations are soulless; that their employees have no regard for life and limb.

The gasp of the dying man, "Press a little harder, boys," is a motto worthy of the safety movement. If it is obeyed the roots of the movement will not only be sustained, but there will come a time when the unsafe man or woman will be considered a menace to society.

The little boy at the corner, and Albert Frick; what powerful arguments for the doubter!

Further Recognition of Need for Relief from Paving Obligations

RELIEF for electric railways from part, at least, of their paving burdens is a burning issue. So far five states—New Jersey, Connecticut, Massachusetts, Montana and Utah—have extended relief of this kind to the railways. In addition more than 50 municipalities also have granted such relief in whole or in part.

New Jersey is the latest state to recognize the need for relief for its railways from burdens to which they should not be subjected under the changed conditions of the present day. There the Legislature, as noted in the ELECTRIC RAILWAY JOURNAL for March 26, has just passed over Governor Moore's veto a bill to relieve electric railways of a large part of their paving costs by not requiring them to put down new paving around their tracks when municipalities pave. The companies, however, are compelled to repair paving for 18 in. on each side of the track when damage is caused by the operation of cars, but are not compelled to repair damage other than that caused by the cars.

Passage of the bill over the Governor's veto followed a hard fight. Virtually the same bill was passed by both houses last year, but was vetoed by the Governor. When the measure came up again this year some local officials went to the extent of running display ads in the newspapers attacking the bill. However, the bill was carried in both houses by a good margin and was passed up to the Governor. Immediately upon his veto, the bill was reintroduced into both houses and quickly repassed.

The passage of the measure, particularly under these circumstances, should have a salutary effect elsewhere. In New Jersey the issue was coupled with that of the preservation of the 5-cent unit idea on the lines of the Public Service Railway. True, the plea for relief was the plea of the railway in the interest of its patrons, but the public did not have to accept the company's

word alone. Rightly, the Board of Public Utility Commissioners as long ago as 1925 aligned itself on the side of the railways. The board then stated that paving obligations have no logical relation to present-day operation as conditions have changed since these obligations were imposed; that they must be considered in fixing the rate of fare, and are a factor in fare increases. The commission went on record to the effect that economies effected by modification of paving obligations more nearly to represent present-day conditions would help not only to maintain the 5-cent unit of fare, but would provide additional revenue toward the better upkeep and maintenance of equipment and in general make available funds for betterment of service and improvement of operating conditions.

These are the conclusions of the state regulatory body. It was a position not taken without due deliberation. Already the passage of the measure has attracted favorable attention elsewhere, notably in New York State, where the cudgels for similar relief have been taken up, notably by the Syracuse *Herald*, which characterizes the relief measure as essentially just. There should be no let-up by electric railways elsewhere in their efforts to secure relief similar to that obtained in New Jersey from conditions that are anachronistic under present-day conditions.

Where One Man Is Better than Two

EVIDENCE continues to accumulate in favor of the one-man car. Not only is it a satisfactory substitute for the two-man car, but service on many properties shows that it is distinctly better than the two-man car. Some of the advantages were referred to briefly in an editorial in this paper for Feb. 19. In a paper read before the recent meeting of the Illinois Electric Railways Association R. F. Palmblade spoke along similar lines from his experience in Peoria and other cities of the Illinois Power & Light Corporation system. He points out that there is a positive decrease in accidents per unit operated when the one-man car is used. Of course, the cars must be equipped with the pneumatic and electric devices that have been developed to forestall man-failure and equipment failure, but these have become so nearly universal in their adoption that one scarcely thinks it necessary to call attention to them any more. In fact, these devices are being used on many of the cars specifically designed for two-man service.

Mr. Palmblade also pointed out once more that the one-man car, properly used, is a time saver. Since the operator does not share responsibility with another, he can proceed with his duties just as soon as he is satisfied in his own mind that he should, without waiting for signals. With the assurance given by the automatic safety devices, many seconds can be taken advantage of which in the aggregate will amount to many minutes in the course of a day. Many of us who have ridden on a street car to save time have listened to the traffic officer's whistle that caused a wait when a fraction of a second saved by the conductor in giving the signal or closing the door would have let the car move through on the previous signal, and have groaned inwardly at the waste of our own time, though we gave not a thought to the company's.

It is well for all those who oppose the introduction or extension of use of the one-man car to ponder well Mr. Palmblade's closing words: "Were it not for the one-man type of operation the public would be paying much more today for a street car ride and many transportation systems would long since have passed out of existence."

Enter the Villain of the Piece

EVEN today on a goodly number of electric railway properties one will find being enacted the typical blood-curdling melodrama of the Roaring Nineties. The hero (Public Relations Department) woos the innocent lass (the General Public) with soft words and gallant gestures. But the wicked villain (Claims Department) grasps the curly locks of our heroine in his vile paw and makes away with her. Ensues a battle royal between hero and villain, with the hero, alas, not always triumphing in the end, according to glorious tradition.

So the standards of the local utility stage must be elevated. Our heroes cannot be allowed to suffer ultimate defeat—it is too unsettling to audience morale. No, the villain in the piece must be given his just deserts, even as he snarls his memorable line "The Public Be Done."

Of what avail the honeyed phrases of the public relations department—its persuasive assurances that its sole desire is to deal in an eminently fair manner with each and every member of the public—when the individuals charged with administering claims settlements are fairly bristling with a "try and get it" air?

The car of a passing motorist is caught between a street car and a coal truck and squeezed into a shapeless and unbeautiful hulk. Possibly the claims investigator will call on the disconsolate owner and assure him that by no stretch of the imagination could the railway company be blamed for the unfortunate occurrence; probably the motorist will be completely ignored. At any rate he is indisposed to let the matter drop and pocket the loss himself, so he writes to the public relations department in the belief that from *this* quarter he will be assured fair consideration. Public relations asks claims about the case and is informed that even though the company may be at fault it would not be "expedient" to arrange a settlement unless the injured motorist actually files a suit. The hands of public relations are tied, so it either writes a letter of meaningless generalities or fails to reply at all.

In high dudgeon the motorist then retains a lawyer and files a suit. Quite as a matter of routine the claims department then waits upon the attorney for the complainant and grudgingly dickers for a settlement. The car owner has won his contention without bloodshed, but must split the amount with his lawyer, so that half of the cost of repairing his automobile probably devolves upon him anyway. When next he reads in the friendly little publication of the transportation company of the great efforts being made to render 100 per cent service and insure cordial relationships with the public, does he believe it? Alas, gentle reader, he does not.

A little public relations psychology injected into the activities of the claims department would make a world of difference on properties where incidents similar to the one just described are all too frequent. Nor does it mean that any claims should be paid unless they are just ones. It is the treatment the claimant receives that counts. A knocker can tear down more good will than ten boosters can build up. On every large city system there is bound to be a considerable number of accidents. Is it good business to develop a first-class

knocker out of every individual who comes into unpleasant contact with a reactionary claims department? Let's scrap the villain in the first act and make the local "drammer" a thing of beauty and a joy forever.

Practicing Penance in East St. Louis

LENTEN mortification has been assuaged in East St. Louis, Ill., with the East St. Louis Railway and subsidiaries playing the rôle of moderator. Beginning on Sunday, March 6, and each Sunday until Easter, each city passenger paying a 10-cent cash fare is given a free return trip coupon. On the interurban cars coupons valued at 10 cents are given upon payment of each regular cash fare and can be applied at that value toward the purchase of a return ticket. The reduction is in effect on Sundays only, and in compliance with numerous requests the courtesy has been extended to cover the hours of morning and evening church services.

Although, with the attendant advertising needed and the actual transportation costs, the company will find itself out of pocket an appreciable amount, still even before the advent of mi-carême, the possible revenue loss had been more than compensated for in letters of commendation, newspaper comment, pulpit approval and general good-will publicity.

But granting that many Laodiceans were in need of just such stimulation as a reduced fare or a free return, who would then deny the efficacy of this novel plan? Seemingly unalluring inducements have a telling effect sometimes, although the tale is seldom told.

Aside from the ethics of incentives to attend church exercises and the commentaries on the possible diversion of the money saved through this plan, the railway is to be commended for its co-operation and contribution to the penitential program. It is another instance of the changed status of the utility in sensing the needs of its patrons and in tangibly supplying such wants. In helping its patrons "to carry on" in Lent, perhaps the railway is doing a service more far reaching than it contemplated!

The Safety Car Duckling Growing Into a Swan

IN THESE days, when a posy thrown in any direction is pretty sure to hit a de luxe trolley car, let us not forget that in many cases this pleasing development was made possible by that ugly duckling the automatized, light-weight safety car.

Born of the dire need for economy, the safety car with its exposed carlines and slat seats could not make claim to that comfort and beauty which create patronage by stimulating the desire to ride an attractive vehicle. Its first job was to cut down costs; its second to hold or recapture business through greater frequency. Those jobs were done so well that hundreds of properties were able to keep their heads above water through all the awful struggles of post-war price increases and personal car expansion.

Now that this phase of the industry is past, electric railway operators are finding that the time is opportune to take the further step of producing transportation of a quality that has something more than mere utility. People use their personal cars not because they have to but because they like to. The present effort is to secure the same viewpoint for the public conveyance. Of course, that can never be 100 per cent possible, but when we consider the increase in the habit of riding brought about by the automobile and the great difference in cost between private and public transport there is plenty of business in sight for cars designed to attract it.

In view of the varieties of de luxe cars coming forward, it is pleasant to observe that the Stone & Webster organization, which did so much pioneering with safety cars, has encouraged its operators and its car specialist, C. O. Birney, to adapt themselves to the needs of the new ride-selling era. The Birney safety cars on various Stone & Webster properties today, with their cushioned seats, treadle doors, rich illumination, bright interior trim and exterior treatment in combinations like red, white and gold, afford a striking and happy contrast to their bareboned predecessor of the war and post-war periods. The duckling hatched under grim necessity shows promise of becoming a beautiful swan.

Manufacturers of Tools Are Missing a Great Opportunity

NOW that the time has rolled around for securing exhibition space at the annual convention of the American Electric Railway Association at Cleveland next October, one is tempted to review the list of exhibitors at last year's convention, having in mind the very few tool manufacturers who have availed themselves of this medium of acquainting the industry with the value of their products with respect to servicing buses.

With the ever-increasing sale of buses as an auxiliary transportation for railway utilities, the need for proper servicing grows daily. Investigation reveals that in instances too numerous to mention the railway companies operating bus lines are at a loss to make emergency or general repairs due to lack of the proper tools. That these tools are being manufactured for every class of bus goes without saying. On the other hand, very few bus operating companies know that the right tool for the right job is available, which brings up the all-important subject of proper exhibits at a convention which attracts practically the entire personnel of the industry.

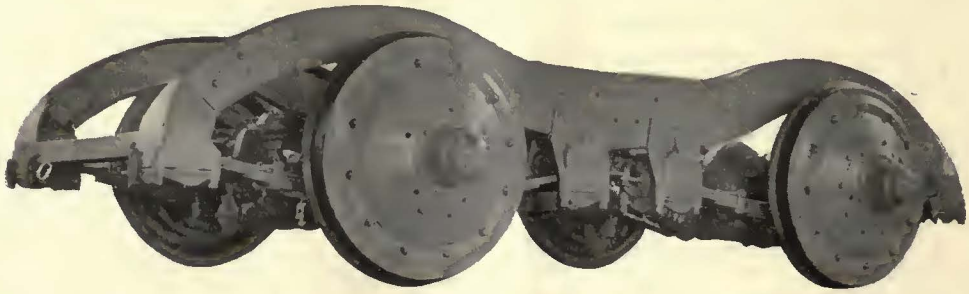
It appears to the JOURNAL that an exhibit of these tools is highly important and will be of mutual benefit to the railway companies and the manufacturers. It is one thing to have a fine stock of tools adapted for all purposes of repair and quite another thing for them to repose unexploited upon the shelves of the manufacturer. A golden opportunity is being missed in this respect, and in a spirit of absolute disinterestedness the JOURNAL suggests that tool manufacturers join the big parade in order that every one concerned may profit by physical inspection of their wares.

As illustrative of the value of showing a tool for every purpose and every job, one prominent member of the American Electric Railway Association was high in his praise of the Annual Maintenance and Construction Issue of the JOURNAL, basing his remarks upon the improved equipment section, which illustrated a wealth of tools and devices of inestimable value to the industry. This gentleman expressed the opinion that a section of this kind not only would give the master mechanic a splendid idea of the tool, and create a desire to possess one in his shop, but it would benefit the manufacturer in one of his greatest problems, i.e., making the purchaser visualize the usefulness of the tool.

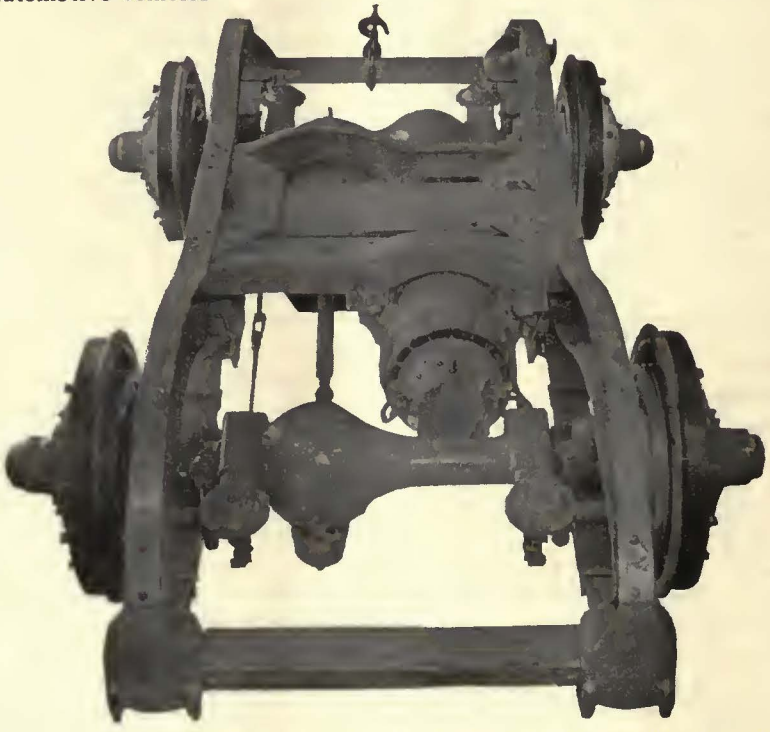
Joliet Develops

Worm-Drive Trucks to Reduce Unsprung Weight

Complete departure from conventional design is expected to reduce noise, cause less wear and tear on the car and track, and increase riding comfort



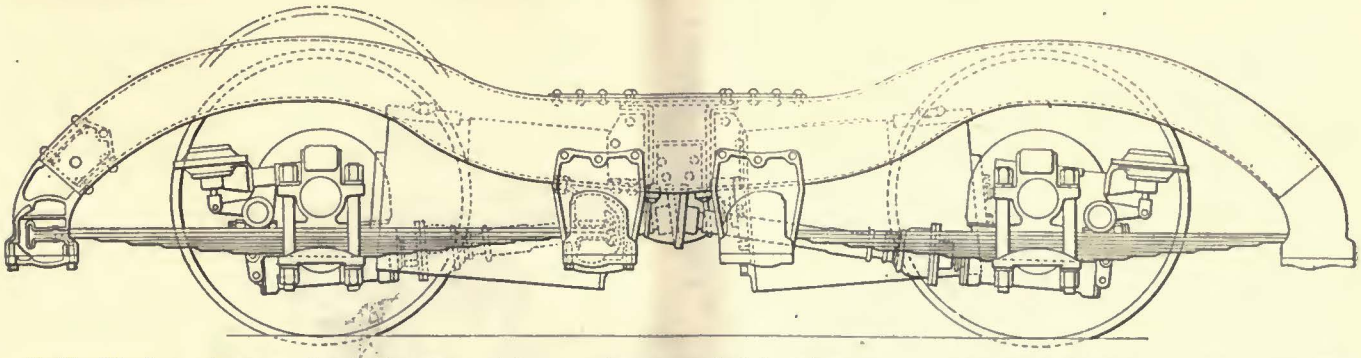
Reduction of unsprung weight, elimination of noise, smaller weight and operating economy were the objectives in the Joliet truck design. Although still considered in the light of an experiment, this departure from customary railway practice is based on the application of design features which have proved successful in heavy-duty automotive vehicles



A very simple type of construction is obtained in this application of automotive axle construction to a street railway truck. The side frames are made of $\frac{7}{16}$-in. pressed steel. The bolster is likewise pressed steel, $\frac{3}{8}$ in. thick

FURTHER radical departures from conventional design are incorporated in a pair of sample worm-drive street car trucks completed for the Chicago & Joliet Electric Railway by the Timken Detroit Axle Company. This development is the outgrowth of a conviction in the mind of J. R. Blackhall, vice-president and general manager of the Joliet property, that an entirely new standard of street car performance is needed to meet the demands of present-day conditions. As in the case of the experimental trucks for Springfield, Mass., an account of which was published in last week's issue of ELECTRIC RAILWAY JOURNAL, reduction of noise was one of the principal objectives sought. This seemed to dictate a design which would provide driving gears fully inclosed, protected from dust and immersed in oil. It also seemed clear that unsprung weight must be reduced to a minimum by carrying the driving motors on spring-suspended members of the truck framing rather than directly on the car axles. This is expected to reduce wear and tear on both equipment and track, while at the same time reducing those noises attributable to the pounding of the conventional construction over joints and special work. A gear reduction of $8\frac{1}{2}$ to 1 is used. The effect of the large gear reduction made possible by worm drive is cumulative in the design, since it permits the use of comparatively light, high-speed motors giving necessary driving power with a large saving in weight. One truck completely equipped with two Westinghouse V-91-B motors having a one-hour rating of 35 hp. and with brake apparatus weighs only 5,328 lb. This weight reduction, together with the probable increased efficiency for frequent stop service resulting from the high gear ratio, is expected to show a considerable economy in power consumption.

Several railway and automotive manufacturers col-

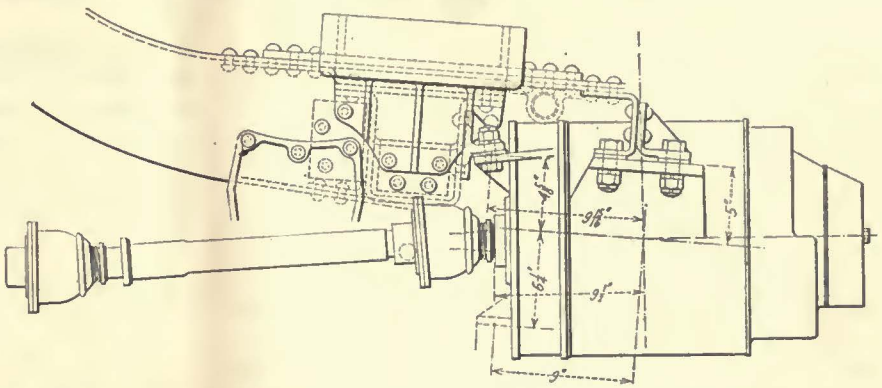


Half-elliptic springs on the Joliet worm-drive truck are carried in Masury rubber shock absorbers mounted in cast steel housings on the truck frame. A fixed pressed steel bolster is used

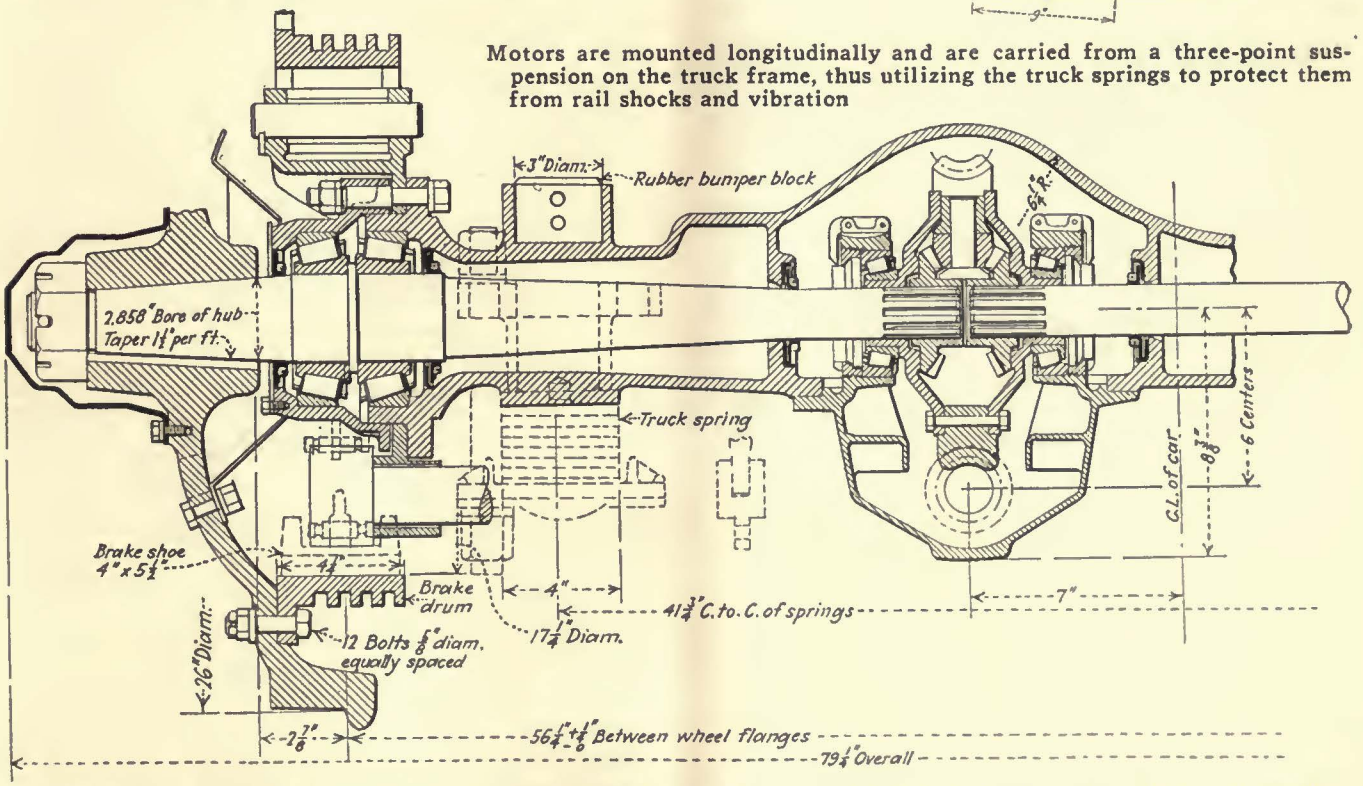
laborated with Mr. Blackhall and the Timken Detroit Axle Company in the truck design and construction. These include the Westinghouse Electric & Manufacturing Company, the Westinghouse Air Brake Company, and A. F. Masury and C. Froesch of the International Motors Company, who co-operated in the spring mounting design. Special section rolled-steel wheels were furnished by the Standard Steel Works. The pressed-steel side frames and all other pressed-steel parts were made by the Inland Steel Products Company. Although the trucks for Springfield, Mass., and the Joliet design are similar in many respects, they differ in several important features. A fixed bolster is used in the Joliet truck, the frame is of different design and the gear reduction is 8½ to 1 instead of 10 to 1 used by Springfield.

A specially designed body of combination wood and Duralumin is being built by the Cummings Car & Coach Company. This will be 45 ft. 1 in. long over all, 8 ft. 6 in. wide and 11 ft. ½ in. extreme height. The body will be arranged for one-man, two-man, double-end operation with automatic rear exit doors and will seat 51 passengers. It is estimated to weigh 14,000 lb. with all equipment. This will make the weight of the car complete with double trucks and four motors approximately 24,600 lb.

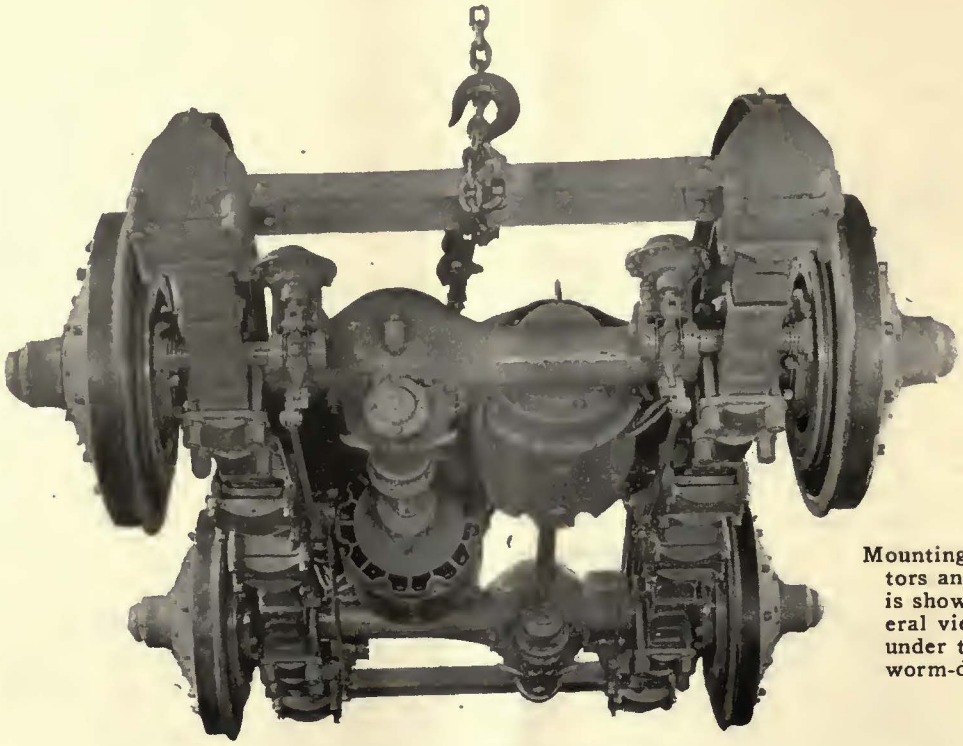
The worm-drive axle is not new in principle but is an adaptation of construction features which have been successfully used on heavy-duty automotive vehicles. It is of the underslung worm, fixed-hub type. The housing



Motors are mounted longitudinally and are carried from a three-point suspension on the truck frame, thus utilizing the truck springs to protect them from rail shocks and vibration



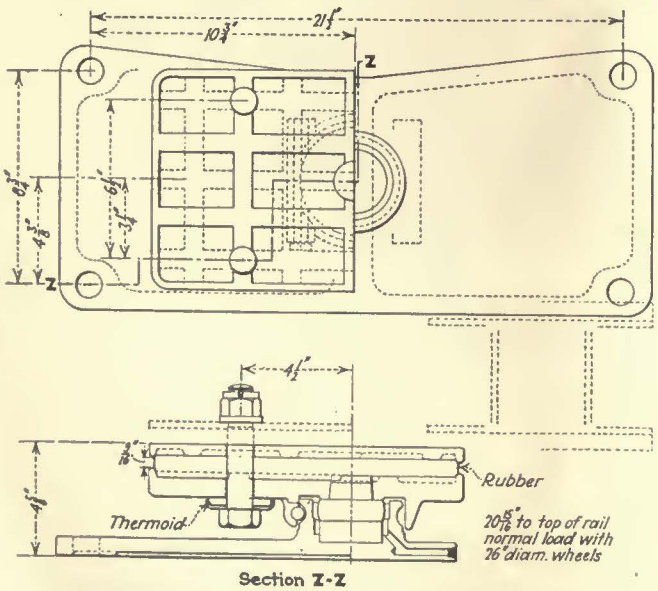
Cross-section through the Timken worm-drive car axle shows the special dished wheel section which reduces the overhang at the wheel bearing. The underslung worm has a clearance of 4 in. to the rail



Mounting of the motors and drive shafts is shown in this general view looking up under the new Joliet worm-drive truck

is a one-piece steel casting with the worm carrier bowl offset from the center so as to permit the motors to be offset in the truck, driving in each case the far axle by a short driveshaft connected through two Spicer universal joints. Spring seats for the 4-in. wide half-elliptic truck springs are cast integral with the axle housing. The axle shafts are made of heat-treated alloy steel, designed with a large margin of safety for the calculated loads. Compared with the conventional automotive shaft the spline end is quite small in proportion to the load end. This is for the reason that the maximum torque that can be exerted is considerably less than in automotive practice because of the relatively small coefficient of friction between steel wheels on rails in comparison with that obtained on a rubber-tired vehicle.

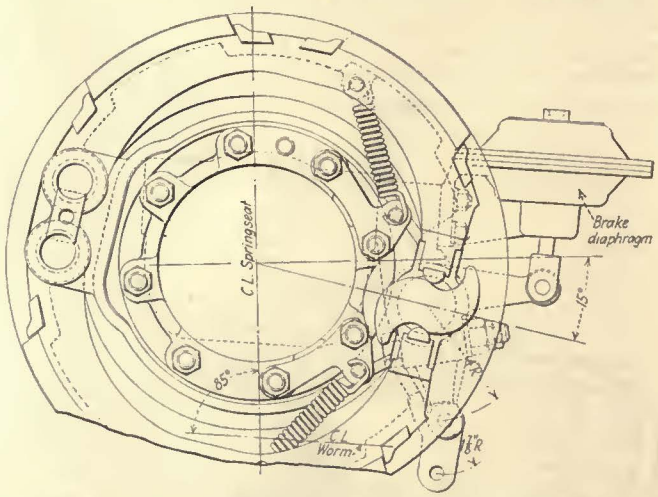
Customary factors of safety have been considerably increased in the sample truck. A 3-in. axle diameter is used in place of 2⅝-in., which has proved satisfactory



Section Z-Z

A rubber pad to absorb vibration and noise is used at the center bearing

in heavy-duty vehicle practice under the same loading. By the use of dished steel wheels a still further improvement is made over automotive practice. With the conventional fixed-hub automotive axle it is customary to have a considerably overhung load on the wheel bearings because the small inside diameter of the rubber tire does not permit dishing the wheel to bring the cen-

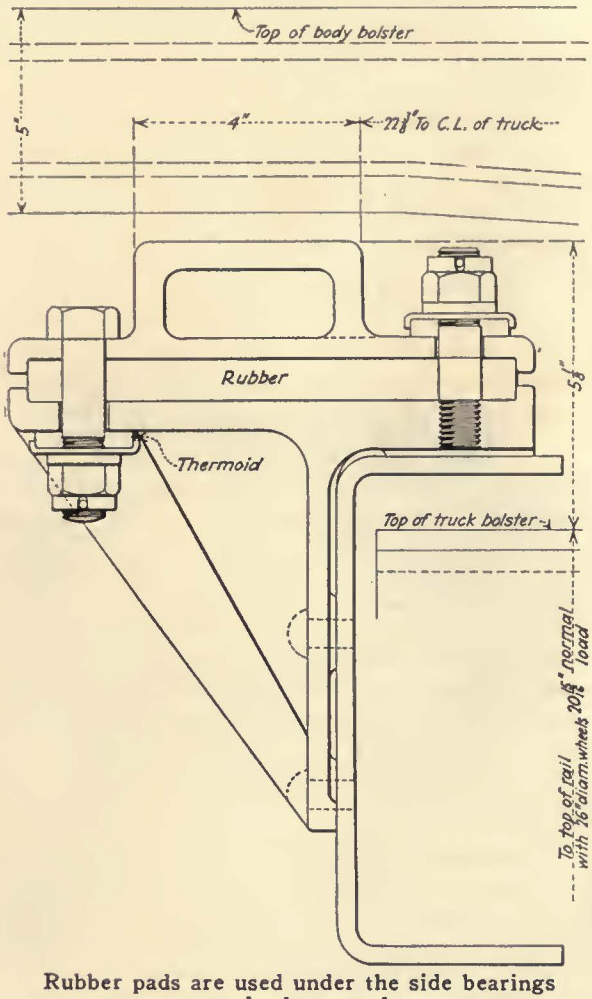


Westinghouse automotive type brake diaphragms are mounted on the axles adjacent to each wheel. The brake drums are bolted inside the special wheels and have a diameter of 17¼ in. The effective braking sufface is almost four times that obtained in automotive vehicles

ter line of the tire in line with the wheel bearing. In the Joliet car axle the dished wheels materially reduce the overhung load and the only serious bending stresses expected are those due to thrust on curves.

The wheels have a taper fit on the axles and are held in place by a nut on the end, covered in turn by a protecting cap. Clearance under the worm housing is 4 in. to the rail. Westinghouse automotive type brake diaphragms are carried directly on the axle housings and are connected through the brake mechanism to the internal expanding shoes at each wheel. The brake drums are 17½-in. diameter with 4-in. face. They are

bolted to the inside of the wheels and have fins turned on their outside surface to improve heat radiation. There is $\frac{7}{16}$ in. of effective wearing metal to insure long life before renewal is necessary. Two brake blocks are used on each shoe, having an area 4 in. x 5½ in. Almost four times the braking surface ordinarily provided on buses is thus obtained. Comparisons of weight per unit of brake block surface on present cars and buses with



Rubber pads are used under the side bearings to deaden sound

that on the experimental trucks gives an expectancy of between 75,000 and 100,000 miles per set of blocks.

Side frames of the truck are made of $\frac{5}{16}$-in. pressed steel in channel form, proportioned to carry the loads and give necessary stiffness. The fixed bolster is made of $\frac{3}{8}$-in. steel, pressed into the form of a deep pan, with a cover plate of the same material riveted in place. It is attached to the side frames by gusset plates. Rubber pads of special design are to be used between the bolster and the center bearing to reduce noise and vibration and to improve riding.

Four-inch semi-elliptic springs of automotive type are securely clamped by bolts under the spring saddles provided on the axle housings. At their ends these springs are carried in Masury rubber shock insulators mounted in special cast-steel housings on the truck side frame, as shown in accompanying illustrations.

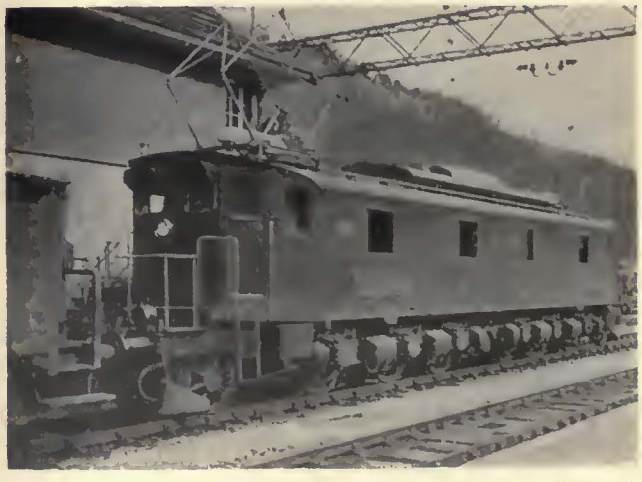
The motors are securely carried on three-point suspensions in the truck frame, so that they are fully protected from vibration and shock through the truck springs. They are wound for 300 volts and are permanently connected in series in pairs of two, for operation on 600 volts. Series parallel control is obtained by treating each pair of two motors like a single motor on an ordinary two-motor control car. The mounting is so arranged that the motor may be readily dropped out of the truck for quick replacement or repair.

Use of automotive type air brakes permits a very simple and workmanlike brake rigging construction which is expected to eliminate much of the rattle attributable to the customary type of street car foundation brake rigging. Adjustment for wear on brake blocks can be conveniently made through an adjustment nut on the brake application shaft. The equipment is arranged so that a hand brake can be conveniently attached. It will be arranged so as to apply the brakes to only one truck from each end of the car. This is considered ample to hold the car on a grade.

Although the new trucks are such a wide departure from customary practice as to make many features of the design experimental in nature, experience with this type of construction in automotive practice indicates a reasonable expectancy of low maintenance and long life. It is claimed that 500,000 miles of life is not uncommon for this type of axle in heavy-duty automotive practice, and that 1,000,000 miles should be obtained under the reduced loads and shocks encountered on street cars. On the basis of an average annual mileage of 40,000 this would give a 25-year life.

Largest Electric Locomotive in Europe

CLAIMED to be the most powerful in Europe is an electric locomotive of the Berne-Lötschberg-Simplon Electric Railway which began service July 22, 1926. There are six driving axles, each driven by two Westinghouse twin motors with quill mounting. Each twin-motor group has a one-hour capacity of 700 hp., making the total capacity of the locomotive on this rating 4,200 hp. The one-hour tractive effort of the locomotive is 22,600 kg. and its starting tractive effort is 34,-



The latest Simplon-Loetschberg locomotive is said to be the most powerful in Europe

000 kg. Its normal speed is 75 km. (47 miles) per hour and it is capable of hauling a trailing load of 586 metric tons up a grade of 2.7 per cent at a speed of 50 km. (31 miles) per hour. The weight of the locomotive is 135.5 metric tons, of which 68.5 tons represents the electrical part and 67 tons the mechanical part. The length of locomotive over all is 20.2 meters or 64 ft. 4 in. The drivers have a diameter of 53¼ in.

Energy is taken from the overhead system at 15,000 volts, 16⅔ cycles.

Electric Locomotives Stand Up Well in Service

After Nineteen Years Operation St. Clair Tunnel Equipment Is Available for Service 97.7 Per Cent of the Time, with Low Maintenance Costs

NINETEEN years ago the St. Clair tunnel of the Grand Trunk Railway, now the Canadian National Railways, between Sarnia, Ontario, and Port Huron, Mich., was electrified with the single-phase alternating-current system at 3,300 volts. Speaking before the heavy electric transportation class of the Westinghouse Club, Walter D. Hall, superintendent of the tunnel, gave an interesting account of the service that has been performed by the equipment in that time, a portion of which is given in the following abstract.

The electric service was inaugurated in 1908, with six 67½-ton Westinghouse Baldwin electric locomotives. In 1908 these locomotives made 154,392 miles, hauled 288,516 cars weighing 9,231,500 tons. Last year, 1926, these same locomotives made 248,025 miles, hauled 468,760 cars weighing 19,696,708 tons.

In the nineteen years since these locomotives were first operated they have hauled 6,617,590 cars, 268,917,150 tons and made about 3,934,010 miles, an average of 655,660 miles per locomotive; during all these years there is not a total of one hour's delay charged to locomotive failures, and in their nineteenth year, 1926, they were available for service 97.7 per cent of the time; time not available being made up as follows:

	Per Cent
Changing wheels, mostly due to soft tires	0.57
Electrical, changing armatures, etc.	0.57
Mechanical, equalizers, brake rigging, pinions, etc.	0.33
Hydrostatic and hammer tests and other tests for government reports	0.63
Derailment damage	0.20
Total	2.30

The average cost of maintenance per locomotive-mile over the entire period was 9.45 cents. Last year, 1926, this cost was 6.21 cents per locomotive-mile, cost per car-mile 0.659 cent, and cost per ton-mile 0.015 cent.

The locomotive auto-transformers have been rewound once and the commutators of the traction motors were renewed once. The fields of all motors have given practically no trouble. Five air compressor armatures have been repaired, but there has been practically no trouble with the blower motor armatures. Controllers and wiring have required only proper inspection and care. Three or four preventive coils have failed and practically all the union joints in copper rods from these gave trouble at some time, apparently due to the piece of fine copper gauze used in them; the gauze perishes and leaves a loose joint.

The pinions and gears have done remarkably well. Some pinions have exceeded 200,000 miles when removed. Some of the original gears are still in service, having made about 655,000 miles.

The frames of these locomotives are rigid from end to end and on account of the many curves encountered in the terminal yards wheel mileage has been low; on account of sharp flanges experiments were made with oil and hard grease applied in various forms, but without success.

At that time, 1910, the yard engine tires were making about 42,000 miles between turnings, and a maximum of about 250,000 miles, which meant a lot of time lost over the pit as well as a big expense. Realizing the seriousness of the situation, Mr. Hall and one of his foremen rigged up an old lubricator body with spray nozzles, similar in principle to an atomizer, so that the engineers could spray oil onto the wheel flanges when approaching curves by pressing a contact button at any of the controllers. This was so satisfactory that some of these tires made more than 150,000 miles between turnings and a total of more than 300,000 miles. The bearings of these locomotives have given practically no trouble.

Improvements Made in Overhead Lines

Strain insulators began to blow up during wet weather and it was found that due to a slight movement having taken place in the insulator, or perhaps due to expansion, the ends had cracked and soot and acid from steam locomotive gases were washed into these cracks during rain storms; this difficulty was overcome temporarily by making shields of sheet fiber which were wrapped around the insulators, allowing the shield to extend beyond the ends about 8 in.

As opportunity presented other insulators were installed, but even with these some difficulty was experienced when hauling heavy ore trains beneath them with steam locomotives; the exhaust gases and moisture would short circuit insulators and result in a ground to the bridge structure; this trouble was overcome by placing two insulators in series a sufficient distance apart to prevent gases emitted from the locomotive stacks striking both at the same time.

In the tunnel were 480 insulating devices which supported two trolley wires from parallel messenger cables. The insulating medium was about 6 in. of impregnated wood. The two messenger cables were supported on barrel-type porcelain insulators. Apparently due to unequal expansion and contraction, the barrel type insulator would sometimes crack, and during damp weather the 480 wood insulators allowed sufficient leakage to blow up the line. An average of eleven short circuits per year resulted from this cause and some danger was present at all hours during the night or day. The wood insulating devices were assembled with hexagon-headed bolts and hexagon nuts and were very difficult to get at even with a box wrench.

To overcome this difficulty 480 insulating supports were made of ⅛-in. x 1-in. strap and standard 10,000-volt pin-type insulators. This was in 1915, and since that time there has not been a single failure, although the barrel-type insulators continue to crack, and sometimes sections even break away and fall to the floor of the tunnel. In this device bolts square under head and square nuts are used so that they can be easily and quickly removed from the line.

Emergency Service at Montreal Completely Motorized

ALL horses of Montreal Tramways, Montreal, Que., used in the past for construction activity and assisting in maintenance of overhead lines, have been sold. Motors have taken their place. The company's stables on Cote Street are now in process of demolition. Car storage tracks will replace the building. Thirty horses comprised the company's equine fleet, grandsons and great-grandsons of the source of power for the old-time horse cars in Montreal. They were all in good shape and brought good prices when they were sold.

Buses and Cars Give Co-ordinated Local and Express Service

By George H. Harris
General Manager Key System Transit Company, Oakland, Cal.

Key System Transit Company has reduced running time between Oakland and Berkeley by five minutes. The fare is the same for both types of service, with free transfer

Express car and local bus in the co-ordinated service recently established by Key System Transit Company

USE of buses in conjunction with street cars, not as feeders, but along the same route, providing local service and leaving the tracks for express service by cars, is being tried by the Key System Transit Company, Oakland, Cal. This railway serves a metropolitan area populated by some half million persons. Consequently on a number of long car routes rapid transit is desirable. Most important of these are the routes between Oakland and Berkeley, which are separate municipalities, but in reality form one large community.

Three car lines operate between the downtown districts of the two cities, via College Avenue, via Telegraph Avenue and via Shattuck Avenue, the two latter running on Telegraph Avenue to a point some 40 blocks from down-town Oakland where Shattuck Avenue branches to the left and, later swinging to the right, becomes Berkeley's principal business street. The Telegraph Avenue line, which is a little longer between the two business centers than is the Shattuck Avenue line, was chosen for the experiment because it is a direct run between the campus of the University of California and the rapidly growing business district on the Oakland side of the campus. From a point a block distant from the campus it veers to the left to rejoin the Shattuck Avenue line in the heart of the Berkeley business area. Traffic on this route is exceptionally heavy.

Fewer Stops Recommended

Steps which led to the plan now in operation are interesting. Two years ago, in the interest of better service to the public, a survey of the traffic situation was made by a committee of three composed of representatives of the California State Railroad Commission, the city of Oakland, and the railway. This committee recommended the establishment of feeder bus lines in various parts of the city, reducing the number of car stops from 13 or 14 per mile to eight and consideration of some form of express service to outlying districts.

After the two first recommendations had been carried out attention was directed to a study of the third. Express bus service between Oakland and Berkeley was first considered and an application was filed for per-

Passengers enter at front and deposit fare in Johnson box

At the rear a sizable well is provided to accommodate passengers leaving by the automatic rear door

mission to put it in operation on a 10-cent fare with the approval of the two cities concerned. Further study indicated that 10 cents per passenger would be insufficient, so the application was withdrawn and revised to call for a 15-cent fare. Meeting with the disapproval of the cities, this, too, was withdrawn. As a result of further consideration the system now in use was developed.

Buses are operated on a local schedule out Telegraph Avenue as far as Alcatraz Avenue, which is about two-thirds of the distance between the two business districts and is the approximate boundary line of the two municipalities. Telegraph Avenue cars operate on an express schedule of three stops to the mile as far as Alcatraz Avenue and then resume local operation. Shattuck Avenue cars run on the same schedule as far as Shattuck Avenue on Telegraph and there resume local operation.

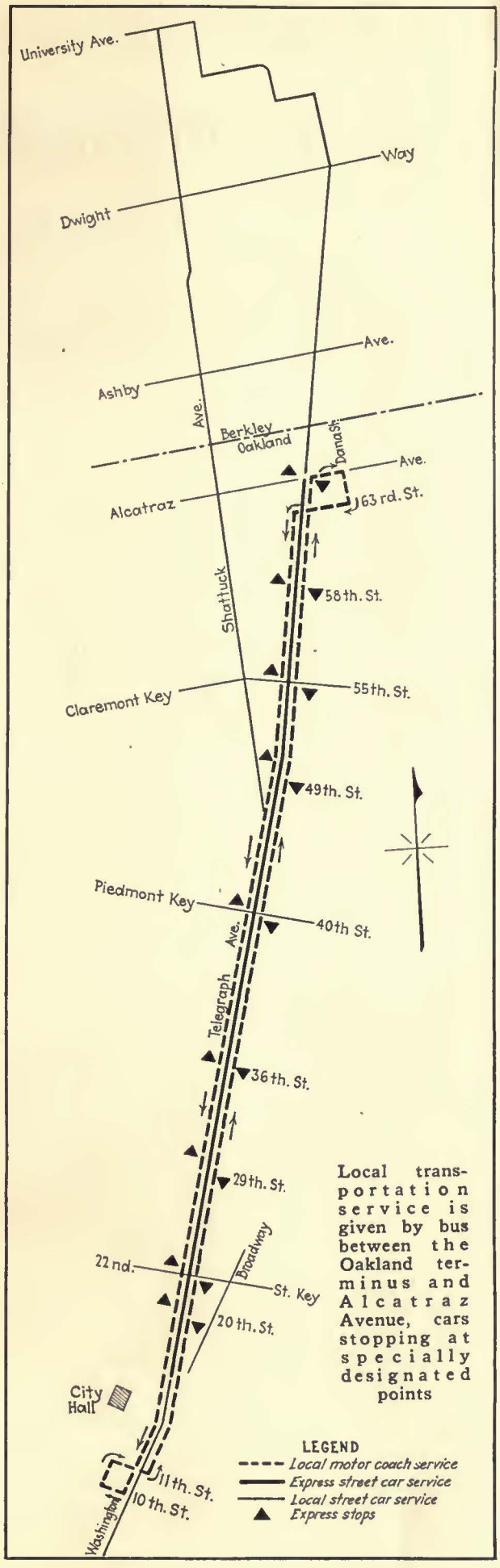
The fare for both buses and street cars is the same as in other sections of the cities—7 cents—and passengers boarding buses outside of the downtown areas, where the cars make regular stops, may transfer to cars at any express stop. Oakland-bound passengers on express cars may leave at any stop along the route provided they have boarded the cars outside the express limits.

The present express service on the Shattuck and Telegraph Avenue lines, respectively 5 and 6 miles long, saves from three to five minutes per trip between the business districts. Cars are operated on a ten-minute schedule and the buses every four, six, or 7½ minutes, depending on traffic conditions.

Buses Have Automatic Rear Exit

For this service fourteen Fageol 29-passenger buses are used. The bodies are all steel and were designed by the railway's engineers. They are the front-

Passengers transferring between car and bus at an express stop



entrance, rear-exit, single-deck, pay-as-you-enter type. The rear door is controlled by a treadle step. In addition the rear door may be operated by compressed air from the driver's seat, the front door being similarly manipulated.

How successful this experiment will be it is still too early to determine, but the management is optimistic. If it proves as successful as is hoped this type of operation will be extended to other sections of the metropolitan area.

Cincinnati Remodels Interior of Cars

Electric Heaters and Cross Seats Installed in 21 Pay-as-You-Enter Cars—All Thoroughly Painted Before Return to Service

INTERIORS of 21 double-truck pay-as-you-enter cars were recently remodeled by the Cincinnati Street Railway, Cincinnati, Ohio. These were manufactured by the Cincinnati Car Company and originally had longitudinal seats to accommodate 34 passengers. Replacing these with twelve cross seats, two longitudinal seats on one end of the car and one longitudinal seat at the opposite end of the car has improved greatly the interior appearance as well as providing additional

Full-upholstered Spanish leather seats are a feature of the new equipment

comfort for the passengers. The upholstering of these seats, which are of Hale & Kilburn manufacture, is in Spanish leather. The color creates a pleasing contrast with the mahogany stained interior finish and the cream headlining.

One Railway Utility Chromalox heater is installed under each cross seat and four are installed in the front vestibule. The cross seats are spaced at 31 in. centers and the seating capacity of the car with the new seats is 34.

The outside of the car is painted burning bush orange with cherry enameled sash, cream letterboard and cream window posts. A black stripe makes a very favorable appearance. Painting the trucks red and the roof slate gives a pleasing contrast of colors. Electric Service Supplies Company air-operated sand valves facilitate sanding. The remodeling of these cars was part of the 1926 reconstruction program.

The Men Who Are Responsible for the *Annual Maintenance* of Electric Rail

SEVERAL new features were included in the annual maintenance and construction issue of ELECTRIC RAILWAY JOURNAL dated March 19. A maintenance notebook section began with this issue and will be continued in the monthly maintenance and construction issues to supply desirable information on maintenance practices for the men who are actually doing the work. A very complete section was devoted to improved devices and equipment for carrying on maintenance work. The new and special tools illustrated point the way to reduced cost and higher grade maintenance workmanship.

The articles in the issue were written by men who have made outstanding progress in the improvement of maintenance practice. ELECTRIC RAILWAY JOURNAL takes this means of thanking them for helping to make this issue so successful by contributing of their time to tell the electric railway operators the results of their experience.

That the industry appreciates the efforts of those who contributed to the issue is evidenced by the many letters received from electric railway maintenance men throughout the country. The following are extracts from some of these comments:

JAMES E. DOOLEY, master mechanic New Haven Division of the Connecticut Company, writes:

"To my mind the maintenance data sheets of the JOURNAL of March 19 are what all equipment men need, so let this good work go on."

H. E. WEYMAN, manager Levis Tramways Company, comments in part as follows:

"I would like to congratulate you on your maintenance notebook section, which I think will prove a real help to the industry. I assume it is your intention to include track and overhead maintenance data sheets and special tools developed for the work, which will be of considerable interest. Some of the special tools developed by railway companies are very good and should lead to further developments and improvements."

E. S. FITZ, operating manager Gulf States Utilities Company, Beaumont, Texas, comments as folows:

"Your new maintenance notebook section, started in the March 19 issue, appears to me to be a step in the right direction, since these sheets will be available for filing much better than clippings that many of us have been taking out of the JOURNAL in the past. Our organization, I know, will be glad to contribute to this department whenever we feel that we have some ideas that would be of benefit to your readers."

J. L. SMITH, superintendent motor coach department, Toronto Transportation Commission, says in part:

"I have read the maintenance notebook section in your March 19 issue with a great deal of interest and I think that a full set of articles along this line will be very valuable indeed to electric railway men."

CLAUDE BRYAN, engineer of ways Wilmington & Philadelphia Traction Company, says in part:

"I have read very carefully the issue of ELECTRIC RAILWAY JOURNAL of March 19. Your maintenance notebook section starting in this issue is a mighty good thing and I think it will prove very valuable to electric railway men."

From H. A. LEONHAUSER, assistant superintendent of rolling stock and shops the United Railways & Electric Company, Baltimore, Md., comes this letter:

"Your annual maintenance number containing the new maintenance notebook section, as well as the JOURNAL in its entirety, appeals to me very much."

J. B. CORDERMAN, master mechanic Lima-Toledo Railroad, Toledo, Ohio, says:

"I think your annual maintenance number of March 19 is fine. It is a real help to the shop men and is good for the management as well. Any property that is worth operating should be in good condition."

JOHN LINDALL, superintendent rolling stock and shops Boston Elevated Railway, says in part:

"Please accept my congratulations on the many timely and interesting articles contained in your March 19 issue of ELECTRIC RAILWAY JOURNAL. Maintenance men will undoubtedly read this issue from cover to cover. Your proposition to provide a maintenance notebook section looks good to me, as it will enable maintenance men to have such notes in convenient form for ready reference. More power to you in the good work."

E. K. MILES, superintendent of transportation New York State Railways, Syracuse, writes:

"Your issue of March 19 leaves nothing to be desired from a maintenance standpoint. The description and explanation of shop equipment was exceptionally fine."

J. E. COLLER, division superintendent Pittsburgh Railways, comments as follows:

"I have read most of your annual maintenance number and I think it is very interesting and useful, and I hope to follow up the suggestions made."

Condition of Electric Railways Commend *and Construction Issue*

way Journal

A. F. REXROTH, master mechanic Harrisburg Railway, says:

"Fine! I never saw a better number."

FRANK E. SHERIDAN, master mechanic Boulder Street Railway, Boulder, Col., says:

"I wish to compliment you on the various articles on high class maintenance in your March 19 annual maintenance issue. They are very instructive to the maintenance man."

D. L. FENNELL, superintendent of transportation Kansas City Public Service Company, writes:

"A very fine issue and in keeping with your high standards. I have read most of it with great interest. Why not have special issues devoted specifically to transportation practices, accident reduction, claims work and selling rides?"

D. E. BLAIR, general superintendent Montreal Tramways, says in part:

"Your issue of March 19 is very interesting. I would especially commend the maintenance notebook section. My experience is that most of the small repair shops around the country are equipped very badly in the way of reference data."

NELS C. RASMUSSEN, superintendent Wisconsin Valley Electric Company, Wausau, says:

"You struck the right idea. This certainly will be the best reference library that the operating men have ever had. Wish you luck in this good work."

HERMAN EICKHOFF writes from Philadelphia as follows:

"In conducting any business efficiently and progressively, it is absolutely necessary continuously to inform ourselves of what and how our competitors are proceeding and the ultimate results accomplished. Your annual maintenance number of March 19 gives just such information. I am sure that it is welcome to the great majority of your readers. Permit me to congratulate you upon the timely improvement."

W. J. SMITH, master mechanic Twin City Lines, Minneapolis, says:

"I was very much interested in reading the articles in your March 19 issue. Am sending a note to all the foremen in this department asking them to read the various articles."

HORATIO BIGELOW, superintendent of railway South Carolina Power Company, Charleston, writes:

"My compliments on your March 19 issue of the JOURNAL. I am pleased particularly with the maintenance notebook section. So often a problem arises, you remember a solution suggested in the JOURNAL, but it takes time to spot the article. The maintenance notebook will help in this regard. I suggest that comparative pull-in records and maintenance costs be included in this section, if possible."

J. W. HULME, assistant superintendent of car equipment Interborough Rapid Transit Company, New York City, says:

"The maintenance number of ELECTRIC RAILWAY JOURNAL for March 19 was a big success and fills a much-needed want. I consider it the most progressive step the JOURNAL has ever taken."

A. F. TOWNSEND, local manager Northern Texas Traction Company, Fort Worth, Tex., says in part:

"We have received and read the annual maintenance number of the JOURNAL with a great deal of interest. This is a splendid edition and reflects a great deal of work and thought upon the part of those responsible for it.

"I think the notebook section, starting in this issue, is an advanced step in trade journal work, and will be of great value to the industry as time goes on."

NILES PERSONS, master mechanic Schenectady Railway, makes the following comments:

"I have read the March 19 annual maintenance issue or ELECTRIC RAILWAY JOURNAL with much interest and do not hesitate to say that it is one of the best issues I have ever read. I was particularly interested in the article and pictorial section of the new DeKalb Avenue shop of the Brooklyn-Manhattan Transit Corporation."

From P. W. J. SMITH, superintendent New York, Westchester & Boston Railway, comes the following:

"I think the March 19 issue was fine. The articles on proper maintenance had the kick that most of us need, and if followed properly should bring about considerable good to all departments. We obtained many good points from this issue from the experience of others."

R. A. BIRD, Portland Electric Power Company, Portland, Ore., says:

"Being a transportation man, I do not know much about the maintenance part of the business, but I enjoyed the March 19 issue of ELECTRIC RAILWAY JOURNAL very much and got a lot of valuable information from reading it."

J. W. KNECHT, superintendent Grand Rapids Railway, said:

"I enjoyed the March 19 issue of ELECTRIC RAILWAY JOURNAL very much. A maintenance issue always creates much interest among operating employees. The maintenance notebook feature is excellent and should be read by all equipment employees."

H. A. DAVIS, superintendent of railway Nashville Railway & Light Company, commented in part:

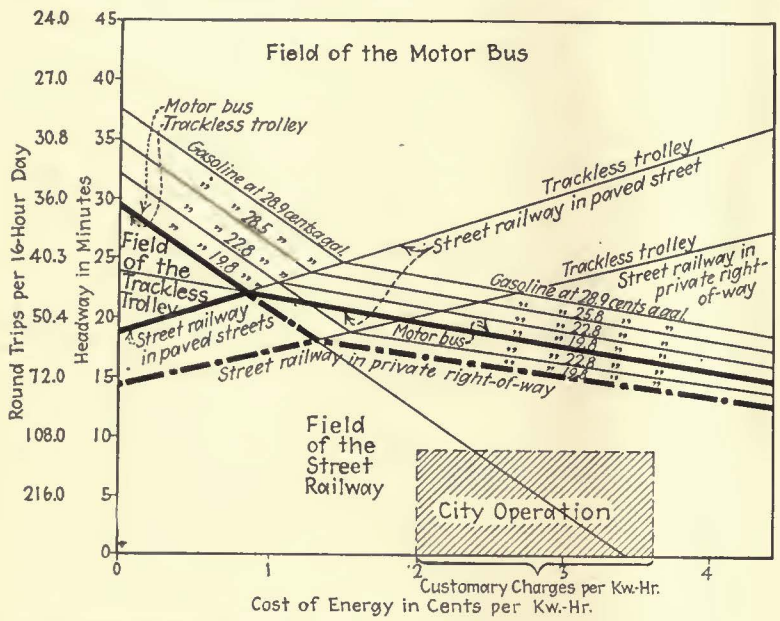
"Your annual maintenance number is a great step forward in solving one of the greatest problems any company has to contend with. I do not believe that we have yet awakened thoroughly to the realization that poor equipment inefficiently maintained will soon demoralize an entire organization—with disastrous results.

"It is equally important that each employee in the mechanical department know his job and be trained thoroughly in the performance of his duties, in order that unnecessary loss of time be eliminated. Old material and old and worn-out equipment help to demoralize the organization. Keep up the morale of your employees by keeping up the equipment, is my advice to any organization. We congratulate you upon this maintenance issue."

Choice of Motive Powers in City Service

Economic Merits of Electric Railway, Trackless Trolley and Motor Bus Operation Charted by Dutch Engineer

GRAPHICAL presentation of the conditions under which each of the three modes of city transit, namely, electric railway, trackless trolley and motor bus, would be the most economical under any given set of conditions has been essayed by P. M. Montijn of the Hague, Holland, Tramway company. In an article in *Verkehrstechnik* for Nov. 26 he works out the basic formulas. In doing this he has taken the costs of the various items as they apply in Holland, but explains that the method is applicable to other conditions if the constants used are changed to fit the particular problem considered. In converting Mr. Montijn's financial data



This chart shows the fields of the electric railway, trackless trolley and bus under Holland double-track operation conditions

and conclusions to dollars, the Dutch florin has been taken as worth 40 cents. His initial assumptions follow:

A_s = cost per mile of track, overhead line and feeders for street railway
- (a) single track in paved streets.....$22,400
- (b) single track over own right of way (including real estate)..... 32,000
- (c) double-track line in paved streets..... 38,400
- (d) double-track line over right of way..... 51,200

A_t = cost per mile of overhead line and feeders for trackless trolley
- (a) single line with two overhead conductors.$14,080
- (b) double-track lines with two overhead conductors 18,560

t_s = interest and sinking fund on A_s
- (a) when laid in paved streets..... 8 per cent
- (b) when over private right of way. .... 7 per cent

t_t = interest and sinking fund on A_t..... 9 per cent

t'_s = interest and sinking fund on first cost of the street railway cars..... 7 per cent

t'_t = interest and sinking fund on first cost of the trackless trolley buses.....12 per cent

t'_a = interest and sinking fund on first cost of the motor buses.....16 per cent

a_s = maintenance per car-mile in cents of track and overhead on the street railway.....0.9

a_t = maintenance in cents per bus-mile of the trackless trolley overhead line.....0.5

b_s = maintenance in cents per car-mile of the street railway car.....3.2

b_t = maintenance in cents per bus-mile of the trackless trolley bus.....6.4

b_a = maintenance in cents per bus-mile of the motor bus 8.3

B = first cost of a car or bus for 35 passengers (same for each of the three systems).....$6,000

p_e = cost in cents of a kilowatt-hour ..... 2 to 3.6

p_b = cost in cents per gallon of gasoline (or "benzine") * .....19.8 to 25.8

c_s = kilowatt-hours per car-mile for the street railway 0.8

c_t = kilowatt-hours per bus-mile for the trackless trolley 1.6

c_a = gallons of gasoline per bus-mile for the motor bus 0.17

m = average distance in miles covered by each vehicle in a day.....109

Reserve rolling stock for time spent in shops and extra trips of 20 per cent is assumed for all three types of transit, although the author says that actually a smaller reserve would be required for the railway than for either bus system. The assumption is made that the street car will have a life of 30 years, the trackless trolley of twelve years and the motor bus of eight years, with an average daily performance for each of 109 miles as already mentioned. No charge for the use of the streets by the buses is included, but the railway track maintenance expense includes the paving charges paid at present by the Hague Street Railway.

From these data the author develops a series of formulas for the yearly cost of operation with each kind of motive power, and on the basis of these formulas two charts were prepared. One is for single-track operation and the other for double-track operation. The latter is reproduced on this page. That for single-track operation has a somewhat similar form.

In discussing the double-track chart the author points out that it shows that even with energy as low as 0.4 cent per kw.-hr. the field of the trackless trolley, as compared with the street railway, would lie only between headways of 17 and 26 minutes for the railway built over private right of way and between 20 and 26 minutes as compared with the railway laid in paved streets. Hence, even at this low cost of energy, the area of the field for the trackless trolley is so small and restricted that a slight change in the headway of the service given would throw the trackless trolley into the field of economic disadvantage. Of course with these long headways the railway would probably be single track, not double track, and the opportunity for the trackless trolley would be even less. Finally, with electrical energy costs at the usual figure of from 2 to 3.6 cents per kw.-hr. the choice really lies between the electric railway and the motor bus.

The author then discusses the fields of the motor bus and trolley and also calls attention to the rectangle in the lower right-hand side of the chart marked "City operation." It will be noticed that this rectangle includes all headways of less than nine minutes where

*The figures in this calculation are based on the use for fuel of benzine which is the customary fuel in Europe instead of gasoline. The word "gasoline" is used in the chart and elsewhere in this article so as to make the formulas more easily usable by American users.

electrical energy can be purchased within the limits of from 2 to 3.6 cents per kw.-hr. These are the customary rates in Holland, so that this area represents the usual conditions of city operation. The author points out that it is well within the area on the chart representing the field of the street railway. Still another advantage of railway operation, not shown in the chart because the chart is based on the use of single units only, is the railway's far greater adaptability to the operation of trailers.

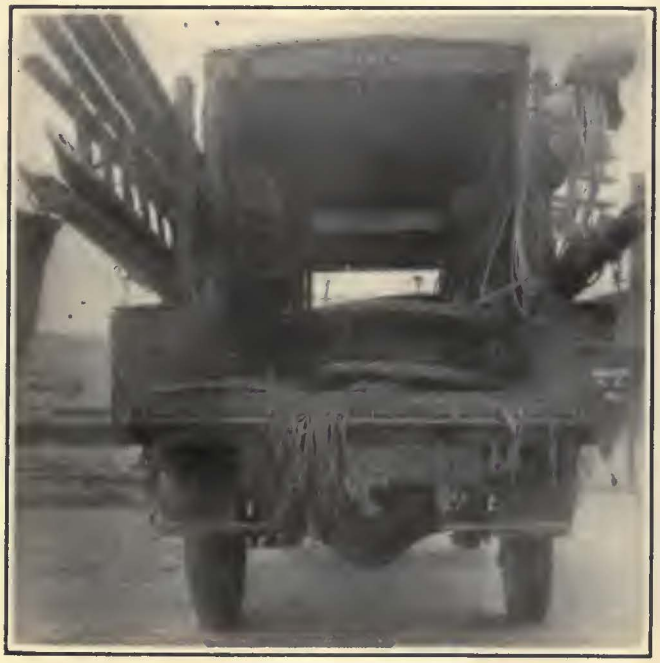
In conclusion, the author compares the results of his study with those reached by Victor Topping in an article in the ELECTRIC RAILWAY JOURNAL for Aug. 25, 1923. Although the basic conditions in the Canadian example discussed by Mr. Topping vary considerably from those in Holland, the conclusions reached by the two investigators are considered by Mr. Montijn to be not very far apart.

North Carolina Public Service Builds Construction Truck

BELIEVING that a construction truck body containing certain unusual features could be built cheaper in the company's shop, led C. M. Seawell, master mechanic of the North Carolina Public Service Company, Greensboro, N. C., to design and construct such a body.

A General Motors Corporation truck chassis, model K-32, having a weight of 3,943 lb., was purchased. A semi-inclosed body made of well-seasoned oak timbers was erected on this chassis and reinforced with heavy angle braces, bolted securely to the chassis. The roof consists of ¾-in. pine boards fastened to 1-in. x 3-in. oak cross-beams and covered with heavy canvas, finished with several coats of paint to make it weatherproof. The flooring is made of 1-in. oak planking. Suitable drop curtains on either side of the body inclose the sides during inclement weather.

A multiplicity of strong hooks and racks inside and outside of the body provide for carrying all of the necessary working tools and equipment, such as ladders, rope and shovels. Spacious weatherproof oak tool boxes, extending the entire length of either side of the body as well as under the driver's seat, provide storage for additional tools and equipment. A 6-in. steel channel erected at the back end of the roof, and a similar channel installed on the chassis extension at the end of the floor provide a strong support for a chain hoist or a pole-lifting boom and gaff when required. The completed body weighs 1,200 lb. and the truck has a capacity of 8,143 lb. This truck, with its attractive appearance, spacious interior, complete tool equipment and speed, has met every purpose for which it was designed.



Rear view of truck showing rugged construction and spacious interior

Side view of truck designed and built by North Carolina Public Service Company, showing symmetrical appearance, tool boxes and method of carrying tools

This Advertising Should Draw

RAILWAY advertising in Australia has a new form. The railway stations on the Sunday suburban lines have earthen platforms built up to about the height of the floors in the car. These platforms run the full length of the trains and are usually finished with white gravel, little garden plots and ornamental shrubs, which are tended by the station staff. About a quarter of the space of each platform is under shelter for protection against bad weather, the remainder being open.

These advertising cabinets usually stand on the central platform of suburban stations and the advertisements can be seen by people waiting for trains or in passing trains, some of which stop at the station. The cabinets are of wood with a tiled roof and a little garden plat at the foot, with hanging baskets of ferns, etc. They are glazed, the glass being held by a nickeled frame, and have a stylish look. The advertisements are painted or on printed cards, which can be changed as desired by unlocking the glass frame, which swings out on hinges. The cards are narrow strips of various colors, with a good deal of small sign writing on them. the idea being that people who are waiting for trains will have time to read the small type, though people any distance away could not do so.

Most of the frames now are divided into four spaces on each side and rectangular cards, about 30 x 40 in. occupy each space. The colored designs behind glass look very well.

The advertisements are used mostly by the theaters and for sports meetings and other "topical events." Many of the people who work in Sydney live in the suburbs and a very large number of them travel by train, so that the advertisements reach a large clientele.

The advertising rights are let to an agency, which sublets to advertisers, and frequent changes of advertisements are the rule.

Maintenance Notes

Motors Rebuilt to 95 Per Cent Condition

SPLIT-FRAME motors which have seen years of service on the Los Angeles Railway are so reconditioned in the shop that the machines, which are Westinghouse 306-L, are comparable with new. Armatures are completely rebuilt, shafts straightened and bearings refinished. The split frame requires considerable reconditioning. The adjoining faces of the two halves are built up by electric welding and then planed off so that the frame when finished is exactly the original size and shape.

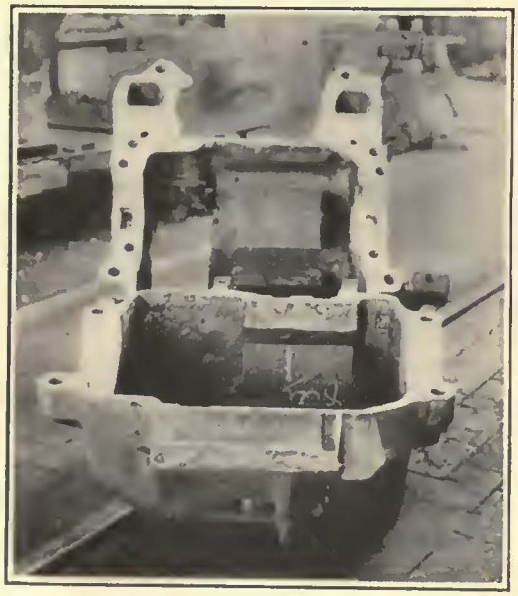
The two halves are bolted together, with 0.006-in. liners between, and placed on a double spindle boring mill, which machines the fits for axle bearings and armature housings. These openings are bored to ⅛ in. oversize. It is necessary to furnish oversize axle bearings and armature housings to fit the reconditioned motor case.

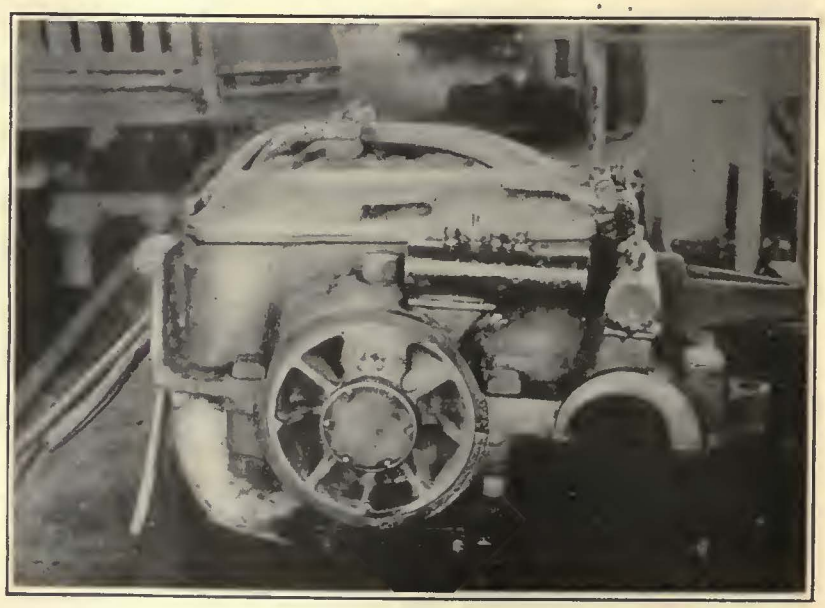
After the case has been finished Rico automatic oilers are fitted to armature bearings and axle bearings. Installation of this type of oiling equipment is standard on the property as this type of motor goes through for reconditioning.

The machine on which the case is bored was constructed in the shop to do this particular job. It is small, compact and simple. This latter feature is made possible with the split case to be bored. The spindles which carry the boring bits revolve in large bearings. These spindles are driven by a worm gear from a small electric motor mounted at one end of the machine. The four cutting bits are held in collars, each driven by its shaft through a single spline, in which is the feed screw. Both right and left hand threads are cut on these feed screws, one-half of the length being cut with each. This makes it possible to feed both cutting tools from the outside of the work to the center with one feed screw. A five-pointed star carried on the end of the feed screw serves as a pick-up for advancing the tool into the work. A dog on the frame of the machine engages a point of the star pick-up every time the main boring shaft makes a revolution.

Particular attention was paid to obtain approximately the same cutting speeds of the tools working on

Motor cases being reconditioned in Los Angeles have openings for axle bearing and armature bearing housing bored on double-end horizontal boring machine





At left, split-frame motors have joints built up by electric welding and then refinished by planing and boring. At right, completely reconditioned No. 306-L split-frame motor with Rico oilers on armature and axle bearings

the large diameter cut, or the armature housing, and the tools cutting the small bore, or the axle bearing. The larger bore is 11⅝ in., while the smaller is 5⅞ in. Therefore, the boring bar working on the axle bearing opening was to run at twice the revolutions of the armature bearing housing boring bar. The feed screw for the smaller boring bar is ⅝ in. with eleven threads to the inch, while the other is ¾ in., with ten threads to the inch. As the length of bore for the smaller hole is approximately twice that of the larger hole, the machine takes care of itself automatically once it is started.

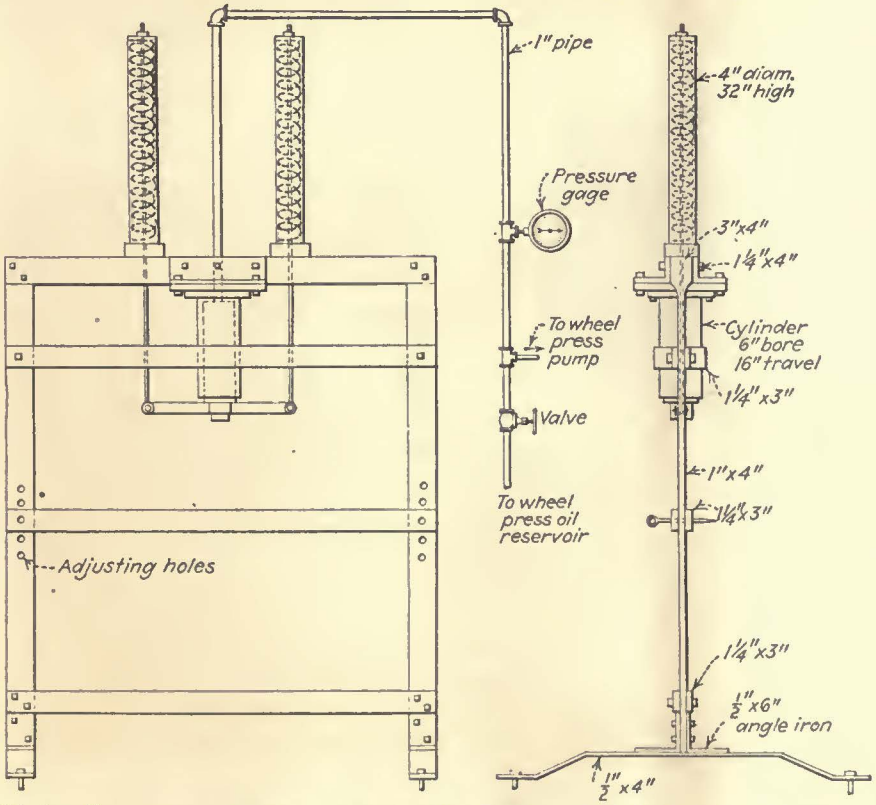
In setting up the machine a disk carried at the center of the large boring bar is clamped between the four pole pieces of the motor case. This centers the hole for the armature bearing housing accurately with the large boring bar. The small boring bar is aligned by raising that side of the case by small jacks. After final alignment the case is clamped to the base of the machine. These clamps are clearly shown in the accompanying illustration of the machine.

Don't be a "pacifist," but be "prepared."
Keep your "snow fighting" equipment repaired.

Armature Bearing Press Operated by Oil Pump from Wheel Press

PRESSING out armature bearings was a very slow and tedious process in the shop of the Southern Public Utilities Company, Charlotte, N. C., until the master mechanic, W. D. Osborne, designed and constructed a hydraulic press in the shop.

This press is operated by the oil pumping equipment of the wheel press. The framework consists of two uprights of 1-in. x 4-in. steel bars that are tied together by steel bars 1¼ in. x 3 in. and 1¼ in. x 4 in. These cross bars are horizontal and are bolted to the uprights. A pressure cylinder having an outside diameter of 12 in., an inside bore of 6 in. and a 16-in. travel is fastened to the two 1¼-in. x 4-in. top cross braces. Two 1¼-in. x 3-in. steel bars encircling the circumference of the cylinder, one on either side and fastened to the uprights, act as steadying clamps for the cylinder. When the pressure is released from the cylinder the ram is returned to the release position by two 3½-in. diameter coil springs, 32 in. long, which are incased in a cast-iron cylinder. Each of these springs is connected to the ram by means of a ¾-in. round iron rod passing through the center and connecting with a ½-in. x 2½-in. clamp fastened to the ram. These connecting rods are threaded on one end and are provided with a nut to permit of adjustment. A 1-in. pipe line between the armature bearing press cylinder and the wheel press pump has a valve mounted near the armature bearing press, which allows for a gradual pressure application. A gage in the pressure line indicates the pressure being applied.



Hydraulic armature bearing press used by Southern Public Utilities Company, Charlotte, N. C.

Each upright is drilled with five adjusting holes to allow for the raising or lowering of the tailstock bars to take care of various sizes of armature bearing heads. The press framework is fastened to two ½-in. x 4-in. U-shaped brackets by means of ½-in. x 6-in. angles. The press is designed to have a maximum capacity of 30 tons.

Aluminum Covering for Stanchions

BY H. S. WILLIAMS
Assistant Superintendent of Equipment Department of Street Railways, Detroit, Mich.

MAINTAINING iron pipe stanchions on the older cars has been an annoying problem for many years. No paint has proved adequate to protect them, and complaints from passengers and crews regarding rust getting on clothing have been most annoying. The Department of Street Railways of Detroit has recently developed what seems a very effective plan for overcoming this difficulty.

Not wishing to go to the expense of replacing the stanchions on old cars that are near their time of retirement with aluminum or a vitreous enameled pipe and yet being desirous of securing a non-rusting stanchion, the practice has been adopted of slipping a piece of thin aluminum tubing over the old iron pipe. This aluminum tube has a 0.022-in. wall and is just the right diameter to slip over the old stanchion. The old fittings are retained, but before the aluminum tube is placed the outer end of the threaded part is chamfered with an ordinary burring reamer just sufficiently to give a socket effect to receive the end of the tubing. This furnishes a finish to the tube and assists in holding it tightly when the fittings are in place. The fittings are painted

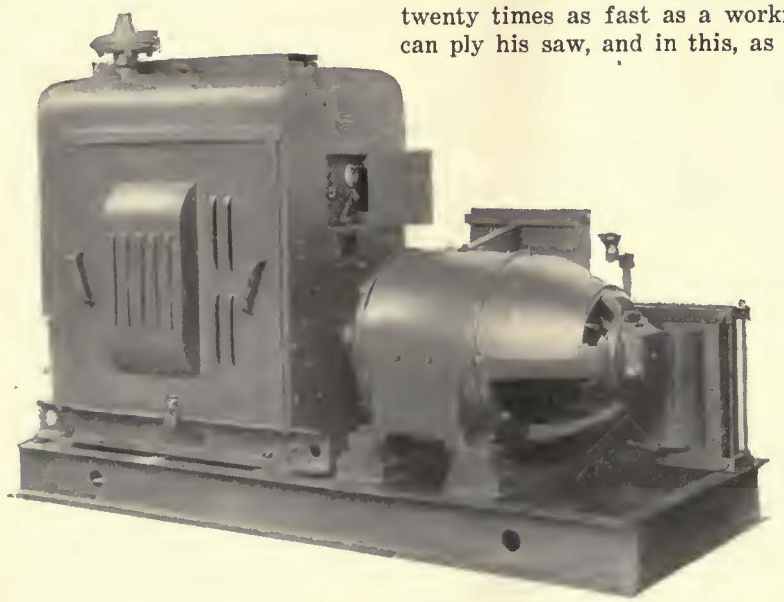
with aluminum bronze. It is not necessary to cover any part of the stanchion except that coming in contact with the passenger's hands. Short sections may be covered, if desired, a collar being used at either end to hold the tube and give proper finish.

New Equipment Available

Small Gas-Engine-Driven Welder

PARTICULARLY for shop and garage use where electric power is not available, a small gas-engine-driven outfit incorporating the WD-11 generator with a continuous rating of 150 amp., a one-hour rating of 200 amp. and a welding range from 50 to 250 amp. is announced by the General Electric Company, Schenectady, N. Y.

The generator is driven by a Continental P-20 power unit rated



Shunt generator direct connected to a gas engine

18.22-hp. S.A.E. and capable of developing 23.5 hp. at 1,400 r.p.m. The generator is equipped with a control panel, rheostat and self-adjusting stabilizing reactor. The engine accessories include a strongly constructed radiator, pressure fed lubricating system with oil pressure gage and indicator, vertical tube gravity feed carburetor, air cleaner, centrifugal governor, starting crank, 10-gal. gasoline tank, tool box and sheet metal hood with sheet metal side panels which can be locked in place.

Among the advantages of this combination are low first cost, light weight and reliability. It is stated that tests have shown the outfit capable of standing up under hard service and overloads. The set is mounted complete on a structural steel base so designed as to facilitate easy moving from place to place.

Air-Driven Portable Hand Saw

FIVE times the work of an ordinary hand saw is the ability of a compressed-air operated portable saw devised by the Ingersoll-Rand Company, New York, N. Y. By a shift of blades, the pneumatic hand saw may be put to work in sawing wood, soapstone, Bakelite, wallboard, cables, copper and other materials. Cross-cut or rip blades for different types of work are available. It cuts timber, does trimming work on buildings and scaffolding and can be used by railroads in car repair work.

In sawing wood the portable air-driven hand saw can be operated twenty times as fast as a workman can ply his saw, and in this, as well as in all other work, it can be operated continuously without fatigue to the operator. Its weight is such that it can be carried about and handled easily by the workman. The 8-in. size weighs only 23 lb.

One outstanding feature of this new air saw is its safeguard against accidents. The design combines the Ingersoll-Rand three-cylinder type of air motor, long in use in I-R grinders and lightweight drills, with the Crowe safety saw guard.

The air-driven hand saw speeds work and reduces accidents

The safety guard is of a telescopic nature. It opens when the saw is applied to the material and it closes automatically and locks in position as the cut is completed. It affords complete protection against accident or damage to the blade. The saw guard has an adjustable stop so that the saw can be set for the required depth of the cut.

The three-cylinder air motor is of the balanced type, smooth running and free from breakdowns. All wearing parts, including the cylinders, are renewable. The cost of upkeep of this safety saw is almost negligible. It is being manufactured in three sizes, known as B6, B8 and B12 and takes 6-in., 8-in. and 12-in. blades, respectively.

Joints Sealed Against Oil Leaks

PAINT which is said to seal effectively joints against oil leaks has been developed by the General Electric Company and is sold by its merchandise department at Bridgeport, Conn. The product, known as G-E No. 880 red protective paint, also prevents water and gas leaks. It can be used for many purposes that require red lead or white lead, and is less expensive than either.

The paint, which is dark red in color, requires no priming and can be applied by brushing or dipping. Denatured alcohol is used as a thinner. It dries rapidly and produces a hard, smooth, glossy film that is cleaned easily and that prevents excessive collection of dirt and conducting material, thereby decreasing surface leakage and subsequent carbonization of the surface when used with electrical apparatus.

Association News & Discussions

Car Maintenance and Shop Practices*

By J. D. Barnhart
Superintendent of Shops Illinois Traction System, Decatur, Ill.

UNTIL other means were provided, it was our practice to raise one end of a car with a stirrup attached to the hook of a 15-ton traveling crane and to move the trucks from underneath the car with pinch bars. This required the men to be under the car while it was suspended in the air, and as the weight of some of the trucks is as high as 30,000 lb. considerable time was required to do this work.

All our truck work is done on two parallel pits, each 150 ft. long and 16 ft. between centers. This arrangement lent itself quite naturally to the installation of an endless rope haulage system for moving trucks back and forth. This consists of an endless ⅝-in. steel cable, a driving engine, a tension adjuster, guiding sheaves, cable supports and a clutch.

The driving engine has a base of structural steel on which is mounted the brass bearings for the drum and gearing shafts. Two drums, 24 in. in diameter, are grooved for passing the cable three times around in the elliptical arrangement to obtain sufficient friction for driving. The driving power for operating the drums is furnished by a Westinghouse D-2-EG compressor motor driving through a triple reduction gearing so as to move the cable no faster than 20 ft. per minute.

Details of Drive

The tension adjuster is made up of two 12-in. stationary sheaves and an adjustable sheave which is anchored to a fixed position by a screw that takes up the slack as the tension demands. The driving engine is located in a pit between tracks at one end of the car pits and the tension adjuster is located in another pit at the other end. The cable is located 28 in. below the top of the rail and 3½ in. from the face of the pit walls on the near sides of the two parallel pits. It is far enough below the trucks so that there is no interference. Four 12-in. sheaves are used at the four corners where the cable passes out of the pits. At distances in the pit of 6 ft. hard wood blocks with grooves cut in them are used to support the cable.

A steel bar with a cable grip which can be closed or released with a lever serves as the connecting link between the truck and the cable. The controller for operating the motor is located in a small pit between tracks and midway between the ends so that the operator is as close as possible to the truck being moved and the man giving signals for his guidance.

Another outfit which has proved worth while at our shops is the air lift used for removing and replacing compressors. Up to the time of the installation of this lift it was our practice to crib up under the compressors, which weighed as high as 1,600 lb., and spend from an hour and fifteen minutes to an hour and 30 minutes of four men's time in removing and replacing one of these compressors. With the lift two men can remove and replace a compressor in twenty minutes. The lift is located under the near rail of the track at a point opposite the door to the air brake department. Four 8-in. x 12-in. cylinder bodies bolted together in pairs are mounted on a 10-in. supporting concrete wall, one pair on each side of the wall. Two cylinders are used on account of the height of lift required.

The lift is sunk in the ground so that it does not interfere with the traffic over the track. In using the lift it is necessary to remove a 4-ft. section of rail and its supporting sill. When these pieces are removed the top of the lift table is about 10 in. below grade. A concrete ramp 7 ft. long extends from the floor of the air brake department to the table of the lift and a roller bearing carriage 4½ in. in height is provided for moving the compressors over this ramp from the track to the air brake department, or vice versa.

Our babbitt furnace includes two 1,000-lb. pots set side by side in a cast-iron top that rests on the brick walls of the coke burning furnace. A hood over the pots connects with the furnace flue and provides a means of escape for the fumes from the pots. One of these pots is used for melting babbitt and the other for the tinning alloy. Our babbitt furnace does not have the automatic control, yet the babbitting of our armature bearings has been uniformly successful.

Thin Babbitt Lining Used

We have our own brass foundry and cast our own armature bearings, so that we babbitt both new and worn bearings. New bearings are made special for each armature. The babbitt lining is limited in thickness to $\frac{1}{16}$ in. and as the armature shaft journals vary, it is necessary to make the bronze shells special for each motor. One-sixteenth of an inch is the limit of wear allowed on armature bearings and a greater thickness of babbitt is not needed; in fact, it is not desired, for with too thick a lining of babbitt it would be possible, should a hot bearing develop, for the armature to get down on the pole piece and be ruined before the hot bearing was discovered. The boring of the babbitt lining is also special for each bearing; the bore is made 0.012 in. larger than the shaft diameter.

While the bearing shell is still warm from the tinning process it is placed in the jig for babbitting. This jig is a device for centering the mandrel in the bearing shell. The gate, which fits the bearing opening closely, is clamped in position and the tapered steel mandrel, heated to a point just below that at which water sizzles on it, is painted with a solution of graphite and water and put in place. The bearing is then ready for babbitting. When the temperature of the shell is held at a sufficiently low degree it is not necessary to block the chinks around the gate, for the babbitt solidifies immediately on passing through these crevices. A self-skimming ladle of sufficient capacity to pour a bearing without stopping is used.

In the machine shop the bearings are bored out for the particular journals they are to fit and the oil grooves cut in them. Except for the GE-69 motors, we have found that these bearings pressed into the frame heads are ready for service without any additional work done to them. When bearings are

*Abstract of paper read before the Illinois Electric Railways Association, Springfield, Ill., March 17, 18, 1927.

COMING MEETINGS OF *Electric Railway and Allied Associations*

April 4—Birney Club, regular meeting, Missouri Athletic Club, St. Louis, Mo., 6:30 p.m.

April 13-14—National Automobile Chamber of Commerce, meeting, Chicago, Ill.

April 20-22—American Society of Civil Engineers, spring meeting, Kenilworth Inn., Asheville, N. C.

April 26-29—Southwestern Public Service Association, convention, New Orleans, La.

April 27-29—American Welding Society, eighth annual meeting, Engineering Societies Building, New York City.

May 6—American Electric Railway Association, Metropolitan Section, Engineering Societies Building, New York City, 8 p.m.

May 31—June 1-2—Canadian Electric Railway Association, annual convention, Winnipeg, Man.

June 6-8—American Association of Engineers, annual convention, Tulsa, Okla.

June 24-25—New York Electric Railway Association, annual meeting, Hotel Champlain, Bluff Point, N. Y.

July 27-29—Association of Equipment Men, Southern Properties, 12th semi-annual meeting, Atlanta, Ga.

June 29-30—Central Electric Railway Association, summer meeting, Book-Cadillac Hotel, Detroit, Mich.

Oct. 3-7—American Electric Railway Association, annual convention and exhibit, Public Auditorium, Cleveland, Ohio.

pressed into the frame heads there is a slight corrugation of the babbitt along the window side of the bearing. A micrometer adjustment expansion reamer is run through these bearings after they are in the heads and the ridges of metal in the corrugations removed.

Spray Gun System of Painting

The spray gun system of painting is now used at our shops for painting all classes of car equipment. Before adopting this method of painting, we learned that painters generally were not kindly disposed toward its use, so we broke some laborers into the use of the spray paint gun. When this apparatus was first put in operation considerable difficulty was experienced by the operator in getting a somewhat uniform coat and avoiding piling up paint and causing curtains and runs in the work. To overcome this difficulty a helper followed the operator and brushed out the paint with an 8-in. wall brush. However, as the operator became more experienced in handling the gun it was found that there were fewer curtains and it was not long till the helper's assistance was no longer needed.

As practically all our freight car work is done in the open, the freight car painting is confined to the summer months. The season extends through three months, and during this time two men, the spray gun operator and the stenciler, turn out on an average 100 cars per month. Flat cars, flat bottom and side dump coal cars, hoppers, box cars, express type trailers, refrigerators and cabooses are run through together.

In the last two years the adoption of the spray gun in applying lacquers to automobile bodies has brought to our painters the realization that they must learn the use of this new tool if they are to keep abreast of the times in their trade. When we decided to adopt the spray gun system of painting our passenger cars we brought to our shops an experienced spray gun operator and had him stay on the job a week to show the men the use of the spray gun in applying primer, surfacer, enamel and varnish to the cars. The great saving in time required for the various operations was a revelation to the men, and from the start they welcomed the opportunity to duplicate the feats of the expert. The men doing the spray gun painting of our passenger cars are old, experienced painters, who were accustomed to turn out a high-class job with the brush, and since they have proved to themselves that they can do as good a job with the spray gun in much less time the brush has been abandoned for work on the outside of cars except for color varnishing the sash. A comparison showing the time required and the amount of material used in the operations where the spray gun has been substituted for the brush is shown below.

The figures for the spray gun do not include the time required in filling the paint pressure tank nor the time required to clean the apparatus after it is used. When the same operation is carried out on a number of cars cleaning is required after the last operation only. Under any condition, however, three-quarters of an hour is sufficient time for doing this work thoroughly.

In this work no guards are used at the windows. It is much more satisfactory to coat the window lights with a good coat of glycerine, which, we find, can be removed more quickly with gasoline than with alcohol or a vinegar solution.

COMPARATIVE STATEMENT OF LABOR AND MATERIAL REQUIRED FOR HAND AND SPRAY GUN PAINTING

	By Hand		Spray Gun	
	Labor, Hours	Material, Gallons	Labor, Hours	Material, Gallons
Painting roof, one coat	4	1½	1	2
Applying surfacer, two coats	8	2	3	2½
Applying colored sealer, one coat	6	1	1½	1½
Enameling, one coat	9	1	2	1½
Varnishing, one coat	9	1	2	1½
Painting underframe, one coat	9	2½	¾	2½
Painting trucks	6	1½	¾	2
Total	51	10½	10½	13¾

Track Maintenance*

By Jonathan Wolfe
Assistant Superintendent of Track and Roadway Chicago Surface Lines

OUR track and roadway department handles both maintenance and all renewal and construction work and is in charge of a superintendent of track and roadway with an assistant. There are four division superintendents, with a total of thirteen maintenance sections. In every division there are two construction gangs, each under a general foreman, these gangs handling construction and renewal work.

There are 31 switch cleaning districts, each taken care of by a switch cleaner reporting to the section foreman of his district. His duties include cleaning all switches and curves, testing mechanical switch protection devices, cleaning drain boxes and inspecting the tracks while riding between locations. These switch cleaners inspect every switch in their district daily.

Emergency men are kept on duty during the night hours at logical locations, the dispatcher reporting any trouble to the man located closest to the trouble, sending the emergency man to make the necessary repairs. When he finds he is unable to handle the trouble himself he calls out other men. If the track is dangerous for car operation, he stays there to flag the cars, having the train crew call necessary help to make the track safe until permanent repairs can be made.

The value of our power tools and equipment has increased 200 per cent in the last four years and we feel that we are entirely justified in carrying this large item because of the great savings accomplished. There is scarcely a machine which does not save its original cost in less than a year's time. The principal power equipments in use are as follows:

We use two sizes of air compressors. The larger unit, of 360 cu.ft. capacity, primarily for large construction jobs, mounted on a four-wheel rubber-tired trailer, operates eight tie tampers or four concrete breakers continuously. When breaking out concrete foundation this equipment, with an operator and four men, will do the work of 25 to 30 men. Each of our four track divisions employs these large compressors.

A smaller unit, mounted at present on a 1-ton truck chassis, operates four tie tampers or two concrete breakers. This equipment is valuable for cutting in rails to repair broken joints, renewing frogs, switches, etc., or for any work where paving or concrete must be removed on a small stretch of track. Being mounted on a truck, this equipment is moved quickly from one location to another and has greatly expedited maintenance repairs where concrete must be chipped out. We propose to add to this equipment for our work this year.

Mixermobiles Place Concrete

For placing concrete we employ Mixermobiles, each mounted on a 1-ton truck chassis, the concrete mixer being run by the engine of the truck, having 20 hp. available. The levers on the Mixermobile are so arranged that they can be operated either from the driver's seat or from the ground. The capacity of the mixer is 7 cu.ft., one batch of thoroughly mixed concrete being made per minute. This mixer will not only handle the concrete required for rail cut-ins and small jobs, but will take care of large installations of special trackwork. We also use this machine on rail renewals, as the amount of concrete to be replaced around the base of the rails is not sufficient to warrant use of the large mixers.

For our extension and reconstruction work we use Chicago mixers mounted on cars and Drake continuous mixers, both running on the tracks, so that concrete can be placed as desired. With the Drake mixers we also use bucket loaders for raising the concrete materials from the street to the belt of the machine, these materials being spread beforehand in a continuous pile along the street.

We have also a large number of grinding equipments, all electrically driven, using for each class of work the type of equipment which we believe proves most efficient. For grinding electric seam-welded joints and electric welds on special trackwork, both manganese and high carbon, rotary grinders, with 7-hp. motors, of the Atlas type are used. For thermit welds reciprocating grinders of the Vulcan type give a smooth surface free from any hollows.

Electric hand grinders are used for grinding the throatways of manganese

*Abstract of paper read before the Illinois Electric Railways Association, Springfield, Ill., March 17, 18, 1927.

mates and frogs where one run is used much more than the other. Thus emergency curves, of which there are a great many, particularly in and adjacent to the Loop district, are kept in good operating condition. We never know when emergency operation may be started—a large fire or an accident in the Loop, a bridge out of service—any of these things may cause the cars to be rerouted, frequently with no advance notice given to the track department.

In each of our two frog shops we have a flexible shaft grinder which is proving valuable for grinding the welded throatways for flange bearing in shop-built frogs. These grinders are several times as fast as the hand grinders and do away with the necessity for bringing in larger grinders from the street.

Rail Corrugations Ground

For the removal of rail corrugations we have six Kerwin grinder cars. All of these have been double-ended and 40-hp. motors installed to operate the double-ended machines efficiently. The subject of rail corrugation is one in itself and is being investigated thoroughly by a committee of the A.E.R.A., which recognizes the seriousness of it fully. Therefore, I will merely summarize our practice with regard to corrugations, which if not removed will destroy the entire track structure and greatly increase car maintenance costs. Some years ago these corrugations were on the increase, but by expanding our grinding equipment we have caught up with the corrugations, removing them when they develop to a stage that warrants grinding. In the last three years we have removed approximately 160 miles of single-track corrugation, the average depth being $\frac{1}{32}$ in. These heavy grinders are worked in sets of two or three, usually between temporary sliding crossovers placed a block or more apart, operating on two shifts, from 8 a.m. to 4:30 p.m., and from 8:30 p.m. until 5 a.m. When a street becomes corrugated we start at one end and work through by this method to the other end or as far as the corrugation extends. By speeding up the work in this way we reduce the interference with service to the public to a minimum and also do the work at a considerable saving in final cost.

Motor truck equipments for hauling materials and excavated materials have been increased rapidly and two years ago supplanted entirely the use of the slow and uneconomical teams and wagons on trackwork. Five-ton trucks are used for the heavy hauling, each equipped with a dump body. These trucks are also fitted with rail racks, so that in addition to other materials, rails can be hauled from the yard to the job. We also have some 4-ton trailers, used for hauling excavated materials, the trailers being placed on the job by the 5-ton trucks and later, when loaded, hauled away. Smaller trucks—1 to 3½-ton capacity—are used for lighter hauling. These trucks are also used for hauling the large air compressors, welding equipments, the use of the trucks being under the direct supervision of the track division superintendents.

For trackwork, electric boring and spike driving machines are used for the screw spikes which hold the rails to the ties. Hand work is done on only the smallest of jobs where there is insufficient work to warrant taking out the power equipments. Tie rod holes and fish plate holes, where required at cutins and special trackwork (these are normally drilled by the manufacturers) are made with Duntley track drills. One or more of these are in use on each division and at each of the frog shops.

We also have an asphalt road repair outfit, which is used to a great extent on maintenance work. During the winter this is used for heating concrete materials on small jobs and for special trackwork installations and at other times for heating asphalt for repairs alongside our right-of-way (we do not have much asphalt paving inside our tracks). Another use for this outfit is for heating natural rock asphalt that is being used to replace oak plank paving in crossings with steam railroads. Not only does this rock asphalt make a very considerable saving over oak plank, which in a railroad crossing usually lasts only from one to two years, but it gives a better paving and a safer one, as the danger of accidents is always present from loose or broken planks. This rock asphalt is easily laid and kept in repair and can be relaid when removed for crossing repairs. Plank pavings in grade crossings are being replaced by the natural rock asphalt on a slag foundation.

We also have larger power equipments, such as electric shovels, which are mounted on caterpillar tractors; a steam shovel, derrick or crane cars, supply cars, etc., which are used more or less for track maintenance, although primarily for construction work.

Use Manganese Coated Electrodes

The electric welding of special trackwork, particularly on manganese steel, has almost unlimited possibilities. We started the use of high manganese coated electrodes (11 per cent to 14 per cent manganese) in 1921 and have been uniformly successful from the start. Due to the nature of manganese steel it is necessary to treat the welds while still red hot with cold water. Care must be taken to see that the part to be welded is cleaned thoroughly and, in addition to frequent quenching, peening the weld with a small hammer to remove scale before proceeding. Welds are ground to a smooth surface with an Atlas or other grinder. We are also using a special grade of coated rod for welding high carbon on battered shop-built frogs and rail ends that has improved our results on such work. Manganese welding alone has increased the life of our special trackwork several years, some of the original 1921 welds still being in service. We are now using approximately 9 tons of high manganese electrodes a year and have not yet reached the limit for producing savings.

Wise Traffic Regulations Vital to Modern Communities*

By E. J. McIlraith
Staff Engineer Chicago Surface Lines, Chicago, Ill.

REGULATION of the use of streets and highways, and not merely the regulation of vehicles, should be the interpretation of the term "traffic regulation" which should create the greatest advantage or usefulness for the streets to the community. This does not always mean the greatest advantage to any one class or the greatest freedom of movement for the majority of the vehicles. It means, rather, that the purpose for which the streets are necessary should be served in the most satisfactory way. It means a variety of answers suitable to the various times and places.

No Parking in Congested Areas

For instance, it is obvious that at least during rush hours busy thoroughfares, that are needed to capacity, should not be congested by parking or by slow service vehicles. It is also obvious that in a business district during most of the business day service vehicles must be able to load and unload express packages or make quick deliveries necessary to the conduct of business. However, it would be quite unreasonable for a warehouse or department store on the busiest streets to have trucks continuously loading or unloading at the curb so that the street and sidewalks would be largely or almost entirely blockaded by such use. In a warehouse district this might be perfectly acceptable.

The greater the tendency toward congestion the more restrictions must be placed to prevent certain practices or customs, thus creating restraint on individual liberty. Good traffic regulation keeps these restrictions appropriate to the time and place, and yet simple and understandable in application. The need for restriction on the rights of individuals to use the streets is perfectly evident and is acceptable as being basically in the interests of public policy.

There are good reasons why we are confronted with an ever-present threat of street congestion. Definite economic advantages to the country and to the individual citizens are clearly evident because of the concentration of certain kinds of business in large cities. Similarly, there are definite clearly established advantages created by the concentration of certain activities of a large city within a small central area. Likewise, there is good reason for the creation of secondary business centers, which concentrate in small areas here and there throughout a city. The theory of decentralization is only partially sound. Decentralization of some activities to small communities or to outlying sections of large cities can be justified, but the basic plan of one concentrated business center, and a large number of small secondary centers in city development, as is well typified in

*Abstract of paper presented before the Illinois Electric Railways Association, Springfield, Ill., March 17, 18, 1927.

the city of Chicago, is fundamentally sound. It is not a mere happening or based on a false sense of values.

Practically all cities are confronted with street systems that for the most part consist of streets of 80 ft. or less in width. With modern twenty-story to forty-story buildings, some of which house between 8,000 and 10,000 regular employees, this street system that was laid out primarily for four-story buildings must be used very intensively and wisely. The only limitation that needs to be placed upon the building heights in Chicago is the limit that still permits adequate light and ventilation. The problem of transportation and of accessibility can be solved at a cost that is reasonable, considering the values created by the need for such business concentration. Accessibility to a business district is what creates and maintains its value.

Individual Rights Give Way Before Community's Needs

Yet it is not necessary to permit each individual to use the streets leading to or in the busy district according to his own individual desires. The smaller the city the greater the liberty that can be granted to the individual to do what he chooses in making use of the streets. As the city grows the natural effect of the greater density of movement is to cause a larger percentage of citizens to see the folly of continuing, for example, to use their own private automobiles in going to and from business. Over 350,000 automobiles are registered in Chicago, and yet only about 90,000 vehicles cross the boundary line to the central district within a single day, although more than 800,000 persons enter this central district per day. It is not possible then to give the right of individual transportation to each person entering this district, neither is it necessary. Certain business vehicles must use the streets, public carriers are necessary to handle such large numbers, and street regulation should be so carefully developed as to provide the greatest possible speed and comfort for those using the public vehicles, who are the great majority, to those service vehicles necessary to the conduct of business and to as many private automobiles as can possibly be served by the street system existing.

It is not desirable to make the use of private automobiles impossible or difficult, but the greatest permissible freedom in the use of this highly appreciated modern convenience or luxury in American life should be one of the aims of traffic regulation.

The city of Chicago must provide subways and elevated railroads within the limit of its financial power, so as to create new street levels for the electric trains in order to leave the maximum of street space available for the other vehicles that must remain on the open streets. Since the streets cannot be widened horizontally in the central district and in many of the other busy areas, there must be an increase in capacity both by regulation of street use and by creating new levels on which the most effective carriers, namely, the electric trains, will operate.

Pending this development much can be done to improve on the existing usefulness of the streets, to increase speed, reduce costs of operation and to make more convenient all street use. Much has already been done in Chicago, as in other cities, such as regulation of parking in the rush hours, elimination of the left hand turns at the busier intersections, creation of through streets and boulevards for faster and freer operation, by installation of safety zones for street car passengers and by placing automatic signal control. Yet tremendous improvements may yet be made to increase the usefulness of the street system.

The creation of through streets and boulevards can make material improvements in the convenience of motor traffic, if laid out wisely and if rights of way are established equitably. Care should be taken, however, that traffic on important streets is not penalized unnecessarily or unfairly by being made to stop at a crossing with a through street or a boulevard, which at that particular intersection is serving a much less important purpose than the intersecting street. There has been a marked tendency everywhere to abuse the through street idea by creating through street or boulevard priority at points where such priority is harmful to the majority.

Many Factors Affect Traffic

Although much has been done in piecemeal fashion, more remains to be done, and the serious problems have not yet been answered. The recommendations of the Chicago Association of Commerce as embodied in the code written as a part of the McClintock report and presented to Council in December, 1926, are likely to be adopted soon. The principal value from this new code will be:

1. Simplification of existing regulations.

2. Authority given to eliminate parking when necessary on the busy streets. Parking will be abolished in the central area throughout the entire business day and may be abolished wherever necessary in business districts throughout the city, and on petitions from 75 per cent of the registered voters along any section of street may be eliminated on that section during hours asked for by the petition. This is done to protect residents from being overrun by patrons of theaters or other amusements in the neighborhood.

3. Establishing a time limit of twenty minutes for loading or unloading of delivery vehicles.

4. Eliminating the standing for loading or unloading with end of vehicle to the curb.

5. Control of mid-block turns.

The McClintock report did not make sufficient study of, nor definite recommendations covering, certain obvious practices, which are very serious factors in creating street congestion. Some of these are:

The use of the streets by building contractors.

(a) For storage of materials.

(b) For temporary sidewalks.

(c) For standing of trucks during unloading, loading or hoisting.

(d) The blocking off by ropes during hoisting of materials to the upper levels.

Elimination of slow moving vehicles from business streets.

Parking of taxicabs in taxicab stands.

Cruising of taxicabs.

Cruising by chauffeurs of private automobiles.

Street repair work, work on underground structures, or underground utilities during the business day.

Sprinkling or washing the streets during business periods.

Delivery or acceptance of passengers by taxicabs at places other than at the curb or within street intersections.

Location of bus loading zones.

Development of detour trucking routes around busy centers.

Delivery of merchandise and heavy materials outside of business hours.

Obstructions on sidewalks near street intersections such as hydrants, newsstands, postal boxes, rubbish boxes and light poles.

Each of these items might be discussed at length. Obviously each one represents a restriction that must some day be given attention in the interest of the greatest good to the greatest number.

It seems always difficult to get good police enforcement of traffic regulation. Police departments in this country are unfortunately forced to be responsive to political pressure. Perhaps part of their laxity is due to faulty judicial practices, and the importance that judges attach to the need for votes instead of to creating public respect for existing laws and regulations. Carelessness and deliberate evasion of responsibility by the enforcing agencies are creating a great public indifference. Many drivers are totally ignorant of the rules of the road, and seem to have no thought of ordinary courtesy to others when driving. Most of the accidents that occur on the streets and highways would be avoided if those using the streets would extend reasonable courtesy and consideration to each other.

Transportation Companies Should Lead Way

In developing better traffic regulation electric railway executives should take the most prominent part. Correct treatment of the traffic problem is of vital importance to the railway business and no other business has more at stake than the electric railways in developing safety and increased usefulness for the streets. It may seem to some that improving operating conditions for automobiles will be detrimental to the railway business, yet may we put it the other way. Unless operating conditions are improved on the streets used by electric railways the decrease in income to the railroad and the increase in expense of its operation will produce an impossible operating ratio. The railways cannot hope to prevent the competition of private automobiles and should not expect to gain business by increasing the discomforts of the users of private cars. If the railway service can be made attractive by adequate speed and reasonable freedom of movement, much more business will be attracted than if the cars are lost in street congestion.

Advantage to the railway operation is in these days of commission control of public utilities merely advantage to the car riders and the public officers

can easily be made to understand that in arranging for improvements in street car operation they are arranging for advantages to all the individual citizens or voters whom they represent. The development of the spirit of fair play, a willingness to be helpful to all interests as well as skilled ability when solving the problems that interest and affect the community and active leadership in directing and developing public discussion or consideration of these problems should be considered obligations upon the railway management. Such activities present rare opportunities for creating public good will and for improving materially the street railway business.

The problems encountered cannot be attacked or answered by casual study. There is need for men thoroughly skilled in the principles underlying traffic regulation. Some one within the organization should be carefully trained, or competent outside assistance should be brought in to assist the management. Much nuisance prevails in methods of traffic control and in signal installation. Many serious mistakes are being perpetrated, and not everyone who claims to be advised is competent. Some of our largest cities have the most glaring defects in their traffic regulation methods, and many imitations of these plans are producing great inconvenience in the smaller cities that are accepting such plans without due attention to correct control principles.

Modernization of Cars*

BY M. J. OSWALD
Sales Representative, St. Louis Car Company

MUCH has been said and written recently about this subject, so there is bound to be repetition of considerable data which may sound familiar, which is due to the constant recurrence to this subject, whenever and wherever street railway men congregate, and is in itself another indication of the importance of this subject and the realization that modern cars are a dominant factor in the progress desired in successful street railway and interurban operation.

Looking at the situation from a cold-blooded business standpoint, the exhaustive survey made of twenty properties before and after modernization by the ELECTRIC RAILWAY JOURNAL shows that there is a reduction of 8 cents per car-mile in operating costs with 50 per cent modern cars. Before modernization the operating cost was 36.41 cents per car-mile and after 50 per cent modernization 28.29 cents per car-mile.

NEW CAR SAVINGS

In the case of five out of these twenty roads practically all cars were purchased new during recent years, and after the acquisition of the new cars the reduction shown is 16 cents per car-mile instead of 8; i. e., the average operating costs of these five roads prior to installing new cars was 39.56 cents and afterward 23.64 cents per car-mile.

Another interesting fact brought out by this survey was that on a different group of twenty properties with approximately the same total number of cars, the same range of sizes, the same total population served, the same mileage and about the same proportion of city and interuban service, practically no new equipment has been purchased during the past ten years. The average operating cost is 37.94 cents per car-mile, or practically the same (in fact about 1½ cents higher) as the different group of twenty referred to above before their equipment was modernized.

These above figures speak for themselves as to the financial betterment in the use of modern cars, and it is evident that the scrapping of obsolete cars is profitable; furthermore, from the additional data given below, taken from the same survey, it is apparent that new cars pay for themselves.

As previously indicated, the saving of a group having all modern light-weight equipment is about 16 cents per car-mile in comparison with operating costs on old equipment—it was also mentioned on a larger group having about 50 per cent modern cars was half of this amount. Similarly, the cost on a property having an average car age of ten years is taken to be about 8 cents per car-mile more than a road having all modern equipment. If excess operating costs between these two points are taken in proportion to age of equipment, the results would be in dollars, based on 82,450 cars comprising the entire industry, a total of $181,707,000, which is equivalent to 12,000 new cars at $15,000 each; to be ultra-conservative, cut these figures in half and it would still show operating losses on present equipment more than enough to pay for a greater number of new cars per year than have ever been inaugurated by the entire industry in any single year in the past twenty.

Charles Gordon, editor of ELECTRIC RAILWAY JOURNAL, in his article in connection with the compilation of these statistics, mentions "that there may be operating conditions on various properties that would make it impossible to obtain the average savings shown, but the conditions covered by the properties studied are sufficiently general to warrant most careful consideration by every operator."

Also, please bear in mind that no account whatever is taken or even estimated of the effect of improved modern cars on increasing revenue. Unless some fallacy can be shown in the figures presented—and we invite discussion on same by those operating members present—the conclusion reflected resolves itself into an axiom, namely, "That obsolete equipment costs far more to maintain than new equipment costs to buy."

Granting that the foregoing has demonstrated that the substitution of new cars for old at certain periods is not only an economical gesture but a necessary part of the program of a progressive and successful railway system, why not incorporate in the new cars all the features which are consistent with modern standards of living, and so popularize this mode of transportation that the appeal to ride in the electric car is so strong that it stands first in the minds of the public. Unfortunately, the attitude in many places at present is, "Well, I suppose I will have to take the street car, as there is no other way to go!"

MODERNIZED CARS NEEDED

An operating expert about a year and a half ago said: "One of the greatest needs of the traction lines today is the modernized cars to replace equipment which not only fails to attract business, but actually repels it in many instances." Based on such a statement, what a wonderful opportunity there is to so change and improve the antiquated street car and its accessories to counteract the last part of the above statement to the effect that it "actually repels business in many instances."

It has been said, and we have to admit it, that one of the most noticeable features of modern life is the gradual awakening in the last decade or two of the American people to the perfection of form resulting from the harmonious combination of diverse elements in unity.

Architecture shows a marked improvement; houses are better plumbed, but more often built with an eye to form and pleasing appearance; contrast the cupolas and ginger-bread gimcracks of a "mansion" of the early Grover Cleveland or Benjamin Harrison period, or the boxlike plainness of a less pretentious home of yesterday, with the Colonial, Spanish or English adaptation of the residential sections of today.

Interior decoration is also infinitely more colorful and artistic than yesterday. Even automobiles have improved quite as much in line and design as in power and upholstery. So-called "Beauty Shops" thrive and turn over millions of dollars yearly because women are eager to make their faces or figures attractive, and this is not confined to any particular class, but the patrons are from every walk of life. This is just another phase of popular taste; it is true that people long to have attractive and pleasing surroundings and will patronize and popularize the vehicle that plays up this appeal to their taste.

In selling city or interurban car rides we cannot overlook the fact that a transportation vehicle which was designed merely for "utility" in order to keep pace with the trend of the times must become a thing of beauty with pleasing lines, attractive painting, easy riding trucks, no unsightly equipment showing, particularly in the interior, comfortable seats, neat floor covering and modern lighting fixtures with plenty of illumination. Heating is another item that should be given careful consideration.

Plate glass throughout the car also adds much to the pleasing appearance and perhaps really would be the economical thing in the long run, provided, of course, that the replacement of ordinary glass is a considerable item of maintenance and could be substantially reduced by the substitution of the

*Abstract of paper presented before the Illinois Electric Railways Association, Springfield, Ill., March 17, 18, 1927.

heavier and less fragile plate glass. On the regulation city car the cost of ¼-in. plate glass, as far as I can determine, is about four times that of the ordinary glass now universally used.

Mr. Gordon mentions in his article the Grand Rapids cars, which reflected a great many of the features mentioned above, and therefore it might be in order to mention the figures which are quoted below from *Electric Traction* of February, 1927, concerning the annual report of the above road, as follows: The gross earnings of the company increased $37,978 over 1925, while operating expenses decreased $45,170, largely due to the placing in service of the 27 new cars last June. In 1925 the company showed a deficit of $67,541 while for the year ended Dec. 31, 1926, a net income of $9,929 was shown.

You might also be interested in the following extract from Mr. DeLamarter's paper read at the C.E.R.A. convention at Toledo a few weeks ago: "During each month since the Grand Rapids rail coaches were placed in service the proportion of increase in passenger revenue on the three lines so equipped has been considerably higher than the increase shown on the balance of the lines. During seven months from June to December, 1926, passenger revenue increased 3.21 per cent over the corresponding period in 1925, while the passenger revenue for the same period on all other lines increased only 1.91 per cent."

HIGH-SPEED CARS SHOW RESULTS

By increasing the speed and installing modern cars a number of interurban railways, such as the Buffalo & Lake Erie, Pennsylvania-Ohio Electric, North Shore, Illinois Valley Division of the Illinois Traction System and numerous others have shown remarkable improvement as to increased revenue and popularizing the electric cars, and you all no doubt have had this called to your attention by various articles and figures that have been published.

It may be rather a broad statement, but personally I do not know of any city or interurban railway system in the United States that has not greatly improved its financial standing and public relations by replacing old equipment with new and modern cars. Furthermore, I heartily agree with these sentiments of City Manager Hopkins of Cleveland, Ohio, brought out in his address at the A.E.R.A. convention at Cleveland last year: "The American people are not an ungenerous or mean people. The American people, by and large, unless they are provoked or irritated or don't understand the situation, mean to pay anybody a fair return for anything he gives them."

Do not forget that the car is the "show window of the industry," and it has been demonstrated in merchandising that you must have an attractive show window in order to draw your customers inside. Incidentally, after he gets inside see to it that he is met by a courteous operator so that he will come again and tell his friends to patronize the electric railway line, and so popularize this method of transportation that it always stands first in the minds of the discriminating public of this progressive age.

Governor Fuller Decries Legislative Meddling

CAR riders are not getting a fair break because of the legislative burdens placed on transportation companies, according to Alvan T. Fuller, Governor of Massachusetts, speaking at the annual banquet of the New England Street Railway Club, held March 24 at the Copley Plaza Hotel, Boston. The cost of building subways should not be paid entirely by the car riders, he said, because subways are built for the convenience of other users of the street as well as for the railway passengers. Moreover, the extension of a subway into the new district benefits the property owners. He referred also to the construction of a new bridge, the cost of which must be paid in part by the Boston Elevated Railway. All persons other than the car riders will use this bridge free of cost. Why, he asked, should the car rider have to pay for what is provided without cost to the users of other vehicles? In the Governor's opinion the problem is one of educating the public to appreciate the rights of the car riders.

Adequate transportation facilities are a necessity, he said. What other industry is so essential, he asked, that public trustees would be appointed by the state to operate the property when it became involved in financial difficulties, as was done some years ago for the Boston Elevated Railway and Eastern Massachusetts Street Railway. That portion of the public which uses electric railways is unorganized and inarticulate. For that reason it does not always receive fair treatment. The opportunity to improve transportation is an inspiring opportunity for public service, the Governor said. A beginning should be made by striking off the shackles of unfair charges that legislation has heaped upon the car rider.

Street railways in New England have put their houses in order and have come to understand by experience that the public is willing to pay for good service, according to Fred Gordon, retiring president of the club. He said that the rate of fare is incidental, and cited the case of a man who does not hesitate to use a taxicab and tip the driver far more than the entire cost of a comparable car ride would be. R. B. Stearns, incoming president of the club, expressed his gratification at being chosen for this post, and assured the members that he would do his utmost to make the coming year a successful one for the club.

Other speakers at the banquet included Malcolm E. Nichols, Mayor of Boston; Benjamin F. Cleaves, former chairman Maine Public Utilities Commission, and Frank P. Sibley, special correspondent Boston *Daily Globe*. Edward Dana, general manager Boston Elevated Railway, officiated as toastmaster.

At a business meeting held in the afternoon new officers were elected. Those chosen were:

President, Robert B. Stearns, Boston, Mass.

Vice - presidents: Massachusetts, Howard F. Fritch, Boston; Connecticut, J. K. Punderford, New Haven; New Hampshire, John B. Crawford, Concord; Vermont, T. B. Jones, Burlington; Maine, Edward M. Graham, Bangor; Rhode Island, Walter C. Slade, Providence.

Secretary, John W. Belling, Boston, Mass.

Treasurer, Fred F. Stockwell, Cambridge, Mass.

Executive Committee: H. M. Steward, Boston, Mass; George E. Haggas, Portland, Me.; H. R. Whitney, Springfield, Mass.; C. B. Pierce, New Bedford, Mass.; H. S. Day, Boston, Mass.; E. W. Davis, Boston, Mass.; George Acker, Boston, Mass.

90,000 Vehicles in Chicago Loop

IN REPORTING Mr. McIlraith's discussion of traffic conditions, on page 579 of the March 26 issue, it was stated that 800,000 vehicles enter the Chicag Loop district in twelve hours. This should have read—"more than 800,000 people enter the Loop district in twelve hours." The statement that 90,000 automobiles enter the business district in twelve hours is correct.

American Association News

Power Transmission and Distribution

PROGRESS reports were considered at the second meeting of the power transmission and distribution committee of the Engineering Association held in Chicago, Ill., on March 8. There were present at this meeting the following: F. McVittie, chairman; C. H. Jones, sponsor; J. W. Allen, C. Bailey representing C. L. Hancock, M. J. Cooke, H. Casey representing G. Wennegal, J. H. Drew, Mr. Daiman representing W. H. Bassett, D. D. Ewing, S. S. Hertz, W. Heeley, A. J. Klatte, K. J. Keith, J. Leisenring, H. S. Murphy, J. F. Neild, W. J. Quinn, M. B. Rosevear, D. L. Smith, A. Schlessinger, W. Schaake and R. D. Wade.

R. H. Rice, board of supervising engineers, Chicago, and C. Smith, Chicago Rapid Transit Company, were guests.

The chairman requested suggestions of subjects to be considered next year. The following three subjects were submitted: (1) Economics of electric track switches; (2) use of braking devices on reels, in stringing trolley wire; (3) reclamation of corroded steel poles.

The distribution representative on the special committee on current collecting devices requested the members of the power distribution committee to give freely any information on this subject which might be asked of them, since the subject was considered to be of considerable importance.

Each of the sub-committees presented a progress report. Sub-committee No. 3 on trolley wire wear will carry on the study of trolley wire breaks and will prepare data which will supplement that published in last year and in previous years. Sub-committee No. 4 on specifications for high-strength trolley wire showed that negotiations with the American Society for Testing

Materials were being continued and that a compromise on the points of issue in connection with this specification was very probable. Sub-committee No. 5 on radio interference stated that more study should be given to the previous reports on this subject by those experiencing this difficulty. The sub-committee investigating the possibility of establishing a standard by which various methods of operating and maintaining overhead lines may be compared has drawn up forms for collecting the necessary information. These forms will be filled in by the members of the committee and will then be summarized for discussion at the next meeting. The standardization of trolley reels has advanced to the point of a tentative size grouping of these preliminary dimensions and will be submitted to manufacturers and users of trolley reels for criticism before any attempt at standardization is made.

The next meeting will be held in New York on June 16 and 17.

Unification of Car Design

Engineering Association Committee Presents Progress Report for the Information of the Industry

WHEN the committee on unification of car design of the Engineering Association was appointed last fall one of the subjects assigned was to follow through the work begun last year by the committee on essential features of modern cars of the American Association. This latter committee made a report at the 1926 convention giving the requirements of present-day car designs, which was abstracted in ELECTRIC RAILWAY JOURNAL for June 26, 1926, page 1086.

The committee on unification of car design has now submitted a progress report, an abstract of which appears below:

In replies from member companies commenting on the report of the committee on essential features of modern cars, there seemed to be some question as to whether particular problems could be met by the recommendations contained in the report of the committee on essential features of modern cars. It was decided, after discussion, that the committee on unification of car design, acting through the secretary of the association, would be glad to take up for analysis the different problems of any of the operators that care to submit them, and will assist to the best of their ability in arriving at a solution of the problems that may arise as to car designs and necessary equipment details in connection therewith.

The car designs submitted were arrived at after careful study of a weighted average of representative cars that have been in successful operation throughout the country. The designs cover fundamental dimensions that are of the utmost importance to the car builder, if he is to place the building of cars on a production basis. No attempt has been made to present a completely designed car that would be adaptable to all properties. The details covered, however, are adaptable to practically all properties, subject to some few modifications in special cars, where physical limitations require changes. It is recommended that member companies contemplating the purchase of new cars give careful study to the 1926 report of the committee on essential features of modern cars before a definite decision is made.

By using these fundamental recommendations, with supplemental detail to meet the individual properties' requirements, the builders will be able to reduce materially their engineering and special equipment requirements, group their production operations, and thus facilitate the building of equipment, with its attendant lowering of costs. Any saving thus obtained by the builder is of twofold advantage to the user—a lowering of first cost and an earlier delivery of equipment. It is also a step toward standardization of equipment, which embodies the best features from not one but a large number of operating properties.

WHY SOME COMPANIES DID NOT FOLLOW COMMITTEE'S RECOMMENDATIONS

As a result of the committee's discussion a number of points were brought out as to the reasons why some companies adopted, and others did not adopt, the recommendations of the committee. In one case, a company made an earnest attempt to follow out completely the recommendations of the committee on the fundamental dimensions and weights. This company submitted its plans and specifications to the association, asking that they be compared with the recommendations made in the 1926 report. In various instances the design and dimensions submitted differed from the recommendations, as a result of which several conferences were held with officials of the company, to see if the design could be modified to embody all of the committee's recommendations. This was at first believed impossible, due to the peculiar character of the service, which was a combined city and interurban service, and due also to rather limited clearances on curves.

Following these conferences, this company made a careful analysis of the design and shortly after was able to modify it so that the car body between corner posts in every way met the committee's recommendations as to the design of interurban car. Since this car operated through a number of small communities, where operating conditions require rapid loading and unloading of passengers, it was considered advisable to adopt a platform design substantially the same as that recommended by the committee for city cars.

The result of all this is that the company now has a car that can be said to meet with the committee's recommendations and that is in every way satisfactory to the operating company, although at first it was not believed that this was possible.

Another instance was discussed wherein an operator of one of the small properties was in the market for a few cars. Considerable time and money had been spent in preparation of specifications for a car that was considered necessary for the individual conditions. The specifications, however, as prepared, were not sufficiently different in the salient features to preclude the adoption of the recommended A.E.R.A. car. The car builders, therefore, offered this company cars of the dimensions and arrangement recommended by the committee for general use, at a saving of from 15 to 20 per cent in cost, due to the possibility of using existing engineering data, drawings and templates. The operating company, however, after much consideration, decided to purchase cars in accordance with its original specifications, and forego the saving in investment and the possibility of securing the cars at an earlier date.

This illustrates a case where a small company could have obtained every desirable feature of style and furnishing which was considered necessary to make the cars attractive in appearance, and at the same time comfortable and convenient for the patrons, at a material reduction in cost. The manufacturer, at the same time, was willing to guarantee that this car, built in accordance with the recommendations of the 1926 committee, would be at least equal in attractiveness to the customer's own design, and was entirely willing to guarantee every feature of the construction. This is one example where individual tastes are working as a detriment to the activities of the association as a whole, in its endeavor to bring about conditions which will tend to lower the cost of cars.

The committee has the assurance of the car builders in general that they are willing to proceed with the manufacture of cars built in conformity with the designs recommended by it. It believes that if the member companies will use cars built in conformity with these general recommendations a definite saving will be made in the cost of cars. The car builders have pointed out that the cost of engineering alone, for a group of cars, runs on the average anywhere from $1,500 to $2,000. In the purchasing of cars as covered by the committee's recommendation, this cost of engineering would be materially reduced. This cost alone, for a lot of ten cars, amounts to $150 to $200 a car. The time of delivery, also a very great factor with cars of special design, will be shorter for cars built in conformity with the recommendations of the committee.

In order that some definite designation be given to the types of cars as covered by the 1926 report of the committee on essential features of modern cars, it was decided, after discussion, to recommend that the designs for the city cars be known as "A.E.R.A. City Car Design" and that the designs for the interurban cars be known as "A.E.R.A. Interurban Car Design."

The report was signed by J. A. Brooks, C. A. Burleson, W. J. Clardy, L. J. Davis, C. Gordon, J. W. Hulme, G. L. Kippenberger, J. Lindall, V. Willoughby, A. P. Jenks, A. L. Kasemeter and H. H. Adams, chairman.

The News of the Industry

New Lines Suggested for Boston "L"

Legislative Committee Suggests Construction of Tunnels—Termination of Public Control Debated

A new rapid transit extension plan has been adopted by the committees on metropolitan affairs and street railways of the Massachusetts Legislature for new lines to be built on the Boston Elevated Railway system. This bill, which has been reported in the Senate, provides for carrying out the plans for rapid transit extensions which the Legislature two years ago directed the planning board to study and report upon. The bill calls for the construction and operation of two rapid transit lines through the center of Boston, one of the lines starting at North Cambridge, extending through Somerville to Lechmere Square, and thence utilizing the existing viaduct to the North station, the Tremont Street subway to the present terminus of that subway at Broadway and Tremont Street, thence by new construction to a point near the corner of Huntington Avenue, and Tremont Street, Roxbury, with stations near the Back Bay station, West Newton Street, Massachusetts Avenue and the Opera House.

FIVE YEARS TO COMPLETE

The other line provides for an extension of the East Boston tunnel in East Boston, and starting from the terminus of that extension trains would run through the East Boston tunnel and a new tunnel connecting with the westerly tracks of the Tremont Street subway at Park Street, thence to Boylston Street, and through the Boylston Street subway to Governor's Square, and by new construction under Governor's Square, and out Commonwealth Avenue, to Harvard Avenue or some terminal beyond. The present plans of the planning division are that the extension in East Boston would connect with the Revere Beach & Lynn at the Wood Island station. It is estimated that it will require five years to complete the construction of these two new rapid transit lines. No new rapid transit extensions have been made, with the exception of the Shawmut branch, since the opening of the Cambridge subway in 1912. It is true, however, that the short extension from Sullivan Square to Everett was opened in 1919, but this extension was of minor importance; were it not for the development of the automobile during the past ten years the present transportation system would have long since been totally inadequate.

This bill ties up somewhat with the other Elevated bill for the 25 year extension of public control, because the financing of the extensions is provided for in that public control bill.

Strong opposition is developing to the public control bill. A substantial minority from the metropolitan affairs and street railway committees has decided to urge termination of public control and the return of the Elevated to its stockholders. It has filed a bill to that effect, to give the Elevated notice of the return to private ownership by July, 1929. A legislative hearing on this general subject was given on March 29, and it was expected that the Elevated stockholders, directors and trustees would express themselves regarding the plan for a 25-year extension of public control. But these three groups remained silent, except for one small stockholder who told the legislative committees that he did not care whether the Elevated property were returned, or the public control extended; he said that the stockholders can run the property now if it is given back to them without any stranglehold from the Legislature.

Mayor Signs Amended Parking Ordinance for Philadelphia

The amended parking ordinance providing one-hour parking on Broad, Market, Arch and several other central city streets of Philadelphia, Pa., became a law when Mayor Kendrick signed the measure on March 28. Comment on the change in the parking regulations was made in the ELECTRIC RAILWAY JOURNAL in the issue of March 26, page 560.

Passage of the amendatory ordinance came as the result of organized opposition by central city business men to the drastic measure which banned parking in a large downtown area. The new law limits the affected area to the district bounded by Vine and Pine Streets and Delaware Avenue and 23d Street.

Under the terms of the ordinance no parking is allowed within 100 ft. of any street intersection where a trolley-loading platform or safety zone is established, and 40 ft. from any other street intersection; no parking is allowed at any time on any street less than 20 ft. wide for a period longer than necessary to load or unload in the restricted area; no parking is permitted anywhere in the city between 3 a.m. and 6:30 a.m.

Proposed Change in New Jersey Fares Suspended

Further suspension was directed by the Board of Public Utility Commissioners of New Jersey on March 26 of proposed changes of fare zones by the Public Service Railway and the Public Service Transportation Company. The new rates were to have become effective on Jan. 1, but the board suspended the change until April 1. The further suspension will be for a period not exceeding three months from April 1, unless the board disposes of the case sooner.

United Suburban Railway Takes Form

New Lease on Life for Michigan Company Celebrated at Enthusiastic Meeting—All Grandville There

In Grandville, Mich., one of the smallest villages in the state, the shortest interurban railway with the longest list of stockholders in the United States was born recently when the United Suburban Railway came into being. The new company will take over and operate the defunct Grand Rapids, Holland & Chicago Interurban line between Grand Rapids and Jenison, a distance of 8.3 miles. Representatives of 700 families along the railroad, all stockholders of the company, and six Grand Rapids bankers and business men attended the birthday party when organization of the company was completed, by-laws adopted, directors elected, contract of purchase ratified and $7,000 additional stock subscribed to bring the total subscriptions up to $50,600, the amount required to close the deal.

DRIVE FOR SUFFICIENT FUNDS

By a peculiar circumstance the Rev. J. P. Battema, pastor of the Wyoming Park Christian Reformed Church, was chosen temporary chairman of the meeting. It was he as a minister who spoke the last words over the old line when it quit business last November and it was he at this meeting who spoke the first words over the new line. The six Grand Rapids bankers and business men, Dudley E. Waters, president of the Grand Rapids National Bank; Gilbert L. Daane, president of the Grand Rapids Savings Bank; Benjamin S. Hanchett, one of the promoters of the original Grand Rapids, Holland & Lake Michigan Railway; Arthur E. Wells, Eugene Richards and Harold M. Braudy, the latter being purchasing agent of the defunct line, injected pep and enthusiasm into the meeting. Their efforts brought the drive for sufficient funds to a successful culmination. They were among the first to subscribe for ten shares of stock when the call for additional shares was issued, increasing their bids to fifteen shares to insure the quota.

Harold T. Slaght, cashier of the Grandville State Bank, who has been the prime mover and guiding spirit in the rejuvenation of the road, was elected director-at-large. Other directors elected from a field of twenty candidates from the different communities to be served by the line are: A. Dick and William Huizenga of Galewood, Paul Gezon of Wyoming Park, E. F. McCarrick of Hamilton and Edward Miller and Gerritt Zuidema of Grandville. Officers will be elected later.

Conditions of the contract of purchase as ratified call for the payment of $30,000 for the old railroad. The Consumers Power Company, the owner,

has offered to lease the right-of-way to the new railroad at an annual rental of $1,000 plus taxes, while the Michigan Railway has offered the use of its tracks from Grandville Avenue junction, at the southwestern limits of the city, to its terminal in the heart of Grand Rapids, for 20 cents a car-mile and a terminal charge of $4,500 a year.

During the meeting Y. Groendyke, chairman of the nominating committee, termed the project as "a railroad owned by the people, operated by the people and patronized by the people." He said if the line fails to pay it will be because the people of Wyoming township have a grudge against themselves.

Wages on Interborough Advanced 5 Per Cent

A 5 per cent increase in pay for its employees who are members of the Brotherhood of Interborough Rapid Transit Company Employees was announced on March 29 by the Interborough Rapid Transit Company, New York, to be effective on April 1. This means an extra annual expenditure by the company of approximately $1,500,000. The advance will affect nearly 15,000 employees, members of the operating, mechanical and clerical departments.

The announcement was made by Frank Hedley, president of the company, following action by the board of directors at which Mr. Hedley read a letter from M. J. Mangan, secretary of the brotherhood, requesting the increase, and suggesting a two-year contract with the brotherhood at the increased rate. This contract will be drawn up and signed shortly. A statement by Mr. Hedley said:

> By this increase the company makes the second of the 5 per cent readjustments in pay following the voluntary reduction of 10 per cent to which the employees agreed in 1921 as their contribution to the plan to keep the Interborough out of receivership. The first 5 per cent was restored in 1923 and the second at this time. This is in accordance with the company's pledge that wages would be raised just as soon as finances permitted.
>
> The Interborough is able to grant this increase, which amounts to approximately $1,500,000 a year, by the utmost economy in other directions and by the most careful management of every department. For a long time we have all realized that these employees should have more money and our aims and hopes in this direction are now achieved to the very limit of our financial ability. Every cent which might be utilized for this purpose is absorbed by the new agreement.

At present motormen receive 82 cents an hour and guards 54⅝ cents as the top rate or $4.37 for a day of eight hours.

New Suggestions Offered on Rainier Project

Requests that it be permitted to have a monopoly of transportation in the district which it serves and no longer be required to pay the city a franchise tax featured proposals made to the Seattle, Wash., City Council recently by the Seattle & Rainier Valley Railway, through M. E. Samsell of Chicago, its president. The conference was secret and the only statement was that of E. L. Blaine, finance chairman and official spokesman for the Council.

Plans to have the city take over the railway on a leasing arrangement were discarded as impractical.

Through Service Between Chicago and Central Illinois Awaited

With the completion about May 1 of a short stretch of connecting track in the city of Joliet, Ill., through interurban railway service will be established for the first time between Chicago and central Illinois valley points, according to a statement issued March 21 by J. R. Blackhall, vice-president of the Chicago & Joliet Electric Railway. A joint operating agreement recently consummated by the Chicago & Joliet line and the Valley division of the Illinois Traction System calls for the operation of the latter's cars from the Chicago terminal of the Chicago & Joliet at Archer Avenue, by way of Joliet, Morris and Ottawa through to Princeton, Ill., a distance of more than 110 miles. From Chicago to Joliet the cars would use the tracks of the Chicago & Joliet line and the Illinois Traction System rails from Joliet westward. Tentative plans provide for four round trips daily, two in the morning and two in the afternoon and evening.

The Illinois Traction system's popular new "Tangerine" light-weight, one-man interurban cars will be operated in this service, stopping only at the larger towns and providing "limited" service over the Illinois Valley division for the first time.

Although the project was approved by both companies last December, actual construction work, which will be undertaken by the Chicago & Joliet line, has been delayed for several months due to the municipal primary election on April 19, Mr. Blackhall explained. He added, however, that permission to make the physical connection between the two lines would undoubtedly be granted by the city commissioners immediately after the election and that he hoped service could be started by May 1. All materials for the work are now on hand.

Power Cost Condition in Seattle Not Obligatory for Deal

Negotiations between the city of Seattle and the Puget Sound Power & Light Company for a reduction in the annual payments on the purchase of the Seattle Municipal Street Railway have advanced a step further with the assurance by A. W. Leonard that he will not insist on a ¼-cent rate for power furnished by the city lighting department to the railway for its operation. In the power company's offer to the city for an extension of time on the purchase bonds, Mr. Leonard had imposed a condition that the present rate charged for electric railway power be lowered to ¼ cent, but he now states that if this means that the city light department would be supplying the power at less than cost of production, he will not insist upon this condition.

The present rate charged is 1 cent a kilowatt-hour. City officials have tentatively agreed upon a ¾-cent rate. This they plan to suggest to Mr. Leonard, and it is understood that the latter will be satisfied with this rate if he is convinced that the city cannot furnish the power at a cheaper rate without loss. Meantime a report on production costs is being prepared by the lighting department, upon which the Council will decide a rate to be submitted for further dealing with the Puget Sound company.

The litigation involving the railway pending in the federal court is no nearer settlement than it was weeks ago. Various delays have continued the hearings from time to time. The only litigation in which the city is involved now is the Von Herberg suit, which seeks an order restraining the city from paying any further money on bond redemption and interest until all labor and operating costs have been met.

Fare Petition Formally Presented in Macon

The formal petition of the Macon Railway & Light Company, Macon, Ga., for increased fare, rerouting of lines and other concessions was presented to the City Council on March 15 and referred to the public utilities committee. The company wants a 10-cent cash fare with three tickets for 25 cents: lifting of paving assessments and gross receipts tax; permission to change schedules and to reroute nearly every line. In return it proposes to rehabilitate the entire system, building new track and sidings, buying ten new cars, and spending in all a total of $314,000. The present fare is 7 cents.

Transit Matters in Philadelphia Passed Upon by Commission

The Public Service Commission of Pennsylvania on March 29 rejected the proposed new lease of the Frankford Elevated to the Philadelphia Rapid Transit Company and approved the Chestnut Street subway agreement with the city. The latter provides for construction of a surface car subway by the municipality to be leased to the transit company until such time as rental payments equal cost of construction, when title will pass to the Philadelphia Rapid Transit Company. Consent of commission to Frankford "L" lease was withheld because of conviction that no lease for that line should be signed which does not include provision for rental to the transit company of the Broad Street subway.

Ordinance Against One-Man Cars in Buffalo Overruled

The city ordinance at Buffalo, N. Y., which makes it unlawful for the operator of a street car to engage in the performance of any other duty while the car is in motion, aimed primarily against one-man cars in operation by the International Railway, is unconstitutional. City Court Judge Peter Maul so ruled in a decision handed down in a test case when the police department arrested an operator of a one-man car in an action to recover $50 penalty for violating the new rule.

Judge Maul cited the opinions of higher courts upholding the regulatory authority of the Public Service Commission with respect to the railway and held that the city is without authority to legislate against one-man car operation. The city's case was dismissed.

Paving Measure Passes in Utah

House bill No. 120, recently passed by the Utah Legislature and signed by Governor Dern, provides that every electric railway in Utah shall, at its own expense, restore the pavement, including foundation thereof, of every street disturbed by it in the construction, reconstruction, removal or repair of its tracks, in the same condition as before the disturbance thereof, to the satisfaction of the Board of City Commissioners or City Council having charge of such street. The obligation imposed by this act shall, in cites of the state of Utah, other than cities of the first class, be in lieu and substitution of any and all other obligations of any such company to pave, repave or repair any street, or to pay any part of the cost thereof.

When any street of any city, other than cities of the first class, occupied by the tracks of the railway is to be paved or repaved, the Board of City Commissioners, or the Mayor, and City Council of said city is vested with authority to assess the entire cost of paving or repaving such street, including the portion occupied by said tracks, against the abutting property.

Railway in Saginaw Oil Boom Area

Oil has been struck in Saginaw, Mich. As a result that city has taken on the appearance of a new El Dorado. And the discovery doesn't seem to be a flash in the pan, either. Many of the big companies have begun operating. The Sun Oil Company is on the ground, so is the Ohio Oil and a host of others. So is the Saginaw Transit Company, for some of its property is believed to be in the "strike" area. It is too early to attempt to predict to what extent the railway and bus company will become an oil producer, but its management doesn't propose to miss any bets.

Every acre included in the present field, which extends 2½ miles northwest of the Saginaw business district and is 1⅓ miles wide, is under lease to the pioneer companies. There is a derrick within a block and a half of the city's largest office building. The flow is there, but there are no gushers. After the initial tumult and shouting has died, a sane appraisal of the prospects will be in order. Then will the transit company know to just what extent it will be a participant in an oil boom that for the present at least has set the whole city topsyturvy.

Houston Company Educates Riding Public

The Houston Electric Company, Houston, Tex., is running a series of newspaper advertisements in its campaign to educate the riding public to the need for an increased fare. One advertisement, entitled "The Future of Public Transportation—Street Cars vs. Buses," stated that the new schedule of rates proposed would provide a lower rate for the constant user and a somewhat higher rate for the infrequent user. The company's fare petition was digested in the JOURNAL recently.

"Will Livelong"

"Will Livelong" in Philadelphia—Make April Safe

Municipal authorities of Philadelphia, Pa., have viséd the passport of "Will Livelong," the safety sage, who as the guest of the Philadelphia Rapid Transit Company will spend the month of April in the Quaker City with the promise to augment the happiness of Philadelphians by reducing the accident hazards of the streets. This kindly, wise old gentleman will be on hand, if not in person at least in picture, to caution children not to play in busy streets; to advise pedestrians to have a care when inclined to indulge in the dangerous practice of jay-walking, and to urge motorists to think for the other fellow as well as for themselves.

Behind this safety campaign are lined up a great many aggressive factors in the community life, including such organizations as the citizens' safety committee of the Chamber of Commerce, the public and parochial schools, the Automobile Club of Philadelphia, the Keystone Automobile Club, the Safety Patrol, the Boy Scouts and Girl Scouts. All other organizations in the city are being asked to lend their active support to the campaign and to contribute to its success by urging the idea and practice of safety upon their members.

A special safety Sunday will be set aside later in the month, at which time the various churches and religious organizations of the city will be asked to co-operate by emphasizing the importance of street safety and by discussing ways and means of reducing the accident hazard.

Each week of April will be devoted to special phases of the campaign. The first week, from April 3 to 9 inclusive, will be devoted to accidents involving children. This phase of the activity is advanced in an effort to reduce the 134 fatal accidents and 4,284 non-fatal accidents involving Philadelphia children during 1926. Later in the month will come periods devoted to pedestrian accidents and automobile accidents.

Headquarters of the "Will Livelong" safety campaign are located on the thirteenth floor of the Hotel Touraine, 1520 Spruce Street.

Subway Proposed in Fulton Street, Brooklyn

The route and plan for a subway in Fulton Street, Brooklyn, N. Y., was adopted on March 31 by the Board of Transportation, which sent a resolution to that effect to the Board of Estimate for approval. The plan calls for a four-track subway which will be the main trunk line of the city's new subway system in Brooklyn. It is expected that the new subway, which is to be constructed from Lafayette Avenue to Alabama Avenue, will hasten the removal of most of the elevated railroad in Fulton Street.

Another resolution was adopted by the board directing Robert Ridgway, chief engineer, to report on the cost of extending the Fulton Street subway from Alabama Avenue to the county line between Kings and Queens and to study the availability of other lines for this extension. A report was also requested on the best method of transfer connection with the Atlantic Avenue division of the Long Island Railroad and best methods of eliminating grade crossings over the railroad tracks.

One-Man Cars on Barberton Run

One-man car operation has become effective on the Barberton-Wadsworth line of the Northern Ohio Power & Light Company. The change is made for two reasons—safety and economy. More than a year of one-man operation in Akron has demonstrated the value of one-man car operation from the standpoint of safety and the company believes that as soon as the public becomes accustomed to the change it will fully approve the move.

The pay-enter plan has been adopted and passengers will board and leave cars at the front. The center exit will not be used. Zone checks are being used. Passengers boarding cars westbound in Akron will not pay as they board the cars, but pay as they leave. Eastbound passengers boarding cars between Wadsworth and Sherman will also pay as they leave. Passengers in the other zones pay as they board cars and secure a check showing destination to which fare is paid.

Thank You Aids in New Brighton

Think you, "thank you" deserves no praise?
It may not directly get you a raise
But it does spread cheer
So at the end of the year
You'll have no fear
But lots of good will, piled up for you, Bill,
And a great big THANK YOU—
from the BEAVER VALLEY BOARD.

Have you heard a thank you? Jot it down. It's contagious with the Beaver Valley Traction men. Each man in the company is a thank you scout, and when he hears a fellow worker praised by a patron for some little kindness or courteous act he takes this as his clue, writes it down in his notebook and at the end of the day transmits it to some member of the board—the dispatcher, superintendent, commercial manager or even the general manager, himself—who passes it on to the original man.

This is the gist of the latest bulletin of C. D. Smith, general manager.

Unusual Publicity Campaign in Grand Rapids

In the campaign literature used by the Grand Rapids Railway, Grand Rapids, Mich., in connection with the paving referendum submitted to the voters at the March 7 primary four stunts were especially interesting and served as evidence of the efforts of the company to win approval to its idea of relief from the cost of paving between the tracks. The measure, which was lost by a vote of 3,375 for and 4,612 against, was referred to in the ELECTRIC RAILWAY JOURNAL, issue of March 26, page 586.

A convincing piece of publicity literature was a bulletin sent out with a letter from the secretary of the Chamber of Commerce to all members of that organization and to factory employees. Factory owners used the material for tack-ups near the time clocks in their shops. The bulletin read that a "yes" vote had been unanimously approved and indorsed by the Grand Rapids Civic Round Table. Another idea was the distribution to the railway organization of pledge cards to help get out the vote. It was called "Votes I Can Secure." Another device was the slip-in connection with the employees' pay checks. On this paper nine results of a "yes" vote were listed. A departure from the usual form of advertising was the issuance of cards by all drivers of the Yellow Cab Company of Grand Rapids in helping the railway in its campaign. The message of the Yellow Cab Company recognized the Grand Rapids Railway as a competitor, but was "happy to co-operate with any movement or enterprise that will help Grand Rapids progress." Invisibly written on the card was the name of Bert Kenyon, manager of the Yellow Cab Company, who apparently believes that working with Mr. DeLamarter means the growth of his city.

News Notes

Would Suffer the Little Children.—A reduction in fare from 7 cents to 5 cents for children under 15 years of age was authorized on March 25 on the lines of the Johnson City Traction Company, Johnson City, Tenn., by the State Railroad & Public Utilities Commission. The commission also authorized the company to issue weekly passes to sell for $1.25 and allowed the sale of fifteen tickets for $1. The Johnson City Traction Company recently raised fares by the consent of the commission and discovered that it lost the business of the school children, who walked rather than pay 7 cents. It is with the desire of restoring the patronage of the children that the fare has been reduced.

Would Abandon Franchise Rights.—The Key System Transit Company has applied to the California Railroad Commission for authority to abandon its franchise rights on East Sixteenth Street between Second Avenue and Fourteenth Avenue in the city of Oakland and for a certificate declaring public convenience and necessity require construction and operation of a connection between applicant's Eighteenth Street line and its East Sixteenth Street line on and along Fourteenth Avenue. The railway sets forth that the city of Oakland proposes to pave East Sixteenth Street, throwing an expense of $88,000 on it, which is not warranted by the traffic on the lines.

New Caps and Badges in Kansas City.—The old style caps and badges worn by transportation employees of the Kansas City Railway, Kansas City, Mo., were replaced on Feb. 1 by new headgear similar in design to that worn by motor coach operators. The new caps are blue and have a larger and more loosely fitting crown. The badges of the new Kansas City Public Service Company are also of a different design. The expense of the new equipment was borne by the company.

Talks on Safety to Students.—Safety talks will be given to the school children of Atlanta, Ga., by a selected group of trainmen of the Georgia Power Company. Under plans outlined by Safety Director W. J. Rountree and H. Reid Hunter, assistant superintendent of the Atlanta public schools, every school will be visited. All addresses will be centered about three major points—conduct in street cars, on streets and hazards of bicycle riding.

Hearing Held on Oneida Fares.—Commissioner Van Voorhis held a hearing on March 25 on the application of the New York State Railways to the Public Service Commission for permission to increase fares from 7 to 10 cents, with three tickets for 25 cents, in the Oneida district between Sherill and Wampsville. Corporation Counsel Scoville, representing Oneida, withdrew opposition to the increase in fare on the stipulation by the railway to give a 30-day commutation ticket from Oneida to Wampsville for $2.50 for 50 rides; a round-trip ticket for 15 cents between Oneida and Wampsville, and to continue the sale of the workmen's tickets as at present at 11 cents.

Another Store Gives Free Rides.—The Reps store of Springfield, Mo., recently held a sale and provided free transportation on the local cars of the Springfield Traction Company between the hours of 9 and 10 o'clock on a Monday morning. As a result of this enterprise, coupled with judicious advertising, the store broke all records for sales during 28 years of business. The store's advertising for that sale day covered ten full pages in the Springfield *Daily News*, Sunday issue.

Amended Fare Order in Syracuse.—The Public Service Commission amended its order of Feb. 2, 1927, on March 24, in reference to fares on the Syracuse line of the New York State Railways by permitting the railway to sell six tickets for 45 cents on its cars and to establish at least fifteen stations in Syracuse where tickets or tokens will be on sale at the rate of four tickets or tokens for 30 cents, provided these stations can be established without expense to the company. This amended order is to become effective on April 1 and to remain in effect for 60 days thereafter or until otherwise ordered by the commission.

Cars Carry Falls Illumination Display.—A large display sign calling attention to the nightly illumination of Niagara Falls, N. Y., was carried in more than 700 city and interurban cars of the International Railway, Buffalo, on March 28. The sign, centrally located in the interior of the cars, shows a night view of the American Falls at Prospect Point, together with the announcement of the time of the illumination. The wide display on all cars with the suggested beauty of the falls at night is expected to stimulate travel to Niagara Falls.

Pamphlet on Railways Distributed.—"He profits most who serves best" is peculiarly applicable to an electric railway and finds its exemplification in the history of every successful street railway. This statement was made the conclusion of a paper read before the Memphis Engineers Club on March 7 by A. D. McWhorter, general superintendent of the Memphis Street Railway, and copied for distribution in pamphlet form with the compliments of the Memphis Street Railway. In some 20-odd pages Mr. McWhorter traces the history of street railways as a factor in transportation and gives some details on the Memphis system. Comment from the *Daily Post*, *Daily Argus* and the *Public Ledger* of May 30, 1866, on the inception of railway operation is reproduced.

Employee's Right Upheld.—The Indiana Public Service Commission on March 18 overruled a motion filed earlier in the week by attorneys for the Indianapolis Street Railway to dismiss the petition of James Green, an employee, that the commission act as a board of arbitration to effect a new wage scale agreement. Mr. Green filed a petition for redress of grievances as provided in a working agreement he said he signed with the company. Attorneys for the company then filed a motion to dismiss the petition, contending that his move was not made in good faith as he represented no one but himself and that the commission had no jurisdiction. The order issued March 18 said in part that "the contract under which this proceeding was instituted was, among other things, for the purpose of guaranteeing to the employees of the respondent signing the contract an effectual and constantly available remedy to adjudicate all controversies which may at any time arise." No date was set for hearing the employee's petition.

Foreign News

Automatic Substations for Cape Town Suburban Railway

When the electrification now in progress on the Cape Town Suburban Railway is completed it will be the first line in South Africa to have all its substation equipment automatically operated and remote-controlled. The line runs from Cape Town to Simonstown, a distance of about 30 miles. It will have six substations, each of which will contain one or more pairs of

1,000-kw. rotary converters by which three-phase current at 33,000 or 12,000 volts from the Salt River power station will be converted to 1,500 volts direct current for operation. The load dispatcher at the central station will be able to start or stop the rotary converters at any of the substations and will be assured by means of visual indications that the machines have done what he wishes and are working properly. For this purpose the all-relay tandem supervisory system of power control of the General Electric Company of England has been adopted. The twelve pairs of rotary converter sets, with automatic starting equipment, high-speed circuit breakers, etc., are being made at the company's Witton Engineering Works, Birmingham. Supervisory control equipment, really a telephone engineering job, is being supplied by the Peel Connor Telephone Works, Coventry.

Lack of Funds Halts French Electrification Program

Electrification of the seven regions in France as outlined in the rather extensive program which started at the conclusion of the World War has been halted because of lack of funds. Unison of these lines began to show progress two years ago, because the regions lying closest to the Alps and Pyrenees having the most available water power were developed first. Five or six years is the length of time to erect hydraulic-electric generating stations. For this reason the cost of construction is enormous, since long-term loans have risen in cost from 5 per cent to 13 and 14 per cent. Several proposals for construction of the program have been made, but the only reasonable solution seems to be the stabilization of the franc, according to industrial authorities.

Success of 2d. Maximum Fares in Glasgow.—The 2d. maximum fare for any distance beyond the 1d. stage, introduced on the Glasgow Tramways in the middle of last year, continues to produce higher traffic receipts. From the beginning of the financial year on June 1, 1926, until Feb. 7, 1927, there was an increase in revenue of £2,255 after wiping out a decrease of £10,000 when the old graded fares were in operation.

Escalators Increase Traffic in London Stations—Traffic has increased in tube railway stations in London since escalators have replaced stairs. The reconstructed station at Picadilly Circus will have at least eleven of them and will handle an annual traffic of 50,000.000 passengers. At the present time there are 64 of these moving stairs in 30 of the city's stations. When the present scheme of extension is completed 85 escalators will be installed at 34 stations. One up and down escalator is said to have the capacity of five stairways. The speed of the individual escalator is little more than 1 m.p.h., but the total number on the system in the course of a twenty-hour day travel about 1,500 miles. When the scheme is completed the daily performance will be 2,000 miles.

Recent Bus Developments

Allentown Problem Solved

Lehigh Valley Transit Official Discovers Efficacy of Schedule Cards in Education of Potential Bus Riders

"Getting the people to know your schedule is the same thing as advertising your service. The cost is a comparatively small one—the result is big, in our case, at least." This is the opinion of Henry F. Dicke, assistant to the president of the Lehigh Valley Transit Company, Allentown, Pa., who was confronted with the problem of selling the bus to the riding public. The idea was brought forward that a substantial, hard-wearing time-table would be an ever-present reminder of the bus lines. Accordingly celluloid cards were printed and 20,000 distributed through the bus passengers and among the big plants and stores. Upon one side was the picture of the new bus in its natural colors, topped by the caption "Turner Street Bus Line," and below, "The Lehigh Valley Transportation Company." On the reverse side was the schedule, telling of the time of arrivals at each of the important intersections, daily and nightly, eastbound and westbound. The card fitted nicely into a wallet or a vest pocket. The schedule card proved to be not only a convenience and reminder but also the final and necessary touch to the company's campaign for the installation of bus service.

When the Lehigh Valley Transit Company, under the title of the Lehigh Valley Transportation Company, recently added four large Mack buses to the organization it became noticeable that although the bus fleet covered the major part of its route through a section which needed additional transit facilities many potential passengers waited upon a spot where there were rails and trolley wire. Years and years of habit were driving them to walk varying distances to ride upon a car, while they might as well have saved the walk and taken the bus, which was being run directly for their convenience. A survey among the people of the territory covered by the bus lines revealed the fact that those who had clamored for the service knew nothing of the schedule of the buses, although the time-table had been published frequently in the papers. It was soon learned that the average person as he scanned the printed page would not cut out such a list because the paper soiled quickly and the wear and tear destroyed it in a short time.

In addition to the company's scheme to print the schedule card the buses were routed along Hamilton Street, the main thoroughfare. The buses stopped at the same loading platform as did the trolleys. The bright red and yellow coloring of the buses was distinctive and it created attention. People began to notice the buses. Presently the number of bus passengers began to mount.

A service has been started for parties and clubs, carrying them everywhere. This phase of the service received a most decided impetus when the Allentown Chamber of Commerce was convinced of the practicability of using two buses to transport its party on a recent "Good Fellowship Tour" to Wildwood and Atlantic City.

Substitution of Buses Being Approved

Permission has been granted the Morris County Traction Company by the Borough Council of Wharton, N. J., to substitute buses for the electric railway in the borough. The terminus, however, will not extend northward beyond the Central Railroad station, which is two blocks farther than the present terminal. The railway had asked permission to extend its lines to North Main Street, in the Luxemburg section, but residents of that section affirmed, in a petition, their belief that the present bus service given by F. B. Sheldon & Son is satisfactory. A 5-cent fare was proposed by the railway as an incentive to permit the extension of the line to Langdon's corner.

With one or two exceptions all communities along the railway have approved the change of transportation and within a few months it is likely buses will be in operation over the entire length of the old railway route.

Long Island Utility Should Be Preserved

The Public Service Commission denied on March 25 the petition of the Northport Transportation Company, Inc., for a certificate of public convenience and necessity for a bus line between Halesite and Huntington Station, Long Island, N. Y. The petitioner is now and has been for some time operating a bus line about 8 miles long from Vernon Valley, Northport and Cole Spring Harbor. The proposed route is about 3 miles long and directly competes with the Huntington Traction Company, which opposed this petition.

Investigation by the commission's engineers revealed that the tracks and equipment of the traction company were well maintained and in safe condition to operate; some maintenance work, however, was required. At the hearing it developed that bus transportation service rather than electric railway service was preferred by many residents. Under a special act passed by the Legislature in 1926 authorizing the substitution of bus service for the electric railway with the consent of the local authorities, the railway secured such consent. The commission in denying the bus petition ruled that competition on this line, if permitted, would mean that neither company would be able to operate with financial success and probably the existing utility would be destroyed.

Prospective Competitor in Buffalo Heard

Ernest M. Howe of the Buffalo Motor Coach Corporation, which is seeking a certificate of convenience and necessity from the New York State Public Service Commission for the operation of four bus lines in Buffalo, outlined details of the company, its financial status and its proposed plans at a series of hearings before Commissioner Pooley in Buffalo.

Mr. Howe said the new bus company will start operations with approximately $325,000 in assets, against $250,000 in subscribed capital. He said there will be an unfunded debt of $75,000. The company expects to operate 1,000,000 bus-miles annually with an average passenger pick-up per bus-mile or five or more passengers at an 8-cent cash fare. On that basis the minimum number of passengers carried annually, Mr. Howe said, would be 5,000,000. The estimated operating costs per mile, figuring in 20 per cent depreciation of vehicles, supervision and other items, would be 32 to 32½ cents per bus-mile. Mr. Howe said the company will buy 25 buses at $10,000 each, paying down $175,000.

After reviewing the railway situation in general President Youngbluth of the International Railway said in substance:

Buffalo is in the same case with many other cities, and International Railway has the same troubles and problems faced by almost all other systems. Things are getting a little better, generally and locally. In 1926 this system, for the first time in many years, earned its depreciation reserve.

Now comes the Buffalo Motor Coach Company proposition. Any independent bus system, of necessity, must be competitive, and this one would be highly competitive. It was laid out so that its three lines would reach one-fourth of the city population. Of course, it could not serve that population without connecting and cross-town lines. Mr. Howe estimates that it will take in at least $400,000. Whatever it takes in will be subtracted from International Railway, because this proposed competition will not generate new business of any appreciable amount.

If the community wants a railway system, and in the present state of the transportation industry it is certain that the city needs such a system, it cannot afford to expose that system to ruinous competition which robs it of the most profitable business. Short, straight rides, without transfers, are the rides which make money. These rides are the ones which the Buffalo Motor Coach Company plans to take away.

Co-ordinated service of railway and bus, with one fare and universal transfer, is better than cut-throat competition and two fares for one ride. It is not possible to have one good city-wide service with competition for the part of the business that absorbs losses and furnishes profits.

Substitution Decision Rests with Marinette

Substitution of bus service for railway service looms in Marinette and Menominee. At the hearing recently held in Marinette by the Wisconsin Railroad Commission to ascertain the extent to which the Menominee & Marinette Light & Traction Company would be willing to share in the cost of new bridges over the Menominee River between the Twin Cities, J. P. Pulliam, vice-president and general manager of the company, disclosed that street railway service was supplied at a loss of $80,000 last year in Marinette and Menominee. This makes the total operating deficit close to $500,000 since the company purchased the system. In the light of these disclosures and the additional explanation that any attempt to recoup these losses through increased rates would require prohibitive fares, discussion at the hearing switched to the substitution of buses as the facts submitted clearly indicated the company's inability to share in the cost of the new bridges. On this point Mr. Pulliam declared that the company would gladly surrender any railway or bus rights it has in these cities, but if some common ground could be reached by all parties the company would be willing to contract to maintain bus service in and between the two cities.

It will be recalled that the ELECTRIC RAILWAY JOURNAL reported in its columns a few months ago that the City Council of Marinette rejected the proposal of the company to substitute bus service on a four months trial basis, railway service to be restored if the change did not meet with approval.

Profit-Sharing for Fifth Avenue Employees

Directors of the Fifth Avenue Coach Company, New York, have approved the principle of profit sharing and the installation of a profit-sharing plan for the benefit of the employees has been authorized. Under a plan effective April 1, 1927, 10 per cent of the net income from the transportation business will be allotted to employees at the end of the year as follows:

1. To present employees who are still in service Dec. 31, 1927.
2. To persons hereafter employed who are still in service on Dec. 31, 1927. Such new employees, however, must serve three months before they begin to participate in the profits.

To give an idea of what this arrangement means, 10 per cent of the net earnings from the transportation operation as applied to the last three years would have been

$115,000 in 1924
115,000 in 1925
97,000 in 1926

Under present conditions approximately 1,850 men will benefit.

The officers, executives and heads of departments will not share in the 10 per cent of the profits above mentioned.

The company says:

The management recognizes that the present high character of its service is due in large part to its employees. Their deep interest in their work is reflected in a very low annual labor "turnover." By this plan each man by doing his part well can increase the patronage of the company, heighten the usefulness of the service to the public and at the same time increase his own earnings.

Further studies, now under way, will be completed about April 15.

Substitution in Eugene Unlikely

Despite the fact that the Oregon Commission some time ago granted an application of the Eugene Street Railway to substitute service by bus for electric railway service, there has been no noticeable decrease in the operation of the railway. Reports filed with the commission indicate, in fact, that more cars are being added to the service and that patronage has improved greatly since the announcement of the proposed change to motor vehicles. In the event of continued fair patronage, officials state that railway service in Eugene will not be discontinued.

More Bus Substitutions in Westchester

Abandonment of railway lines and the substitution of buses in southern Connecticut and Westchester County are sought in petitions which the New York, New Haven & Hartford Railroad and affiliated companies are preparing to file with the Public Utilities Commission. Everett Miller, president of the New York & Stamford Railway, disclosed that the petitions were to be filed as "the result of negotiations initiated nearly a year ago by the Traffic Commission of the Greenwich Chamber of Commerce." The New York & Stamford uses an interstate railway line which, in part of its territory, leases and operates lines owned by the petitioners. This company had announced that on April 3 the railway operating locally in Portchester would be abandoned and buses installed sufficient to afford a twenty-minute service. It is understood that if the petitions are granted the companies will cancel their present leases with the New York & Stamford Railway and will release their rights-of-way to this company for the motor coach routes.

Seeks Interurban Substitution.—The Mesaba Railway, Virginia, Minn., is planning to abandon its line between Gilbert and Hibbing as authorized by the federal court. At present public conveyances between the two towns are a rail and a bus line. Committees representing eleven range towns are seeking assurance from the Mesaba Railway Coach Company that transportation facilities will be adequate after the rail line has been abandoned. The bus and railway line are jointly owned.

Bus Operation Results in Loss.—Operation of buses in and between Superior and Duluth failed to net a profit for the Duluth Street Railway during 1926, according to the report filed with the Wisconsin Railroad Commission on the activities of the Superior-Duluth Coach Company, a subsidiary. The report revealed a loss of $6,379 last year. Operating revenues were $101,679 and expenses $103,256, a loss of $1,577, to which must be added taxes of $4,802. Operating expense covered $10,486 in bridge tolls for the use of the interstate bridge between Superior and Duluth. If the company had been relieved of this expense, the profit in 1926 would have been $4,089.

Will Continue Bus Operation—Despite reports that the New England Transportation Company would take over buses now operated by the Worcester Consolidated Street Railway, Worcester, Mass., Howard R. Whitney, vice-president of the railway, said his company would continue to operate the lines where they have developed the business. The railway will continue to operate in the sections where bus and railway service have been given.

Bus for Churchgoers.—The Boston Elevated Railway, Boston, Mass., has established a special Sunday bus service between the Park Street subway station and the Old North Church for the accommodation of churchgoers. The service was started March 27. So popular was the idea that the bus made three trips to serve 75 passengers.

Financial and Corporate

$494,471 Carried to Surplus

Market Street Railway, San Francisco, Reduces Debt $634,000—Showing Good All Elements Considered

Operating revenues of the Market Street Railway, San Francisco, for the year 1926 remained practically the same as the previous year. Due principally to increased wages of trainmen, effective early in the year, net earnings decreased as compared with 1925. Funded debt in the hands of the public was reduced $634,000 and there was no increase in the amount of capital stock outstanding. No dividends were paid. Capital expenditures during 1926 were $244,564. The sum of $1,346,243 was expended for maintenance of way and structures and rolling stock and equipment. A balance of $494,471 was carried to surplus.

The company operates its properties under a number of franchises, some of which expire in 1929, while others continue as long as 1952. In view of this situation the Board of Supervisors of the city and county of San Francisco has appointed a committee to study transportation problems and formulate a comprehensive program for future development.

SUMMARY OF INCOME STATEMENT OF MARKET STREET RAILWAY FOR 1926

Operating revenue		$9,891,667
Operating expenses and taxes except federal income tax		8,019,093
Net operating revenue before provision for depreciation		$1,872,574
Other income		53,453
Gross income		$1,926,027
Income charges:		
Interest on funded debt	$845,148	
Discount on funded debt	53,113	
Provision for 1926 federal income tax—company's estimate	74,423	
Depreciation of railroads and properties	500,000	
Other	25,628	
Total		$1,498,312
Net income		$427,715
Other profit and loss credits		66,756
Surplus		$494,471

Operating revenue for 1926 was $9,891,667, a decrease of $11,100 under 1925. The slightly reduced passenger receipts were due partly to a building trades strike, which continued through most of the year, and partly to the fact that the previous year was benefited by the celebration of California's 75th anniversary as a state.

Operating expenses, including taxes other than federal income tax, were $8,019,093, an increase of $344,285, or 4½ per cent, over 1925. This increase was mainly due to an increase in the wages of employees effective on March 1, 1926.

Thirty new cars were built in the company's own shops, and a number of others cars were remodeled to provide open-air sections in response to popular demand. During the year the company started a bus line through the rapidly growing Excelsior district.

Expenses incident to injuries and damages were 30.18 per cent less than in 1925. Statistics indicate that collision accidents per car-mile were reduced 26 per cent. This result is attributed largely to the company's policy, started during the year, of painting the front and rear ends of all cars white, and indirectly lighting them at night, to increase visibility. About one-half of the cars have been processed in this fashion and the remaining cars will be given white ends during 1927.

The company owns 773 passenger cars, operates 274 miles of single track, and during 1926 carried 265,563,016 passengers.

Montreal Tramways & Power to Be Liquidated

A special meeting of shareholders of the Montreal Tramways & Power Company, held at Montreal, Que., on March 19, virtually marked the passing of that company from existence, a resolution being passed appointing a liquidator who will wind up the affairs of the company. Another meeting will be held on April 4, but this is merely a matter of routine to comply with the English laws, under which the company was incorporated.

Inasmuch as United Securities, Ltd., owns practically all shares of the common stock of the Montreal Tramways & Power Company, Ltd., it follows that this company will receive practically the entire stock of the Consolidated Securities, Ltd., so that United Securities, Ltd., will automatically hold the control through the new medium of the shares of the Montreal Tramways as it has done previously through the medium of the Montreal Tramways & Power Company, Ltd., the English company.

$534,308 Profit in Louisville

Annual Report Discloses Decline in Traffic—Company Awaits Decision on Bus Competition—Review of Matters Affecting Railway

PASSENGER traffic on lines of the Louisville Railway, Louisville, Ky., dropped 479,705 riders in 1926 on account of an increase of about 5,000 autos. However, the company finished the year with a net profit of $534,308, against $480,557 for 1925, or an increase of $53,756. These facts were disclosed by James P. Barnes, president, at the recent stockholders' meeting.

Railway passenger traffic fluctuated through the year. January, February (when the rate was increased to a 7-cent straight fare under the terms of Ordinance No. 330, then in effect), May, June, July and September showed increases in passengers carried, which offset the decreased riding in March, April and August. The entire year showed a decrease of 479,705 passengers carried, compared with 1925, all of which decrease occurred in the last three months of 1926, due to unemployment and industrial depression. Total passenger traffic, which includes revenue, transfer and free passengers, compared with the four preceding years, was as follows:

	1922	1923	1924	1925	1926
January	7,600,072	7,861,986	8,435,464	8,297,839	8,633,543
February	6,830,188	7,371,936	7,957,906	7,562,261	7,590,218
March	7,760,463	8,498,345	8,515,182	8,354,832	8,274,959
April	7,686,732	8,341,493	8,422,780	8,214,226	8,145,383
May	8,170,426	8,920,188	8,844,856	8,469,877	8,603,531
June	8,659,721	8,211,428	8,097,217	7,837,978	7,905,530
July	7,401,345	7,943,088	7,712,320	7,648,982	7,697,183
August	7,333,738	7,827,996	7,549,678	7,744,573	7,471,624
September	7,735,517	8,125,974	7,850,813	7,995,353	8,004,341
October	7,976,451	8,257,865	8,334,069	8,395,428	8,235,552
November	7,731,835	8,059,261	7,720,786	8,048,480	7,894,275
December	8,013,257	8,250,837	8,298,196	8,564,736	8,189,721
Total	91,899,745	97,670,397	97,739,267	97,134,565	96,654,860

The negotiations in January, 1926, with the Board of Public Works turned largely upon certain differences of opinion with regard to construction of certain sections of Ordinance No. 330, which became effective in September, 1922, and under which the so-called barometer fund plan of service-at-cost had been carried out for three years. The differences were amicably adjusted and under the provisions of that ordinance a 7-cent fare went into effect on Feb. 1, 1926. A large and carefully planned publicity campaign resulted in

COMPARATIVE INCOME STATEMENT OF LOUISVILLE RAILWAY

	1926	1925
Operating revenues:		
Revenue from transporation	$4,665,693	$4,239,571
Other operating revenues	197,612	189,544
Total operating revenues	$4,863,305	$4,429,115
Operating expenses	3,275,786	2,962,512
Net revenue from operations	1,587,518	1,466,602
Taxes	461,000	431,000
Railway operating income	1,126,518	1,035,602
Bus operating income	31,566	.....
Total net operating income	$1,094,952	$1,035,602
Non-operating income:		
Louisville & Interurban Railway net income	82,903	88,637
Other non-operating income	10,228	10,432
Total non-operating income	$93,131	$99,070
Gross income	1,188,083	1,134,673
Deductions from gross income:		
Interest on bonds and notes	651,750	651,750
Miscellaneous debits	2,025	2,366
Total deductions	$653,775	$654,116
Balance available for dividends on stock	$534'308	$480,557

the adoption of Ordinance No. 361, Series 1926, which follows the principles of regulation embodied in the federal transportation act of 1920. Thus the city committed itself to the definite policy of a regulated transportation service at a rate such as to yield to the investor a reasonable return upon the value of property used and useful in the public service. In determination of the value of the property so used the ordinance provides for a valuation, and the Beeler Organization was selected to conduct this appraisal, a work upon which it is now engaged.

Ordinance No. 361, Series 1926, which became effective on Sept. 13, 1926, contemplates a co-ordinated bus and railway service, with motor coaches serving as feeders and connections to railway lines in territory not presently served by street cars. This service is conducted at a 10-cent bus fare with transfer to and from street cars.

MOVE TO PREVENT UNFAIR COMPETITION

On Jan. 17, 1927, an organization incorporated under the name of Peoples Transit Company started competitive bus operations. This operation competed with one of the railway's best lines and was carried on under jitney bus license. As these coaches operated between fixed terminals, on a regular schedule and over a regular route, the railway felt a franchise was necessary for their operation and suit was immediately filed for an injunction restraining the Peoples Transit Company from operating without such franchise. A temporary injunction was granted under date of Jan. 28, 1927, and operations of the competitive bus lines immediately stopped, pending decision of the Court of Appeals. The injunction has been made permanent and the case is being prepared for final argument in the Court of Appeals.

During 1926 the current dividends were paid on preferred stock, 2½ per cent on April 1 and 2½ per cent on Oct. 1. On Oct. 1, 1926, $2 a share was paid on common stock, the first dividend paid on this class of stock since July 1. 1918, and on Jan. 3, 1927, a dividend of $1 a share was paid on common stock. These dividends were paid out of the 1926 net earnings, a balance of $109,600 over and above dividend requirements being carried to the company's surplus account.

The work of the safety department in decreasing preventable accidents has progressed remarkably during the past five years, as reflected in the following figures:

STATEMENT SHOWING ACCIDENT TREND ON LOUISVILLE RAILWAY

	1922	1923	1924	1925	1926
Accidents	3,272	3,404	1,825	1,534	1,157
Miles operated per accident	3,323	3,380	6,390	7,432	10,386

This improvement was made in spite of the tremendous increase of motor vehicles on the streets. The safety dinners were continued throughout the year, given monthly to the carhouse operating the greatest number of miles per accident. The system average has increased from 1,800 miles per accident in 1920, prior to the start of the accident elimination contests, to 10,386 miles per accident in 1926. Two hundred and sixteen employees operated during 1926 without an accident, compared with 179 in 1925 and 136 in 1924.

Of the 1,634 employees of the Louisville Railway, the Louisville & Interurban Railroad and the Kentucky Carriers, Inc., on Dec. 31, 1926, 1,320 were enrolled in the Co-operative Association. There was a decrease in death and sick benefits in 1926 compared with 1925, as indicated in the following tabulation:

	1925	1926
Death benefits paid	$8,250	$6,300
Sick benefits paid	13,243	12,789
Nursing service	514	458

There was added to the surplus of the association during the year $9,904.

In his report Mr. Barnes referred to the Anthony F. Connelly award, established in 1925, in memory of Anthony F. Connelly, chief inspector, who died on Dec. 3, 1925, with a service with the company extending over 50 years. This award brought forth 50 nominations for the award, as outlined in the 1925 annual report. From these 50 names the Connelly award committee selected three employees whose records were of outstanding merit. George W. Kenn, a conductor at Thirteenth and Main carhouse, was awarded the Anthony F. Connelly award gold medal and $75 in cash, which is furnished from the fund set up by one of the directors of the company, and a trip to the annual American Electric Railway Association convention at Cleveland, Ohio. Two other employees were given bronze medals of honorable mention. Announcement of the winner for 1926 will be made in the near future.

Other subjects listed and discussed by President Barnes in his report are power, way, overhead department, jitneys, grade crossing elimination and equipment.

Sale at Foreclosure Ahead for Morris County Traction

Application will be made soon to the federal court for permission to sell the property of the Morris County Traction Company, Morristown, N. J. Elmer King of Morristown, counsel for the receivers of the company, will make the application before Judge Runyon. The sale plan was mentioned by Mr. King in opposing a motion to direct the receivers to pay a judgment. Mr. King said there were no funds with which the receivers could pay the claim. In the sale and reorganization of the company it is planned to convert it into a bus line. Forty-two buses, costing more than $400,000, are expected to be used. The road has been in the hands of Joseph P. Tumulty and Joseph K. Choate as receivers for four years. The progress of the plan to change to buses is discussed elsewhere in this issue.

U. G. I. Buys Into the National Public Service

Announcement has been made that the United Gas Improvement Company, Philadelphia, Pa., has acquired a minority interest in the common stock of the National Public Service Corporation, control of which passed recently from the Fitkin interests to Day & Zimmermann and their associates. Despite the construction placed on this event in some of the daily papers, there is no change involved from the status of affair with respect to this company reflected in the article in the ELECTRIC RAILWAY JOURNAL for March 19, page 553. Day & Zimmermann will continue through the General Engineering & Management Corporation to manage and operate the properties included in the National Public Service group.

Terms of Sale of Coral Gables Road Approved

The Florida Railroad Commission recently approved the sale of the Coral Gables Rapid Transit Corporation and all its properties to the city of Coral Gables, Fla. The sale was conditioned upon the assumption by the purchaser of all fines, dues, obligations and liabilities of the company. The purchase price was given as $1,782,000. Reference was made to the sale in the ELECTRIC RAILWAY JOURNAL, issue of Feb. 19, 1927, page 359. According to City Engineer Friedman, the extension of the Coral Gables Rapid Transit System has been completed into central Miami. The line eventually will be extended to the proposed Seaboard Railway station.

Dividend Omitted by Chicago City Railway

Omission of the regular quarterly dividend by the Chicago City Railway of 1½ per cent on the capital stock was announced in a letter to stockholders from Leonard A. Busby, president, on March 27. The dividened of $1.50 per share is payable on April 1, but the board of directors at a recent meeting decided to defer action, due to the unsettled relations of the company with the city.

Among the reasons for this action, the letter stated, is the fact that the operating rights under the company's franchise expired on Feb. 1, and while an extension of six months has been granted by the city, the agreement can be terminated on 30 days notice.

Another difficulty, the statement points out, is "the question of enabling legislation necessary to bring unification of the traction properties and to enable the city to grant a modern type of franchise, which is still pending in Springfield. Our first mortgage bonds, amounting to $33,926,000, are past due and unpaid. In this situation the board felt that the declaration of a dividend at this time would not be warranted."

As the company now is situated, it is impossible either to refund or extend the period of the life of the funded debt.

Last year the company earned 10.15 per cent on the capital stock, the closing year under the old franchise being

the best in the history of the Chicago traction properties from the standpoint of both revenue and traffic handled. The Chicago City Railway paid off its $786,744 in bank loans and the profit and loss surplus was increased to $4,074,987.

In conclusion, the latter said:

We wish to assure stockholders that the earnings of the company, over and above our first mortgage bond requirements, will be conserved for their benefit.

The Chicago City Railway operates all the south side lines composing the Chicago Surface Lines system.

Reorganization Committee Reviews Kansas City Affairs

Affairs of the Kansas City Railways, Kansas City, Mo., are discussed in a circular addressed by the reorganization committee to the holders of deposit for first mortgage 5 per cent bonds, three-year 7 per cent collateral notes and two-year 6 per cent collateral notes. Much of the information contained in the circular recapitulates news of the events in connection with the reorganization recorded from time to time in the ELECTRIC RAILWAY JOURNAL. It has seemed well to repeat at this time the fact that under the terms of the reorganization plan the preferred stock and the common stock issued by the Kansas City Public Service Company, the successor company, have been deposited under a voting trust agreement dated July 1, 1926, and extending for five years. Voting trust certificates in temporary form are in process of issuance for ultimate distribution to depositors.

On the subjects of rehabilitation, litigation and distribution of securities the circular says:

Since taking over the property on Oct. 15, 1926, substantial progress has been made in the rehabilitation and improvement program. Approximately 10 miles of track on important trunk lines has been completely rebuilt, together with new concrete foundations and paving. The elevated railroad in the so-called "West Bottoms," condemned as unsafe and abandoned in 1923, is being restored as a combined elevated and surface line, with necessary inclines, thereby giving much needed service to the industrial district along the Kaw River. The rolling stock is being thoroughly reconditioned, and numerous other improvements installed over the system. This work should show substantial results in 1927 and subsequent years through decreased costs and increased earnings.

There is now pending in the federal Circuit Court of Appeals for the Eighth Circuit, four appeals by junior bondholders, other creditors and stockholders from various decrees of the court entered in the receivership proceedings. The preferred stockholders and the holders of certain notes have appealed from the final decree of foreclosure, and the second mortgage bondholders and preferred stockholders have appealed from the decree confirming sale.

In view of the franchise situation and the pending litigation, the committee has deemed it inadvisable to proceed to an immediate distribution of the new securities (bonds and preferred and common stock, or voting trust certificates therefor) provided for depositors in the plan of reorganization, but anticipates that such distribution can be properly accomplished during the next few months, together with such interest and dividends as may have been paid thereon in the interim. It is expected that the new bonds issued in reorganization will be dated and will bear interest from July 1, 1926, or, if dated later, will carry warrants entitling the holder to an amount of cash equivalent to interest at the rate of 6 per cent on the principal amount from July 1, 1926, to such later date.

$105,968 Increase in West Penn Net

System Near Pittsburgh Does Well—Marked Progress Made in Reducing the Funded Debt

Net income of the West Penn Railways, Pittsburgh, Pa., for the year ended Dec. 31, 1926, was $2,604,331 compared with $2,498,363 for the previous year. In general, the year's operations were most satisfactory. A. M. Lynn, president, explains that the revisions of line and other improvements made during recent years enabled these results to be achieved, in some instances having reduced the number of cars without change in headway. Proposed revisions in line, rehabilitation of tracks and installation of improved signal systems are expected to result in further improvements in service. The general tendency of the public to relieve electric railways from burdensome franchise obligations, particularly as they appertain to maintenance and replacement of paving, is becoming more pronounced. The company has under negotiations franchises in many municipalities which will no doubt result in substantial relief.

CONSOLIDATED INCOME ACCOUNT OF WEST PENN RAILWAYS EXCLUDING INTERCOMPANY ITEMS

	1926	1925
Gross earnings from all sources	$22,157,054	$20,206,221
Operating expenses, including maintenance, taxes and rentals	11,594,947	11,169,278
	$10,562,107	$9,036,942
Less:		
Interest and amortization	3,690,278	3,375,715
Preferred dividends of subsidiary	1,173,152	909,195
Income applicable to minority interest	1,092,500	587,889
	$5,955,931	$4,872,800
Balance	4,606,175	4,164,141
Reserved for renewals, replacements and depletion	2,001,843	1,665,778
Net income	$2,604,331	$2,498,363

The co-operation of the State Highway Department in Pennsylvania has made possible in several instances the removal of tracks to private right-of-way alongside highways, resulting in safer operation, more economical maintenance and improved service and running time.

Freight service between Pittsburgh and important coke region towns, started in 1924, is growing to be an important factor in the company's revenues. In addition to the larger and more adequate freight house erected in Greensburg, improvements have been made to facilities in Uniontown, Pa.

The use of the "Sunday pass" for long interurban rides, first adopted in 1925, has been extended and placed on a permanent basis. Weekly passes for local city service have also been started. Both of these show very satisfactory results. The company has entered into the bus business in certain localities where service can be undertaken and rendered supplementary to the railway lines.

In July, 1926, the company consummated its agreement made in 1916 by the sale of Connellsville power station to the West Penn Power Company. The proceeds of this sale were placed with the Equitable Trust Company, New York, trustee of the first mortgage of April 1, 1905. The trustee called for tenders and retired to Dec. 31, $1,497,500 of 5 per cent first mortgage gold bonds of the company, due Jan. 1, 1931, leaving on hand for further redemption of bonds the sum of $1,496,300. Mr. Lynn explains that if further purchases can be made at satisfactory prices, the company will continue to redeem bonds to the exhaustion of the fund, temporarily invested in United States government obligations, with any balance utilized for improvements and extensions of its physical properties.

On Sept. 1, 1926, the company called and retired all of its outstanding three-year 6½ per cent gold debentures, due April 1, 1927, aggregating $3,500,000, funds having been made available to its treasury through reimbursement by certain subsidiary companies to which temporary advances had heretofore been made for construction, now funded. All of the company's outstanding first equipment trust 8 per cent notes of 1921, aggregating $120,000, were retired on Oct. 1, 1926.

During the year there were purchased $102,000 principal amount of 5 per cent first mortgage gold bonds of the Pittsburg, McKeesport & Greensburg Railway, now a direct obligation of West Penn Railways, reducing the amount of these bonds outstanding in the hands of the public to the sum of $271,000. The company also purchased through the trustee $7,000 principal amount of first mortgage 5 per cent gold bonds of West Penn Traction Company, issued under first mortgage of that company dated June 1, 1910. The amount of these bonds now outstanding has been reduced to $4,847,000.

As they matured from time to time during the year the West Penn Railways retired or purchased and retained in its treasury the following bonds of the Wheeling Traction System:

Wheeling Traction Company five year 8 per cent Wheeling Bridge collateral gold notes (retired)	$90,000
Twenty-year 5 per cent first mortgage gold bonds of the Wheeling & Western Railway ($2,000 yet to be presented)	182,000
Twenty-year 5 per cent first mortgage gold bonds of the Bellaire-Southwestern Traction Company	50,000
	$322,000

Mr. Lynn points out that the retirement of $5,548,500 of funded obligations of the company and its subsidiary railway companies during the year 1926, in almost all instances in anticipation of their maturity, will prove to be of advantage in handling its financial affairs in future years.

Refunding Plan in Cincinnati.—The Cincinnati Street Railway, Cincinnati, Ohio, is said to be arranging to refund an issue of $4,500,000 short term notes and supplant them with long term bonds. The notes are of three years duration and pay 6 per cent interest. The bonds are to bear a rate of interest lower than the notes, but it is expected that their longevity will attract note holders and other investors.

Legal Notes

INDIANA.—*Company Suspends Uninsulated Wire at Peril.*

The electric company owned and operated a line of poles along a public highway, on which were strung bare uninsulated wires carrying 6,000 volts. Plaintiff was engaged in moving his house along the highway and in order that the house might pass under certain guy wires which were not far enough from the ground to permit passage of the house, he climbed on the roof and accidentally came in contact with one of the uninsulated electric wires which was about 3 ft. above the guy wire and roof of the house, thereby receiving an electric shock which resulted in a serious injury. Under the state law the defendant is required to provide full and complete insulation of wires transmitting electricity at points where the public is liable to come in contact with such wires. It was held that in suspending an uninsulated wire across the highway the company does so at peril, and judgment for plaintiff was affirmed. [Linn Grove L. & P. Co., vs. Fennig, 154 N. E., 877.]

MARYLAND. — *Carriers — Taxation of Easements.*

Street railroad's right in street is an easement, subject to taxation, but in fiixing the value of such easement in street for purpose of rate basis, the Public Utilities Commission cannot consider such value as is dependent on use to which franchise of corporation permits easement to be put. [Miles vs. West, et al, 135 Atl., 579.]

MICHIGAN.—*Plaintiff Was Allowed to Express Views.*

In an action against the street railroad for personal injuries and damages to auto struck by street car, plaintiff was properly permitted to express opinion as to the speed of the street car, under evidence showing he saw the car when he turned on the track, and also showing that he had driven automobiles for some time. [Mills vs. Michigan Elec. Ry. Co., 212 N. W., 75.]

MINNESOTA. — *Fog Should Prevent Usual Speed of Car.*

A single track of the railway company was laid west of the center of the road. A northbound car, traveling at its usual speed through a heavy fog, struck a southbound auto, killing two of its occupants. A verdict in behalf of the next of kin of one of the occupants was affirmed, the court stating that weather conditions often demand increased vigilance on the part of those who use highways not only for their own but for the safety of others, and under the above conditions it was negligence for the operator of the trolley car to travel at the usual speed. [Kimpell vs. Duluth St. Ry., 211 N. W., 955.]

NEW JERSEY. — *Truck Helper Was Guilty of Negligence.*

Plaintiff was a helper on a truck proceeding on a road where there were tracks on both sides of the highway. A trolley was going in the same direction. Driver of truck drew it up alongside and quite near the trolley road on the right side. The plaintiff jumped off the truck and was immediately struck by the trolley car. Held that plaintiff was guilty of contributory negligence and verdict in his favor set aside. [Markowski vs. P. S. Ry. Co., 135 Atl., 783.]

NEW YORK.—*Receivership Does Not Exempt Street Railroads from Penalties.*

A street railroad corporation is not exempt from penalties for failing to pay certain percentage of gross income to city as required by its contracts under Railroad Law, N. Y. Sect. 175, because it is operated by a receiver appointed by the court. [City of New York vs. Brooklyn, Q. C. & S. R. Co., 219 N. Y. S., 399.]

NEW YORK.—*Stock Ownership Is Insufficient to Hold Dominant Company with Liability for Injuries of Subsidiary.*

Plaintiff was injured while leaving a car, through the negligence of the motorman. The franchise to operate a street railroad along the route on which the car was traveling belongs to the 42d Street, Manhattanville & St. Nicholas Avenue Railway. Substantially all of the stock of that company is owned by the Third Avenue Railway, which has its own franchises along other streets. An attempt was made to hold the latter company liable for the injury on the theory that under the screen of this subsidiary and others it operates for itself the entire system of connected roads, and is therefore liable for the torts of the consolidated enterprise. Held that stock ownership alone is insufficient to charge dominant railroad with liability for torts of the subsidiary. [Berkey vs. Third Ave. Ry., 155 N. E., 58.]

NEW YORK —*Power of State in Rate Fixing Defined.*

A state, through its proper agencies, has power to increase or lower rates charged by public service corporation, notwithstanding the existence of a contract providing for lesser or higher rate, and exercise of that power does not violate state or federal constitution. [Niagara, Lockport & Ontario Power Co., vs. Seneca Iron & Steel Co., 219 N. Y. S., 418.]

OHIO.—*Injuries at Safety Zones.*

A ten-year-old girl, standing in a safety zone, was struck by the rear end of a trolley car which was passing her. The allegations of negligence were that the car was going at a high rate of speed; that the motorman failed to ring his gong, and that the car did not stop in time to avoid the accident. There was no allegation that there was any projection on the rear of the car which might have produced the injury. Testimony showed the child had seen the car approaching, and it was accordingly held that recovery could not be based on the failure of the motorman to ring his gong and that such allegations were not therefore material. [Steinman vs. Cleveland Ry., 155 N. E., 149.]

OHIO.—*Casual Service Not Proper Subject of Certificate of Convenience and Necessity.*

A bus company received from the Public Utilities Commission a certificate of public convenience and necessity to operate motor transportation passenger service on irregular routes, "over all public highways, roads and streets in the state of Ohio." The law requires publication of all applications for such certificates in a newspaper of general circulation, published at the county seat of each county through which the applicant proposes to operate, or in a newspaper of general circulation throughout the territory in or through which the applicant proposes to operate. Publication in five newspapers issued in different parts of the state was held by the Commission to be "substantial compliance" with this part of the law, but it was held inadequate by the Court. The Court also held that such a certificate over highways already traversed by regular routes is unauthorized, where it is not shown that the regular lines in that section are not furnishing reasonable facilities and that casual and unusual service of the kind proposed is not proper subject matter of a certificate of public convenience and necessity. [Lake Shore Electric Railway vs. Public Utilities Commission of Ohio and other cases. 154 Northeast. Rep., 239.]

OKLAHOMA.—*Bus Line Must Justify Certificate of Convenience and Necessity.*

To warrant licensing of additional public utility, it must appear that present facilities are inadequate and inconvenient to traveling public. That proposed bus line, serving same territory as railroad, may accommodate few individuals, does not justify certificate of "convenience and necessity." [Chicago, R. I. & P. Ry., vs. State, 252 Pac., 849.]

PENNSYLVANIA. — *Expert May Testify on His Own Examination.*

A medical expert may testify as to symptoms and sensations narrated by patient for the purpose of securing correct diagnosis and give his professional judgment as to the effects of injury, based on his own physical examination of injured party. but not on what others have told him, though he was fully advised of history of case. [McMinis vs. Phila. Rapid Transit Co., 135 Atl., 722.]

PENNSYLVANIA. — *Pedestrian Should Cross Street Only When Action Does Not Seem Hazardous.*

A young man in full possession of his faculties was held guilty of contributory negligence as a matter of law. barring recovery for injuries sustained as a result of stepping in front of a moving street car which was in plain sight in broad daylight, with nothing to obstruct his view or distract his attention when he started across the street from a wagon on the opposite side. A pedestrian may properly attempt to cross a street car track on which a car is approaching when there appears to be sufficient opportunity to do so safely, but not when to do so appears hazardous. [Schuchalter vs. Phila. Rapid Transit Co., 135 Atl., 739.]

Personal Items

R. B. Stearns Honored

Operating Head of Eastern Massachusetts Company Made President of New England Club

Because of his outstanding accomplishments in the West, especially in Milwaukee, R. B. Stearns received a commission in the East ten years ago as vice-president in charge of operating one of the important systems in Massachusetts. And now he has just been elected president of the New England Street Railway Club. R. B. Stearns, vice-president and general manager of the Eastern Massachusetts Street Railway, certainly is well known in New England and is recognized as an important influence in general utility enterprise.

R. B. Stearns

In the summer of 1917 he was elected senior vice-president in charge of operation of the Bay State Street Railway in Boston, to become in 1919 the Eastern Massachusetts Street Railway, relinquishing his position as vice-president of the Milwaukee Electric Railway & Light Company, Milwaukee, Wis. At that time P. F. Sullivan, president of the Bay State property, said that Mr. Stearns had been asked to join the Bay State because of the conspicuously successful work he had done in the West. In Milwaukee he had charge of a property with 400 miles of track, doing a business then in excess of $6,000,000 a year. In his six years of service with the Milwaukee company he had done a great deal toward rehabilitating and reconstructing the property. In addition he had started the Employees' Mutual Benefit Association and other employee benefit associations looking toward the development of the co-operative spirit.

Mr. Stearns' Early Work

Prior to his affiliation with the Milwaukee property, Mr. Stearns had been actively engaged in work in Chicago. He was employed in the construction of the Northwestern Elevated Railroad, the Union Loop and extensions to the Lake Street Elevated Railroad, Chicago, later known as the Chicago & Oak Park Elevated Railway, as assistant chief engineer and superintendent of construction. After that, he was appointed chief engineer and superintendent in charge of the operation of the Northwestern Elevated Railroad. At one time he was general manager of the Chicago & Milwaukee Electric Railroad.

Mr. Stearns was graduated from Purdue University, class of 1889. He was engineer in connection with the Columbian Exposition in Chicago in 1893, and subsequently was engaged in the United States Engineers Service on the Chicago drainage canal and the Hennepin Canal.

A decade ago, when Mr. Stearns went to Boston, the roads there were in a somewhat perilous state. What was needed, many felt, was a broad view of the railway question, followed by legislation to the end that electric railway investment might again become attractive to capital. The hope was expressed that Mr. Stearns' entry in New England would help the railway companies in the solution of their problems. He at the very beginning urged the railway companies to co-operate, and stressed particularly the assistance which the trainmen could give in explaining the needs of the railways to the public. He introduced the zone fare system on the Bay State lines.

Adolf Blunk Leaves St. Joseph

Adolf Blunk, associated with the St. Joseph Light, Heat & Power Company, St. Joseph, Mo., since November, 1925, and for the past year general superintendent of the railway department, was transferred recently to the Toledo Edison Company. His change is in the nature of a promotion, although his duties with the Toledo Edison have not been specified.

Mr. Blunk first worked for the Union Pacific Railroad in the maintenance of way department. Then he went to the Toledo Railway & Light Company, as junior engineer. It was at this time in his career that the war broke out and he entered the military, becoming first lieutenant in the army air service. After the armistice Mr. Blunk returned to the Doherty organization as railway engineer with the Durham Public Service Company, Durham, N. C. Then for a time he was with the Toledo & Western Railway, Sylvania, Ohio, as master mechanic, trainmaster and purchasing agent. His next post was with the Ohio Public Service Company, Mansfield, Ohio, as railway engineer and superintendent of the gas department. The Portsmouth Public Service Company, Portsmouth, Ohio, claimed him next, and from there, following a short stay in the New York office, he went to St. Joseph, taking the position as assistant general superintendent. In February, 1926, he was made general superintendent of the railway department. Mr. Blunk was educated at the University of Nebraska.

Niles Persons Goes to Brooklyn

Niles Persons, who for the past four years has been master mechanic of the Schenectady Railway, Schenectady, N. Y., has accepted a position with the Brooklyn-Manhattan Transit Corporation, Brooklyn, N. Y., with the title of superintendent of surface lines shops. In this capacity he will fill a new opening in the mechanical department, reporting to W. G. Gove, superintendent of equipment. The new position was made necessary on account of the rapid expansion of the system and the need for directing surface maintenance work as a complete unit separate from rapid transit work.

Mr. Persons' first connection in electric railway work was in the armature department of the United Traction Company, Albany, where he remained for thirteen years as foreman, general foreman, assistant master mechanic and master mechanic. He has also been in charge of the mechanical department for the Hudson Valley Railway, Glens Falls; New York State Railways, Rochester; Gary & Interurban Railway, Gary, Ind., and the International Railway, Buffalo.

Niles Persons

Mr. Persons was born in Albany in 1888. He was educated in the public schools of that city and at the State Normal School. He is a member of the New York Electric Railway Association, American Electric Railway Association and the Schenectady Chamber of Commerce.

Thomas Miller Promoted in Schenectady

Following the resignation of Niles Persons as master mechanic of the Schenectady Railway, Schenectady, N. Y., Thomas Miller, formerly assistant master mechanic, succeeds to the vacated post. Mr. Miller's present position will be filled by William Golden, long identified with the Schenectady Railway shops.

Mr. Miller's first experience with railway work was gained with the Quincy & Boston Railway as an electrical inspector. He was connected at one time with the Bay State Street Railway as foreman and general foreman and later served the New York, New Haven & Hartford Railroad as general foreman of electrical operation at Pemberton, Mass. Mr. Miller went to Schenectady in 1910 as general foreman of the McClellan Street carhouse and has since held positions as general foreman and assistant master mechanic. Mr. Miller was born in Preston, England, in 1879.

Oklahoma Association Elects E. R. Ernsberger

Earl R. Ernsberger of Oklahoma City, Okla., president of the Southwestern Light & Power Company, was elected president of the Oklahoma Utilities Association on March 9. For many years Mr. Ernsberger has been what is known as an electric light and power man, but he will be recalled to railway men as the former chief engineer and general manager of the Mount Hood Railway & Power Company, Portland, Ore. This was an electric railway and hydro-electric power development. Mr. Ernsberger went with this property just after the construction was started, and completed that work and operated the property until it was sold to the Portland Railway, Light & Power Company in 1913.

E. R. Ernsberger

This, however, was not his only railway connection, for in 1913 he went with the Charles City Western Railway, Charles City, Iowa, as vice-president and general manager. During Mr. Ernsberger's management the road was electrified, extended and put on a paying basis and operated as such until the time he severed his connection with it in January, 1922. It was from this property that he went in February, 1922, as president and general manager of the Southwestern Cities Electric Company, a holding organization for the Lawton & Duncan Electric Company, Mangum Electric Company and the Lawton Gas Company in Oklahoma, and the Quanax Light & Ice Company, operating in Texas, also the Pecos Valley Gas & Electric Company in New Mexico. These are all properties now included in the Southwestern Light & Power Company. He is also president and general manager of the Keyes Corporation, owning and operating oil and gas fields at Walters, Okla.

Mr. Ernsberger's experience has covered a wide range of engineering activity. The project at Portland, Ore., to which reference has been made before, consisted of the 20,000-hp. hydro-electric plant at Bull Run, with a 500-ft. head. The work there included the building of 3 miles of tunnel conveying the water from one river to another, 5 miles of flume with a 280-acre reservoir reserve with two auxiliary steam plants in Portland, 66,000-volt high-tension transmission lines and a 20-mile railway which had to be built before the machinery could be transported to the power plant site and installed.

Mr. Ernsberger is a graduate civil engineer. His first experience after leaving school was with the Pennsylvania Railroad in the engineering department with headquarters at Pittsburgh. He left that company to accept a position as assistant to the chief engineer of the Wheeling & Lake Erie Railroad, Cleveland, Ohio, but later became engineer and superintendent of track elevation for the Chicago, Milwaukee & St. Paul Railway in Chicago. This last position he held for eight years, during which time several million dollars worth of construction work was done under his direction each year. As a part of his work at Chicago Mr. Ernsberger helped supervise the electrification of the Northwestern Elevated Railroad from Wilson Avenue to the Central Street Station in Evanston, Ill.

Mr. Ernsberger was a pioneer among utility men with engineering training who recognized the value of good public relations. The very nature of his work has compelled him to be exact in his dealings, but the practice of the Golden Rule has been his motto, with the result that he has found in all cases that the public in turn has treated the property which he represented as it would like to be treated.

Changes at International Annual Meeting

T. E. Mitten was elected chairman of the board of directors of the International Railway and J. A. Queeney chairman of the executive committee at the annual meeting of the board of directors, held on March 28. Dr. A. A. Mitten, son of Mr. Mitten, was added to the executive committee, the other members being Mr. Queeney and President B. J. Yungbluth. Mr. Queeney becomes vice-chairman of the board.

Harold P. Lesswing was elected a director of the company, taking the place of George L. Burgain, retiring president of the I. R. Co-operative Association. Mr. Lesswing is the newly elected vice-president of that association. He was born in Tonawanda, N. Y., and has been employed by the company continuously since April, 1916. His first job was as helper in a construction gang. He is now an electrician.

The complete list of directors elected by the stockholders includes T. E. Mitten, J. A. Queeney, C. J. Joyce, Harold P. Lesswing, Dr. A. A. Mitten, W. E. Murphy, Nelson Robinson, H. G. Tulley and B. J. Yungbluth.

G. W. Welsh Heads Illinois Association

G. W. Welsh, vice-president of the East St. Louis & Suburban Railway, East St. Louis, Ill., was elected president of the Illinois Electric Railways Association at the meeting in Springfield, March 17. A little more than a year ago, when W. H. Sawyer, president, departed for Australia for the purpose of making the electrical survey, Mr. Welsh was elected vice-president of the East St. Louis Railway, which included the East St. Louis & Suburban Railway and the St. Louis & Belleville Electric Railway. Before that promotion Mr. Welsh had been assistant to the president of all the railway companies in the group.

G. W. Welsh

It was in 1914 that Mr. Welsh became connected with the East St. Louis & Suburban group of properties in East St. Louis as superintendent of power. He continued in that position until 1919, when he was made chief engineer. He has been identified with the General Electric Company, the New York Central Railroad, the Southern Pacific Company at San Francisco, where he was interested in electrification work, as he was on the New York Central. Mr. Welsh was educated at Lehigh University, where he was graduated with a degree of electrical engineer in 1901.

Obituary

Albert Ball

Albert Ball, chief mechanical engineer of the Sullivan Machinery Company for nearly 50 years, died at his home in Claremont, N. H., on Feb. 7, at the age of 91 years and nine months. Mr. Ball was born in Boylston, Mass., on May 7, 1835. His schooling ended at the age of 16 years, when he became a machine shop apprentice. His first employment was with L. W. Pond at

Worcester, Mass. In 1863 he brought out his first important invention, a combined repeating and single loading rifle, and in the same year he perfected a machine for polishing flat surfaces. Mr. Ball was sought out by E. G. Lamson, of the firm of Lamson, Goodnow & Yale, manufacturer of the Ball gun, many of which were sold in Germany and used by the Prussian army in the war against Austria.

It was while Mr. Ball was with the Windsor firm that he invented the first cartridge greasing machine, an indirect outcome of his visit to the Springfield, Mass., arsenal for the purpose of discussing contracts for the Ball rifle. Mr. Ball went to Claremont in May, 1868, to become affiliated with the J. P. Upham & Company machine shop, which later became the Sullivan Machinery Company. It was after he became associated with the Sullivan Machinery Company that his full power as an inventor was attained. Beginning in 1869 with the diamond channeler and gadder, his genius was responsible for the development of many important improvements in mining and quarrying machinery.

Development of the Sullivan diamond core drill brought to Mr. Ball a lasting fame, and the romantic history of the opening up of the rich gold fields in the South African Transvaal is closely linked with the history of Mr. Ball's diamond drills. Mr. Ball's inventions during his life in Claremont were not limited to mining machinery.

Following his retirement from the Sullivan company in 1914, Mr. Ball turned his time and efforts to an avocation in which he had taken great interest, namely, the making of violins. He produced many instruments of beautiful design, praised by experts for their tone and finish, and developed special machinery for executing unique wood patterns. He continued active until his last illness.

Edward C. Niles, former chairman of the New Hampshire State Public Service Commission, reporter of Supreme Court decisions and special counsel for New Hampshire in its railroad cases, died in Concord on Feb. 16. He was born in Hartford, Conn., on March 28, 1865.

Fred W. Reitz, for many years president of the Evansville Traction Company, which later became the Evansville & Ohio Valley Railway, Evansville, Ind., died recently. The Evansville & Ohio Valley Railway operates from Evansville west to Mount Vernon, east to Rockport and Grandview and south to Henderson, Ky. Mr. Reitz was 69 years old.

Charles H. Alexander, pioneer electric railway man of Texas, died at his home in Dallas on March 21. Mr. Alexander retired from business several years ago. He went to Dallas in 1888 from Tennessee and organized the Standard Light & Power Company and the Dallas Consolidated Street Railway. In the organization of the street railway he consolidated and electrified the lines in Dallas. His property was the first electric railway in that part of the state of Texas. Mr. Alexander was 68 years old.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

Best Year for General Electric

Selling Prices Up Only 13 Per Cent Despite 54 Per Cent Advance in Commodity Prices

Sales billed by the General Electric Company in 1926 amounted to $326,974,104, compared with $290,290,166 in 1925, an increase of more than $36,000,000. The best previous high record was in 1924, when sales totaled $299,251,869. Orders received during 1926 aggregated $327,400,207, an increase of 8 per cent over 1925. The previous high record was $318,470,438 in 1920.

Profit available for dividends on the common stock on the 1926 business was $44,314,884, equivalent to $6.14 a share on the 7,211,481 shares of no par value stock outstanding, as compared with $20.49 a share in 1925 on the 1,802,870 shares of $100 par value common stock then outstanding, which is equivalent to $5.12 per share on the present stock. In August, 1926, four shares of no par value common stock were issued in exchange for each share of the old common stock.

This split-up of shares is reflected in an increase in the number of stockholders from 36,697 in December, 1925, to 46,305 in December, 1926. More than 98 per cent of the stock is held in the United States and nearly half of the stockholders are women. Every state in the Union is represented in the list of stockholders.

A striking illustration of the company's contribution to the benefit of the consuming public and of its employees is contained in a statement showing that during the past twelve years, while commodity prices have advanced 54 per cent and the cost of living has risen 68 per cent, General Electric selling prices have increased only 13 per cent and the average earnings of the company's employees have more than doubled.

The export business of the company is conducted by the International General Electric Company, Inc. Those portions of its orders and billing which were for General Electric products are included in the corresponding figures of the General Electric Company at their cost to the International Company. The total of all orders received by the International Company during the year was $20,824,000, compared with $25,710,000 during 1925. The net sales billed were $22,696,577 during 1926, compared with $21,981,951 for 1925. The International Company's business yielded a profit available for dividends of $1,538,306 compared with $2,617,204 in 1925. Dividends of $1,500,000 were paid during 1926, of which the General Electric Company received $1,375,772, which is included in the financial statement as part of "income from associated companies."

COMPARATIVE STATEMENT OF INCOME AND EXPENSES OF THE GENERAL ELECTRIC COMPANY

	1926	1925
Net sales billed	$326,974,103	$290,290,165
Less: Cost of sales billed, including operating, maintenance and depreciation charges, reserves and provision for all taxes	289,878,335	257,479,490
Net income from sales	$37,095,768	$32,810,675
Income from other sources:		
Income from associated companies	$4,937,901	$3,411,292
Income from miscellaneous securities	915,835	751,142
Interest and discount	3,047,048	2,838,513
Income from U. S. government securities	2,647,502	2,394,398
Royalties and sundry revenue	1,013,238	964,720
	$12,561,526	$10,360,067
Total income	$49,657,294	$43,170,743
Less: All interest payments and, in 1925, premium on debentures retired	$436,511	$1,925,696
Addition to general reserve	2,548,284	2,603,828
	$2,984,796	$4,529,525
Profit available for dividends	$46,672,498	$38,641,217
Less: 6 per cent cash dividends on special stock	2,357,614	1,735,576
Profit available for dividends on common stock	$44,314,884	$36,905,641
Less: Cash dividends on common stock*	19,828,896	14,407,544
Surplus for the year	$24,485,987	$22,498,097
Surplus at January 1	85,848,170	72,362,223
	$110,334,158	$94,860,320
Less: Dividends paid in special stock: $1 per share in 1926 (equivalent to $4 per share on old $100 par value stock) and $5 per share in 1925	7,210,810	9,012,150
Surplus at Dec. 31	$103,123,348	$85,848,170

* At the rate of $8 per share on old $100 par value stock in 1925 and first half of 1926 and at the rate of $3 per share on new no par value stock (equivalent to $12 per share on old stock) in last half of 1926.

Large Bus Shops Proposed at Newark

For purposes of efficiency and economy Public Service Transportation Company, Newark, N. J., will erect a large bus repair shop and remodel the present storage building on the south side of Ferry Street west of and adjoining the Newark railway repair shops. It is intended to make this shop the major repair and overhauling headquarters for all the buses operated by the company in the state.

The proximity of the bus repair shop to the railway shops is expected materially to reduce the time heretofore taken to overhaul buses, as it will be possible to make chassis and body repairs simultaneously by utilizing the facilities of both shops. Another advantage will result from placing the two main storerooms adjacent to each

other, as economies can be effected by the delivery of railway and bus supplies to the point of common activity.

All chassis and engine work will be done in the new bus shop and the electrical work, carpenter work and painting, together with spring, radiator and sheet metal work on the buses will continue to be done in the railway shops.

The bus shop will be thoroughly equipped with the latest models of machinery, making it possible to perform any major overhauling job at this point. All minor repairs to buses will continue to be made at the smaller garages in various parts of the territory.

The new bus shop will be 318 ft. long, 102 ft. wide and 26 ft. high, sufficient to accommodate double-deck buses if necessary. The roof will be of glass of special sawtooth design, constructed so that light from the north will be reflected into the working space beneath. The storeroom will be two stories.

Trends in the Metal Markets

BUYERS of the non-ferrous metals have for the most part not responded during the week ended March 30 even when producers were willing to shade prices. Demand for copper has been slightly better than last week, but this is all that can be said for it; demand for zinc subsided and lead and tin show little change so far as volume of business is concerned.

Copper was generally available for Eastern deliveries at 13¼ cents on Thursday, Friday and Saturday, but as early as Friday reports of 13¼ cents seem to be well authenticated. By Monday the market was generally quoted at 13¼ cents and that price ruled on business placed March 29 and 30. The copper sold at 13.05 cents was a resale offering. In the Middle West as low as 13.20 cents, delivered, has been done. The volume of business was somewhat greater than last week, but is still much below normal. The total of March sales will be the lowest in months, so the prospect of a good buying wave in the coming week, or possibly in the week after next, seems excellent. The large producers have so far consistently refrained from forcing copper on the market, the depression in price being attributable to the custom smelters, who make a policy of selling current intake. Following recent sales, they are, perhaps, in somewhat improved position. The copper sold has been pretty well distributed. Sheet and tube business is reported active, and brass business good. Wire continues to be the dullest line. Copper prices abroad were reduced on March 29 by the export association from 13.65 to 13¼ cents, c.i.f.; there, too, the week has been dull.

The *Engineering and Mining Journal* says that an unusual situation exists in the lead market. The peculiarity lies in the fact that the present dip has taken the price lower than the bottom reached at the end of the long decline, a condition that has not existed for many years. The market is quite clearly in the hands of buyers, and sellers are competing for business. In New York, the limited amount of "outside business" has virtually all been at the Smelting company's price. In the Middle West second-hands have been inclined to undersell the principal interests, some lead being available on March 30 as low as 7.05 cents. Absence of buying in volume by battery makers is an important feature in the situation.

Demands for zinc from galvanizers have been few and sellers have been obliged to make concessions in price. The volume of sales has been smaller than for several weeks. Prompt zinc has been offered for somewhat less than forward. On March 29, for example, early deliveries were available at 6.525 cents without being taken up, whereas a good tonnage for forward delivery sold at 6.55 cents. On March 30 the market was much the same, though some zinc was reported having been offered as low as 6½ cents. Some increase in ore production is reported from the Tri-State district, but smelter production is probably 8 or 10 per cent less than it was a month ago. High-grade metal continues dull at 8½ cents delivered in the East.

Tin has been quiet during the week, with prices fluctuating within narrow limits in the domestic market. An advance in London on March 30 was reflected in some improvement in the domestic market from a quotational standpoint. Future delivery is at a discount of from 1⅛ cents to 2 cents; and 99 per cent, for prompt delivery, commands about a cent less than Straits.

METAL, COAL AND MATERIAL PRICES
F. O. B. REFINING

Metals—New York	March 29, 1927
Copper, electrolytic, cents per lb.	12.90
Copper wire, cents per lb.	15.25
Lead, cents per lb.	7.32
Zinc, cents per lb.	6.88
Tin, Straits, cents per lb.	68.00
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$4.425
Somerset mine run, Boston, net tons	1.975
Pittsburgh mine run, Pittsburgh, net tons	2.05
Franklin, Ill., screenings, Chicago, net tons	2.25
Central, Ill., screenings, Chicago, net tons	1.875
Kansas screenings, Kansas City, net tons	2.50
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	$5.50
Weatherproof wire base, N. Y., cents per lb.	16.75
Cement, Chicago net prices, without bags	2.05
Linseed oil (5-bbl. lots), N. Y., cents per lb.	10.70
White lead in oil (100-lb. keg), N. Y., cents per lb.	14.50
Turpentine (bbl. lots), N. Y., per gal.	$0.69

H. M. Robinson a General Electric Director

Henry M. Robinson, president of the First National Bank of Los Angeles, was elected a director of the General Electric Company at the meeting of the board in New York on March 25. In addition to his position with the First National Bank, Mr. Robinson is president of the First Securities Company, chairman of the board of the Pacific Southwest Trust & Savings Bank, and a director in a number of other large corporations. This is the first time the General Electric Company has gone to the West for a member of its board.

Terms of Purchase of Seattle Cars Under Discussion Again

Negotiations for the purchase of 80 new cars for the Seattle Municipal Railway, Seattle, Wash., are being pushed by Seattle city officials. Only one or two details are yet to be worked out with the St. Louis Car Company, awarded the contract some time ago. A bond issue of $1,875,000 has been voted for the purchase, of which $1,420,000 will go for the cars and the rest for financing track extensions in various parts of the city and for a railway trestle over the West Duwamish waterway.

The car builder desires that there be included in the purchase contract, before the company signs it, a clause making a separate fund of the money to retire the bonds for buying the cars. Its desire is to be reassured that money put aside for the retirement of the bonds will be used for that purpose only. The Council sees no objection to this clause and is ready to include it in the contract as soon as the company which has agreed tentatively to buy the bonds is ready to take them. Operation of the new cars is expected to effect a saving of $260,000 a year.

Mazda Price Cut Again

Effective on April 1, announcement is made by the General Electric Company of another reduction in the prices of Mazda incandescent lamps. This is the third reduction in prices since the new inside-frosted lamps were introduced in 1926. The reduction lowers the price of 25 and 40-watt lamps to 23 cents each, the 50 and 60-watt sizes to 25 cents each and the average price of all Mazda lamps to 49.4 per cent less than in 1914.

"This reduction is made possible by the elimination of waste through the abandoning of about 45 types of lamps and the universal acceptance of the six new types of inside frosted bulbs," the announcement said in part. "The old type of outside frosted lamp, which absorbed approximately 20 per cent of the light and collected considerable dust and dirt with the rough surfaces, sold for approximately three times as much as the new inside frosted lamp."

Great Northern Railway Electrification Progressing

The 7,500-kva. frequency changer at Skykomish, Wash., which will supply part of the current used by the electrified Great Northern Railway has been installed, ready to supply 11,000-volt, 25-cycle, single-phase current to the overhead lines which are now being erected. A similar frequency changer is also to be located at Tumwater. Installation of the equipment for the electrification of the railroad over the Cascade Mountains is progressing rapidly, and train operation with electric locomotives is predicted in the near future.

Two single-phase, motor-generator type locomotives, each weighing 250 tons and being the largest single-unit electric freight locomotives ever built, will be placed in operation this summer. These, as well as the frequency

changers, are being supplied by the General Electric Company. The American Locomotive Company has the contract for the mechanical parts of the locomotives.

Power will be supplied to the substations by the Puget Sound Power & Light Company.

Slingluff Goes to Kuhlman Car Company

Eugene Slingluff, well known in the car building industry, has resigned his position with the Cincinnati Car Company to accept the post of general superintendent with the Kuhlman Car Company, Cleveland, Ohio. Mr. Slingluff commenced his career in 1895 with the Baltimore Traction Company in the electrical department. The following year he went to the Westinghouse Electric & Manufacturing Company in its construction department, and a year later was connected with the mechanical department of the Washington Railway & Electric Company. He remained with that company up to 1903, when he accepted a position with the Cincinnati Traction Company, remaining in its employ until 1914. While there he was superintendent of carhouses and superintendent of shops and equipment. Mr. Slingluff went with the Cincinnati Car Company in 1914.

Rolling Stock

Monongahela West Penn Public Service Company, Parkersburg, W. Va., has in contemplation a program of improvements which includes among its items the purchase of eighteen cars and a quantity of buses, the number of which is still to be fixed.

Yellow Cab Company, recently taken over by the Twin City Rapid Transit Company, Minneapolis, Minn., has bought 25 cabs at a cost of $50,000.

Portland Electric Power Company, Portland, Ore., has received all of the eight pay-as-you-enter type buses to be used on the new Ross Island bridge line. The total cost of the buses was $90,000. Seven of them are of the Yellow Truck & Coach Company make and one is a Mack.

Track and Line

Interborough Rapid Transit Company, New York, N. Y., has agreed to proceed at once with the signaling of the elevated tracks on the Astoria and Corona lines in Queens. Frank Hedley, president and general manager of the Interborough, has already directed the preparation of the specifications. Mr. Hedley proposed to make experiments with the automatic block signals on the Third Avenue elevated before installing them on the Queens lines. The Transit Commission's engineers pointed out, however, that no such intensity of traffic exists on the Queens lines as on the Third Avenue "L" and that the present system of signaling which is used on the express tracks of the subway and elevated lines would handle the present traffic on the Queens lines. It has been estimated that the signaling installation will cost in the neighborhood of $690,000 for the local tracks on the Astoria and Corona lines.

Shops and Buildings

Alabama Power Company, Birmingham, Ala., is making extensive improvements to its substation at West Huntsville, Ala. The new work involves an expenditure of $10,000.

Public Service Production Company, which is a subsidiary of Public Service, Newark, N. J., has nearly completed a new bus garage in Union and Gamewell Streets, Hackensack, N. J. The new structure will have a capacity of 40 buses and is already housing rolling stock of the Newark-Hackensack, Hackensack-Little River Ferry, and Hackensack - Rutherford lines. The garage is built of brick and steel with art stone trim, and it has a frontage of about 204 ft. on Union Street, and 91 ft. on Gamewell Street. Inside clearance is 12 ft. from concrete floor to roof tie rods. Roof construction is of the "amellas" type, consisting of a dome-shaped arch made of wood units so assembled as to give the appearance of an immense inverted fishnet. This type of roof construction does away with all interior columns and roof trusses and has been extensively used in Germany.

Rockford Public Service Company, Rockford, Ill., has announced plans for the construction of a two-story brick and concrete car and bus storage barn over the storage tracks on Kishwaukee Street, adjacent to the present carhouses. Ramps and elevators will lift the buses to the second floor.

Trade Notes

Howard E. Oberg has been put in charge of sales engineering in the Middle West by the Billings & Spencer Company, Hartford, Conn. Mr. Oberg's office will be located in Room 5-251, General Motors Building, Detroit, Mich.

Nichols-Lintern Company, Cleveland, Ohio, announces that it is now prepared to furnish the N-L bus heater, which has been under development in practical service.

O. J. Neslage of the St. Louis office sales staff of the Sullivan Machinery Company, for several years past located in the Joplin, Mo., lead and zinc district, has been appointed local manager at Mexico City, Edificio Oliver No. 3. A. W. Oakes, for several years past manager at Mexico City, has been assigned to a post in the United States. C. W. Miller has been appointed special representative of the Sullivan Machinery Company in Cuba and will cooperate with the company's general agents for Cuba, the Purdy & Henderson Trading Company, Habana 55, asquina a Empedrado, Havana, Cuba. Matt Brodie, manager for Asia of the Sullivan Machinery Company, has sailed from San Francisco for Tokyo, following a three months furlough in this country.

Trico Fuse Manufacturing Company. Milwaukee, Wis., manufacturers of Trico renewable fuses, announces the following staff appointments: B. M. Slicting as sales promotion manager, in charge of the company's main office in Milwaukee; J. E. Eldredge of South Windsor, Conn., sales representative for the state of Connecticut and western part of Massachusetts; Arthur E. Bacon, Denver, Col., sales representative for the states of Colorado, New Mexico, Utah and Wyoming.

Haskelite Manufacturing Corporation, Chicago, Ill., reports that so far this year its products Haskelite and Plymetl are being used in the construction of street cars for the following utilities: Gary Street Railways, Gary Ind.; Municipal Railways, San Francisco, Cal.; Grand Rapids Railway, Grand Rapids, Mich.; West Penn Power Company, Connellsville, Pa.; Cincinnati, Hamilton & Dayton Railway, Dayton, Ohio; Virginia Electric & Power Company, Richmond, Va.; Eastern New York Utilities Corporation, Albany, N. Y.; Cincinnati Street Railway, Cincinnati, Ohio; Union Traction Company, Anderson, Ind., and Eastern Massachusetts Street Railway, Boston.

New Advertising Literature

International Steel Tie Company, Cleveland, Ohio, has just issued a handsome calendar for March, April and May, 1927, which has as its decorative feature a colored print of the Rue de Rivoli, Paris.

Condit Electrical Manufacturing Corporation, Boston, Mass., is issuing a descriptive folder of its type D-15C oil circuit breaker. The interrupted capacity of this device is 2,700 amp. at 15,000 volts.

Mitchell-Rand Manufacturing Company, New York City, N. Y., through a circular, announces that it has dissolved its associations with outside mills and is now producing its own line of material under the trademark "Shield Brand." Tapes and webbings are the company's principal products.

Baker-Raulang Company, Cleveland, Ohio, is issuing several new booklets describing bus bodies. No. 105 gives complete specifications for bus bodies adapted to the White chassis models 53 and 18 with a 212-in. wheelbase. Bulletin 106 details bodies for the same chassis models 50-B and 54, while bulletin No. 107 illustrates the bodies mounted on White chassis, special attention being paid to their application to models 50-B, 53 and 54.

A. Gilbert & Sons Brass Foundry Company, St. Louis, Mo., manufacturer of armatures, axle bearings, trolley wheels, solder and line material, is sending out a series of sales letters to the mechanical and purchasing departments of the electric railways. Each letter deals with an individual subject, explaining how the Gilbert company came to adopt the standard composition used. The letters are designed to assist the mechanical departments in adopting standards for their roads, whether it be the Gilbert standard or some other.

Service—*Your Product!*

And in order to successfully merchandise it, your equipment must be kept at the highest point of efficiency, safety and comfort. In the carrying out of this doctrine the most successful electric railways have nearly all their cars equipped with

"Peacock" Staffless Brakes

Reg. U. S. Pat. Off.

These operators know that in the event of an emergency, or during power interruptions, these brakes *will hold!*

Modern car design demands the Peacock Staffless, because of little platform space occupation, simplicity of operation, tremendous braking power, almost unlimited chain winding capacity and light weight.

We will gladly send figures and statements proving what these brakes have done for others and what they will do for you.

National Brake Company, Inc.

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AIR SPRINGS float the chassis on cushions of air

And Thus Road Shock and Vibration are Practically Eliminated

ELIMINATE road shock and vibration and you eliminate the two most destructive factors in the profitable operation of trucks and buses.

From every state in the union, from Canada and from Europe comes proof of this from thousands of truck and bus operators who have standardized on air springs.

From their own experience these operators have found that air springs lower maintenance cost by lessening breakage and repair bills.—

They have found bus patronage is increased because of the supreme riding comfort air springs bring about.—

They have found truck cargoes are protected from damage due to shifting and wrenching.—

They have found air springs lessen driving strain and make it easy to maintain regular schedules regardless of road conditions.

You can prove this to yourself by trying out one pair of air springs. Shall we send you further details and the name of our nearest distributor?

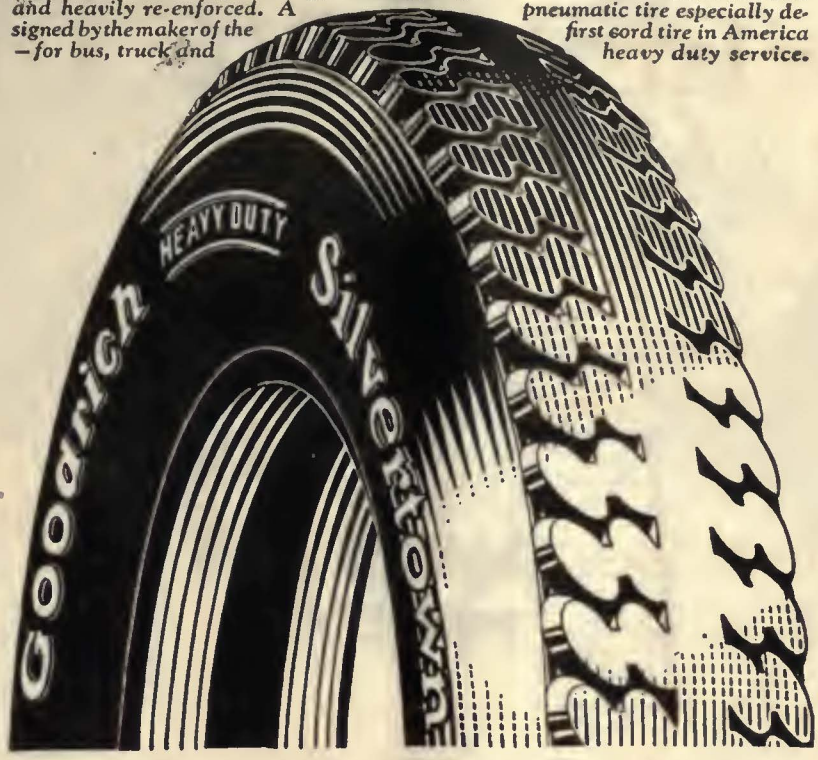
The Cleveland Pneumatic Tool Co.
CLEVELAND, OHIO

GRŪSS Sleeve Type **AIR SPRING**

WESTINGHOUSE Piston Type **AIR SPRING**

THE SHOCK ELIMINATORS FOR TRUCKS-BUSSES-PASSENGER CARS

Super dimensions—special rubber compound. Extra tough, heavy duty, anti-skid tread. Long-wearing, "non-rippling." Sidewalls, same stock as tread and heavily re-enforced. A pneumatic tire especially designed by the maker of the first cord tire in America —for bus, truck and heavy duty service.



The Open Road to hidden profits!

There are profits in using Goodrich Silvertown Heavy Duty Cords that may not show on your company's books.

Profits increased by savings in maintenance.

Profits made by elimination of roadside stops for repairs—because Silvertowns reduce these stops to a minimum.

Profits earned by speedier schedules—thanks to soft-cushioned, fast-running Silvertowns.

THE B.F. GOODRICH RUBBER COMPANY, *Established 1870*, Akron, Ohio
In Canada: Canadian Goodrich Company, Kitchener, Ontario

Goodrich
HEAVY DUTY
Silvertowns
HIGH PRESSURE OR BALLOON

The rush hour and the interior finish of your cars . . .

THE throng at the street corners . . . waiting—waiting with other shoulders to join the shoulders already rubbing away at the finish of the interior of your cars, with other scuffing feet . . .

Duco is the modern material for all classes of railway equipment. Its flint-like smoothness of surface resists the scuffing and rubbing that so soon mar ordinary types of finishes. Duco endures for years.

An added advantage, and a great one, is the short time required for refinishing when this is finally necessary. When finished with Duco, cars in your paint shop will be marked for Service in half the time it formerly took.

There is only ONE Duco . . . DU PONT Duco

DU PONT DUCO REG. U.S. PAT. OFF.

PAINTS—VARNISHES—ENAMELS—DUCO

Duco is the correct finishing material for railway equipment. For information write to the E. I. du Pont de Nemours & Co., Inc., Chemical Products Division, Parlin, N. J., 2100 Elston Avenue, Chicago, Ill., 560 Mission Street, San Francisco, Cal.

DU PONT

What SUPERTWIST Adds to Goodyear Tires

One of the Goodyear-equipped fleet of buses of the Miami Beach Railway Company, Miami, Florida

You know what rugged strength and long life have always been built into Goodyear Pneumatic Bus Tires.

Now you may confidently expect even greater service from Goodyears in motorbus service, because Goodyear Pneumatic Bus Tires are now made with SUPERTWIST.

SUPERTWIST is the extra elastic, extra enduring new material specially developed by Goodyear for Goodyear balloon tires, motorbus and heavy duty cord tires.

It far outstretches ordinary cotton cord, and has a maximum flexing power that yields under impact, protecting the tire from rupture, stone bruise and other injuries. It thus insures virtually *double* the *carcass* life of the tire.

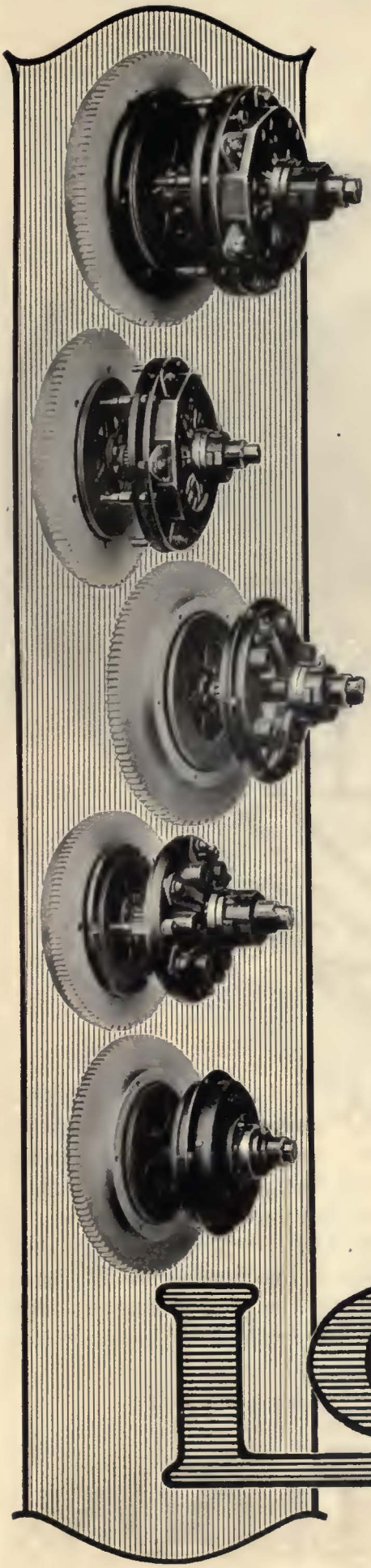
Other exclusive features of the Goodyear Pneumatic Tire construction for motorbus service are (1) the new Goodyear band-building method; (2) the new Goodyear breaker; (3) the new Goodyear bead—patent applied for, and (4) the famous All-Weather Tread.

These advantages you get only in Goodyear Pneumatic Bus Tires—the only motorbus tires made of SUPERTWIST.

They are real advantages, because they result in the utmost durability, tractive power, road safety, riding comfort and long, trouble-free mileage at low cost.

Goodyear Means Good Wear

GOODYEAR



Keeping Pace with the Industry

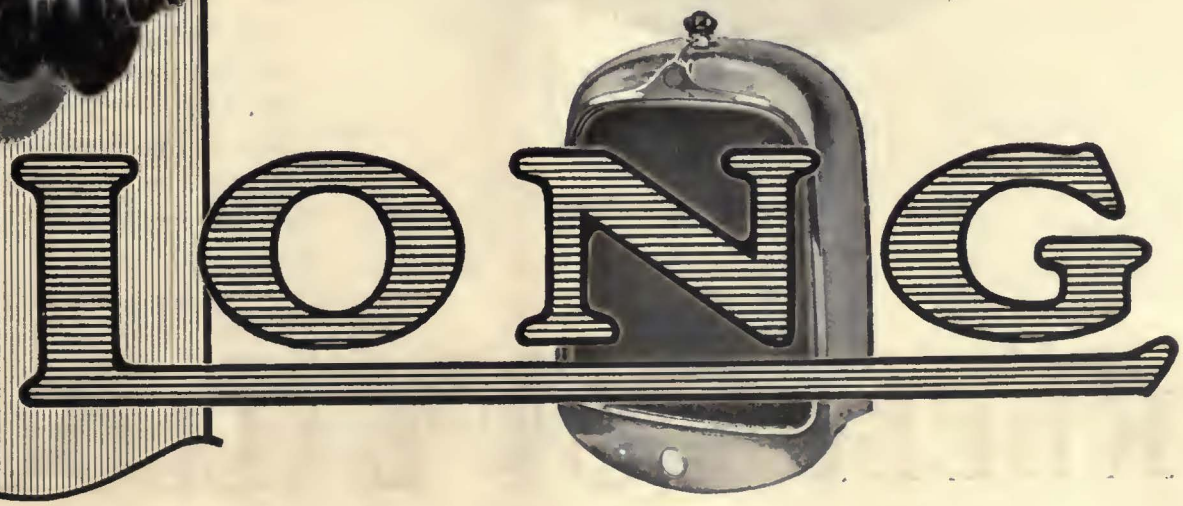
After six years' production of automotive clutches, in addition to years of research work, our Clutch Division now offers automobile, bus and truck manufacturers a complete line, (*patented*). The past performance of the Long Clutch merits the investigation of those manufacturers who are seeking *better* clutch performance.

Our Radiator Division is very thoroughly equipped for the design and manufacture of automotive radiators.

LONG MANUFACTURING CO.
DETROIT MICHIGAN

LONG PRODUCTS

Automotive Clutches and Radiators



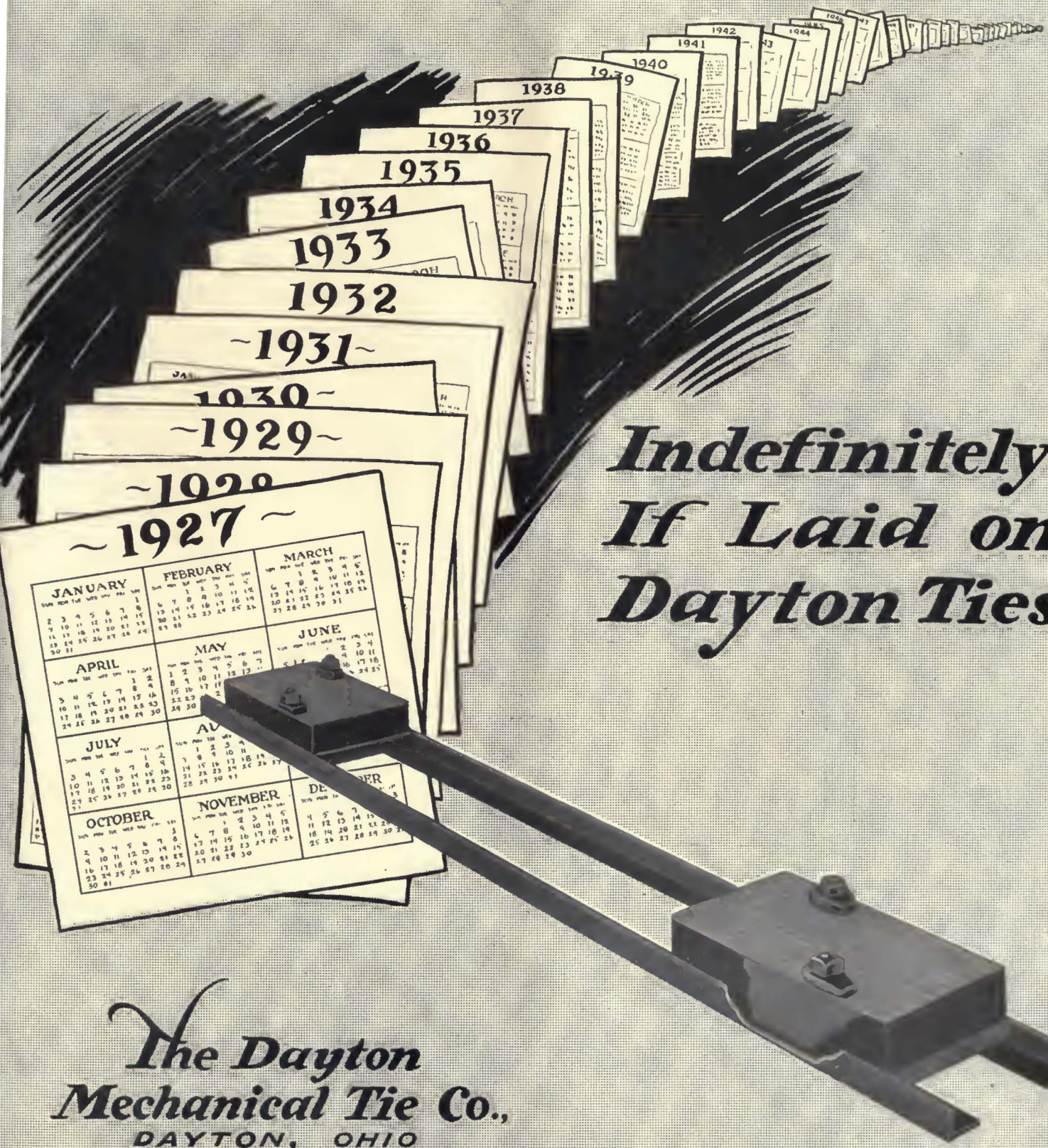
Announcing a
KELLY
Balloon Tire For Busses

WITH all the stamina, all the easy-riding qualities and all the rugged characteristics of the Kelly passenger car balloon tire, plus the additional strength needed to carry a heavy bus. You will find their use a real economy from the standpoint not only of greater tire mileage, but lowered repair costs to the engine and chassis.

KELLY-SPRINGFIELD TIRE CO.
250 West 57th Street, New York, N. Y.

KELLY SPRINGFIELD BUS BALLOONS

How long will Track stay Modern?

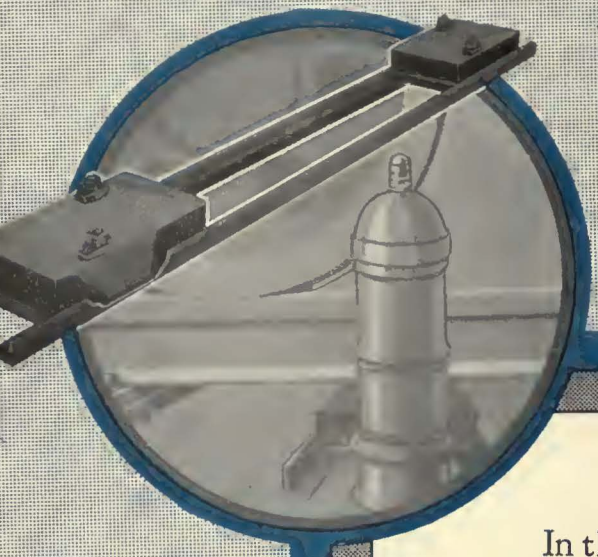


Indefinitely If Laid on Dayton Ties

The Dayton Mechanical Tie Co.,
DAYTON, OHIO

Dayton Shock Absorber Track Lasts Indefinitely

Without a penny of repair expense



alling Dayton Ties
ishawaka, Ind.

In the 15 years since the inception of Dayton Tie Track, none of it has ever had to be replaced, or cost a penny for maintenance. It has withstood the heaviest traffic street railways have to offer.

With a record like that behind it, we are safe in saying that the day when it must be replaced is many years remote.

Permanently smooth—easy on rolling stock—quiet—Dayton Ties are the answer to the track problem.

Dayton Tie Installations are spread all over the United States. Write for the name of the property near you which has them—then talk to the officials yourself.

The Dayton Mechanical Tie Co.
Dayton, Ohio

Parts and Service

In TULSA *The Union Transportation Company, operating 16 Graham Brothers Motor Coaches, writes: "Your Company has kept 100 per cent stock of parts available for maintenance".*

In SANTA MONICA *The Bay Cities Transit Company says of its fleet of 9 Graham Brothers Motor Coaches: "They are very sturdy, economical and dependable".*

GRAHAM MOTOR

SOLD BY DODGE BROTHERS DEALERS EVERYWHERE

Always Available

For Completeness and Accessibility the Service Facilities for Graham Brothers Motor Coaches are not equalled by any other Motor Coach Organization

Graham Brothers Motor Coaches are so sturdily built and so well designed that their reputation for dependability is unquestioned. They stand up.

There is double assurance for the operator in the knowledge that service is always available—right there where he bought his motor coach. Every Dodge Brothers Dealer is equipped to give immediate service.

Sales of Graham Brothers 21-passenger street car type coach continue to emphasize the trend towards medium capacity motor coaches.

GRAHAM BROTHERS
EVANSVILLE — DETROIT — STOCKTON
A DIVISION OF DODGE BROTHERS, INC
GRAHAM BROTHERS (CANADA) LIMITED, TORONTO, ONTARIO

Standard 21-Passenger Street Car Type, complete, $3815
12-Passenger Parlor Coach, complete, $3750
16-Passenger Parlor Coach, complete, $3995
f. o. b. Detroit

BROTHERS COACHES

GRAHAM BROTHERS GB DETROIT

"Noise and

MR. C. A. SMITH, *Superintendent of Roadways, the Georgia Power Company, with offices in the Glenn Building, Atlanta, Ga. Mr. Smith's study of electric traction problems has brought him nation-wide recognition.*

track corrugation have been substantially reduced"

"OUR efforts in track construction have been directed toward two important factors," said C. A. Smith, Superintendent of Roadways, of the Georgia Power Company.

"Corrugation is a rather annoying problem here," Mr. Smith continued. "At times in the past we have found it necessary to grind rail that has been in service only one year. Noise, too, has been quite a problem, although we know definitely that our present method of construction has greatly reduced it.

"We use concrete beam construction under ties and rails—wood ties, spaced at about 4-foot centers, 80-lb. ASCE rail, the concrete beams extending 5" below the bottom of the tie. This type of construction including concrete pavement costs approximately seven dollars per foot of track. Our method of track insulation, we have reason to believe, has greatly reduced two of the most annoying problems the electric railway engineer encounters."

In view of the intensive study Mr. Smith has devoted to track insulation problems, it is significant to note that Carey Elastite System of Track Insulation is being used extensively in the construction of the Georgia Power Company tracks. We shall be glad to tell you more about this efficient material—how easily it is installed and how it cuts vibration and noise to a minimum. Write for full particulars.

THE PHILIP CAREY COMPANY, *Lockland*, Cincinnati, O.

View of the Georgia Power Company Street Railway, on Hunter Street, Atlanta, Georgia. Note the interesting construction features, and the Carey Elastite System of Track Insulation in place.

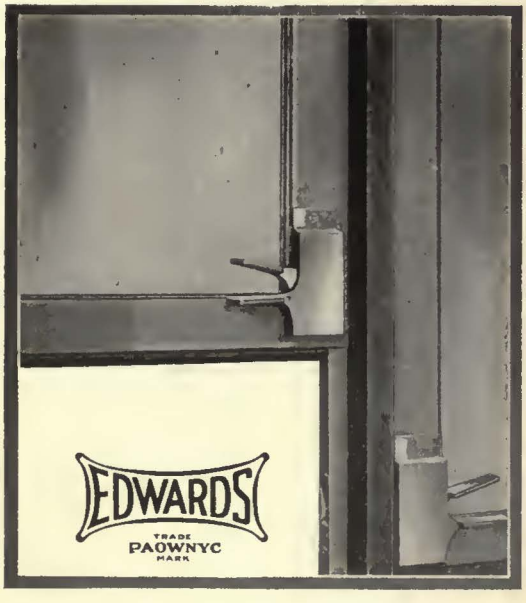
Carey Elastite
REG. U.S. PAT. OFF.
TRADE MARK REG. U.S. PATENT OFFICE

SYSTEM OF
TRACK INSULATION

windows DO MAKE A DIFFERENCE in *stimulating* patronage

Modern car for Chicago & Joliet Electric Railway by Cummings Car & Coach Co. Edwards Metal Sash is used.

Air-tight
Light in Weight
Free from Rattles
Easy to Operate
Neat and Trim



SCHEDULES planned for convenient headway and good running time have their place. But the surest stimulant for passenger patronage is the modern car!

The O. M. Edwards Company, pioneers in the refinement of car body details, is keeping pace with this modernization program with Edwards Metal Sash.

Here you have every requirement for passenger comfort, so essential in stimulating patronage—quiet, air-tight windows that are easy to open and close, windows that give a maximum of clear vision.

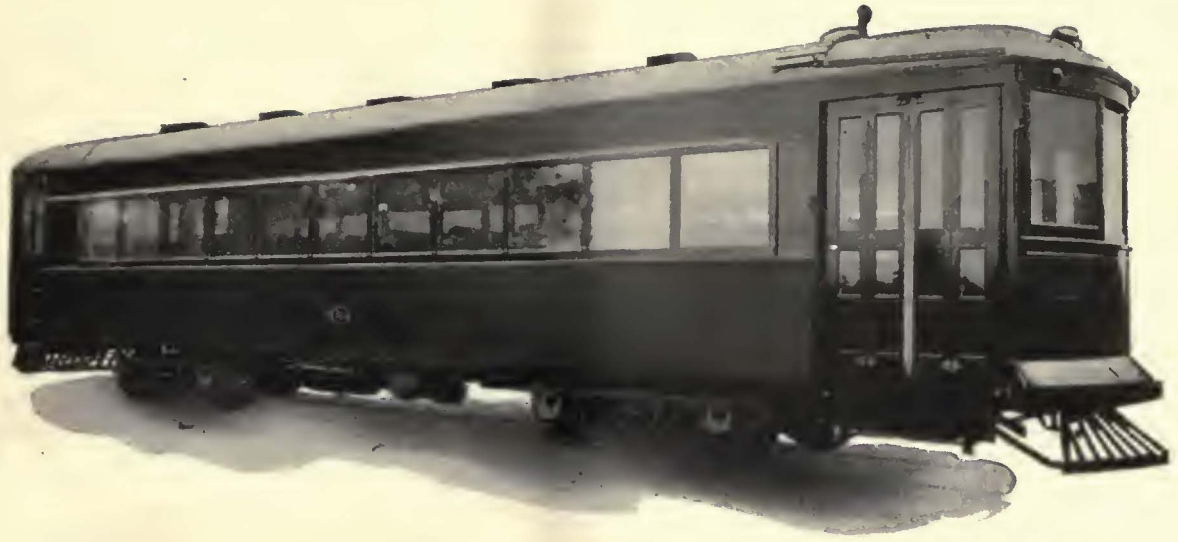
Specify Edwards Metal Sash on your next order. The several types are illustrated in our Catalog S, sent on request.

O. M. EDWARDS CO.

New York Syracuse, N. Y. Chicago

Canadian Representatives: Lyman Tube & Supply Co., Ltd., Montreal and Toronto

Edwards Metal Sash



The Modern Car
is a Business Builder

WHAT could be more effective in drawing increased patronage to the electric railway than the modern car? Its convenience has never been equalled. Now it is more pleasing in appearance, more comfortable to ride in, and quieter than ever before.

With all the modern features, the street car is becoming the preferred method of transportation

CUMMINGS CAR AND COACH COMPANY

Successors to McGuire-Cummings Mfg. Co.

111 W. Monroe Street, Chicago, Ill.

What "Boyerized" means!

- Brake Pins
- Brake Hangers
- Brake Levers
- Pedestal Gibs
- Brake Fulcrums
- Center Bearings
- Side Bearings
- Spring Post Bushings
- Spring Posts
- Bolster and Transom Chafing Plates
- Manganese Brake Heads
- Manganese Truck Parts
- Bushings
- Bronze Bearings
- McArthur Turnbuckles

"BOYERIZED" not only means a special steel treatment process and service, but it is also the modern method of protecting car parts against wear and tear. "Boyerized" car parts easily outlast ordinary parts three to four times.

Look over the list of "Boyerized" parts—every one a sure winner in the endurance contest—a considerable reducer of maintenance costs!

Many of the largest electric railways have given their unqualified approval to the "Boyerized" protective method. More are recognizing its merits almost daily.

Don't ask "why"—find out by giving "Boyerized" car parts a thorough test on your own system. We will gladly submit quotations on your requirements. Write for them today.

Bemis Car Truck Company

Electric Railway Supplies

SPRINGFIELD, MASS.

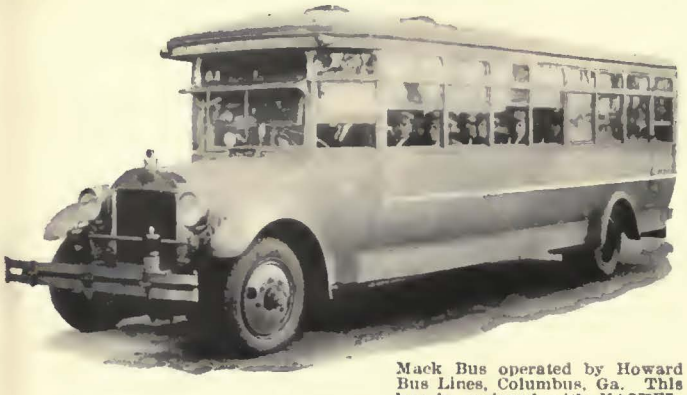
REPRESENTATIVES:

Economy Electric Devices Co., Old Colony Bldg., Chicago, Ill.
F. F. Bodler, 903 Monadnock Bldg., San Francisco, Cal.
W. F. McKenney, 54 First Street, Portland, Oregon.
J. H. Denton, 1328 Broadway, New York City, N. Y.
A. W. Arlin, 772 Pacific Electric Bldg., Los Angeles, Cal.

Can the industry afford NOT *to have modern equipment?*

A STUDY made by Charles Gordon, Editor of *Electric Railway Journal*, indicates an annual loss to the industry of $181,707,000 through excess or avoidable costs for the operation of obsolete equipment. Can the industry afford *not* to stop such a loss?

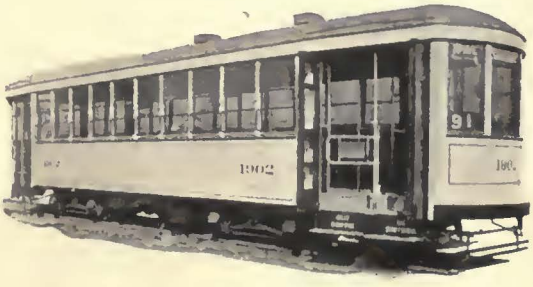
HASKELITE-PLYMETL cars and buses are helping many leading operators cut down this waste. The saving in weight through the use of these structural plywood products not uncommonly amounts to 20 lbs. or more per unit of seating capacity. This reduction is effected without weakening the body— in fact, a HASKELITE roof and PLYMETL side panels offer much greater resistance to accidents and withstand the twisting, wrenching and weaving of regular service much longer than either wood or steel construction.



Mack Bus operated by Howard Bus Lines, Columbus, Ga. This bus is equipped with HASKELITE roof.

While decreasing operating costs, these materials help increase revenue by attracting riders. Pleasing body lines and a beautiful finish inside and out are characteristics of the HASKELITE-PLYMETL car which appeal to riders and help meet competition.

Our blue print booklets showing the applications of HASKELITE and PLYMETL to car and bus construction will interest you. Copies will gladly be sent on request.



The Montreal Tramway car shown above was built by the Canadian Car and Foundry Co., Ltd., with PLYMETL side panels.

Haskelite Manufacturing Corporation

133 West Washington Street, Chicago

RAILWAY REPRESENTATIVES:

Economy Electric Devices Co., 37 W. Van Buren St., Chicago
Grayson Bros., 600 La Salle Bldg., St. Louis, Missouri
George E. Watts 1523 Candler Bldg., Atlanta, Ga.
Railway & Power Engineering Corp., Toronto, Ont., Canada

HASKELITE·PLYMETL

ERJ4-2Gray

H-K Seats part of new program put into effect by Northern Ohio Traction Company

The Northern Ohio Traction Company's display at the Cleveland Convention was an excellent example of how refitting and remodeling cars will put them on a modern basis.

Hale-Kilburn Seats Type 900-D played a prominent part. As shown above this is the double chair type with extra soft cushions having deep spring and air individual top pads and concave backs with soft spring pads. The smoking compartment chairs are all leather covered. The main compartment chairs are plush covered and leather trimmed.

Whether you have a remodeling program or a new car program, ask for full particulars of the complete line of H-K Seats.

HALE-KILBURN COMPANY

General Offices and Works: 1800 Lehigh Avenue, Philadelphia

SALES OFFICES:

Hale-Kilburn Co., 30 Church St., New York
Hale-Kilburn Co., McCormick Bldg., Chicago
E. A. Thornwell, Candler Bldg., Atlanta
Frank F. Bodler, 903 Monadnock Bldg., San Francisco
Chris Eccles, 320 S. San Pedro St., Los Angeles
T. C. Coleman & Son, Starks Bldg., Louisville
W. L. Jefferies, Jr., Mutual Bldg., Richmond
W. D. Jenkins, Praetorian Bldg., Dallas, Texas
H. M. Euler, 146 N. Front St., Portland, Oregon

Hale and Kilburn SEATS

Clark Street, Chicago, Between Randolph and Washington, 1887.

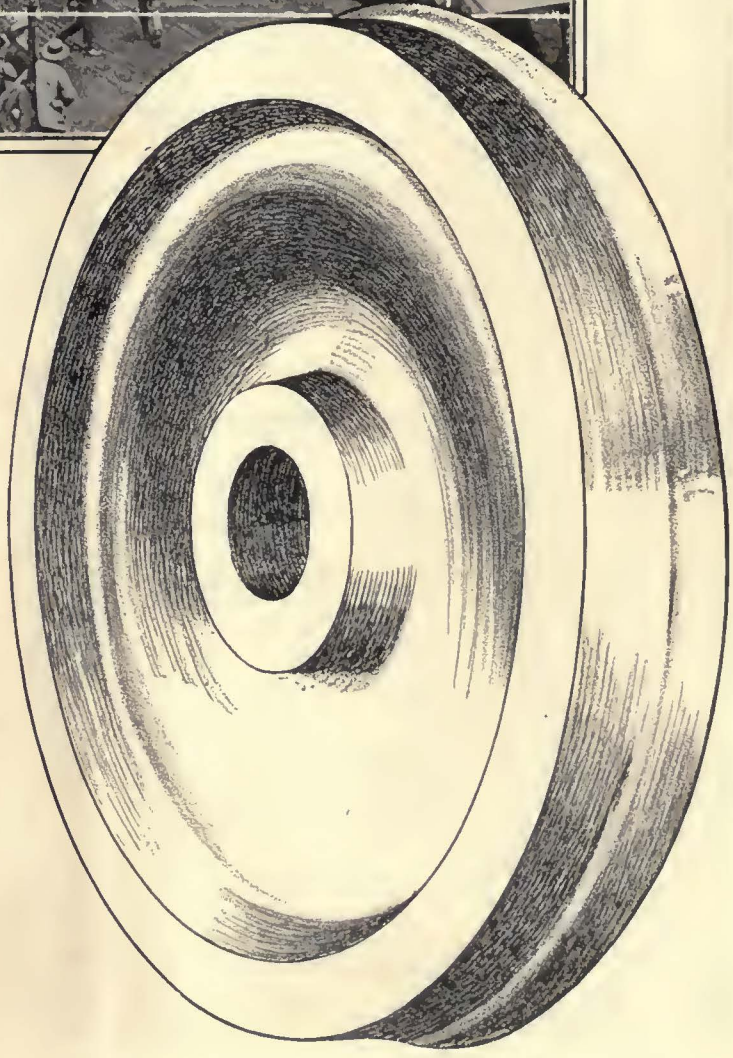
Compare This Scene With That of Today!

The calm, leisurely days of a few decades ago! ··· No unbroken procession of automobiles, no thundering motor trucks, no hurrying dashing crowds.

Contrast this scene with that of today: Peak periods, rush hours, stringent schedules; quick starting, sudden stopping, frequent recurrence of emergencies.

Yes, traffic conditions have changed ··· and the Gary Wrought Steel Wheel has kept pace with the change.

Our wheel engineers are at your command.



Illinois Steel Company

General Offices:
208 South La Salle Street
Chicago, Illinois

Low cost per year and low cost per ton mile

CAR MATERIAL at low cost per year and per ton mile is easily obtainable in strong, durable Douglas Fir. From clear siding to decking; in sills; in every item, this West Coast wood can be supplied ON GRADE in every A. E. R. A. requirement.

A normal Douglas Fir log contains 85% to 90% durable heartwood, and 85% to 90% of the lumber manufactured from it is *all* heartwood. This is the reason for the extra durability of Douglas Fir—why its cost per year is low.

Douglas Fir has light weight in proportion to its strength—a fact of great importance to car builders, but of even more importance to the operating department—for light rolling stock helps to keep down cost per ton mile.

In addition, Douglas Fir has sturdy wear-resistance and unusual stiffness, as well as being an excellent insulation against heat and cold, and almost impervious to water.

Surely a wood which can make a freight car look as spick and span as the one shown above, deserves use in your passenger cars for ceiling, finish, lining and flooring, as well as for framing and hidden parts.

Technical data on electric railway uses of Douglas Fir will be gladly furnished. *Address*, West Coast Lumber Bureau, 5562 T Stuart Bldg., Seattle, Wash.

Durable Douglas Fir
America's Permanent Lumber Supply

W119R

Important West Coast Woods — Douglas Fir - West Coast (Sitka) Spruce - West Coast Hemlock - Western Red Cedar

Bankers and Engineers

SEARCHLIGHT SECTION

USED EQUIPMENT & NEW—BUSINESS OPPORTUNITIES

UNDISPLAYED—RATE PER WORD:

Positions Wanted, 4 cents a word, minimum 75 cents an insertion, payable in advance.

Positions Vacant and all other classifications, 8 cents a word, minimum charge $2.80.

Proposals, 40 cents a line an insertion.

INFORMATION:

Box Numbers in care of any of our offices count 10 words additional in undisplayed ads.

Discount of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED RATE PER INCH:

1 to 3 inches..... $4.50 an inch
4 to 7 inches..... 4.30 an inch
8 to 14 inches..... 4.10 an inch

Rates for larger spaces, or yearly rates, on request

An advertising inch is measured vertically on one column, 3 columns—30 inches—to a page.

SEARCHLIGHT SERVICE

Covers the advertising of

Agencies Wanted
Agents Wanted
Auction Notices
Bids Wanted
Books and Periodicals
Buildings for Sale
Business Opportunities
Civil Service Opportunities
Contracts to Be Let
Contracts Wanted
Desk Room for Rent
Desk Room Wanted
Educational
Employment Agencies
Evening Work Wanted
Foreign Business
For Exchange
For Rent
Franchises
Industrial Sites
Labor Bureaus
Machine Shops
Machinery Wanted
New Industries Wanted
Partners Wanted
Patent Attorneys
Patents for Sale
Plants for Sale
Positions Vacant
Positions Wanted
Property for Sale
Proposals
Receivers' Sales
Representatives Wanted
Salesmen Want Connections
Salesmen Wanted
Second Hand Equipment
For Sale For Rent
Exchange Wanted
Specialties
Tutoring
Vacation Work Wanted
Water Front Property
Work Wanted
Miscellaneous for Sale for Rent or Want Ads.

Can we serve you?

0150

WANTED

Wanted to Purchase for Cash

36—Westinghouse 306—CV-4 Motors.
40—K-35-G2 Controllers.

IRVING S. VAN LOAN CORPORATION
1750 Broadway, New York City

Specialists in street cars or any part of a street car. Illustrated bulletin supplied on request.

WANTED

DEALERS in used equipment are always in the market for special items. Their current wants are either advertised here or on file in this department. They check these columns regularly for equipment offered for sale by consumer-owners. If you have any used equipment to dispose of advertise it here so both dealers and possible consumer-buyers will know of it. Or tell us what you have for sale and we will check it against our file of equipment wanted by dealers.

Searchlight Department

Electric Railway Journal
10th Ave. at 36th St., New York

Over 6,000 other men in the Electric Railway field will see this page.
Advertise it in the SEARCHLIGHT SECTION!

POSITIONS WANTED

AUDITOR, office manager, accountant, high class man of executive type, qualified by successful experience with large organizations; particularly trained in street railway work; available on short notice; correspondence invited. PW-985, Electric Railway Journal, 1600 Arch St., Philadelphia, Pa.

SITUATION wanted as purchasing agent or executive assistant, eight years railway storekeeper, ten years lighting and railway purchasing, also general electric experience. PW-984, Electric Railway Journal, Guardian Bldg., Cleveland, Ohio.

SUPERINTENDENT of railways with 20 years' experience, desires for personal reasons to make change. Nation wide reputation as railway operator. Can take full charge. Has ability to handle men and show results, correspondence invited and treated in confidence. PW-979, Electric Railway Journal, 7 So. Dearborn St., Chicago, Ill.

SUPERINTENDENT transportation available. Qualified by broad experience, fine record of achievements, city and interurban properties, East and Central West. Recognized ability, successful in handling labor, public relations, selling service, increasing revenue, accident prevention, traffic problems. Progressive efficient, a worker for results, fine references. Correspondence invited. PW-983, Electric Railway Journal, Guardian Bldg., Cleveland, Ohio.

MOTORS FOR SALE

60—101 B-2 Motors at a bargain. All in good condition. Address

Northern Ohio Power and Light Company
Akron, Ohio

Attention P. V. C. See

FOR SALE

15 BIRNEY SAFETY CARS

Brill Built

West. 508 or G. E. 264 Motors
Cars Complete—Low Price—Fine Condition

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Philadelphia, Pa.

THE WORLD'S STANDARD

"IRVINGTON"

Black and Yellow
Varnished Silk, Varnished Cambric, Varnished Paper

Irv-O-Slot Insulation Flexible Varnished Tubing
Insulating Varnishes and Compounds

Irvington Varnish & Insulator Co.

Irvington, N. J.

Sales Representatives:

Mitchell-Rand Mfg. Co., N. Y.
E. M. Wolcott, Rochester
I. W. Levine, Montreal
A. L. Gillies, Toronto
Prehler Brothers Inc., Chicago
White Supply Co., St. Louis
Clapp & LaMoree, Los Angeles
Martin Woodard, Seattle
Consumers' Rubber Co., Cleveland

Kalamazoo Trolley Wheels

The value of Kalamazoo Trolley Wheels and Harps has been demonstrated by large and small electric railway systems for a period of thirty years. Being exclusive manufacturers, with no other lines to maintain, it is through the high quality of our product that we merit the large patronage we now enjoy. With the assurance that you pay no premium for quality we will appreciate your inquiries.

THE STAR BRASS WORKS
KALAMAZOO, MICH., U. S. A.

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car
Collier, Inc., Barron G.

Air Brakes
Westinghouse Air Brake Co.

Air Receivers and After-coolers
Ingersoll-Rand Co.

Air Springs
Cleveland Pneumatic Tool Co.

Anchors, Guy
Elec. Service Supplies Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Armature Shop Tools
Columbia Machine Works
Elec. Service Supplies Co.

Automatic Regulators, Voltage, Current & Synchronizing
American Brown-Boveri Elec. Corp.

Automatic Return Switch Stands
Ramapo Ajax Corp.

Automatic Safety Switch Stands
Ramapo Ajax Corp.

Axles
Bemis Car Truck Co.
Bethlehem Steel Co.
Brill Co., The J. G.
Cincinnati Car Co.
Illinois Steel Co.
St. Louis Car Co.
Standard Steel Works Co.
Westinghouse E. & M. Co.

Axles (Front and Rear) Motor Truck and Passenger Car
Timken-Detroit Axle Co., The

Axles, Steel
Carnegie Steel Co.

Axles, Trailer & Motor Bus
Timken-Detroit Axle Co., The

Babbitting Devices
Columbia Machine Works

Badges and Buttons
Elec. Service Supplies Co.
International Register Co.

Bankers & Engineers
Public Service Engineering Bureau

Barges, Steel
American Bridge Co.

Batteries, Dry
Nichols-Lintern Co.

Bearings and Bearing Metals
Bemis Car Truck Co.
Brill Co., The J. G.
Cincinnati Car Co.
Columbia Machine Works
General Electric Co.
St. Louis Car Co.
Westinghouse E. & M. Co.

Bearings, Center and Roller Side
Columbia Machine Works
Stucki Co., A.

Bells and Buzzers
Consolidated Car Heating Co.

Bells and Gongs
Brill Co., The J. G.
Cincinnati Car Co.
Columbia Machine Works
Elec. Service Supplies Co.
St. Louis Car Co.

Benders, Rail
Railway Track-work Co.

Bodies, Bus
Brill Co., The J. G.
Cummings Car & Coach Co.
Graham Brothers

Body Material, Haskelite and Plymetl
Haskelite Mfg. Corp.

Boilers
Babcock & Wilcox Co.

Boiler Tubes
National Tube Co.

Bolts and Nuts, Track
Illinois Steel Co.

Bond Testers
American Steel & Wire Co.
Electric Service Supplies Co.

Bonding Apparatus
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Ohio Brass Co.
Railway Track-work Co.
Ura Welding & Bonding Co.

Bonds, Rail
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Railway Track-work Co.
Ura Welding & Bonding Co.
Westinghouse E. & M. Co.

Braces, Timber
Duff Mfg. Co.

Braces, Trench
Duff Mfg. Co.

Brackets and Cross Arms (See also Poles, Ties, Posts, Etc.)
American Bridge Co.
Bates Expanded Steel Truss Co.
Columbia Machine Co.
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.

Brake Adjusters
Brill Co., The J. G.
Cincinnati Car Co.
National Ry. Appliance Co.
Westinghouse Tr. Br. Co.

Brake Shoes
American Brake Shoe & Foundry Co.
Bemis Car Truck Co.
Brill Co., The J. G.
St. Louis Car Co.
Wheel Truing Brake Shoe Co.

Brakes, Brake Systems and Brake Parts
Bemis Car Truck Co.
Brill Co., The J. G.
Cincinnati Car Co.
Columbia Machine Co.
General Electric Co.
National Brake Co.
St. Louis Car Co.
Westinghouse Tr. Br. Co.

Brakes, Magnetic Rail
Cincinnati Car Co.

Bridges, Steel
American Bridge Co.

Brushes, Carbon
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
Westinghouse E. & M. Co.

Brushes, Wire, Pneumatic
Ingersoll-Rand

Brushholders
Columbia Machine Works

Buildings Steel
American Bridge Co.

Bulkheads
Haskelite Mfg. Corp.

Bunkers, Coal
American Bridge Co.

Bus Heaters
Nichols-Lintern Co.

Buses
Brill Co., The J. G.
Cummings Car Coach Co.
Graham Brothers
St. Louis Car Co.
Yellow Truck & Coach Co.

Bushings, Case Hardened and Manganese
Brill Co., The J. G.
Bemis Car Truck Co.
Cincinnati Car Co.
Columbia Machine Works
St. Louis Car Co.

Cables. (See Wires and Cables)

Cambric Tapes, Yellow and Black Varnish
Irvington Varnish & Ins. Co.

Cambric Yellow and Black Varnish
Mica Insulator Co.

Carbon Brushes (See Brushes, Carbon)

Car Lighting Fixtures
Elec. Service Supplies Co.

Car Panel Safety Switches
Consolidated Car Heat. Co.
Westinghouse E. & M. Co.

Car Steps, Safety
Cincinnati Car Co.

Car Wheels, Rolled Steel
Bethlehem Steel Co.

Cars, Dump
Brill Co., The J. G.
Differential Steel Car Co. Inc.
St. Louis Car Co.

Cars, Gas-Electric
Brill Co., The J. G.
General Electric Co.
Westinghouse E. & M. Co.

Cars, Gas, Rail
Brill Co., The J. G.
St. Louis Car Co.

Cars, Passenger, Freight, Express, etc.
Amer. Car Co.
Brill Co., The J. G.
Cincinnati Car Co.
Cummings Car & Coach Co.
Kuhlman Car Co., G. C.
St. Louis Car Co.
Wason Mfg. Co.

Cars, Second Hand
Electric Equipment Co.

Cars, Self-Propelled
Brill Co., The J. G.
General Electric Co.

Castings, Brass Composition or Copper
A. & J. M. Anderson Mfg. Co.
Cincinnati Car Co.
Columbia Machine Works

Castings, Gray Iron and Steel
American Bridge Co.
American Steel Foundries
Bemis Car Truck Co.
Columbia Machine Works
St. Louis Car Co.
Standard Steel Works Co.

Castings, Malleable & Brass
Bemis Car Truck Co.
Columbia Machine Works
St. Louis Car Co.

Catchers and Retrievers, Trolley
Earll, C. I.
Elec. Service Supplies Co.
Ohio Brass Co.
Wood Co., Chas. N.

Catenary Construction
Archbold-Brady Co.

Ceiling Car
Haskelite Mfg. Corp.
Pantasote Co., Inc.

Ceilings, Plywood, Panels
Haskelite Mfg. Corp.

Cement
N. Amer. Cement Corp.

Cement Accelerator
N. Amer. Cement Corp.

Chairs, Parlor Car
Haywood-Wakefield Co.

Change Carriers
Cleveland Fare Box Co.
Electric Service Supplies Co.
Illinois Motive Equipment Co.

Change Trays
Cincinnati Car Co.

Circuit-Breakers
A. & J. Anderson Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

Circuit Breakers (Oil)
American Brown-Boveri Elec. Corp.

Clamps and Connectors for Wires and Cables
Columbia Machine Works
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Cleaners
Oakite Products

Cleaners and Scrapers, Track (See also Snow-Plows, Sweepers and Brooms)
Brill Co., The J. G.
Cincinnati Car Co.
Ohio Brass Co.
St. Louis Car Co.

Clusters and Sockets
General Electric Co.

Clutches
Long Mfg. Co.

Coal and Ash Handling (See Conveying and Hoisting Machinery)

Coil Banding and Winding Machines
Columbia Machine Works
Elec. Service Supplies Co.
Westinghouse Elec. & M. Co.

Coils, Armature and Field
Columbia Machine Works
General Electric Co.
Westinghouse E. & M. Co.

Coils, Choke and Kicking
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Coin Counting Machines
Cleveland Fare Box Co.
International Register Co.

Coin Sorting Machines
Cleveland Fare Box Co.

Coin Wrappers
Cleveland Fare Box Co.

Commutator Slotters
Columbia Machine Works
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.
Wood Co., Chas. N.

Commutator Truing Devices
General Electric Co.

Commutators or Parts
Cameron Electrical Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

Compressors, Air
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Tr. Br. Co.

Compressors, Air, Portable
Ingersoll-Rand Co.

Condensers
General Electric Co.
Ingersoll-Rand Co.
Westinghouse E. & M. Co.

Condenser Papers
Irvington Varnish & Ins. Co.

Connectors, Solderless
Westinghouse E. & M. Co.

Connectors, Trailer Car
Columbia Machine Works
Consolidated Car Heat. Co.
Elec. Service Supplies Co.
Ohio Brass Co.

Controllers or Parts
Columbia Machine Works
General Electric Co.
Westinghouse E. & M. Co.

Controller Regulators
Elec. Service Supplies Co.

Controlling Systems
General Electric Co.
Westinghouse E. & M. Co.

Converters, Rotary
General Electric Co.
Westinghouse E. & M. Co.

Conveying & Hoisting Machinery
American Bridge Co.

Copper Wire
American Brass Co.
American Steel & Wire Co.
Anaconda Copper Mining Co.

Copper Wire Instruments, Measuring, Testing and Recording
American Brass Co., The
American Steel & Wire Co.
Anaconda Copper Mining Co.

Cord, Bell, Trolley, Register, etc.
American Steel & Wire Co.
Brill Co., The J. G.
Elec. Service Supplies Co.
International Register Co.
Roebling's Sons Co., John A.
St. Louis Car Co.
Samson Cordage Works

Cord Connectors and Couplers
Elec. Service Supplies Co.
Samson Cordage Works
Wood Co., Chas. N.

Couplers, Car
American Steel Foundries
Brill Co., The J. G.
Cincinnati Car Co.
Ohio Brass Co.
St. Louis Car Co.
Westinghouse Tr. Br. Co.

Cowl Ventilators
Nichols-Lintern Co.

Cranes, Hoists & Lifts
Buda Co., The
Electric Service Supplies Co.

Cross Arms (See Brackets)

Crossings
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.

Crossing Foundations
International Steel Tie Co.

Crossings, Frog and Switch
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.

Crossings, Manganese
Bethlehem Steel Co.
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.

Crossing Signals. (See Signal Systems, Highway Crossing)

Crossings, Track (See Track, Special Work)

Crossings, Trolley
Ohio Brass Co.
Westinghouse E. & M. Co.

Curtains & Curtain Fixtures
Brill Co., The J. G.
O. M. Edwards Co., Inc.
Pantasote Co., Inc.
St. Louis Car Co.

Dealer's Machinery & Second Hand Equipment
Elec. Equipment Co.
Van Loan Corp., Irving S.

Derailing Switches
Ramapo Ajax Corp.

Destination Signs
Columbia Machine Works
Elec. Service Supplies Co.

Detective Service
Wish Service, Edward P.

Door Operating Devices
Brill Co., The J. G.
Cincinnati Car Co.
Consolidated Car Heat. Co.
National Pneumatic Co.

Doors & Door Fixtures
Brill Co., The J. G.
Cincinnati Car Co.
O. M. Edwards Co., Inc.
General Electric Co.
St. Louis Car Co.
Hale-Kilburn Co.

Doors, Folding Vestibule
National Pneumatic Co.

Drills, Track
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Ingersoll-Rand Co.
Ohio Brass Co.

Dryers, Sand
Elec. Service Supplies Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Ears
Columbia Machine Works
Elec. Service Supplies Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Electric Grinders
Railway Track-work Co.

Electric Transmission Towers
American Bridge Co.

Electrical Wires and Cables
Amer. Electrical Works
Amer. Steel & Wire Co.
John A. Roebling's Sons Co.

Electrodes, Carbon
Railway Track-work Co.
Ura Welding & Bonding Co.

Electrodes, Steel
Railway Track-work Co.
Ura Welding & Bonding Co.

Enamel
Duco, E. I. Du Pont de Nemours Co.

Engineers, Consulting, Contracting and Operating
Archbold-Brady Co.
Beeler, John A.
Buchanan & Layng Corp.
Byllesby & Co., H. M.
Day & Zimmermann, Inc.
A. L. Drum & Co.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Kelker & DeLeuw
Linn & Marshall Co.
McClellan & Junkersfeld
Richey, Albert S.
Sanderson & Porter
Stevens & Wood
Stone & Webster
White Eng. Corp., The J. G.

Engines, Gas, Oil and Steam
Ingersoll-Rand Co.
Westinghouse E. & M. Co.

Exterior Side Panels
Haskelite Mfg. Corp.

Fare Boxes
Cleveland Fare Box Co.
Illinois Motive Equipment Co.
Ohmer Fare Register Co.
Perey Mfg. Co.

Fare Registers
Elec. Service Supplies Co.
Ohmer Fare Register Co.

Fences, Woven Wire and Fence Posts
Amer. Steel & Wire Co.

Fenders and Wheel Guards
Brill Co., The J. G.
Cincinnati Car Co.
Consolidated Car Fender Co.
St. Louis Car Co.
Star Brass Works
Wood Co., Chas. N.

Fibre and Fibre Tubing
Westinghouse E. & M. Co.

Field Coils (See Coils)

Flangeway Guards, Steel
Godwin Co., Inc., W. S.

Floodlights
Elec. Service Supplies Co.

Floor, Sub
Haskelite Mfg. Corp.

Floors
Haskelite Mfg. Corp.

Forgings
Brill Co., The J. G.
Cincinnati Car Co.
Duff Mfg. Co.
Standard Steel Works Co.

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Frogs & Crossings, Tee Rail
Bethlehem Steel Co.
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.

Frogs, Track (See Track Work)

Frogs, Trolley
Elec. Service Supplies Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Furnaces, Electric
American Brown-Boveri Elec. Corp.

Furnaces, Electric, Steel Melting
American Bridge Co.

Fuses and Fuse Boxes
Columbia Machine Works
Consolidated Car Heat. Co.
General Electric Co.
Westinghouse E. & M. Co.

Fuses, Refillable
General Electric Co.

Gaskets
Westinghouse Tr. Br. Co.

Gasoline
Texas Co., The

Gas Producers
Westinghouse E. & M. Co.

Gates, Car
Brill Co., The J. G.
Cincinnati Car Co.
St. Louis Car Co.

Gauges, Oil and Water
Ohio Brass Co.

Gear Blanks
Brill Co., The J. G.
Standard Steel Works Co.

Gear Cases
Chillingworth Mfg. Co.
Columbia Machine Works
Elec. Service Supplies Co.
Westinghouse E. & M. Co.

Gears and Pinions
Bemis Car Truck Co.
Columbia Machine Works
Elec. Service Supplies Co.
General Electric Co.
Nat'l Ry. Appliance Co.
Nuttall Co., R. D.

Generating Sets, Gas-Electric
General Electric Co.

Generators
American Brown-Boveri Elec. Corp.
General Electric Co.
Westinghouse E. & M. Co.

Girder Rails
Bethlehem Steel Co.
Lorain Steel Co.

Gongs (See Bells and Gongs)

Greases (See Lubricants)
Texas Co., The

Grinders & Grinding Supplies
Metal & Thermit Corp.
Railway Track-work Co.

Grinders, Portable Electric
Railway Track-work Co.

Grinders, Portable
Ingersoll-Rand Co.
Railway Track-work Co.

Grinding Bricks and Wheels
Railway Track-work Co.

Guard Rail Clamps
Ramapo Ajax Corp.

Guard Rails, Tee Rail & Manganese
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.

Guards, Trolley
Elec. Service Supplies Co.
Ohio Brass Co.

Hammers, Pneumatic
Ingersoll-Rand Co.

Harps, Trolley
Columbia Machine Works
Elec. Service Supplies Co.
Nuttall Co., R. D.
Star Brass Works

Headlights
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
St. Louis Car Co.

Headlining
Columbia Machine Works
Haskelite Mfg. Corp.
Pantasote Co., Inc.

Heaters, Car (Electric)
Consolidated Car Heat. Co.
Gold Car Heat. & Ltg. Co.
Smith Heater Co., Peter

Heaters, Car, Hot Air and Water
Smith Heater Co., Peter

Heaters, Car, Stove
Smith Heater Co., Peter

Helmets, Welding
Railway Track-work Co.
Una Welding & Bonding Co.

Hoists & Lifts
Columbia Machine Works

Hoists, Portable
Ingersoll-Rand Co.

Hose, Bridges
Ohio Brass Co

Hose, Pneumatic
Westinghouse Tr. Br. Co.

Instruments, Measuring, Testing and Recording
American Steel & Wire Co.
General Electric Co.
Westinghouse E. & M. Co.

Insulating Cloth, Paper and Tape
General Electric Co.
Irvington Varnish & Ins. Co.
Mica Insulator Co.
Okonite Co.
Okonite-Callender Cable Co. Inc.
U. S. Rubber Co.
Westinghouse E. & M. Co.

Insulating Machinery
Amer. Ins. Machinery Co.

Insulating Silk
Irvington Varnish & Ins. Co.

Insulating Varnishes
Irvington Varnish and Insulating Co.

Insulation (See also Paints)
Electric Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Irvington Varnish & Ins. Co.
Mica Insulator Co.
Okonite Co.
Okonite-Callender Cable Co. Inc.
U. S. Rubber Co.
Westinghouse E. & M. Co.

Insulation Slot
Irvington Varnish & Ins. Co.

Insulator Pins
Elec. Service Supplies Co.
Hubbard & Co.

Insulators (See also Line Materials)
Electric Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Irvington Varnish & Ins. Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Interior Side Linings
Haskelite Mfg. Corp.

Interurban Cars (See Cars, Passenger, Freight, Express, etc.)
Cummings Car & Coach Co.

Jacks (See also Hoists and Lifts)
Buda Co., The
Columbia Machine Works
Duff Mfg. Co.
Elec. Service Supplies Co.

Jacks, Automatic Lowering
Duff Mfg. Co.

Jacks, Ball Bearing Screw
Duff Mfg. Co.

Jacks, Governor Controlled
Duff Mfg. Co.

Jacks, Horizontal
Duff Mfg. Co.

Jacks, Lifting
Duff Mfg. Co.

Jacks, Pipe Forcing
Duff Mfg. Co.

Jacks, Pole
Duff Mfg. Co.

Jacks, Push and Pull
Duff Mfg. Co.

Jacks, Special Purpose
Duff Mfg. Co.

Jacks, Track
Duff Mfg. Co.

Journal Boxes
Bemis Car Truck Co.
Brill Co., The J. G.
Cincinnati Car Co.
St. Louis Car Co.

Lacquer
Duco, E. I. Du Pont de Nemours Co.

Lamps, Guards and Fixtures
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Lamps, Arc & Incandescent (See also Headlights)
General Electric Co.
Westinghouse E. & M. Co.

Lamps, Signal and Marker
Elec. Service Supplies Co.
Nichols-Lintern Co.
Ohio Brass Co.

Lanterns, Classification
Nichols-Lintern Co.

Letter Boards
Cincinnati Car Co.
Haskelite Mfg. Corp.

Lighting Fixtures, Interior
Electric Service Supplies Co.

Lightning Protection
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Line Material (See also Brackets, Insulators, Wires, etc.)
Archbold-Brady Co.
Electric Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Locking Spring Boxes
Wm. Wharton, Jr. & Co.

Locomotives, Diesel Electric
American Brown-Boveri Elec. Corp.

Locomotives, Electric
American Brown-Boveri Elec. Corp.
Cincinnati Car Co.
Cummings Car & Coach Co.
General Electric Co.
St. Louis Car Co.
Westinghouse E. & M. Co.

Locomotives, Oil Engine, Electric Driven
Ingersoll-Rand Co.

Lubricating Engineers
Universal Lubricating Co.

Lubricants, Oil and Grease
Texas Company
Universal Lubricating Co.

Lumber (See Poles, Ties, etc.)

Machinery, Insulating
American Insulating Machinery Co.

Manganese Parts
Bemis Car Truck Co.

Manganese Steel Guard Rails
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.

Manganese Steel, Special Track Work
Bethlehem Steel Co.
Wm. Wharton, Jr. & Co.

Manganese Steel Switches, Frogs & Crossings
Bethlehem Steel Co.
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.

Mica
Mica Insulator Co.

Mirrors, Inside and Outside
Cincinnati Car Co.

Motor and Generator Sets
American Brown-Boveri Elec. Corp.
General Electric Co.

Motor Buses (See Buses, Motor)

Motorman's Seats
Brill Co., The J. G.
Cincinnati Car Co.
Elec. Service Supplies Co.
Heywood Wakefield Co.
St. Louis Car Co.
Wood Co., Chas. N.

Motors, Electric
General Electric Co.
Westinghouse E. & M. Co.

Nuts and Bolts
Bemis Car Truck Co.
Cincinnati Car Co.
Hubberd & Co.

Oils (See Lubricants)
Texas Co., The

Packing
U. S. Rubber Co.
Westinghouse Tr. Brake Co.

Paint
Duco, E. I. Du Pont de Nemoura Co.

Paints and Varnishes (Insulating)
Dixon Crucible Co., Joseph
Electric Service Supplies Co.
Irvington Varnish & Ins. Co.

Paints and Varnishes, Railway
Nat'l Ry. Appliance Co.

Panels, Outside, Inside
Haskelite Mfg. Corp.

Pavement Breakers
Ingersoll-Rand Co.

Paving Guards, Steel
Godwin Co., Inc., W. S.

Pickups, Trolley Wire
Elec. Service Supplies Co.
Ohio Brass Co.

Pinion Pullers
Duff Mfg. Co.
Elec. Service Supplies Co.
General Electric Co.
Wood Co., Chas. N.

Pinions (See Gears)

Pins, Case Hardened, Wood and Iron
Bemis Car Truck Co.
Ohio Brass Co.
Westinghouse Tr. Brake Co.

Pipe
National Tube Co.

Pipe Fittings
Standard Steel Works Co.
Westinghouse Tr. Brake Co.

Planers (See Machine Tools)

Plates for Tee Rail Switches
Ramapo Ajax Corp.

Pliers, Rubber Insulated
Elec. Service Sup. Co.

Plywood, Roofs, Headlinings, Floors, Interior Panels, Bulkheads, Truss Planks
Haskelite Mfg. Corp.

Pneumatic Tools
Ingersoll-Rand Co.

Pole Line Hardware
Bethlehem Steel Co.
Elec. Service Supplies Co.
Ohio Brass Co.

Pole Reinforcing
Hubbard & Co.

Poles, Metal Street
Bates Expanded Street Truss Co.
Elec. Ry. Equipment Co.
Hubbard & Co.

Poles, Ties, Posts, Piling & Lumber
American Bridge Co.
Naugle Pole & Tie Co.
West Coast Lumber Bureau

Poles, Trolley
Elec. Service Supplies Co.
National Tube Co.
Nuttall Co., R. D.

Poles, Tubular Steel
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
National Tube Co.

Portable Grinders
Buda Co., The

Potheads
Okonite Co.
Okonite-Callender Cable Co. Inc.

Power Houses
American Bridge Co.

Power Saving Devices
National Ry. Appliance Co.

Pressings, Special Steel
Cincinnati Car Co.

Pressure Regulators
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
Westinghouse Tr. Brake Co.

Pumps
A. S. Cameron Steam Pump Wks. (Ingersoll-Rand Co.)
Ingersoll-Rand Co. (A. S. Cameron, Steam Pump Works)

Pump, Vacuum
Ingersoll-Rand Co.

Punches, Ticket
International Register Co.
Wood Co., Chas. N.

Pyroxylin
Duco, E. I. Du Pont de Nemours Co.

Radiators
Long Mfg. Co.

Rail Braces & Fastenings
Ramapo Ajax Corp.

Rail Filler
Carey Co., Philip

Rail Grinders (See Grinders)

Rail Joints
Carnegie Steel Co.
Illinois Steel Co.

Rail Joints, Welded
Lorain Steel Co.
Metal & Thermit Corp.

Rail Welding
Metal & Thermit Corp.
Railway Track-work Co.
Una Welding & Bonding Co.

Rails, Relaying
L. B. Foster Co.

Rails, Steel
Carnegie Steel Co.
Electric Equipment Co.
L. B. Foster Co.
Illinois Steel Co.

Railway Safety Switches
Consolidated Car Heat. Co.
Westinghouse E. & M. Co.

Railway Welding (See Welding Processes)

Rattan
Brill Co., The J. G.
Cummings Car & Coach Co.
Elec. Service Supplies Co.
Hale-Kilburn Co.
St. Louis Car Co.

Rattan Car Seat Webbing
Heywood-Wakefield Co.

Rectifiers, Mercury Arc, Power
American Brown-Boveri Elec. Corp.

Registers and Fittings
Brill Co., The J. G.
Cincinnati Car Co.
Elec. Service Supplies Co.
International Register Co.
Ohmer Fare Register Co.
St. Louis Car Co.

Reinforcement, Concrete
Amer. Steel & Wire Co.
Bethlehem Steel Co.
Carnegie Steel Co.

Repair Shop Appliances (See also Coil Banding and Winding Machines)
Elec. Service Supplies Co.

Repair Work (See also Coils)
General Electric Co.
Westinghouse E. & M. Co.

Replacers, Car
Cincinnati Car Co.
Elec. Service Sup. Co.

Resistance, Wire and Tube
General Electric Co.
Westinghouse E. & M. Co.

Resistances
Consolidated Car Heat. Co.

Retrievers, Trolley (See Catchers and Retrievers, Trolley)

Rheostats
General Electric Co.
Westinghouse E. & M Co.

Roofing, Car
Haskelite Mfg. Corp.
Pantasote Co., Inc.

Roofs, Car and Bus
Haskelite Mfg. Corp.

Rubber Specialties of all kinds
U. S. Rubber Co.

Sanders, Track
Brill Co., The J. G.
Elec. Service Supplies Co.
Nichols-Lintern Co.
Ohio Brass Co.
St. Louis Car Co.

Sash Fixtures, Car
Brill Co., The J. G.
Cincinnati Car Co.
O. M. Edwards Co., Inc.
St. Louis Car Co.

Sash Metal Car Window
Hale-Kilburn Co.
O. M. Edwards Co., Inc.

Scrapers, Track (See Cleaners and Scrapers, Track)

Screw Drivers, Rubber Insulated
Elec. Service Supplies Co.

Seating Materials
Brill Co., The J. G.
Haskelite Mfg. Corp.
Heywood-Wakefield Co.
Pantasote Co., Inc., The
St. Louis Car Co.

Seats, Bus
Brill Co., The J. G.
Hale-Kilburn Co.
Heywood-Wakefield Co.
St. Louis Car Co.

Seats, Car (See also Rattan)
Brill Co., The J. G.
Cincinnati Car Co.
Hale-Kilburn Co.
Heywood-Wakefield Co.
St. Louis Car Co.

Second Hand Equipment
Electric Equipment Co.
Van Loan Corp., Irving S.

Shades, Vestibule
Brill Co., The J. G.
Cincinnati Car Co.

Shock Absorbers
Cleveland Pneumatic Tool Co.

Shovels
Brill Co., The J. G.
Hubbard & Co.

Shovels, Power
Brill Co., The J. G.

Signals, Car Starting
Consolidated Car Heating Co.
Elec. Service Supplies Co.
National Pneumatic Co.

Signal Systems, Block
Elec. Service Supplies Co.
Nachod and U. S. Signal Co., Inc.
Union Switch & Signal Co.
Wood Co., Chas. N.

Signal Systems, Highway Crossing
Nachod and U. S. Signal Co., Inc.
Wood Co., Chas. N.

Slack Adjusters (See Brake Adjusters)

Sleet Wheels and Cutters
A. & J. M. Anderson Mfg. Co.
Cincinnati Car Co.
Columbia Machine Works
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.

Smokestacks, Car
Nichols-Lintern Co.

Snow-Plows, Sweepers and Brooms
Brill Co., The J. G.
Columbia Machine Works
Consolidated Car Fender Co.
Cummings Car & Coach Co.
St. Louis Car Co.

Snow Sweeper, Rattan
Heywood-Wakefield Co.

Soldering and Brazing (See Welding Processes and Apparatus)

Spacer, Tie
Duff Mfg. Co.

Special Adhesive Papers
Irvington Varnish & Ins. Co.

Special Trackwork
Bethlehem Steel Co.
Lorain Steel Co., The
Wm. Wharton, Jr. & Co.

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WHAT AND WHERE TO BUY—Continued from page 62

Spikes
Amer. Steel & Wire Co.
Illinois Steel Co.

Splicing Compounds
U. S. Rubber Co.
Westinghouse E. & M. Co.

Splicing Sleeves (See Clamps and Connectors)

Springs, Car and Truck
American Steel Foundries
American Steel & Wire Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Cincinnati Car Co.
St. Louis Car Co.
Standard Steel Works Co.

Sprinklers, Track and Road
Brill Co., The J. G.
Cummings Car & Coach Co.
St. Louis Car Co.

Steel and Steel Products
American Steel & Wire Co.
Carnegie Steel Co.
Illinois Steel Co.

Steps, Car
Brill Co., The J. G.
Cincinnati Car Co.

Stokers, Mechanical
Babcock & Wilcox Co.
Westinghouse E. & M. Co.

Stop Signals
Nichols-Lintern Co.

Storage Batteries (See Batteries, Storage)

Strain, Insulators
A. & J. M. Anderson Mfg. Co.
Electric Service Supplies Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Strand
American Steel & Wire Co.
Roebling's Sons Co., J. A.

Street Cars, Passenger (See Cars, Passenger, Freight, Express, etc.)
Cummings Car & Coach Co.

Structural Steel
American Brown-Boveri Elec. Corp.

Superheaters
Babcock & Wilcox Co.

Sweepers, Snow (See Snow Plows, Sweepers and Brooms)

Switch Stands and Fixtures
Ramapo-Ajax Corp.

Switches
American Brown-Boveri Elec. Corp.

Switches, Selector
Nichols-Lintern Co.

Switches and Switchboards
Consolidated Car Heating Co.
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Switches, Tee Rail
Ramapo Ajax Corp.

Switches, Track (See Track Special Work)

Tampers, Tie
Ingersoll-Rand Co.
Railway Track-work Co.

Tapes and Cloths (See Insulating Cloth, Paper and Tape)

Tee Rail Special Track Work
Ramapo Ajax Corp.

Telephone and Telegraph Wire
American Steel & Wire Co.

Telephones and Parts
Elec. Service Supplies Co.

Testing Instruments (See Instruments, Electrical Measuring, Testing, etc.)

Thermostats
Consolidated Car Heating Co.
Gold Car Heat. & Ltg. Co.
Railway Utility Co.
Smith Heater Co., Peter

Ticket Choppers and Destroyers
Elec. Service Supplies Co.

Tie Plates
Illinois Steel Co.

Ties, Mechanical
Dayton Mechanical Tie Co.

Ties and Tie Rods, Steel
American Bridge Co.
Carnegie Steel Co.
Godwin Co., Inc., W. S.
International Steel Tie Co.

Ties, Wood Cross (See Poles, Ties, Posts, etc.)

Tires
B. F. Goodrich Rubber Co.
Goodyear Tire & Rubber Co.
Kelly-Springfield Tire Co.

Tongue Switches
Wm. Wharton, Jr. & Co.

Tools, Track & Miscellaneous
Amer. Steel & Wire Co.
Columbia Machine Works
Elec. Service Supplies Co.
Hubbard & Co.
Railway Track-work Co.

Towers and Transmission Structures
Archbold-Brady Co.

Bates Expanded Steel Truss Co.
Westinghouse E. & M. Co.

Track Grinders
Metal & Thermit Corp.
Railway Track-work Co.
Ramapo Ajax Corp.

Track, Special Work
Buda Co., The
Columbia Machine Works
Ramapo Ajax Corp.

Trackless Trollicars
Brill Co., The J. G.
St. Louis Car Co.

Transfer Issuing Machines
Ohmer Fare Register Co.

Transfer Tables
American Bridge Co.

Transformers
American Brown-Boveri Elec. Corp.
General Electric Co.
Westinghouse E. & M. Co

Transmission Towers & Structures
American Bridge Co.

Treads, Safety Stair Car Steps
Cincinnati Car Co.

Tree Wire
Okonite Callender Cable Co.
Okonite Co.

Trolley Bases
General Electric Co.
Nuttall Co., R. D.
Ohio Brass Co.

Trolley Bases, Retrieving
General Electric Co.
Nuttall Co., R. D.
Ohio Brass Co.

Trolley Bases
Brill Co., The J. G.
General Electric Co.
Westinghouse E. & M. Co.

Trolley Material, Overhead
A. & J. M. Anderson Mfg. Co.
Elec. Service Supplies Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Trolley Wheels (See Wheels, Trolley)

Trolley Wheel Bushings
Star Brass Works

Trolley Wire
American Brass Co.
Amer. Electrical Works
Amer. Steel & Wire Co.
Anaconda Copper Min. Co.
Roebling's Sons Co., J. A.

Trucks, Car
Bemis Car Truck Co.
Brill Co., The J. G.
Cincinnati Car Co.
Cummings Car & Coach Co.
St. Louis Car Co.

Truss Planks
Haskelite Mfg. Corp.

Tubing, Steel
National Tube Co.

Tubing, Yellow & Black Flexible Varnishes
Irvington Varnish & Ins. Co.

Turbines, Steam
American Brown-Boveri Elec. Corp.
General Electric Co.
Westinghouse E. & M. Co.

Turnstiles
Elec. Service Supplies Co.
Perey Mfg. Co., Inc.

Turntables
American Bridge Co.
Elec. Service Supplies Co.

Valves
Ohio Brass Co.
Westinghouse Tr. Br. Co.

Varnished Papers & Silks
Irvington Varnish & Ins. Co.

Varnishes (See Paints, etc)

Ventilators
National Ry. Appliance Co.

Ventilators, Car
Brill Co., The J. G.
Cincinnati Car Co.
Consolidated Car Heating Co.
Nichols-Lintern Co.
Railway Utility Co.
St. Louis Car Co.

Vestibule Linings
Haskelite Mfg. Corp.

Welded Rail Joints
Lorain Steel Co.
Metal & Thermit Corp.
Ohio Brass Co.
Railway Trackwork Co.
Una Welding & Bonding Co.

Welders, Portable Electric
Ohio Brass Co.
Railway Track-work Co.
Una Welding & Bonding Co.
Westinghouse E. & M. Co.

Welders, Rail Joint
Ohio Brass Co.
Railway Track-work Co.

Welding Processes and Apparatus
General Electric Co.
Metal & Thermit Corp.
Ohio Brass Co.
Railway Track-work Co.
Una Welding & Bonding Co.
Westinghouse E. & M. Co.

Welding Steel
Railway Track-work Co.
Una Welding & Bonding Co

Welding Wire
American Steel & Wire Co.
General Electric Co.
Railway Track-work Co.
Roebling's Sons Co., J. A.

Welding Wire and Rods
Railway Track-work Co.

Wheels, Car, Steel & Steel Tired
American Steel Foundries
Assn. of Mfrs. of Chilled Car Wheels
Bemis Car Truck Co.
Carnegie Steel Co.
Illinois Steel Co.
Standard Steel Works Co.

Wheel Guards (See Fenders and Wheel Guards)

Wheel Grinders
Wheel Truing Brake Shoe Co.

Wheel Presses (See Machine Tools)

Wheels, Trolley
Columbia Machine Works
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Nuttall Co., R. D.
Star Brass Works

Wheels, Wrought Steel
Carnegie Steel Co.
Illinois Steel Co.

Whistles, Air
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
Westinghouse Traction Brake Co.

Window Guards and Fittings
Cincinnati Car Co.

Wire Rope
American Steel & Wire Co.
Roebling's Sons Co., J. A.

Wires and Cables
American Brass Co., The
Amer. Electrical Works
Amer. Steel & Wire Co.
Anaconda Copper Min. Co.
General Electric Co.
Okonite Co.
Okonite-Callender Cable Co., Inc.
Roebling's Sons Co., J. A.
Westinghouse E. & M. Co.

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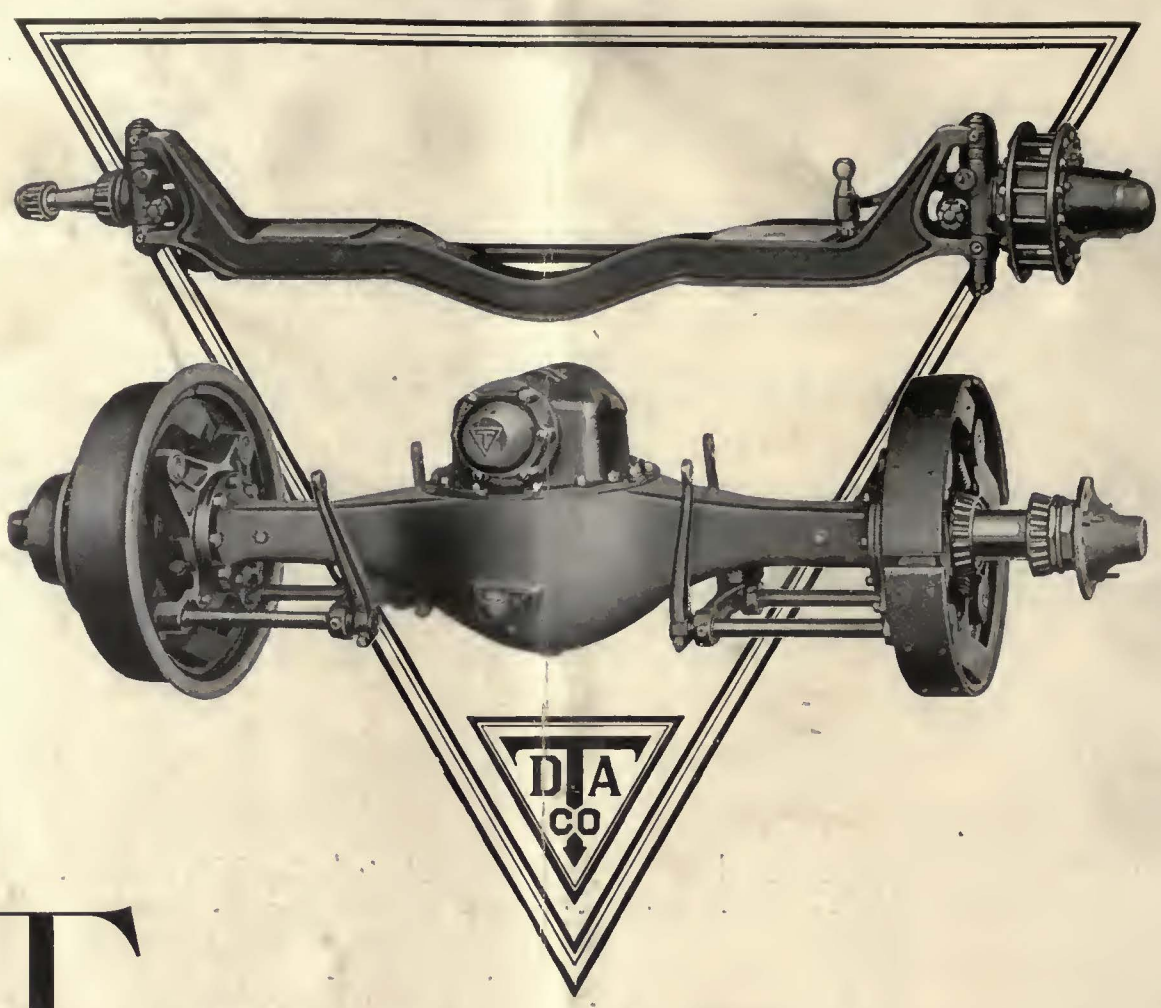

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