MAINTENANCE ISSUE

McGraw-Hill Publishing Company, Inc. February 20, 1926 Twenty Cents per Copy

ELECTRIC RAILWAY JOURNAL

This is the work which cost 13% less than their wood tie track in stone ballast. Rail, joints and paving the same in both cases.

Modernize and Merchandise

The Car Reflects the Standing of the Electric Railway in its Community

The use of electricity for all lighting purposes has steadily and rapidly gained ground since the days of the first practical application of the incandescent principle. The electric light and power industry has never hesitated to scrap obsolete methods and equipment to make way for the more modern.

And, as with the electric light,—

so also in the railway industry must obsolete equipment be replaced. In 1923 BRITTON I. BUDD, then President of the American Electric Railway Association, sounded the keynote of modern progress for our industry when he said that—

the electric railway industry must modernize and merchandise.

The car is the first place to modernize, as it is with the car that we must merchandise. It has been definitely proven that new, modern, light-weight cars create new traffic —the reason is a superior service to the rider.

There are 28,000 obsolete cars in operation today on electric railways in this country. When these have been replaced by modern cars the railway industry needs to fear no form of competition.

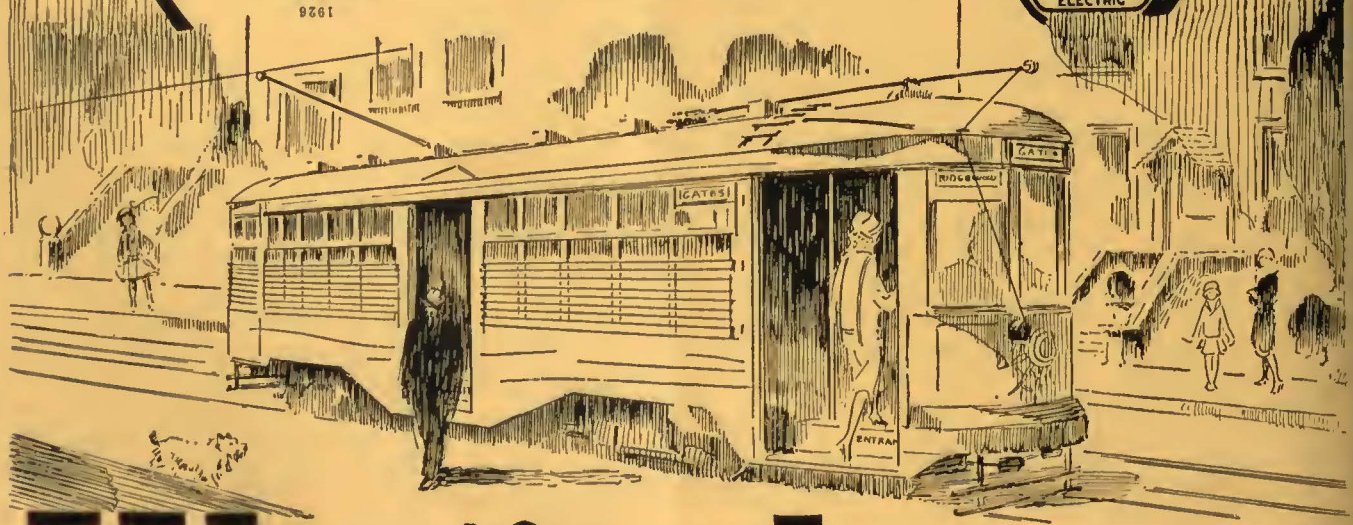
How many of the 28000 obsolete cars have you?

Modern street cars attract patronage

MEMBER AERA 1926

Westinghouse Electric & Manufacturing Company
East Pittsburgh Pennsylvania
Sales Offices in All Principal Cities of the United States and Foreign Countries

W WESTINGHOUSE ELECTRIC



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Vol. 67
No. 8

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Playing Fair

JUST a short time ago this paper requested a copy of an address to be made by a street railway manager at a coming meeting. This manager seldom prepares advance copies. Nevertheless he sent a copy to ELECTRIC RAILWAY JOURNAL. Accompanying it was a letter from his assistant which said in part:

> In compliance with the request contained in your letter of Feb. 3, I am forwarding herewith a copy of the paper which . . . . . will read at the annual conference.
>
> May I bring to your attention the fact that this material has been prepared at the last moment and would perhaps admit of much criticism from a publication of less generous reputation than the ELECTRIC RAILWAY JOURNAL.

Of course it is because the JOURNAL has earned the reputation of playing fair that it has been able to get advance information like this. It's just another of the many reasons why the JOURNAL occupies the position it does in the electric railway industry.

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Published weekly. Entered as second-class matter, June 23, 1908, at the Post Office at New York, N. Y., under the Act of March 3, 1879. Printed in U. S. A.

Dispatcher's Control Cabinet

Dispatcher's Relay Cabinet

Real Supervisory Control

THE Westinghouse synchronous type supervisory control is an all-relay system. It is in operation only when an indication is desired, or when some apparatus under its control operates automatically. Wear is thus kept down to the minimum.

The relays operate in chain sequence and can be stopped at any point in the sequence. When stopped, a direct control circuit with indicating lamps is provided from the dispatcher's cabinet to the apparatus controlled at that point in the sequence. Thus the dispatcher receives instant indications of the condition of the apparatus which he controls.

This direct circuit can also be used for remote metering.

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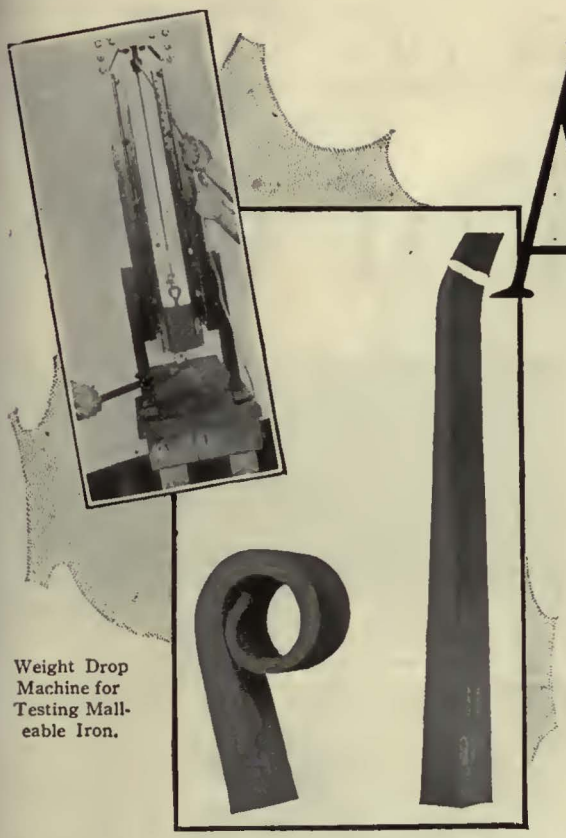
East Pittsburgh Pennsylvania
Sales Offices in All Principal Cities of the United States and Foreign Countries

MEMBER ELECTRIC RAILWAY ASSOCIATION AERA 1926

Westinghouse

X87229



Weight Drop Machine for Testing Malleable Iron.

A New Malleable

(B) FLECTO IRON

Insurance against breakage of Hot-dip Galvanized Malleable Fittings

HERE ARE TWO identical test pieces of Hot-dip Galvanized Malleable Cast Iron. Both were made from the same raw materials, in the same furnace, and under the same working conditions.

What is the difference?

Simply this.

The test piece on the left is galvanized O-B FLECTO IRON. It bends. It is ductile. It will not break in service. It is your insurance against broken or brittle malleable fittings.

The other is just regular good hot-dip galvanized malleable iron. Frequently it is brittle.

O-B Flecto Iron

is the material of which the following O-B products have been made for the past two years.

Catenary Hangers
Mine Trolley Harps
Pole Brackets
Pole Hardware, Miscellaneous
Suspension Insulator Caps
Suspension Strain Clamps
Suspension Wire Clamps
Trolley Bases
Trolley Catchers
Trolley Retrievers
Trolley Clamps
Trolley Cross-overs
Trolley Frogs
Trolley Hangers
Trolley Pull-overs
Wood Strain Insulators

Hot-dip Galvanizing of malleable iron has a tendency to cause it to become embrittled. Experience has shown that an average of 20%, or 1 out of every 5 ordinary malleable castings are brittle after galvanizing. Out of the same heat, after hot-dip galvanizing, part of the castings will be brittle—while the remainder will retain their malleable properties.

Many attempts have been made to dodge the real problem by the use of substitute methods of rust-proofing. Yet the fact remains that no commercial protective coating, yet invented, is quite as good as hot-dip galvanizing.

Through long research, the Ohio Brass Company has developed a special heat treatment that causes the iron to retain its ductility after galvanizing. It actually makes brittle iron good and good iron better. It eliminates the faulty 20%. This special process raises the shock resisting qualities to the maximum and makes this maximum permanent. The product of this new patented process has been named "Flecto Iron".

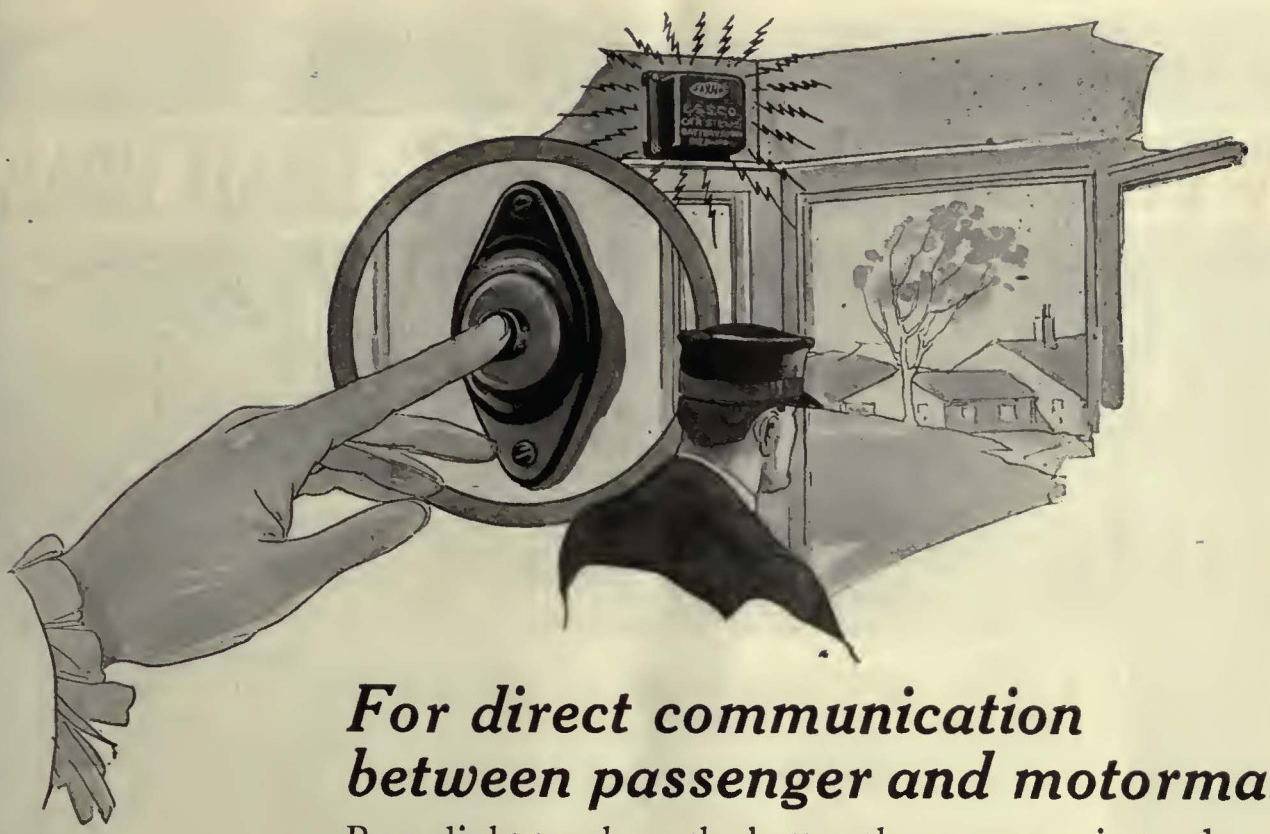
Really, O-B Flecto Iron is not new. For the past two years all O-B Malleable Castings have been made of Flecto Iron. And through the most severe test—the test of service—this iron has proved its worth. Now, with the product thoroughly proved, the process is announced.

Ohio Brass Company, Mansfield, O.
Dominion Insulator & Mfg. Co., Limited
Niagara Falls, Canada

9

Ohio Brass Co.

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



For direct communication between passenger and motorman

By a slight touch on the button the passenger instantly and positively notifies the operator to stop.

Even though the car or bus is crowded there's never occasion to shout nor to wave wildly as the stop is approached. The Faraday System provides buttons within easy reach of every passenger.

Its installation is a practical, inexpensive and reliable method of building up goodwill among your patrons.

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PITTSBURGH 839 Oliver Building | BOSTON 88 Broad St. | SCRANTON 316 N. Washingtoo Ave. | DETROIT General Motors Building

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FARADAY CAR SIGNALS

No. 19587
Vibrating Bell

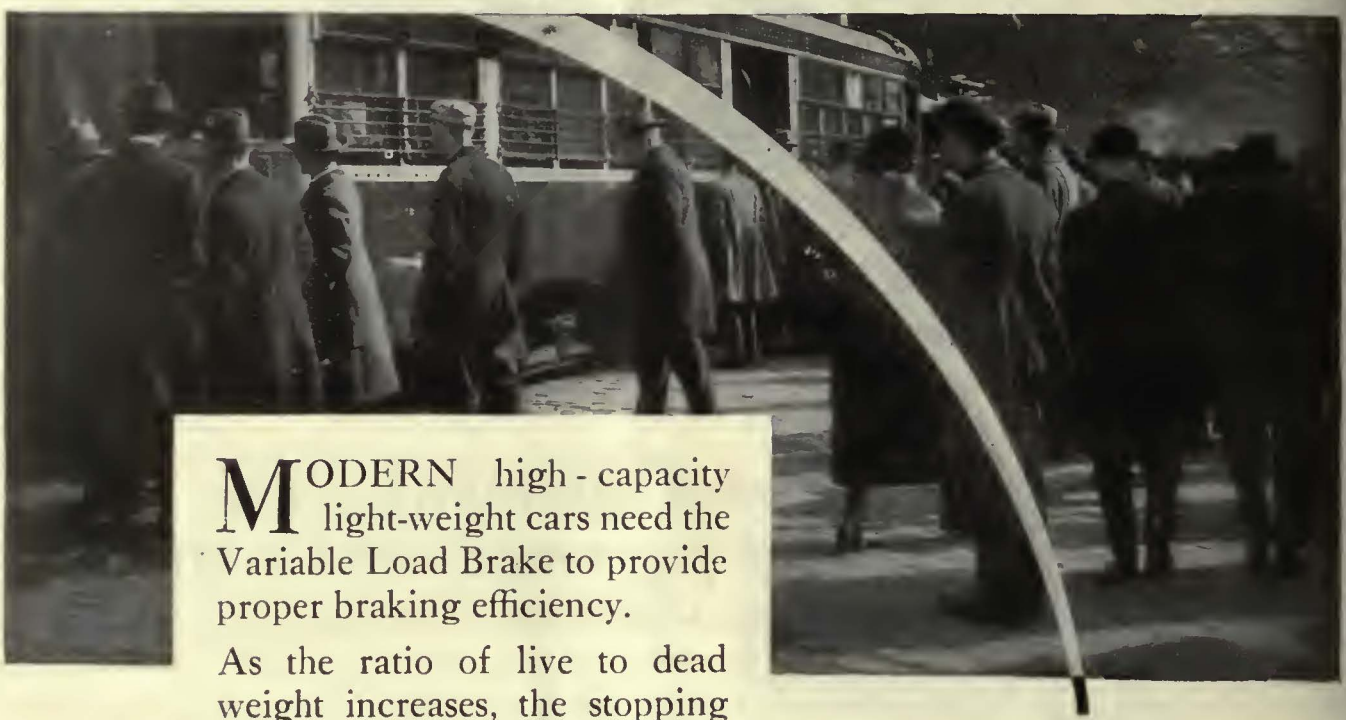
No. 19403
Buzzer

Type A
Push Button

Type B
Push Button

Faraday Car Signal Systems are made for every requirement—high or low voltage systems, buzzers, vibrating bells or single stroke bells, resistance panels, flush or surface type push buttons.

WESTINGHOUSE "VARIABLE LOAD" BRAKE



MODERN high-capacity light-weight cars need the Variable Load Brake to provide proper braking efficiency.

As the ratio of live to dead weight increases, the stopping ability of a loaded car diminishes, and the stopping distance (or time) is materially lengthened, *if ordinary brakes are used.*

But there is no difference in the stopping distance between an empty and loaded car *when the Variable Load Brake is used.*

These short, uniform stops mean a saving of time and a speed-up of car schedules — increased mileage, increased earning power—especially in congested districts.

for cars of
LOW WEIGHT
and
HIGH CAPACITY

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

WESTINGHOUSE TRACTION BRAKES

Pantasote and Agasote

Endorsed and used by the entire railway field for more than a quarter century

Many claims have been made for Pantasote and Agasote. All of them are easily provable.

But of more importance to you, as a prospective user of these products, must be the fact of their consistent and almost universal use by the steam railroads, the Pullman companies and the most important electric railways in every part of the world,.... *over a period of 25 years and more.*

Such evidence of satisfactory and economical service, under every possible operating condition, becomes the most logical and convincing sales argument, for Pantasote Products, that we could present.

Railroad companies have always bought on a last-cost basis. The requirements of railroad service have precluded survival of any but the fittest in construction and maintenance materials. And never has the industry been justified in overlooking possible economies.

Pantasote and Agasote have met every requirement. Their continued use sets a precedent worth careful consideration by every electric railway executive responsible for the maintenance of old or the purchase of new equipment.

Revolving Parlor Car Chair

for de luxe passenger service

Passengers now-a-days are being attracted to cars and buses equipped with the most luxurious and comfortable appointments. Nothing seems to good for the modern rider.

This beautiful chair is a marvel of comfort and occupies minimum floor space. Turns in a circle of—28½ to 32½ inches diameter. Deep luxurious springs, softly upholstered, and formed to scientific proportions and dimensions give perfect support and rest for the body. An ingenious device in the pedestal prevents chair from swaying, yet permits revolving with only normal effort.

Pattern 15A, illustrated, is especially adapted for the fine Electric Railway Car and Pattern 15, designed on the same lines is for de luxe buses. They may be upholstered in leather, plush or other fabrics.

Hale-Kilburn Seats in various styles for every requirement.

Standard rattan or wood-slat cross seats, inexpensive and durable. Reversible and non-reversible cross seats. Plush or leather covered interurban seats.

Space-saving features included in all Hale-Kilburn Seats. Longitudinal Seats and circular end seating. De Luxe cross seats and double-chair types for cars and motor buses.

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General Offices and Works: 1800 Lehigh Avenue, Philadelphia

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Hale and Kilburn SEATS

Spinning KW cobwebs

ROLLS that rumble day and night, spinning from red hot copper bars millions of pounds of wires and cables every year. Row after row of wire drawing machines, continuing this reduction process in some cases to a hair-like thread of copper. Stranding, rubber insulating, and braiding machines, building up these copper conductors into finished wires and cables of all sizes and types.

These are some of the processes that take up the twenty acres of manufacturing floor space in the Rome Wire Company's mills.

Because all of these processes are under one centralized control, industry is assured of uniform quality in Rome Wires.

Because of the intimate knowledge of all types of wire which such complete production brings, industry can be, and is, offered the service of an engineering department composed of men who have made a lifetime study of the construction and use of all types of wire.

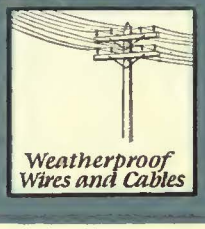
These production facilities and these men are at your disposal in working out knotty wire and cable problems.

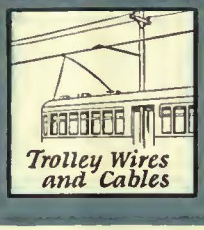
ROME WIRE COMPANY, ROME, N.Y.

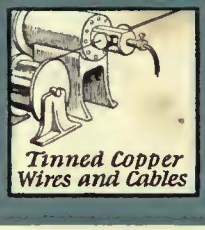
ROME WIRE

FROM WIRE BAR TO FINISHED COPPER WIRE

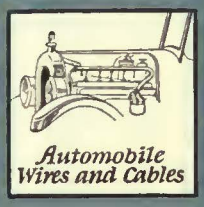

Antenna Wire


Weatherproof Wires and Cables

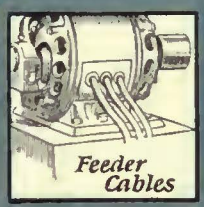

Trolley Wires and Cables


Tinned Copper Wires and Cables

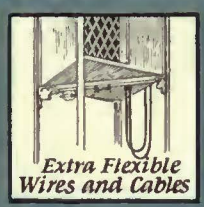

Telephone Wires and Cables


Automobile Wires and Cables


Slow Burning Wires

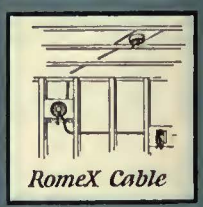

Feeder Cables

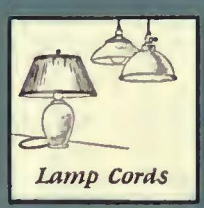

Super Service Cords and Cables

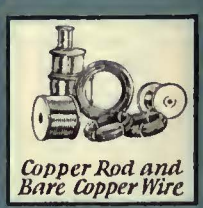

Extra Flexible Wires and Cables


Rubber Covered Wires—Code 30% Intermediate


Heater Cords


RomeX Cable

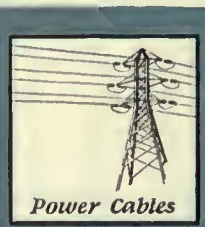

Lamp Cords


Copper Rod and Bare Copper Wire


Lead Sheathed Cables


Magnet Wire


Mining Machine Cables


Power Cables


Radio Wires and Cables

WHETHER you are wiring a building, winding a coil, installing a transmission line, or manufacturing a product that requires the conveyance of electric current, you can find a Rome Wire that will fit your particular needs.

Many of these are indicated in the border of this page, but for complete information you should have the Rome catalog devoted to that particular type of wire.

If you will let us know in what wires and cables you are interested, we will be glad to send you samples, catalogs, and other information that will be of help to you—while an opportunity to quote on any of your wire requirements will always be welcomed.

ROME WIRE COMPANY

Mills and Executive Offices: ROME, N.Y.

Diamond Branch: Buffalo, N.Y.

New York—50 Church Street

Boston—Little Building

Chicago—14 E. Jackson Blvd.

Detroit—25 Parsons Street

Cleveland—1200 W. 9th Street

Los Angeles—J. G. Pomeroy, Inc., 336 Azusa Street

San Francisco—J. G. Pomeroy, Inc., 51 Federal Street

The Bus as you buy it—

Mack roofs built as carefully as a bridge!

Bridges and bus roofs are both subject to strain. Both must be designed along engineering lines. Only the best materials must be used. Both must be reinforced. Both must have a factor of safety.

Mack builds its roofs like bridges, to stand the gaff of service over a long term of years.

Nothing but solid ply-wood roofing, to give added strength for the amount of weight, is good enough for the Mack.

To make construction rugged, Mack uses ash ribs strongly reinforced with steel plates and stamped steel gussets.

Wiring should be accessible—so Mack lays it that way.

Ventilators should be more than holes, so Mack uses special ventilators of improved type, three in number and figures them carefully as to position.

Throughout the rack and tear of constant service, Mack roofs stand up. In ice and snow, sun and rain, the sturdy construction underneath assures the resistance that means long life.

MACK TRUCKS, INC.
INTERNATIONAL MOTOR COMPANY
25 Broadway, New York City

One hundred direct MACK factory branches operate under the titles of: "MACK MOTOR TRUCK COMPANY," "MACK-INTERNATIONAL MOTOR TRUCK CORPORATION," and "MACK TRUCKS OF CANADA, LTD."

The Mack Bus

Points of *Refinement* about Lang Bodies

Craftsmanship expressed in the inviting entrance ~

LANG BODIES feature many points of refinement that show the highest degree of craftsmanship in body building.

For example, consider the inviting entrance. The door is always under the complete control of the driver and covers the step well when closed. A step light automatically guides the passenger—and even such a detail as the grab rail is placed in the exact position to assure the easiest reach.

It's the little things that count—in body building; points of refinement that although small in themselves contribute greatly to passenger comfort and the operation of the bus.

Experienced in designing and building highest quality bodies, Lang body engineers express their craftsmanship in every detail.

The Potter

A Mark of Craftsmanship

The potter in moulding a lump of clay into a thing of beauty, employs a craftsmanship that results from years of experience. He is an artisan.

Lang body engineers, by their command of raw materials, employ a craftsmanship which is expressed in the finished job. They, also, are artisans.

LANG BODIES

Miles of Smiles
for Rider for Driver for Owner

DESIGNERS AND BUILDERS OF INDIVIDUALIZED BODIES FOR THE BUS MANUFACTURING INDUSTRY

THE LANG BODY COMPANY • CLEVELAND ~Q

The Phono Record

1865 A bulletin of Phono-Electric Achievement 1926

Memphis St. Railway Standardization On Phono-Electric

Installations Already in Service Prove Eminently Satisfactory

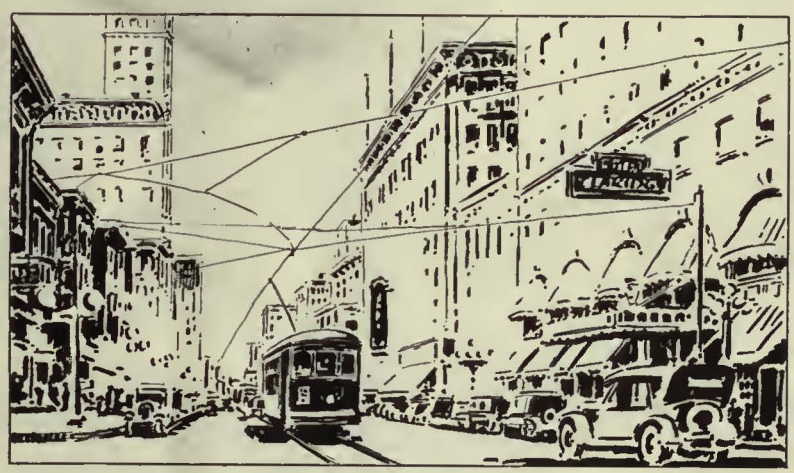
Conditions of trolley wire service in Memphis, Tennessee, are anything but easy. This busy and progressive distributing center of the Southern cotton and lumber region, uses its urban transportation freely.

Memphis made its first installation of Phono-Electric Trolley Wire in 1919. Five years later this wire was still in service at some of the heaviest traffic points in the city. Probably it is still on the job, for the proven record of Phono-Electric in this and other cities has shown such exceptional service to be the rule rather than the exception.

Naturally the Memphis Street Railway Company proposes to standardize on Phono, as soon as this can be done in conformation with operating programs.

Bulletin on Phono Facts

What Phono-Electric will stand in a fire, what it will stand under heavy fatigue strains, how its remaining life may be determined at any time during service and many other useful facts are illustrated and tabulated in a recently issued bulletin published by Bridgeport Brass Company.



Phono-Electric Trolley Wire at Union Avenue and 3rd Street, Memphis

Original Wire Lasts 2,000,000 Car Passes

Still in Service

Time and again we find and record instances of truly exceptional wear from Phono-Electric installations. Were it a new product these might well be accepted merely as exceptions and not as a safe basis for figuring trolley maintenance. But where, as is the case with Phono, they are constantly repeated under every operating condition, over a period of 30 years and more, they must be a true indication of average results.

On a conservative estimate Phono-Electric outwears hard drawn copper trolley wire two or three times.

"Bridgeport" BRASS TRADE CO. MARK Phono-Electric

MEMBER AERA

Bridgeport Brass Company

BRIDGEPORT - CONNECTICUT

Goodyear Balloon Tire Equipped Coach No. 214 of the Colonial Coach Lines, Watertown, N. Y.

GOODYEAR

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Publishing Company, Inc.

MORRIS BUCK, *Managing Editor*

Volume 67 New York, Saturday, February 20, 1926 *Number* 8

Car Floors Can Be Given Increased Attention

FLOOR coverings of some rubber material or linoleum are being tried by many railways to replace the ordinary wooden floor with raised slats. This improves the appearance considerably and has an added advantage in reducing noise. Some difficulties have been experienced from uneven wear and a tendency to warp and buckle. Costs of keeping such floors in good repair are not available, but definite figures as to the cost of maintaining them are looked forward to with interest.

Trapdoors are considered an eyesore by most transportation departments but a necessity by the mechanical departments. Since they are required for proper inspection of motors they should be given particular attention so as to harmonize with the remaining floor area and not create the impression on passengers that they are something to be avoided.

Whatever type of floor is used it requires careful design to prevent the openings for trapdoors from gradually showing worn and soiled edges. Of course the openings are included for a specific purpose, and if they are not used they are of no value. But care in the selection of the floor covering and care in maintaining it will do much to prevent unsightliness.

Removal of Obstructions from Car Interior Should Give More Pleasing Impression

VARIOUS arrangements of stanchions and barriers have been used on car platforms for directing passenger movement. By separating incoming and outgoing passengers less confusion and more satisfactory operation usually result. In general, however, such barriers are looked upon with disfavor by passengers. People resent the impression of being penned up or herded. Several railways have improved conditions by a removal of some of the barriers and a rearrangement of the remaining ones. The change can be made in a manner that will remove the source of annoyance and still retain most of the good features of the plan.

The problem of keeping stanchions and barriers in good condition is a difficult one, but nevertheless it should receive more attention. Porcelain enameling appears to be satisfactory only for straight lengths of pipe. It also is likely to chip, and when it does so the exposed iron is unsightly. Aluminum and brass oxidize and become unsightly, galvanizing is unsatisfactory and iron pipes with enamel paint leave much to be desired. Light colors, while they have a most pleasing appearance when kept fresh, require constant cleaning. Dark colors are easier to maintain but do not create the pleasing impression that is so desirable when a passenger boards the car. Altogether designs of stanchions and barriers leave much room for improvement.

The arrangement of railings and hand straps inside the car is another thing that may create an unfavorable impression on the passengers and give a ragged, unfinished appearance to the car that is entirely out of harmony with the modern trend toward light weight and pleasing design. A judicious arrangement of such equipment will increase the range of vision and give a more satisfactory appearance.

High-Pressure Salesmanship Needed in the Electric Railway Field

ONLY a few years ago efforts on the part of electric railway executives toward the merchandising of transportation were practically nil. The street car afforded the only convenient means of transportation for the majority of urban and interurban passengers. The electric car had no important competitor and the passenger no choice in his method of travel, as it was necessary for him to utilize such facilities as existed. Knowledge that the public was compelled to use electric cars became so firmly imbedded in the rank and file of street railway employees that it has been most difficult to change this attitude. Advent of the private automobile and later the luxurious bus created an entirely new situation. The riding public has in many cases been in a position to choose its transportation medium, and naturally its choice has been with the more attractive and pleasing vehicle. Passengers are no longer satisfied with any antiquated, noisy, hard-riding vehicle on wheels, but demand speed, comfort and cleanliness. It is only natural that the private automobile should be used extensively under unfavorable conditions.

Recognition of the existence of serious competition has served to awaken the industry from the self-satisfied attitude which has been quite prevalent. It has been said that next in importance to doing the right thing is advertising that you have done the right thing. Earnest effort to improve railway service, it is believed, exists in every street railway organization, but this effort will not produce the desired results if achievements are not effectively placed before our customers. Railways have an article to sell; the sales organization exists. It must, however, be organized and it must be made to function.

High-powered salesmanship under able leadership is required in the transportation field to the same degree that it is required in any manufacturing field. No manufacturing company, no matter how efficient the

This is the issue in February that is devoted essentially to maintenance subjects

productive organization might be, would expand and grow without a highly-trained sales department. The railways have a product to sell which is in natural demand, and this demand can be capitalized only through effective salesmanship. Every employee who comes in contact with the public should be an enthusiastic member of this organized sales force. When this has been accomplished, the private automobile will be used to a lesser extent, particularly in crowded cities, street car riding will increase and net revenues will show decided improvement.

Substitution of Car Names for Numbers Presents a Problem for Master Mechanics

SEVERAL electric railways have recently adopted the practice of bestowing names on their passenger cars in place of the old-fashioned numerical designations. This change deserves careful consideration from two angles. Will it have a beneficial effect in popularizing the transportation service? Will it add to the problems of the master mechanic by complicating the classification of rolling stock?

From the transportation standpoint results have shown that there is a real advantage in using names on cars rather than numbers, according to several railway managers who have adopted the practice. Perhaps it has a tendency to personalize the service by giving each vehicle a definite individuality. Use of local names appeals to local pride. The mere novelty of the scheme has a certain appeal. In any event the public seems to take kindly to the use of car names.

From the standpoint of the master mechanic the change undoubtedly involves some difficulties. In this connection it is interesting to consider the practices of the Erie Railroad and the Pullman Company. For a number of years past it has been the custom of the Erie to place the name of the engineer on the cab of one locomotive of each division instead of the number. This special recognition is believed to improve the morale of the engine man. The locomotive, however, retains its original number and is known by this number in all the records of the mechanical department.

Identification of the rolling stock of the Pullman Company, which is known only by name, is a more difficult problem. Every car has a plan number in addition to the name. For example, the latest twelve-section drawing room sleeping cars are known as plan 3410. A descriptive list is printed periodically and distributed to the mechanical department, showing the names, plan numbers and types of brakes, couplers, trucks, electric fixtures, water and heating systems with which the cars are equipped. Information is also given as to the exterior design of the cars. In addition, all of the different terminals are furnished with very complete catalogs of parts, illustrated with photographs of each part. This facilitates the identification of the part and reduces the liability of wrong replacement parts being furnished.

Since the number of electric railway cars identified by names is likely to be comparatively small on any one property, the method used by the Erie seems to be the easier solution of the master mechanic's problem. It will be well worth while, however, to give due consideration to this question at the very beginning, because the difficulty of keeping track of the kind of parts required will increase rapidly as the number of names increases.

The Manufacture of Parts by Railways Is Often Poor Economy

HOW often the question has been asked as to whether or not operating companies have exceeded their proper field of effort in undertaking a large-scale manufacture of parts! Walking into the erstwhile maintenance shops of some railways one is struck with the feeling that he has by accident happened upon the plant of an equipment manufacturer. Shiny new parts are to be seen in every direction.

But—and of course there must be a but—it is well to consider just where this situation is leading. To say that circumstances never justify the manufacture of parts by operating companies would be absurd. But it would be equally foolish to cast discretion to the four winds and to enter upon a period of stubborn competition with the established manufacturers. Competition in itself, if limited to proper bounds, stimulates a healthy condition in any industry. However, care must be observed in steering clear of what may at first glance appear to be a means of effecting real savings in manufacturing costs, but which may later manifest itself in its true colors as a costly anomaly.

Were it possible for individual companies to take upon themselves the task of manufacturing all of the widely diversified products needed in their operations and to carry out this task quite as cheaply and as effectively as the regular manufacturers are able to do, then would the latter firms be hard put to it to defend their economic prerogatives. But under the existing order of things this is manifestly impossible. Each year the manufacturers spend vast sums of money in research and development programs. Since the cost of such work would be far beyond the reach of individual companies, the immense value of all this engineering endeavor would be lost to the industry.

Shop superintendents and purchasing agents of the various companies are frequently deluding themselves concerning the true economies to be effected by undertaking the production of new equipment and replacement parts. It is simply a matter of accurate bookkeeping. Instead of fairly apportioning the item of shop overhead between maintenance and new parts manufacture, they have placed the entire burden upon the former. This has resulted in an absurdly small apparent cost for manufactured parts, as shown on the books.

Right Materials Essential for Armature Repairs

SO MUCH depends on the perfect functioning of a railway motor armature that it is essential to keep it in as good operating condition as possible. The modern armature is a rugged piece of apparatus, even though the wires, commutator bars and insulation are relatively delicate. Motor manufacturers go to great pains to build armatures correctly. They have done a great deal of development work covering a long period of years, and have profited greatly by study of the service records of many armatures.

Since even the best of armatures will fail in time, it is necessary to repair them so that they will once more do their work as at first. In practice, however, many railways do not put them back into their original condition. Frequently other materials are employed and

other methods of winding are resorted to than those developed by the manufacturer. While some of these substitute practices are excellent, in general it may be stated that they cannot produce results better than the original.

An article by Jesse M. Zimmerman in this issue, which gives in detail the practice of one manufacturer, is well worth the attention of the master mechanic and armature foreman. While the practice of other manufacturers may differ somewhat in detail the general principles are the same. Close adherence to such methods should result in far less failures than are common on some roads.

Hope Springs Eternal in New York City

MAYOR WALKER of New York hopes to negotiate a city-wide bus franchise with a 5-cent fare clause, it is said. Such optimism is truly remarkable. Few of the forty-odd applicants for franchises have offered to carry passengers for 5 cents, and it may be doubted if those who have offered could actually carry out any such plan. Only a short time has elapsed since the Tompkins Bus Corporation on Staten Island found that it could not operate profitably on a 5-cent fare and increased its rate to 10 cents. Operating conditions on Manhattan Island are more difficult than on Staten Island. Due to the prevailing traffic congestion the speed would necessarily be slow and the cost of operation correspondingly high. In recent years many trucking concerns in New York have substituted horse-drawn vehicles for motor trucks to cut down the expense of time wasted in traffic jams.

It is said that one of the chief advantages of a city-wide franchise would be that the operator would take the lean lines along with the fat ones. At a 5-cent fare, however, it's a safe guess that most of the lines would be lean.

A Good Name Cannot Be Measured in Dollars

PUBLIC relations men have for years been preaching the value of square dealing with the officials and residents in a community served. They point out that consistent adoption of this policy has a lasting value. But it is not so often that they have the opportunity to point to tangible results that show just how much influence such a policy has on a utility.

Seldom has there been an expression of opinion so favorable to a utility and its management as that given J. N. Shannahan and his associates on the occasion of their sale of the Newport News & Hampton Railway, Gas & Electric Company. The local newspapers have gone to great length to express editorially the sentiment of the people in the community. "The company has never attempted to dicker with the municipal bodies of this section," says the Newport News *Times-Herald.* "To the contrary, it has treated those bodies with consideration, has kept no secrets from them, has laid its case in frankness and confidence before them whenever any emergency in its affairs has arisen. . . . In short, the company has made itself part and parcel of the community and has heartily co-operated with the people in all movements and enterprises for the common good. It has been a good and helpful partner and has rendered service in many directions outside of its immediate sphere of activities."

While praising the work of the company, the same newspaper points out particularly Mr. Shannahan's leading part in it. The Newsport News *Press* goes even farther, saying, "It is not in disparagement of the other officers to say that this is due primarily to the integrity and the fidelity of President Shannahan. He is an upright man and a loyal citizen. He has dealt with the community not in selfishness but in the spirit of fairness and generosity."

Such praise is praise indeed. But the value of this mode of conduct is not overlooked by the *Press.* "His indorsement of any enterprise is sufficient to inspire the confidence of investors." That is the acid test. The results that have been obtained by Mr. Shannahan show that his methods should be studied by other operators.

Maintaining Axle Bearings of Paramount Importance

HEAT generators is the name given to bearings by one workman. This is true. The object of the manufacturer is to design the bearing to generate as little heat as possible, and that of the maintenance man to keep it running on a low production basis—as to its byproduct, heat.

Attention is again called to the information on bearing practice developed at the January meeting of the Metropolitan Section of the American Electric Railway Association. The papers, which were abstracted in this paper, issue of Jan. 16, showed that more attention should be given to the subject of bearing wear and replacement. The range in wear over a given period by different roads under quite similar conditions shows that much can be done by the average road to get less wear.

Oiling is also important. A sufficient flow to keep the bearings lubricated is an essential that never should be overlooked. Too many operators save oil at the expense of bearing metal, with the result of poor performance. The work of packing bearings is so important that good men should always be assigned to it and they should be given the best of instruction.

Perhaps the bearings most difficult to maintain are those supporting the driving motors on the car axles. Necessarily these must be split to allow easy removal of the motors. They receive a maximum of thrust from side to side as the axles are moved, due to track imperfections or curves and special work, as well as due to the shifting of the motor itself from side to side. The weight is also unsprung.

An article published in this issue shows the bad effects of excess bearing clearance on the meshing of gears. Even a slight increase in the distance between centers throws the gears out of alignment and causes excessive wear. When the bearings are worn so that the centers are ¼ in. too great, as happens frequently, conditions are far more serious.

Despite all these difficulties and opportunities for undue wear it is these bearings that determine the life of gears and pinions and the incumbent noise arising from their operation if gear centers become spread due to wear in the bearings. Care should be taken of all bearings, their lubrication and maintenance as well, but particular care should be given to the axle bearings if low gear and pinion cost is desired.

Rail Bond Maintenance

Several Types of Bonds Have Been Tried in the Electrified Sections of the Chicago, Milwaukee & St. Paul Railway—The Maintenance Methods and Organization Used Are Described

By Charles G. Lorell

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WHEN plans for the electrification of the mountain divisions of the Chicago, Milwaukee & St. Paul Railway were prepared, it was decided to use a bond with an expanded terminal, expansion being secured by means of a tapered pin driven through the hollow terminal of the bond. This type of bond had been in use on a number of important roads and at that time was probably the preferred form of rail bond for steam railroad electrification. The consideration which was felt particularly important in selecting this type of bond was that it provided a bond which the section crews could install readily, as most of the tools required would already be normally in their possession.

All bonds were single conductor, 250,000 circ.mil capacity, made up of 61 wires. The terminals were ⅞ in. in diameter and 1⅛ in. long under the head. The hole through the terminal was 0.406 in. and was expanded with a ½-in. diameter steel pin. The bonds were installed in rails of 85 and 90 lb. standard sections on the main line, and on miscellaneous rails from 56 lb. to 85 lb. on the side tracks. In general, 100 per cent, Bonzano, angle and Weber joints are found on the 90-lb. rail; continuous and angle joints on the 85-lb. rail; and angle joints on the smaller rails.

Three forms of bonds were used, depending on the nature of the rail and joints. Where space under the splice bar was sufficient, and conditions permitted the removal of the bar, a concealed bond was used. This bond was provided with a crimp between the middle bolts to provide for expansion and flexibility. Where there was sufficient space under the splice bar, but it was undesirable to remove the bar, a bond with one welded and one detached terminal was used. One joint bolt was removed to allow the passage of the crimp, and the bond was pushed into place under the bar. The loose terminal was then soldered on and applied to the rail in the usual manner. On the remaining rails exposed bonds were used enough longer than the splice bars to provide the necessary clearance and to permit stapling the bonds to the ties.

Double Bonding Used for Large Currents

Exposed bonds were installed on the inside face of the rail, as this position appeared to result in less damage to bonds in cases of derailment. Where the contemplated current per rail was more than the carrying capacity of one bond of the standard size, double bonding (i.e., two bonds per joint) was used. In exposed bonding, one bond was identical with those used in single bonding and the second was enough longer to extend beyond the terminals of the first. When concealed and semi-concealed bonds were used, the two bonds were identical but on opposite sides of the rail. Both rails of the main line were bonded. On side tracks one rail only was bonded, but provision was always made for two connections of such tracks to the return circuit.

The concealed and semi-concealed bonds had extended lengths of approximately 20 in. and 38 in., respectively. The single exposed bond was, in general, 37 in. in length, and the second bond in double bonding was 42 in. On account of some of the angle bars on the lighter rails being six-bolt bars, special bonds of longer lengths were occasionally required

Since the contact resistance of this type of bond depends on the conditions of the contact surfaces and on the pressure obtained between surfaces, the care with which the bonds were applied was very important. Carefully prepared instructions were furnished to both the installation forces and to the operating forces that were required to take care of bond replacements. It was required that the terminals be cleaned with fine emery cloth and the hole in the rail wiped out with a piece of clean, dry cheesecloth immediately before the bond was applied. No lubricant was allowed on the drill bits. To make certain that a good fit was obtained, a plug gage was provided and all holes gaged. If holes were accidentally drilled oversize, the bonds were installed with an oversize pin. However, great care was used in regrinding the bits so as to guarantee holes of proper diameter. Careful supervision of all parts of the installation work was found very desirable.

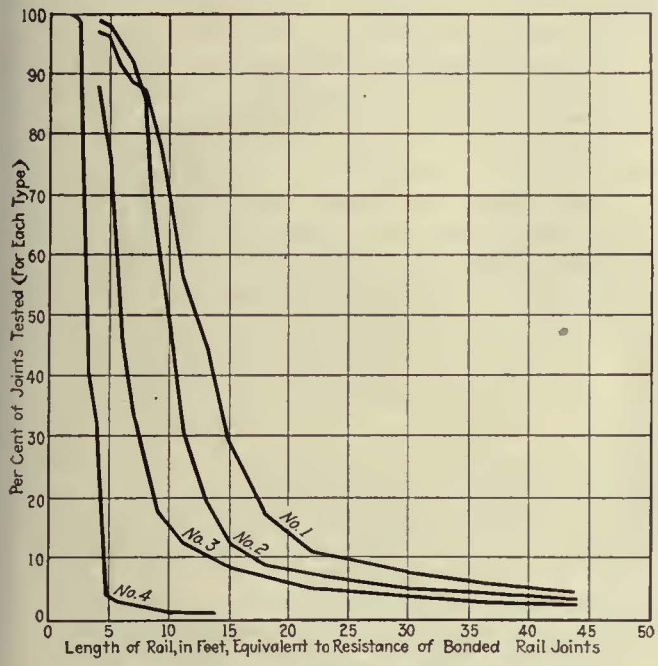
Some Special Equipment Used for Drilling

For drilling the holes for the application of the bonds, hand-operated drills were used throughout on the first two divisions electrified. On the Coast division, however, a very large proportion of the work was drilled by air-driven drills, the power being supplied from an Ingersoll-Rand air compressor. A special drill carriage was made up to hold, guide, and feed an air drill. The use of this equipment accomplished a very decided saving in the cost of application of the bonds and was used with good success. It was only when the necessity for rushing the work required establishing additional bonding crews and compressors were not available that hand drills were used on this division. The saving secured by the use of the compressor is reflected in the cost of applying bonds by the two methods, the cost per bond, using hand drills, being about 49 cents as compared with a cost of about 31 cents for bonds applied where the holes were drilled with air. These are direct labor costs only (including foreman and all men in crew) with a laborer's rate of 53 cents. Adding other labor charges such as repairing equipment, moving, etc., the above figures should be increased by 13 cents, and to this must be added tools, equipment, camps, transportation, etc.

When one compressor was being used the crew usually consisted of one foreman, two drillers, two gas-

engine men, eleven helpers, and one camp helper. The cost when applying concealed bonds was about double the above.

After the initial installation was completed by the electrification department, the roadway forces and the signal department were made jointly responsible for the maintenance of the bonds. Section crews were to replace bonds where rails were renewed, but the signal maintainer was to be notified in each case so that he could inspect the work. Full instructions in regard to installing the bonds were incorporated in the special instructions which were issued covering the electrical operation. These instructions were placed in the hands of all section foremen, as well as all other employees having to do with electrical operation. The instructions covering the installation of bonds were substantially full specifications for maintenance and renewals.



Resistance of Bonded Rail Joints—Missoula Division

Special tests were made to determine electrical resistance on 2,725 rail joints, as follows:

Curve No.	Type of Bonds	No. Joints	Bonds per Joint	Weight of Rail
1	Pin type	1,143	1	85 lb.
2	Pin type	515	1	90 lb.
3	Pin type	809	2	90 lb.
4	Welded	258	1	85 and 90 lb.

All measurements made between points 30 in. apart.

Curves show for various rail lengths, percentage of rail joints with resistance equal to, or greater than, such lengths.

Where new rail was laid or other causes required the bonds being replaced, new bonds, drawn from the storeroom, were used in every case, the bonds removed being sent to the state department for re-forming. At first these used bonds were merely inspected and strands straightened, and when again replaced in rails, special oversize pins were used. The amount of oversize of these pins was considerably more than that of the pins classed as oversize and used, where necessary, in the application of the new bonds. A method was later developed whereby the terminals of the second-hand bonds were reshaped so as to bring the tubular portion of the bond back to its original length, and inside and outside diameters. These bonds were then handled in the same manner as new bonds. A very appreciable saving in the cost of replacing bonds was secured by this practice of recovering used bonds.

This method of repairing the bonds overcame several serious objections to the use of second-hand bonds. Previously, considerable confusion had arisen through the necessity of using various sizes of pins, extra oversized pins being used in new bonds or the small oversized pins in used bonds. Even after being applied with the proper oversize pins, poor contact was secured in many cases, as the original shape of the terminal had been changed by the process of application and removal, although a tool had been especially designed for removing the terminals. It is, of course, very costly to scrap the bond when replacement is necessary. To scrap a 37-in. bond and apply a new one involved a net expenditure for material of about $1.15, whereas the cost of repairing was only 70 cents.

In addition to the inspection which was expected from track forces and signal maintainers, a bond repair crew goes over all the trackage, inspects the bonds and replaces those found defective. The latter are usually bonds which had been installed by the section crews in connection with rail replacements. The personnel of these crews is subject to rather frequent replacement and it is difficult to make even the older men appreciate that more than a mere tight connection between rail and bond is necessary. Our experience with the installation of bonds by section crews is, therefore, rather unsatisfactory.

Meanwhile, the gas weld bond had been developed to such an extent in interurban and similar service that we decided to determine its suitability for our own trunk-line conditions. Its attractive features were its relative cheapness, more reliable and permanent bond and rail contact, assuming proper installation, and greater ease of inspection.

Conditions Met by Gas-Weld Bond

Our problem was, mainly, to determine: First, whether the welding would have any deleterious effect on the steel of the rail; second, whether bond maintenance and replacements could be handled without ultimate uneconomical increase in existing maintenance forces, and third, whether the bond itself would stand up under the actual service conditions.

In order to determine the effect on the steel of welding the bond to the rail, the railway company had microscopical and chemical examinations of the steel made by a competent testing laboratory after a bond had been applied. The observations indicated that no serious injury was done to the rail as a whole. The experience of other companies was also studied, and the conclusion reached was that the welded bond could be tried safely.

In changing to this type of bond it was not possible to have the application made by the section forces and, therefore, it was arranged that the signal maintainers should be supplied with welding equipment and do the welding work. This arrangement has worked out very satisfactorily. The men have learned the operation of welding quickly and they are supplied with small tanks of welding gas, which may be carried easily on the gas cars commonly used by signal maintainers. The signal department is thus placed in charge of all bonding and bond maintenance, whether or not the bonds are on rails involving signal circuits. This removes an undesirable condition previously existing wherein the signal maintenance forces were responsible for the condition of the bonds without having direct supervision over the forces which applied the bonds. In addition to the bond maintenance work done by the signal maintainers who have

fixed headquarters, there are the bond testing crews previously mentioned that move from place to place and whose duty it is to make a routine test of all bonded joints and replace defective bonds. These crews are used also wherever there is extensive rail relaying work and the application of a number of bonds is required.

Saving Results from Use of Gas-Weld Bonds

The cost of applying the bonds varies, of course, with the conditions under which they are applied. Taking, however, for the sake of comparison, a condition where a number of bonds are to be applied in rail re-laying work it is found that the cost of the gas-weld bond is for the bond, gas, etc., about 70 cents, and for labor 38 cents, or $1.08 per bond. The cost of the 37-in. pin-type bond would be for materials $1.50 and for labor $0.45, or a total of $1.95. Thus a saving of about 87 cents per bond is realized. This saving is increased in territories where double bonding is used with the long bond, since a single bond only is required when the shorter bonds are used. This fact was determined by calculations of the relative heat conducting capacity of two types of installations, the favorable results of which were afterward confirmed by actual trial.

The welded bond, when properly applied, has a low contact resistance and this resistance does not increase with age. A defective application is usually more readily detected than with a pin-type bond, although we have had some cases where the steel sleeve of the bond was welded to the rail, but the strand was not, so that, although the bond appeared all right, the resistance was high, since the sleeve is not, in manufacture, welded to the strands. Such cases of defective welding appear to be very few and will decrease in number as the welders become more proficient.

Application of gas-weld bonds was started in 1921, since which year practically all new rail laid has been gas-weld bonded and a large part of the maintenance work, particularly in the past two years, has been done with this bond. A No. 0000 bond, 7 in. long, with pressed steel terminals is used, formed U-shape and welded to the ball of the rail.

Tests Show Results Accomplished

The experience to date with it has been very favorable, and unless there are objections not yet apparent the use of this bond will be continued. It has not been in use long enough yet to determine fully to what extent breakage of strands will be experienced or to be sure what the ultimate effect of welding will be on the rails, but these points were taken into consideration before the use of the welding process was begun, and it is not expected that sufficient trouble will be experienced from these causes to overcome the advantages of this type of bond.

In conclusion, it may be interesting to give the results of a special investigation which was made in 1924 of the bonding conditions on a considerable portion of our older electrified line. Over 3,000 bonds were tested at points so selected as to indicate the average condition of the bonds. Measurements were made by using two voltmeters, one indicating the drop in the bond and the other the drop in a fixed length of rail. The result of this study is shown on the accompanying curve, which shows the percentage of bonds with conductance less than the conductance of the stated rail lengths. The original pin bond installation, much of which still exists, was made in 1914 and 1915. The gas-weld bonds have, as already stated, all been installed within recent years.

Hot Brine Clears Car Tracks Quickly

Motorists Unconsciously Aid Snow Removal Along Lines of the Cumberland Traction Company—Tracks Cleared in One-Third Time Otherwise Needed

COLD dry snow to a depth of 14 in. covered the tracks of the Cumberland Traction Company, Bridgeton, N. J., when the blizzard of Feb. 11 ended. One plow and one sweeper, the snow-fighting equipment of this railway, had been put in service soon after the storm began and they experienced no difficulty in getting through on the 10-mile interurban line to Millville. After returning to Bridgeton the local lines were cleared. The high wind, however, drifted the dry snow badly and the rails were soon covered again to a considerable depth. The path cleared by the sweeper was immediately chosen by the local motorists when they began to operate the following morning. A slight rise in temperature softened the snow and it was soon packed down hard on the tracks to a depth of about 4 in. The railway equipment proved powerless to remove this coating from the rails.

Under similar circumstances the attitude of the former management of this company had been "the Lord put it there, let the Lord take it away." The present manager of the road, Clayton W. McPherson, remarked, however, that while he had a great deal of faith in the Lord, he was not sure just when the ice would be taken away, so the company hired laborers with scrapers to try to remove it. One gang of twelve men took six hours to clear 3,900 ft. of track. Another gang of fifteen men at the Millville end of the line took nine hours to clear 4,800 ft. Salt was sprinkled both before and after cleaning.

Progress by this means was so slow that the manager decided that some more effective means must be employed. Motor trucks were borrowed from a local ice cream plant and filled with a boiling hot mixture of salt and water. This escaped onto the tracks through the vents provided to allow melted ice to run away. The first tank wagon was started late in the afternoon in the worst downtown section. Automobile traffic continued to follow the car tracks and churn up the salty mixture. In 30 minutes the steel rails were again visible. Soon the 14 miles of the company's route was open and the cars were running. It is believed by the management that at least another 24 hours would have been required to open the lines without the use of hot brine.

Previous to the application of the brine the men cleaning the track averaged about 31 ft. per man per hour. After this treatment had been applied it is conservatively estimated that progress was three times as fast. Altogether 23 loads of brine were used by three trucks. Each load consisted of approximately 400 gal. of water and 460 lb. of salt. The total cost of ice removal by this method was approximately $1,000.

Rewinding Railway Armatures

Descriptions, Functions and Location of Armature Rewinding Insulation, Core Insulation and Banding Material Will Help Repairman to Do a Better Job

By Jesse M. Zimmerman
Engineering Department, Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

EACH piece of insulation used in rewinding armatures for railway motors has a definite function to perform and accurate location is important. Insufficient insulation at some points may result in short circuits or grounds, while too much may cause the coils to build high and make winding difficult. Information regarding the material used in winding the Westinghouse type 306 railway armature has been gathered and is given to help the repairman who rewinds this and similar type armatures.

Material used for rewinding is divided into three groups, (1) core insulation, (2) winding insulation and (3) banding material. When making minor repairs on an armature, it may be necessary to use only the banding material. In rewinding an armature sometimes it is unnecessary to use the core insulation, so that the rewinding insulation and banding material only are required.

In order to present the information so that the repairman can see its proper location in the winding a diagram and halftone are used as illustrations. The numbers for the parts in the illustrations will enable the reader to follow the description more intelligently.

Core Insulation

Item 1.—Ninety-six tan-treated* cloth caps, 0.010 in. thick cut in 8 sections from a circular piece, 12 in. inside diameter and 18½ in. outside diameter. Each section has four fingers cut 1½ in. deep from the center. These caps are placed against the end bell in three layers; each layer is four strips deep. They are held against the end bell by tan tape, Item 2, which is used to cover the coil supports. On high-voltage motors micarta molded strips are used to cover the coil supports and end bell.

Item 2.—Three rolls of tan-treated cloth tape, bias cut. This tape is used to cover the coil supports and holds the tan-treated cloth caps.

Winding Insulation

Item 3—Fifty-eight fishpaper U-pieces, 0.056 in. x 3½ in. x ⅝ in. grooves are provided in both ends of the slot in the armature core for fishpaper U-pieces. These U-pieces protect the ends of the coils where they leave the slot.

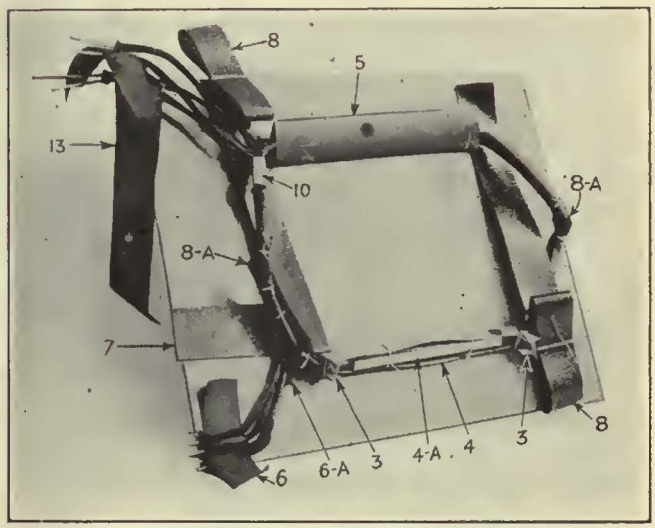
Item 4.—Twenty-nine fishpaper cells for bottom coil, 0.023 in. x 2 in. x 10 in. Separate cells are used for the coils in the bottom of the slot. This cell is placed over the coil and driven into the slot with the coil.

Item 4-A.—Twenty-nine fullerboard pieces between top and bottom of coils, 0.030 in. x ½ in. x 6 in. This strip separates the top and bottom coils in each slot.

*This is a trade name for tan-colored, oil-treated linen or other cloth.

Item 5.—Twenty-nine fishpaper cells for top coils, 0.023 in. x 4½ in. x 10 in. This cell is large enough so that it extends above the laminations. A separate cell is used for the top coil so that if the top coil has to be repaired it can be done without disturbing the insulation of the bottom coil. When the top coil is replaced a new cell is used.

Item 6.—One strip of treated surgical tape, 0.023 in. x 2 in. x 42 in. This tape is woven between the bottom leads back of the commutator neck. It keeps the leads separated at this point.



Materials Used to Insulate Armature Coils

Item 6-A.—Twenty-nine strips of treated oil duck, 0.035 in. x 1 in. x ¾ in. This strip is placed over No. 2 and 4 leads where they leave the front bottom corner of the coil. Leads Nos. 1 and 3 will lay on top of this strip. This separates the leads where they leave the coil, thus preventing the leads from shorting at this point because the leads form a double layer.

Item 7.—Twenty-nine strips of treated oil duck, tapered, 0.035 in. x 2 in. x 4½ in. short side, 6 in. long side. These strips are placed between the lower leads and the bottom half of the front diamond part of the adjacent coil. The tapered end is anchored and brought up between the bottom half of the two front diamond parts of adjacent coils. After the coils are laid and the bottom leads connected the ends of these strips are brought around the extreme end of the diamond and fastened with friction tape. This strip protects the bottom leads from the bottom of the adjacent coil besides separating the coils where they make the bend at this point.

Item 8.—Two strips of treated oil duck, 0.035 in. x 1¾ in. x 42 in. These strips are placed between the top and bottom halves of the diamond parts of the coil, for the front and rear of the armature. They serve to separate the top half of the diamond part of the coil where it crosses the bottom half of the diamond part of the lower coil, which is running in the opposite direction and is of a different potential.

Item 8-A.—Fifty-eight treated duck pieces, 0.035 in. x 2 in. x 3 in. These strips are placed over the drop loop of the diamond, both front and rear, where the top half crosses the bottom half of the preceding coil. It serves as a separator where the insulation is most apt to be damaged in winding.

Item 9.—This is a fiber wedge which fits over the coil in the armature slot.

Item 10.—Twenty-nine strips of fishpaper, 0.015 in. x 1½ in. x 1¼ in. These strips are bent to an L shape so that they will fit between the top halves of the front diamond parts of two adjacent coils. This strip insulates the top leads where they cross the adjacent coil.

Item 11.—Friction tape to hold Item 7 in place.

Item 12.—Tan-treated cloth tape used as a filler.

Item 13.—Four strips of surgical tape (not treated), 2 in. wide x 0.020 in. This strip of surgical braid is woven alternately between Nos. 2 and 4 leads of each coil, as these leads are connected first, after which it is then wound once over the top of these leads next to the commutator, then woven alternately between leads 1 and 3 of each coil. This separates adjacent leads at the top with two layers of surgical braid. This is essential because the cotton insulation is scraped from the leads when they are tinned. It must be wound tight so that it will keep the leads firm. Some types of motors have the leads taped with friction tape.

Banding Material

Item 14.—One-half pound of tan-treated cloth tape. This tape is used to cover the top leads. It must be wound tight so that it will hold the leads firmly, as vibration of the leads at this point may result in broken leads.

At this point of the winding the armature must be heated to 100 deg. C. and banded with temporary bands while it is hot, thus drawing the coils down firmly.

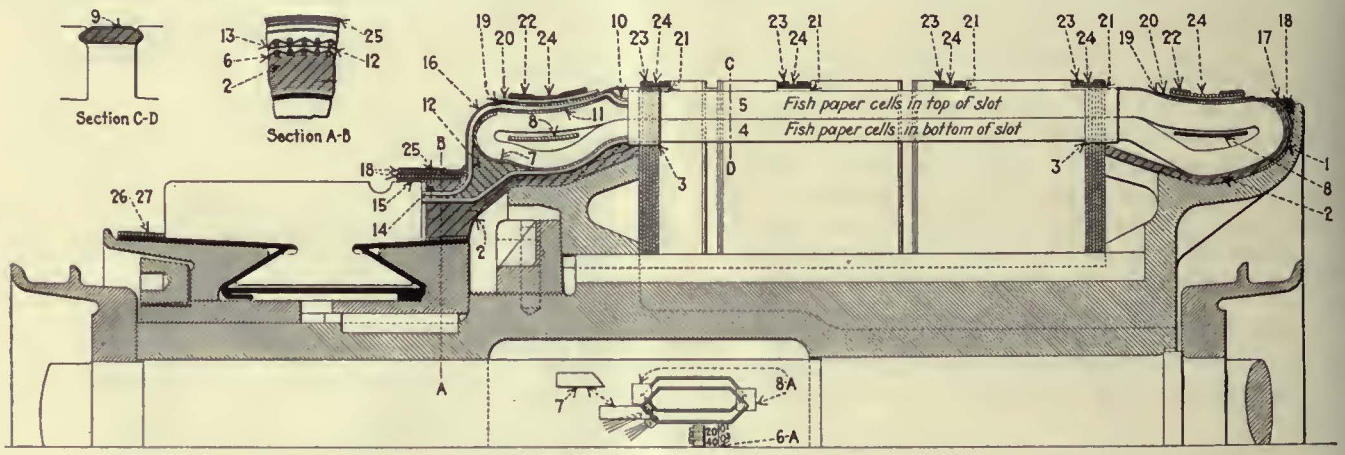
Item 15.—Seven strips of mica, 0.008 in. x 1 in. x 6 in. These strips are placed over the commutator neck to prevent the solder from flying out of the slots in case it melts. It is held in place by Items 16 and 18.

Item 16.—No. 49 drilling hood is placed over the mica strips which cover the commutator neck and is held in place by a layer of No. 12 thread, which is wound tight around the armature at this point and is painted with an air-drying varnish. It is then doubled back over the first layer of No. 12 machine thread. It is covered by a second layer, wound tight on the thread. This layer of thread should cover the drilling hood to the point where the leads bend up to go over the ends of the coil. The top lap of the coil is sewed.

Item 17.—One drilling hood, 0.017 in. x 9 in. x 48 in. The tan-treated caps (Item 1) are laid over against the ends of the coil and the one edge of the hood is firmly anchored by a tight woven band of No. 12 machine thread. The hood is doubled back over the coils.

Item 18.—Two hundred and fifty yards of No. 12 machine thread.

Item 19.—Two strips of fishpaper and mica, 0.012 in x 2 in. x 96 in. After the temporary band, which was used to draw the ends of the coils down, is removed, the drilling hood is drawn tighly over the coils. One strip of fishpaper and mica is placed around the hood.



Types of Material Used for Rewinding Armatures

Item 20.—Two layers of surgical tape, 0.020 in. x 2 in. x 4 in. A strip of surgical braid covers the fishpaper and mica strip. This braid is covered with a tight layer of No. 14 banding wire (Item 24), with twelve tin clips (Item 22) placed under the banding wire, the ends being bent over and soldered to the banding wire. The above outlined operations covering Items 19, 20, 22 and 24 are identical for banding over the front and rear coil support. The two outer core bands are used to anchor the ends of the front and rear drilling hood.

Item 21—Four strips of sheet tin, 0.012 in. x ⅞ in. x 48 in. These strips of sheet tin are placed over the coils in the banding slot on which to wrap the banding wire (Item 24).

Items 22 and 23.—Tin clips. These tin clips are placed under the bands, bent over and soldered to the wire to keep the banding wire intact.

Item 24.—Wire used for banding.

Item 25—Two layers of surgical braid wrapped tight and sewed in three places serve as a protection to the No. 12 machine thread (Item 18) against flashes.

Items 26 and 27.—Italian twine. One layer of four-ply Italian twine, saturated first with No. 3 and then No. 4 shellac and well ironed with a hot soldering iron after each application of shellac, makes an oil and moisture proof V-ring protection upon which a minimum amount of dust will adhere.

Excessive Gear Spacing Causes Trouble

Model Shows How Noise and Wear and Breakage of Teeth Follow Rapidly with Increases in Distance Between Centers of Gear and Pinion

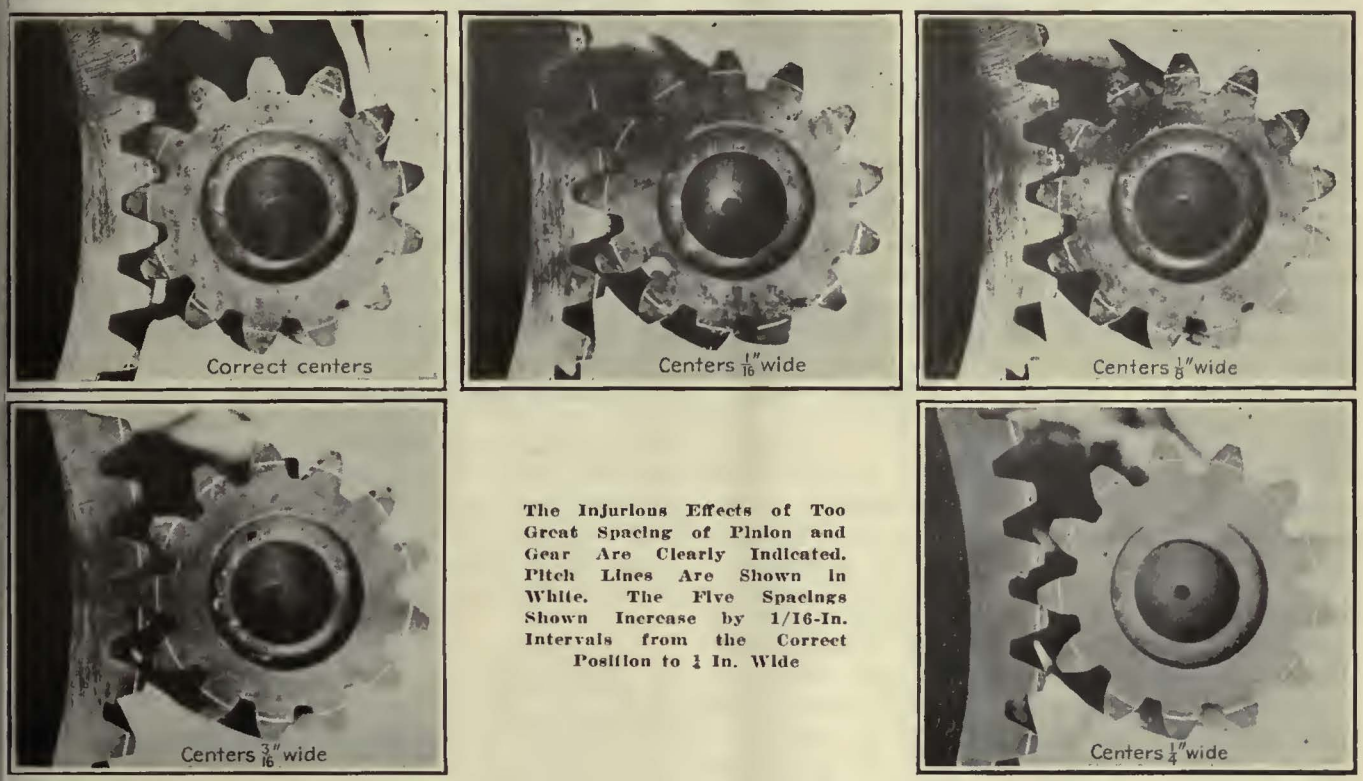
DURING the early days of electric railroading great efforts were made by motor manufacturers to design a motor whose armature could be mounted directly on the car axle. The purpose was to dispense with gearing, which in those days was a source of great expense as well as noise in car operation. These efforts to design a gearless motor have been given up, at least so far as car operation is concerned. It was found that the gearless motor has many serious objections, and as gear manufacturers have improved their product most of the defects experienced with the earlier gears and pinions have disappeared. If properly run and protected from damage, the modern gear and pinion should have a long life and give very little trouble. If their operation is not properly supervised, however, the life which they should have is greatly shortened, and they are responsible for a great deal of the noise which comes from car operation. In other ways, also, they will not give the maximum performance of which they are capable.

The principal trouble from gears of proper shape and material and properly lubricated comes from too great spacing between the gear and pinion. As the armature and motor axle bearings wear, the spacing between the pinion center and gear center tends to become greater. In consequence, the teeth of the gear and pinion, instead of touching at the pitch line, come in contact only at the outer ends of the teeth, with resulting greater wear and noise from the backlash.

The wear of the armature bearings and motor axle bearings which causes this spread of the gear and pinion can take place both in the bore of the bearing and on the outside of the bearing where it is held in the housing. Some wear is also possible on the inside of the motor housing, caused by a loose fit of the dowel pins or keys used to prevent the bearing from turning. There is also possible wear between the motor housing and the motor frame. It naturally follows that the distance of the spreading apart of gear and pinion is the sum of all the loose fits mentioned.

The bad condition brought about by too great spacing between gear and pinion is clearly illustrated in the accompanying five illustrations. They are from a series of photographs made by the R. D. Nuttall Company of a new railway gear and pinion set at different spacings. To bring out the injurious effect of improper spacing the Railway Improvement Company constructed a model, made up of a new gear and pinion mounted on a pedestal so designed that the space between the centers of the gear and the pinion could be set at various lengths by exact graduations of $\frac{1}{16}$ in. This model was shown at the Atlantic City convention. The gearing illustrated has a 13:74 ratio and a 4$\frac{1}{4}$ pitch. The pitch line is shown by a white line marked on each tooth.

The first illustration shows the gear and pinion at the correct distance apart. In this position, as will be seen, the teeth engage at the pitch line. With this condition the white marks on the teeth of the gear and pinion in engagement make a practically continuous line.



The Injurious Effects of Too Great Spacing of Pinion and Gear Are Clearly Indicated. Pitch Lines Are Shown in White. The Five Spacings Shown Increase by 1/16-In. Intervals from the Correct Position to ¼ In. Wide

The next view shows the centers of the gear and pinion 1/16 in. farther apart, and in the third view the centers are another 1/16 in. apart, or at a distance 1/8 in. greater than in the first view. Already the teeth are shown to be beginning to engage at their outer ends only. This condition is still more marked, of course, in the fourth and fifth views, which shows the centers 3/16 in. and 1/4 in. farther apart respectively than in the first view. The engravings are about one-half actual size. In consequence, the spacing between teeth and gear centers are correspondingly reduced in the engravings over that in actual practice.

It is obvious from the view of the 1/16-in. wide centers that the teeth are engaging on only a very small portion of their wearing surfaces, and that if operations under these conditions are continued for any considerable length of time the natural result would be for the teeth to lose their original shape. It is also clear that all of this wear is coming at the ends of the teeth and that only one tooth on the gear and one on the pinion are in contact for any considerable part of the time, whereas in the view of the correct spacing two sets of teeth are in engagement for most of the time.

A condition like that in a 1/16-in. wide spacing will not continue long until the teeth will begin to lose their proper shape and it will be necessary to discard them. There will also be a great increase in noise, especially as the car speed changes during a run, as there is a great deal of backlash to take up when a change in the speed of the car makes the change from engaging on the front of the teeth to engaging on the back of the teeth, or when the direction of rotation of the motor is changed. There is danger also, under such conditions, that the teeth of gear or pinion or both will become broken because of the great impact between teeth combined with a small area of bearing surface.

Clearly, the correct way of gear operation is when the gear and pinion mesh as shown in the first illustration. This condition should be approximated as closely as possible by keeping the tolerance allowed for the fit of the bearing on its shaft as small as possible. This condition can be maintained only by measurement of the wear in the bearings and associated parts at more or less frequent intervals, depending upon their wearing qualities and the quality of lubrication supplied to them. A slight increase in the distance between centers may not seriously affect the proper shape of the gear teeth, but it is doubtful whether the allowance of 1/16 in. permitted under the rules of the American Electric Railway Engineering Association is not too great. The London Underground Railway is said to work to 1/32 in. clearance.

Clearances between shafts and bearings should not only be kept very small, but constant attention should be given to keeping bearings tight in their housings and housings tight in motor frames. Omission of this precaution, as already stated, permits spreading of gear and pinion centers.

When new bearings are installed, the caps should be pulled up tight and steel feelers applied between the cap and the brass to see that the bearings actually are tight. Still another way of determining whether they are tight is to apply the air brake, then turn the controller to the first notch for a moment. If the brasses move they are not tight.

Present-day practice seems to be not to give as much attention to the axle bearings as to the armature bearings, so conditions at the axle bearing fits are more likely to be neglected. Nevertheless, axle bearings are subject to greater wear than armature bearings because there are no springs between the axle bearings and the track and the pounding they get is harder. Moreover, water from the street is much more likely to get into the axle bearings than into the armature bearings. Still another point, and one of great importance, is that in the axle bearings the openings or windows for waste usually are larger in proportion to the surface of the bearings than they are in the armature bearings. Here are a number of very good reasons for very careful watching of axle bearings in motor inspection.

The destructive results of too great a spread and loose brasses are so insidious that it would be desirable on any property where the conditions are not positively known to have a check made right away. Even where it is thought the conditions are good, a check test may be worth while. As an example of how much wear sometimes comes, measurements will be quoted of wear observed on four axle bearings recently taken from a 40-hp. motor used in city service. The following amounts of wear were found:

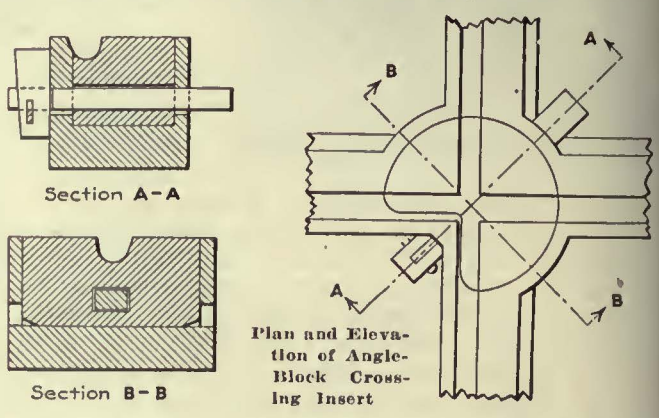
Flange Wear	Wear in Bore
One bearing, 1/8 in. wear	One bearing, 1/8 in. wear
One bearing, 1/4 in. wear	One bearing, 1/8 in. wear
One bearing, 1/16 in. wear	One bearing, 1/8 in. wear
One bearing, 1/16 in. wear	One bearing, 1/4 in. wear

The figures given above are of wear only in the axle bearings. If to this wear is added that in the armature bearings and in the housings, the particular motor mentioned must have had considerable spread.

Crossing Insert Shaped to Hold Position

AN ANGLE-SHAPED hard center insert for crossing frogs has recently been designed by J. H. Asselin, engineering and construction department, Market Street Railway, San Francisco. A tapered key extending through the side walls of the casting and through the block itself holds it solidly in position. This key is held in place by a wedge through the end of the key.

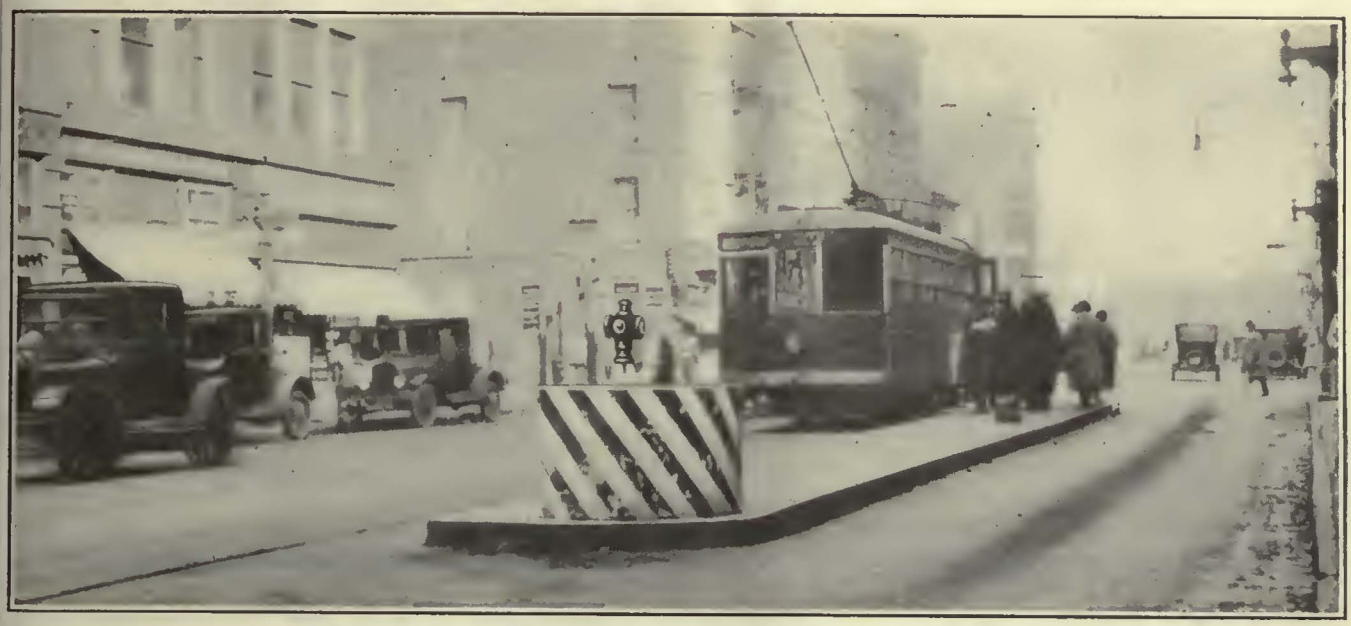
The block itself resembles a cylinder, one-quarter of which has been removed. The angle thus formed



Plan and Elevation of Angle-Block Crossing Insert

fits into the inside angle of the intersection, where there is no wear. Due to this right angle, it is impossible for the block to shift. The alignment is thus kept true at all times and the block cannot rise or buckle.

The angle block has the thickness of approximately two-thirds of the depth of the casting. The block is cast-steel and specially heat-treated to resist shock. When worn down this block can either be built up by welding or the block itself can be removed. If desired, both the crossing and block can be made of manganese.



Safety Zone with Raised Platform Recently Installed in Terre Haute

Substantial Safety Zones Constructed in Terre Haute

Curved Concrete Guards Reinforced with Old Rails Afford Protection to Waiting Passengers—Cast-Iron Buttons Fastened to the Pavement Mark Limits of Zone

By D. H. Walker
Assistant Engineer Terre Haute, Indianapolis & Eastern Traction Company

During the past year the Terre Haute, Indianapolis & Eastern Traction Company constructed several cheap but effective safety zones on Wabash Avenue, the main street of Terre Haute, and part of the National Old Trails Highway. This national road carries a heavy stream of cross-country tourists all the year around. In addition, the majority of the large retail stores in the downtown district are on Wabash Avenue and the vehicular congestion made safety zones necessary to protect people boarding street cars.

The first zone was installed as a raised platform at the corner of Wabash Avenue and Seventh Street, the busiest corner in town. As the street was 50 ft. wide between curbs there was approximately 18 ft. left from the rail to the curb. The platform was made 80 ft. long and 4 in. high above the brick pavement and 5 ft. wide, with its inside edge 18 in. from the rail. This provided enough length for unloading three Birney cars at once. A quarter circle concrete guard was placed at the end, and back of this guard was placed a concrete lamp base surmounted by an ordinary switch lamp with red lenses.

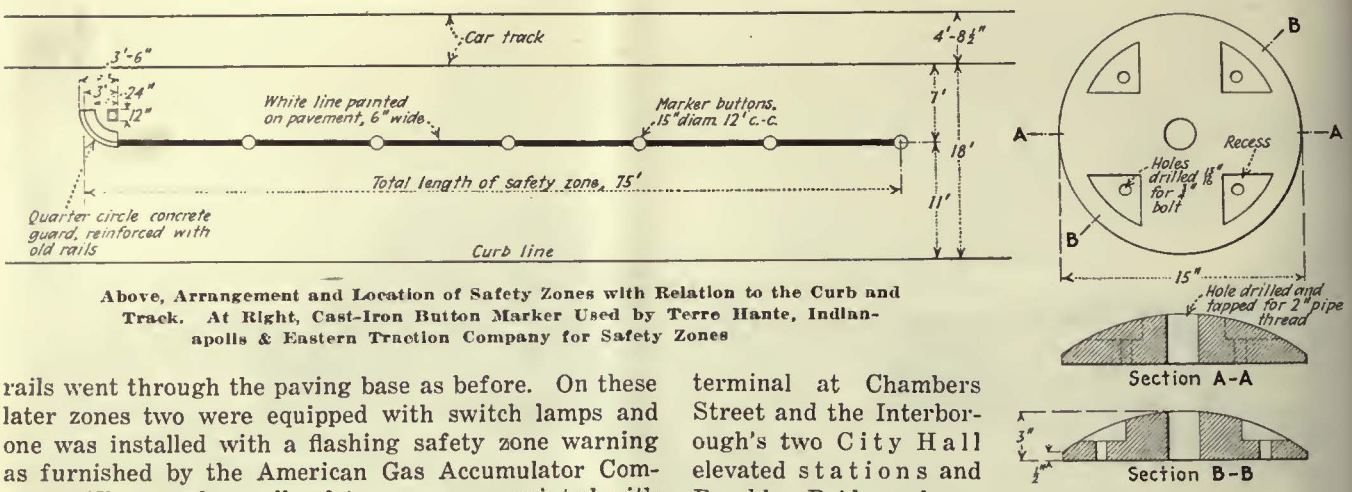
To prevent the guards at the ends of the zones being knocked over by a careless motorist, when the concrete was poured half a dozen old rails about 4 ft. long and extending down through the paving base were included for reinforcement. Guards were made 3 ft. high, 1 ft. thick, with a 3-ft. outside radius. In order to provide a hub guard the outside edge of the quarter circle was placed 6 in. inside the edge of the platform. The platform itself was poured directly on top of the brick paving, after taking out a zigzag row of bricks as a means of forming concrete lugs monolithic with the platform. A row of brick was removed at the inside edge of the platform toward the crown of the street to prevent seepage under the platform. To keep the concrete from chipping off an old three by three angle iron was used all the way around the edges and held by darts welded into the angle and extending diagonally down into the concrete.

It soon was found that the quarter circle guard prevented accidents that even the raised platform could not have stopped. Accompanying illustrations show a few of the dents put in the guards by careless or inebriated motorists. Several arrests of drunken drivers have resulted from these attacks upon the zones, but up to date no one waiting in the zones has been injured and the guards themselves have suffered nothing worse than the chipping off of a little concrete.

After a few weeks trial of this first zone it was decided to install three more. These were not of the platform type, but had the zone line marked on the street with cast-iron buttons and white painted lines. However, the same safety feature was provided by quarter circle concrete guards as used with the platform. These isolated guards also had the 6-in. hub guard with an angle iron forming the edge. This angle iron was extended the whole circumference and was welded at the corners to prevent loosening. Darts welded to the angle and extending into the concrete also helped hold this.

Bricks were removed under the whole guard and concrete poured to the paving base. Reinforcing

Reinforced Concrete Guard at End of Safety Zone—Cast-Iron Buttons and White Lines on Pavement Mark Limits



Above, Arrangement and Location of Safety Zones with Relation to the Curb and Track. At Right, Cast-Iron Button Marker Used by Terre Haute, Indianapolis & Eastern Traction Company for Safety Zones

rails went through the paving base as before. On these later zones two were equipped with switch lamps and one was installed with a flashing safety zone warning as furnished by the American Gas Accumulator Company. The guards on all safety zones were painted with diagonal 6-in. stripes of alternate black and white.

In the use of buttons to outline these zones it was necessary to design a special type and have a pattern and castings made to order. The Board of Works and the city engineer thought that posts connected by a chain would be necessary. They were willing to try first without the chains, however, if provision were made to install them in case it was deemed necessary later. The company felt that the chains were undesirable and accordingly used a button as shown by the accompanying sketch. This was fastened with four ¾-in. bolts on the corners in recessed notches. Holes were drilled in the paving for these bolts and they were set in cement grout. A hole through the center of the button was drilled and tapped for 2-in. pipe thread in order that posts could be placed in these holes later. While in use without posts the holes were filled by pipe plugs, a countersunk plug being used to minimize danger of tripping on the buttons. After a thorough trial it was found that the posts and chains were not necessary as the quarter circle guard furnished all the protection needed against motorists with inclinations to ramble through the zones.

New York City's Greatest Traffic Points

SUBWAY stations of the Interborough Rapid Transit Company and the New York Rapid Transit Corporation (B.-M. T.) at Times Square, Manhattan, remain the greatest traffic points upon their respective systems and constitute New York City's greatest rapid transit center. This is the conclusion drawn from the Transit Commission's annual compilation of figures of ticket sales at various stations upon the rapid transit lines made public recently.

During the fiscal year ended June 30, last, the Interborough collected 39,493,384 fares at Times Square, while the ticket collections at the B.-M. T. stations were 26,064,283, a total of 65,557,667 fares collected, as against 60,388,549 in 1924, a growth during the year of more than 5,000,000.

The figures show that Times Square as a rapid transit traffic center is further ahead of Brooklyn Bridge than last year. The center shifted two years ago. Last year Times Square increased to approximately 7,000,000 ahead of Brooklyn Bridge, and this year it is approximately 11,000,000 ahead. The total at Times Square includes the fare collections, as has been stated, at the Interborough and B.-M. T. stations, while at Brooklyn Bridge the total embraces fare collections for the Bridge station of the Brooklyn elevated lines, the B.-M. T. terminal at Chambers Street and the Interborough's two City Hall elevated stations and Brooklyn Bridge subway station. At the Brooklyn Bridge center there were 53,983,558 passengers in 1925, as against 53,885,798 in 1924, a growth for this center of only about 97,000.

Another great center of rapid transit traffic is at Union Square, Manhattan. There is one station of the Interborough at Union Square and two B.-M. T. stations, one of them on the Fourteenth Street-Eastern line, which was first placed in operation on June 30, 1924. The Interborough at Union Square had a traffic of 20,508,136, or an increase of approximately 900,000 over 1924. The B.-M. T. traffic was 19,690,245, or an increase of approximately 1,500,000. The total traffic for the center was 40,198,381, or a growth for the year of more than 2,350,000.

At Grand Central station, which is the station of second importance on the Interborough lines, 37,234,126 nickels were paid, as against 35,864,163 in 1924, a growth of 1,369,963, a rate of increase somewhat less than in the year previous. The Pennsylvania station, the third in importance in the Interborough system, with 32,073,801, had a growth of 1,922,771, or slightly less than the rate of increase in the previous year.

Figures for important Interborough stations follow:

	1925	1924
Times Square	39,493,384	37,594,661
Grand Central	37,234,126	35,864,163
Pennsylvania Station	32,073,801	30,151,030
Fourteenth Street (East Side line)	20,508,136	19,636,487
Atlantic Avenue (Brooklyn)	16,952,648	16,703,450
Brooklyn Bridge	15,714,454	15,673,611
Fulton Street (East Side line)	14,157,961	14,010,247
Borough Hall (Brooklyn)	13,414,219	13,640,702
Fourteenth Street (West Side line)	12,419,299	12,304,865
86th Street (East Side line)	11,406,290	11,267,689

On the Interborough subway system the local station of heaviest traffic, that is, a station served only by local trains, is that at 50th Street and Broadway, where there were collected in 1925 9,902,832 fares, or an increase of a little less than 300,000 fares for the year.

The most important traffic stations of the B.-M. T. subway and elevated lines are indicated as follows:

	1925	1924
Times Square	26,064,283	22,793,888
34th Street	21,853,851	19,163,092
Union Square	19,960,245	18,195,263
Coney Island terminals (Brooklyn)	16,825,685	14,932,523
Essex Street	15,815,237	14,200,520
Chambers Street (Municipal Building)	15,336,469	15,212,858
Cortlandt Street	13,891,455	12,626,451
Brooklyn Bridge ("L")	12,970,766	12,840,666
De Kalb Avenue (Brooklyn)	11,971,464	12,141,732
23d Street	10,807,254	10,064,998

It will be noted that Essex Street passed Chambers Street during the year and Cortlandt Street passed Brooklyn Bridge.

Combination Locomotive-Car Developed in Switzerland

Twelve-Wheel Vehicle Consists of a Six-Wheel Passenger Coach Permanently Coupled to a Six-Wheel Motive Power Unit—Unusual Safety Devices Are Provided

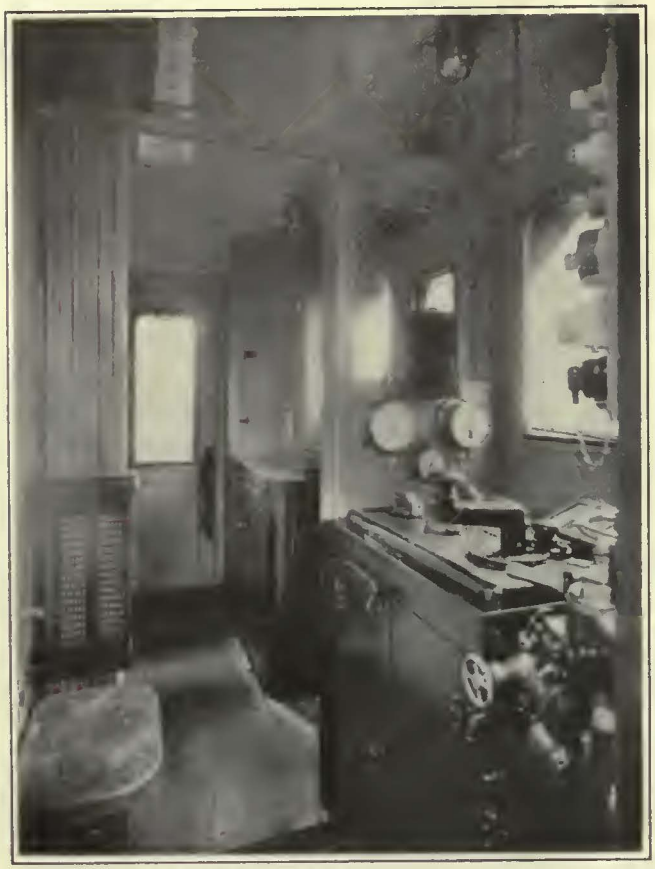
Combination Twelve-Wheel Locomotive-Car Used in Switzerland on Runs Where Traffic Does Not Justify Regular Train Operation

FOR service during slack periods when a long train is unnecessary, a combination locomotive and passenger coach is used by the Lötschberg Railway, which operates the section of the Swiss railways between Berne, Lötschberg and the Simplon. The new coaches are somewhat similar in design to those supplied by the Oerlikon Company in 1921 to the Burgdorf-Thun Railway. Electrical equipment is concentrated on a truck fitted with a leading axle and two driving axles, this truck being coupled to the main frame carrying the passenger and luggage compartments.

All the electrical equipment is in the locomotive portion. Current, single-phase 16⅔ period at 15,000 volts, is fed from the overhead collector device through isolating switches to the main current breaker, which is constructed for outdoor mounting. The circuit breaker is arranged for electro-pneumatic closing and for automatic electric release. A second pole of the circuit breaker is connected to the high-tension terminal of the transformer. The latter is of the oil-immersed, self-cooled type. In order to improve the cooling the transformer is inclosed in a second casing, into which air is drawn through the roof, passing over the transformer and escaping into the motor room.

The low-tension winding has eleven tappings which are connected to the motor as required for the various speeds, the highest voltage supplied to the motor being about 500. Connection between transformer tappings and motors is insured by means of twelve contactors that are controlled electro-pneumatically and are interlocked to prevent short circuits. They are arranged in the motor room. Passage from one notch to the next is insured without breaking the circuit in the usual way by means of a bridging coil.

Development of an hourly output of about 500 hp. at the wheel tires at a speed of 35 km. per hour (21.7 m.p.h.) was a requirement of the design. Another was that the motors should be as similar as possible to the spare motors kept on hand for the other electric engines of the company in order that they can be used in case of emergency. In view of this it was decided to adopt motors of the type supplied by the Oerlikon Company to the Bernese "Decree" railways that have been in successful use for a period of five years.



Motorman's Cab in Locomotive End of Combination Unit. Safety Devices Are Controlled by a Pedal and a Push Button

Each motor has ten poles, an actual one hour rating of 518 hp. at 21.7 m.p.h. and a continuous output of 425 hp. at 24.2 m.p.h. The highest speed is 40 m.p.h. The two driving axles are coupled together by means of a triangular system of rods and connected to the motor through a jackshaft. In this way it has been possible to use not only motors similar to those of the locomotives referred to but also the same gearing. Driving wheels are 4 ft. 4 in. in diameter, the gear ratio being 1 to 3.78. The controller is mounted on the motor frame, together with a fan set. The latter draws air from the motor room and drives it through the motor and out through the openings below. Multiple control and automatic acceleration are provided.

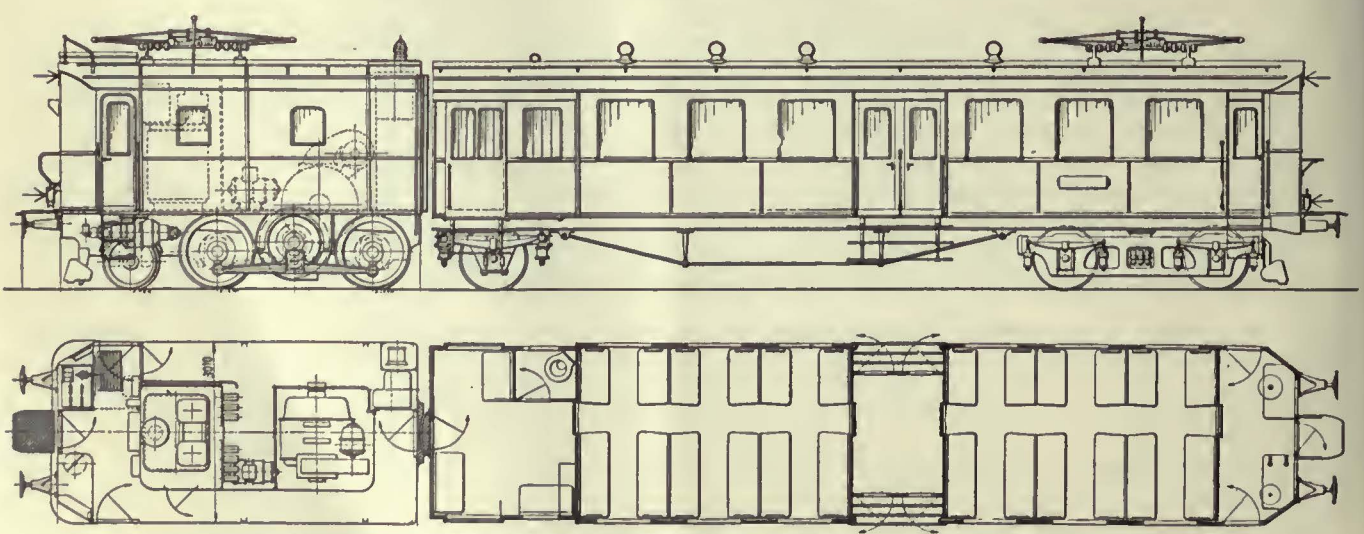
As they are intended for one-man operation, the cars have "dead man's" safety devices. Instead of having the safety device on the operating handle of the master controller, it is connected with a pedal which is depressed by the driver during the operation of the motor coach. When the pedal is released the motor circuit opens after a given interval, and the brake is brought into action by a relay. Within this interval, however, if the driver presses a push button mounted on the other side of the driver's cab, the switching off and braking is prevented. This arrangement was adopted to facilitate shunting operations, as the driver must under those circumstances be able to look out from one side of the cab or the other.

In order to permit of the vehicle being operated in either direction, the passenger coach is also provided with a driver's cab at the end away from the locomotive. Both the coach and the engine portion are provided with current-collecting apparatus.

Direct current at 36 volts for the control circuits and lighting is supplied by a 1-kw. motor-generator set and a battery of accumulators. Heating current for the different compartments of the coach is derived from the train heating bus lines. These are connected to a tapping of the transformer, giving 1,000 volts through an electro-pneumatically operated circuit breaker. The heating current for the driver's cab is obtained from the same supply system as the auxiliaries, such as the compressor set for the brake and the control gear. This supply system is connected to the 220-volt tapping of the transformer.

The coaches are each adapted to carry 60 passengers, although at times of heavy traffic five sitting and fifteen standing passengers can be accommodated in the luggage compartment. Over-all length of the engine proper is 21.6 ft. and of the complete vehicle 71 ft. 8 in. Total weight of the motor coach is 60.1 tons, of which the electrical equipment is responsible for 15.4 tons.

The vehicles were the joint production of three Swiss concerns, the Oerlikon Maschinenfabrik being responsible for the whole of the electrical equipment, the Swiss Locomotive & Machine Works, Winterthur, for the chassis and underwork, and the Swiss Industrial Company of Neuhausen for the body work.



Elevation and Floor Plan of Lötschberg Railway Locomotive-Coach. Seats for 60 Passengers Are Provided in the Main Compartment, with Fifteen Additional Seats in the Luggage Room

When Should Pinions and Gears Be Removed for Tooth Wear

By E. S. Sawtelle
Assistant General Manager Tool Steel Gear & Pinion Company, Cincinnati, Ohio

Gages Can Be Used Successfully on a Large Majority of Present-Day Gears and Pinions to Determine When Teeth Are Worn Out —A Few Abnormal Cases May Require Special Consideration

PRESENT practice of leaving to the judgment of inspectors the decision as to when a gear or pinion should be removed as having finished its useful life is unsatisfactory. Most superintendents of equipment and master mechanics would welcome some sort of a gage to decide when gears and pinions should be scrapped, but they seem to feel that the variety of tooth shapes and differences in gear ratios offer obstacles that prevent the use of a satisfactory gage. A study of the subject, however, shows that gages can be used successfully on the great majority of gears and pinions to determine when they should be removed. An occasional gear or pinion may wear abnormally, due to misalignment, bad bearings or some other condition. In such cases the tooth may be very badly worn at the top and thoroughly fit for rejection, though it may not show much wear at the gage point. Judgment must be used in connection with the gages to safeguard against a condition of this kind.

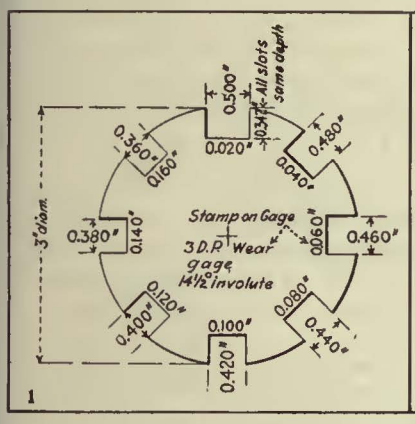
In order to illustrate the problems that are encountered in gaging gear teeth for wear, and also as a suggestion for types of gages that appear to be satisfactory for determining when gears or pinions should be scrapped, I have outlined in the accompanying diagrams several gages that should be of assistance to inspectors.

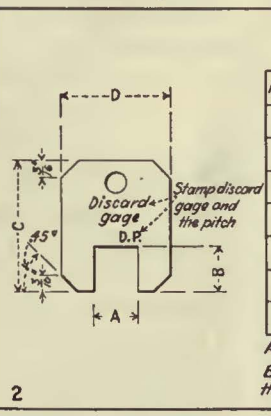
Where the standard Brown & Sharpe 14½-deg. gear or pinion is used wear at the pitch line can be determined by a simple snap gage which measures the wear from the top of the tooth to the pitch line. Fig. 1 shows such a gage, which can be read quickly and should be useful. This can be applied to any type of three-pitch pinion. The slots of this gage are all of the same depth and are equal to the corrected addendum for the pitch, but the width of each slot in the gage is varied so as to measure all the way from a new tooth to one worn out by progressive steps of 0.020 in. This gage should prove very handy for determining approximately how near worn out a pinion may be.

A discard gage is shown in Fig. 2, which can be used readily on a Brown & Sharpe 14½-deg. tooth for measuring a worn-out gear or pinion. The dimension *A* for the thickness of the tooth is usually taken as two-thirds of the original thickness at the pitch line of a new gear or pinion.

For a diametrical pitch of three this would be two-thirds of 0.523, or 0.348 in. The dimension *B* for the depth is the corrected addendum, which for a three-pitch pinion of about 14 to 17 teeth should be 0.345 in. This corrected addendum varies slightly with the number of teeth, but a gage for a depth of 0.345 in. can be used for any gear or pinion with a negligible error.

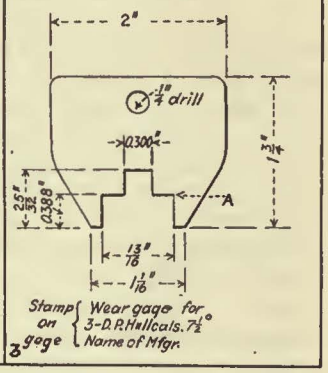
Several of the more modern tooth shapes depart from the Brown & Sharpe standard and have higher pressure angles. These include the long and short addendum tooth, the helical tooth and the wisdom tooth pinion. Originally these teeth are cut broader at the base and narrower at the top, with the result that frequently they may wear to a knife edge at the top before they are sufficiently worn at the center of the tooth to warrant discarding. Such a condition is shown in Fig. 4, to-





For 14½ and 20° Std. depth spur					R.Y. Helical	
Pitch	A	B	C	D	A	B
2	0.525	0.512	1⅛"	1¼"	0.521/P 0.493/G	0.434
2½	0.418	0.410	1½"	1¼"	0.398"	0.361"
3	0.348	0.342	1½"	1¼"	0.337"	0.276"
3½	0.298	0.293	1¼"	1"	0.294"	0.250"
4	0.262	0.256	1¼"	1"	0.246"	0.246"
4¼	0.246	0.240	1¼"	1"	0.230"	0.209"

A = ⅔ of the tooth thickness when new
B for helicals is measured at a depth of ½ the working depth plus correction



Note: all gages of 3/16" cold rolled steel, case hardened.

Note: for helical pinions 4 D.P. and 4¼ D.P. use gage C-144

Fig. 1—Wear Gage for Three-Diametrical Pitch Gearing. This Provides for Gaging Wear Every 0.020 In.

Fig. 2—Discard Gage for Brown & Sharpe 14½-Deg. Teeth to Measure Worn Condition

Fig. 3—Discard Gage for Gearing with Long and Short Addendum Teeth, Helical Teeth and the Wisdom Tooth Pinion

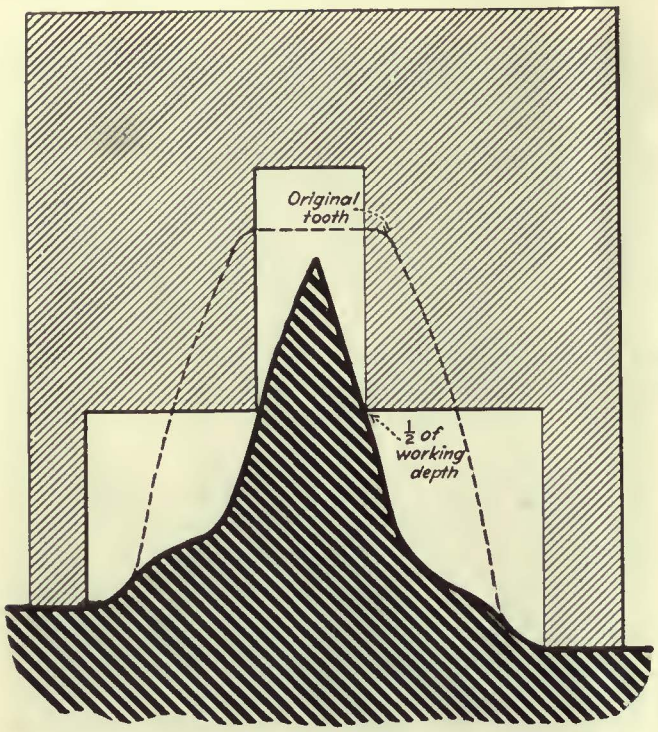


Fig. 4—Gearing with High-Pressure Angles Frequently Can Be Worn to a Knife Edge at the Top Before It Is Sufficiently Worn at the Center to Warrant Discarding

gether with an outline of the general type of gage that could be used to meet this condition. The gages shown in Figs. 1 and 2 cannot be used safely after the gear or pinion is worn to a knife edge. For such conditions a type of gage shown in Fig. 3 is recommended. This takes its height bearing from the root of the tooth. In this gage the offset at *A* is half way down the working depth of the tooth, and the thickness measured at this point is that at which the gear or pinion should be rejected. This is recommended to be two-thirds of its original thickness at point *A*. The vertical legs of the gage are of such length as to make the gage point *A* bear at the center of the working depth. The inside slot of the gage is such as to provide a clearance over the top of the tooth. This gage cannot be made universal, but a separate gage must be made for the gear and for each pinion with a different number of teeth. Likewise, an exact formula cannot be offered since there are variations used in the height and depth of the teeth for various types of gearing. The simplest method of getting dimensions for such a gear is to obtain exact data from gear manufacturers for the specific type of gearing used and make up a gage to suit individual ideas as to the degree of wear permissible before rejection.

During 1925 the number of accidents on the lines of the International Railway, Buffalo, N. Y., decreased 7.2 per cent. Serious accidents fell off even more, as shown by the fact that 10.28 per cent fewer persons were injured. During the *Courier* campaign against safety zone violators, I. R. C. employees turned in to the police 1,044 reports covering 1,235 violations of the ordinance establishing a 7-ft. safety zone around standing street cars. The campaign has greatly lowered the risk of accident to pedestrians and to passengers. A flashing signal was installed at Union Road on the Lancaster line and a new improved block signal system on the Buffalo-Niagara Falls High Speed line.

The Readers' Forum

Noise Reduction Should Pay Well

WISCONSIN VALLEY ELECTRIC COMPANY

WAUSAU, WIS., Feb. 9, 1926.

To the Editor:

Several very inspiring articles have appeared in the ELECTRIC RAILWAY JOURNAL of late, and no doubt they have been read with a great deal of interest by many men in the industry who are constantly trying to improve service in their different localities.

The reply to "Master Mechanic" by the chairman of the noise reduction committee is very appropriate indeed, and I believe this committee deserves the support of the entire industry and should be encouraged rather than discouraged. There will, of course, always be with us the man who is ready to throw cold water on any proposition, but fortunately those men are in the minority, and the committee should know this.

It is very gratifying to read the letter by Clinton D. Smith, who certainly takes a very optimistic view about the future of our industry, and we must agree that he is right when he states that the car is our show window and it is through the pleasing appearance as well as comfortable, speedy and safe transportation that we will get our message across to the public, and that only in this way can we expect to get patrons enough to make our industry profitable. "Master Mechanic" wonders where the money to improve equipment is to come from. It is by the improvement of equipment and track that patronage is going to be increased, but occasionally we find some executive who thinks he must either curtail service or cut down the appropriation for maintenance of equipment as soon as the seasonal drop in patronage occurs.

Such men are losing track of the fact that we are at a dawn of a new era in transportation. The standard of living in our country, we are told, is constantly ascending to higher levels. If that is so it holds true equally well in transportation. We cannot expect that people are going to ride in dirty, dilapidated cars, many of which are equipped with hard slat seats. Instead we must be up to date and offer them an attractive ride, on full spring cushions, in cars which are clean and attractive, not necessarily luxurious. The bus properly co-ordinated with railway service should provide our service de luxe at proportionately higher rates than we are now getting for electric car service.

A word in regard to noise. Our old, heavy equipment was very noisy. It was also clumsy and was not economical to operate. We found that we could operate cars of lighter weight with quite a saving, but most of us went to extremes in lightness. Certainly the safety car has not proved less noisy than the old heavy equipment previously operated.

Within the last few years the car builders have brought out cars which they believe—and I think they are right—would strike a medium between the old heavy equipment and the too light safety car. This medium-weight double-truck car has met with favor among the operators as well as the riding public. It has a much more pleasing appearance, is more comfortable and speedier. Certainly the noise is considerably reduced and the cost of operation less.

The reduction of noise can be extended to the track structure as well as to the rolling stock. The more resilient the track structure the less noise will be noticed, and I believe that in all future trackwork, either new or reconstruction, serious consideration should be given to materials now on the market which have been proved to make the track resilient, and without movement enough to disturb pavement in the track area. On test track in different localities resilient construction has proved very popular.

The Wisconsin Utilities Association has a railway fellowship at the University of Wisconsin. The young man who is taking the course this year was given as his subject to study, "The reduction of noises in equipment." A committee of three operating men was appointed to confer with this young student and to guide him. He is free to call on any of the operators at any time for information which will help him in his work, and I have no doubt that when he makes his report next summer it will be of great benefit not only to us here in Wisconsin but to the entire industry.

I feel that the industry ought to get behind the committee on noise reduction and give it the support it so well deserves.

I have just read the address delivered by Mr. Budd at Indianapolis, and if all utility operators would look at the future as brightly as Mr. Budd does there would be no cause for worry, as every man would then be up and doing all the time.

NELS C. RASMUSSEN,
Superintendent of Railways and Chairman Railway Section Wisconsin Utilities Association.

Additional Information Concerning Number of Employees in Seattle

SEATTLE, WASH., Feb. 5, 1926.

To the Editor:

After reading the editorial in the Dec. 12, 1925, issue of ELECTRIC RAILWAY JOURNAL entitled "Cold Comfort for Municipal Ownership Advocates in Seattle Experience," I wish to call your attention to certain features of the situation not mentioned in that article. Acquisition of the street railway lines by the city occurred in April, 1919. Prior to this acquisition the total number of street railway employees was 1,876.

EMPLOYEES IN SERVICE OF SEATTLE MUNICIPAL STREET RAILWAY

	April 1, 1919*	April 1, 1920	Dec. 1 1925
Transportation:			
Dispatchers, schedule clerks, inspectors, starters, and station masters	39	44	30
Office	15	36	17
Trainmen	1,289	1,439	1,220
Shops and carhouses	325	461	287
Way and structures	169	234	285
Accounting	39	40	36
Accounting, stores department	†	26	16
	1,876	2,280	1,891

* Figures under April, 1919, include employees of the traction company and city employees engaged in operation of a municipal car line.

† The number of employees in the storeroom of the accounting department of the traction company not known at this time.

This figure includes those engaged in the operation of a municipal car line. Between April 1, 1919, and April 1, 1920, the number rose to 2,280. On March 22, 1920, a reorganization occurred which created a railway division of the public utility department. When this reorganization was completed and put into effect the services of 236 employees were disposed of. Due to further economies and reductions since that time, we had in our employ on Dec. 1, 1925, only 1,891. During the time that this reorganization has been in effect we established the basic eight-hour day. We allow the trainmen one day off in eight on their own time and have increased the number of car-hours on account of the installation of bus service in different sections. At this time 55 per cent of our operation is one-man. When the city took over the line from the traction company there was only a very small percentage of one-man operation. A tabulation of the number of employees at different dates is given in the opposite column.

There is considerable discrepancy between these figures and those which you quoted in your editorial from one of the Seattle newspapers. I thought you would be interested to know of this difference and to publish a correction.

D. W. HENDERSON,
General Superintendent.

Payroll Time Not Running Time

Feb. 15, 1926.

To the Editor:

In your issue of Jan. 30, page 195, there is a letter to the editor headed "Buses Faster than Electric Cars in New York." The writer bases his conclusions on a comparison of vehicle-miles and vehicle-hours, including layovers and delays. This is an error which is often accepted from statistical data and yet it is no true showing of the speed of a company's cars. Actual speed is determined by the average running time between terminals, excluding layover time and all other payroll time such as that allowed for reporting, turning in, meal relief, making out reports, etc. I do not know if the New York figures would show if it were possible to exclude these items from the New York Transit Commission reports showing car-hours, which generally mean payroll hours. I might mention in this connection that on certain properties the excess time is considerable, going to as much as 20 per cent over and above that spent in operating cars between terminals.

FAIR PLAY.

Credit Union Organized in Atlanta

GEORGIA already has one credit union, the Public Service Credit Union, which recently began operations under the auspices of the Georgia Railway & Power Company in Atlanta. A charter was secured by this union and organization was effected on Jan. 12, with an initial membership of 30, a stock subscription of 137 shares, at $5 a share, and excellent prospects for work among the 5,300 employees of the company.

The entrance fee has been placed at 25 cents and a member can start in it by taking out a single share. No member can hold more than 100 shares of stock, and no member can have more than $500 in stock or cash on deposit.

Two kinds of loans are made—a "character" loan and an "indorsed" loan. The character loan may run as high as $50 and is made, in the judgment of the credit committee, on the character of the applicant. This provides for emergency cases when an employee needs money quickly and cannot offer security for it. The indorsed loan may run to as high as $250, but must bear the indorsement of other members of the organization or some responsible person. These two types are expected to take care of the loan end.

A special feature will be the savings bank, which will lend out money at 6 per cent and pay 4 per cent for deposits, the difference of 2 per cent going to take care of the expenses of operation.

Equipment Maintenance Notes

Strengthening Fare Boxes During Repairs

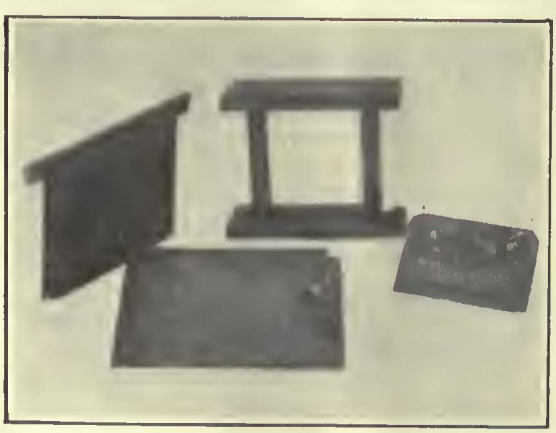
PASSENGERS alighting from electric cars frequently find the fare box a convenient place to hang onto for support until the car stops. As a result the supporting side of the fare box is frequently subjected to severe strains. The Eighth Avenue Railroad, New York City, has had a considerable number of breakages of the metal on the supporting side of Johnson fare boxes along the top edge. In repairing these, C. P. Westlake, supervisor of equipment, has arranged a strengthening plate of steel 5¾ in. x 4 in. x ⅛ in., which he installs and rivets inside to strengthen the point where failures occur. In order to provide a satisfactory and economical job several fixtures and jigs are used for the drilling and riveting operations in doing the work.

One of the accompanying illustrations shows the casing of three Johnson fare boxes; the one at the left in the illustration is a box before any repairs are made. This shows the breaking away of the metal at the top right hand corner. In repairing these boxes the first operation is to cut away the supporting side as shown in the center one of the fare boxes. The fare box at the right shows the finished job after repairs and reinforcement have been made. In order to hold the box in position after the side has been removed while work of drilling and riveting is being done a clamp is placed around the box. A second illustration shows this clamp in position. It has a number of thumbscrews for adjustment and tightening. Another illustration shows the fixtures used for doing the work. In this view the jig at the left is for drilling the new side plates which are installed.

Fare Boxes Before and After Repairs Have Been Made
At left, casing with broken supporting side. In center, the supporting side has been cut away while making repairs. At right, completed casing after repairs have been made.

One of these plates is shown in the foreground of the illustration. The jig is made with two sides and the plate to be drilled is slipped between these and held firmly in position during the drilling operation. The reinforcing plate is shown at the extreme right in this illustration and a fixture for riveting in the background. This fixture is placed inside the box and, with the clamp shown in another illustration, makes firm support so that the riveting can be done satisfactorily. By this method of strengthening the supporting side of boxes during repairs the number of boxes which require work to be done for breaking away of the supporting side has been reduced considerably.

Clamp Used to Hold Fare Box in Position for Drilling and Riveting



Jigs and Fixtures for Repairing Fare Boxes
At left, jig for drilling supporting side plates; in foreground, side plate before being drilled. At right, reinforcing plate; in background, fixture for riveting.

Hinged Apron Permits Easy Repairs to Cars

IMPROVED appearance of cars is one of the important factors in the campaign of modernization with which electric railway operators are bringing back the business that is logically theirs. The smart street car today is wearing an apron. The old-fashioned car set high over the trucks and displaying a confusing array of wheels, brake rods, motors, air compressors, etc., is quite out of harmony with the streamline designs and complete inclosures of the modern automobiles and buses which crowd the cars on every highway. Along with steps to make electric railway equipment more comfortable and less noisy, the elimination of this objectionable appearance of cars is being given careful consideration on a maintenance basis.

A simple method of accomplishing this purpose even on old cars is the apron in use by the Grand Rapids Railway, as illustrated herewith. William Goldner, master mechanic, reports that the original aprons were put on solid all the way around, which was not satisfactory due to the fact that it was almost impossible to get to the trucks for oiling, repair work, etc., without removing the apron, a defect which

Metal Moldings at Top and Bottom of Hinged Aprons Give Finished Appearance and Add Streamline Effect

he expects to remedy by putting the apron on hinges, as shown, which is the first apron built in that manner. This apron is ⅜-in. Plymetl, faced with steel on both sides. This provides great resistance to breakage or puncture with minimum weight. It is easily made and simple to maintain. Mr. Goldner says in the future he would prefer and specify ¼-in. Plymetl.

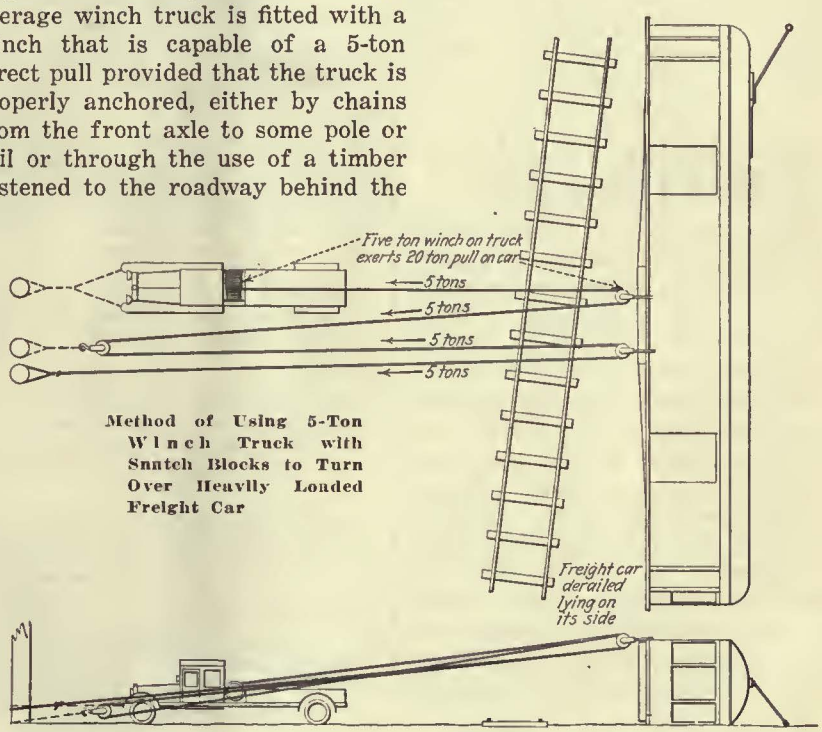
The apron shown is also the first one made with the metal molding running along the bottom. The top molding is screwed to the car proper so that when the apron is hanging down in place it has the appearance of having the molding all the way around, whereas the molding is fastened only to the bottom portion of the apron, while the top edge of the apron will be perfected by one metal face being broken over the edge.

Five-Ton Winch Truck Clears Freight Wreck

By Pierre V. C. See
Superintendent of Equipment Northern Ohio Traction & Light Company, Akron, Ohio

MOST city properties realize the possibilities of using trucks for street car wrecking. Their ability to get to the point of trouble in a minimum of time provides a speedy method for rerailing cars and clearing minor wrecks. It seems, however, that few properties realize the great possibilities offered to use the winch-type truck and a snatch-block combination for clearing up large interurban and freight car wrecks. The track and line departments of most electric railway properties are provided with winch trucks, which are available in case of emergency. Where the railway itself is not provided with such trucks it can usually secure the use of them from large auto towing concerns. The average winch truck is fitted with a winch that is capable of a 5-ton direct pull provided that the truck is properly anchored, either by chains from the front axle to some pole or rail or through the use of a timber fastened to the roadway behind the truck. A 5-ton direct pull will haul the car or truck back to the track and rerail it, and if the car is in a ditch or turned over the power furnished can be multiplied by attaching additional lines with snatch blocks. Each line adds an additional 5-ton pull.

The accompanying sketch shows how a 5-ton truck was used to turn over a 43-ft., 40-ton freight trailer which was laying flat on its side. In this particular case it was impossible to get a line under the car so as to provide a rolling hitch. Had this been possible the matter of turning the car over would have been simplified somewhat. As it was, the line was connected to the highest point on the bottom of the underframe. This was at the end of the bolster



Method of Using 5-Ton Winch Truck with Snatch Blocks to Turn Over Heavily Loaded Freight Car

Type of Truck Used for Wrecking Repairs by the Northern Ohio Traction & Light Company

and top of the needle beam. By using four lines as shown in the sketch, it was a very simple matter to turn this heavily-loaded freight car over to an upright position with one pull.

The winch truck that was used on this job is shown in another illustration. It has a six-cylinder chassis with 36x6 pneumatic tires, duals in the rear. A large cab is provided so that seven men can be seated very comfortably inside, while the open body is used for carrying jacks, blocks and other wrecking material. This particular truck is capable of making a speed of 40 m.p.h. and makes nearly as good time as can be made with a touring car in getting to a wreck promptly. In the particular case mentioned the wreck was more than 40 miles from the shop, so this speed was of decided advantage in clearing the tracks promptly.

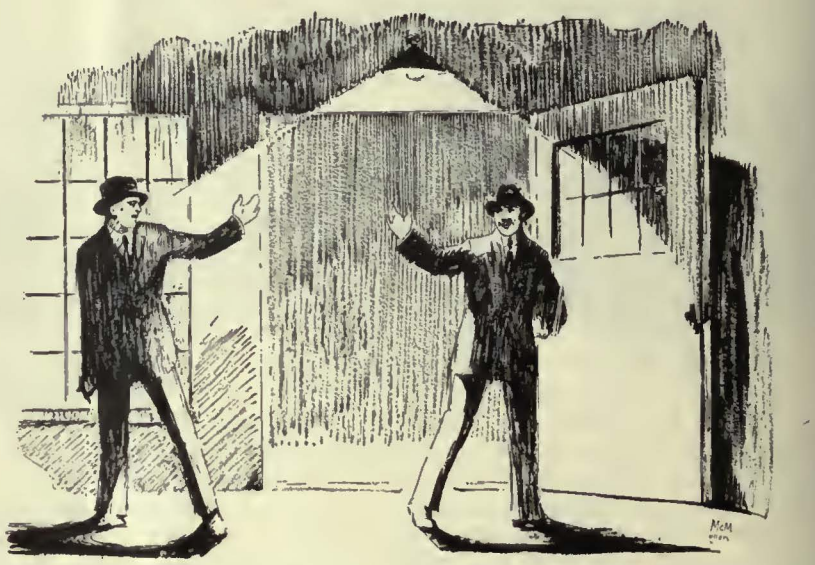
Bolted Anchor Plate Used to Hold Trolley Wire

UNTIL recently the Union Street Railway, New Bedford, Mass., experienced some difficulty with the type of anchor plate used to hold trolley wire. It had been the practice to solder the usual eyebolt clamp to the trolley wire and then attach the anchor wire to the clamp. It was found, however, that the heat from soldering had made a weak place in the trolley wire. It was also noted that the soldered surface of the clamp was so small that the trolley wire bent very easily when any extra pressure was brought to bear on the anchor wire. These defects frequently caused a breaking of the trolley wire.

To overcome these difficulties, Peter Dupuis, line foreman, designed a type of anchor plate that has proved very satisfactory. A piece of ⅜-in. machine steel plate, 8 in. long and 5 in. wide, was bent V-shaped. This plate was held together at the top by three 1½-in. x ⅜-in. machine bolts. Below these bolts is an 8-in. piece of ½-in. square machine steel, through which four 1½-in. x ⅜-in. setscrews are passed. The bottoms of these setscrews bear on an 8-in. piece of ⅜-in. square machine steel. When the anchor plate is in use this piece of steel rests on the trolley wire. By tightening the setscrews the ⅜-in. steel rod presses the trolley wire against the bottom of the V-shaped plate, while the ½-in. steel

Dick Encounters Difficulties

And Discusses Maintenance Cost Records



IT WAS far into the night when Dick Prescott, engineer of equipment of the Consolidated Railway & Light Company, and Steve White, carpenter foreman, decided to call it a day and go home. They had struggled long and wearily in the endeavor to arrive at a method of estimating the excessive maintenance cost on some of the antiquated equipment operated on their property.

"There are so many factors involved in this darn thing," said Dick, when they finally began to pack up thir papers, that it's almost a guess to try to get any comparision from the meager records that we've got available."

Dick picked up the pad on which they had been working. "It would be simple if the accounts were divided for different groups of cars," he remarked as he cast his eye down the row of items they had listed. "In addition to the costs," he continued, "I would also like to see pull-ins classified by car types. Gee! I'll bet that would tell a story that would soon show our practice up in a new light."

"I can remember one case," said Steve, "where we got to looking into the number of rewinds on one particular type of armature, and everybody was surprised to learn that the darn things were being rewound more than an average of once every year. No one knew how long that had been going on, until we happened to stumble onto it. If the accounts had been set up in the right way, the cost of maintenance on that type of motor would have stood out like a sore thumb."

"Well, all this is fine for the future, but we haven't got very far in estimating the costs for some of the equipment we now have in service."

"We can't get very far with that," replied Steve. "I've been digging up all the figures I can get hold of, but they don't give much. I do think, though, that I can get some estimates together now for the old 200 series cars that we're overhauling and the new 1200s."

"How are you going to get at it?" queried Dick.

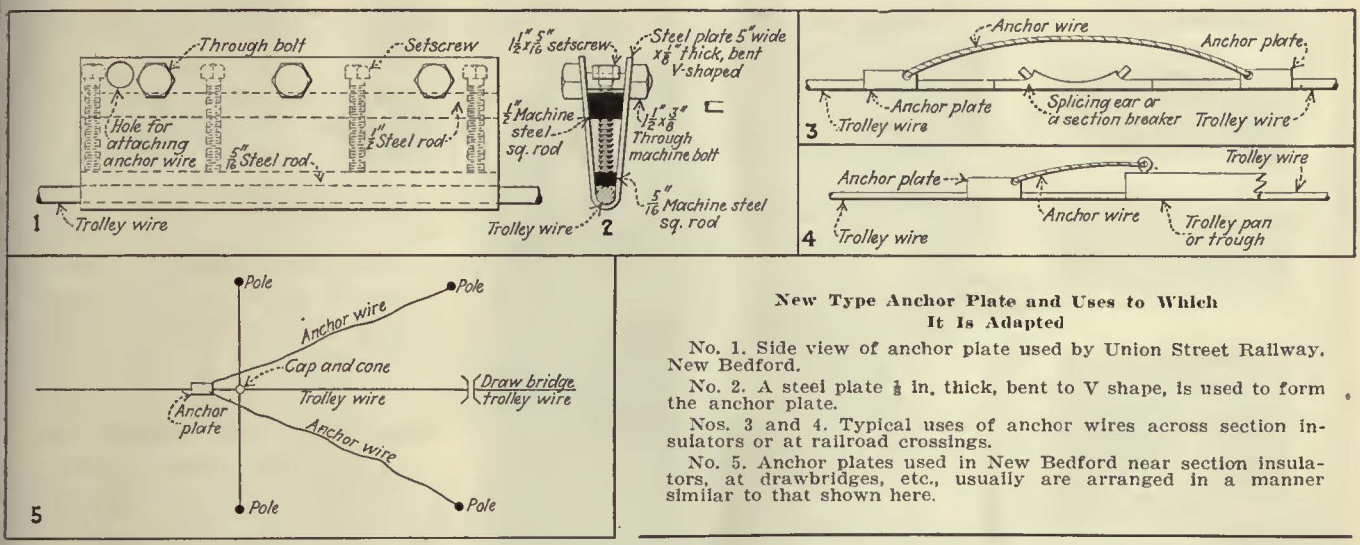
"Well, I know about what we're spending on the bodies. I can get a fair estimate of the truck job from Bill Johnson, the truck shop foreman. Then, you see, Mike over at Center barn has all the 200s and some of the 1200s. I think he keeps some records of his own that may help us out. We've got power meters on both these groups of cars, and it won't be much of a trick to find out how much the power saving on the new cars amounts to. I also think Mike can check up his pull-ins and tell us how they compare on the old and the new cars. That's about as far as we can go."

"Even if that's all we can get together, I think it's worth talking over with the old man. He's working on the budget for next year and he could use that estimate for putting in a recommendation that we buy a group of new cars to replace the 200s and stop this heavy rebuilding program on them. Gee, I'll bet the money we're spending right there would more than pay the interest on new cars."

"Yes, but what about the capital?"

"You've got energy saving, faster schedules and reduced pull-ins to figure on. That's without allowing anything for the increased riding that would be bound to result if we took those old gunboats off the street. There's no question in my mind but that we've been blindly hanging on to some of this old stuff long past the time when it was profitable to do so. Of course, it's not up to us to say what's to be done, but it's a good thing to give the old man the dope. I'll bet if he takes that kind of a proposition into the staff meeting the transportation department and the new commercial department will be ready to hug him."

"Well, all right, Dick, I'm going to beat it for home before my wife comes after me. It's going to be kind of interesting to see what the old man has to say."



New Type Anchor Plate and Uses to Which It Is Adapted

No. 1. Side view of anchor plate used by Union Street Railway, New Bedford.

No. 2. A steel plate ⅛ in. thick, bent to V shape, is used to form the anchor plate.

Nos. 3 and 4. Typical uses of anchor wires across section insulators or at railroad crossings.

No. 5. Anchor plates used in New Bedford near section insulators, at drawbridges, etc., usually are arranged in a manner similar to that shown here.

rod presses against the three through bolts at the top of the plate. By this means the plate is securely held in place on the trolley wire. As will be noted, the trolley wire is not damaged by soldering and remains intact when the anchor plate is removed. This has proved advantageous when it is found necessary to change the location of the anchor plate.

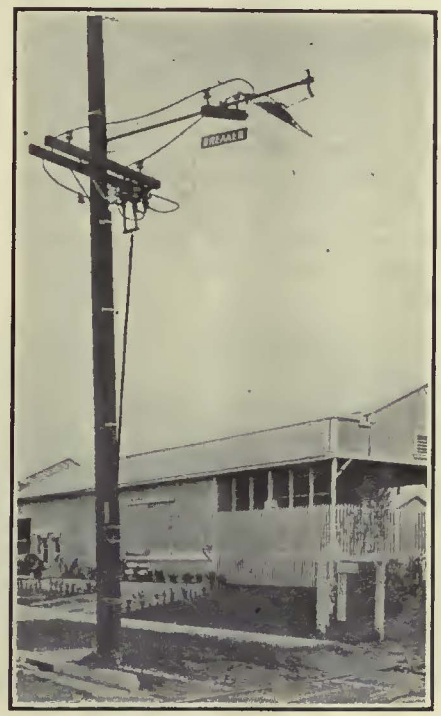
Various uses have been made of these anchor plates. They are used to hold an anchor wire where section breakers or splicing ears are located and wherever any strain on the trolley wire must be relieved. Trolley wires that go into trolley troughs or dead-end at drawbridges are an example of these uses. These anchor plates are also used in locations where there is a long stretch of unanchored trolley wire, to prevent strain on the span wires. Not only have these anchor plates proved inexpensive to make but they have given satisfactory results in the several hundred places where they have been in use.

Double Sectionalizing Switch for Oil Sidings

BY L. H. APPEL
Assistant Superintendent of Power Pacific Electric Railway, Los Angeles, Cal.

TO SAFEGUARD the loading and unloading of petroleum products the standard practice of the Pacific Electric Railway is to install a combined trolley and track sectionalizing switch on all spur tracks serving industries which handle oils and gasoline. This provision, together with that of installing insulated flange unions in pipe lines, has proved very effective in preventing electric sparks, which under certain conditions may cause serious troubles in the presence of fuel oil, distillates of gasoline, etc.

The double sectionalizing switch de-energizes both the trolley wire and the track at the siding, thereby removing any potential hazard that might exist if the trolley were left energized while tank cars were being handled. A double-pole, single-throw switch is used, which consists essentially of two copper blades fastened to insulators which are installed on cross-arms attached to the pole. One blade is used for controlling the trolley circuit and the other for the track circuit. A standard maple sectionalizing insulator is inserted in the trolley wire and white fiber insulated joints in the track.



Combined Trolley Wire and Track Sectionalizing Switch in Open Position

The trolley switch blade when closed permits the circuit to be completed or shunted around the circuit breaker and similarly the track switch blade permits the circuit to be shunted around the insulated joints, thereby allowing normal operation of the spur. Both blades of the switch are operated simultaneously by means of a long pole permanently fastened to the insulated blade head. This can be padlocked in either the open or closed position by train crews.

The switch is kept open normally so that the trolley and track are de-energized and is closed only when the spur is actually in use for electric operation. In addition to the use of this equipment for sidings serving plants where oils are handled, which include approximately 75 installations, a number of single insulating switches have been installed on sidings which serve industries operating clamshell shovels or other loading and unloading equipment which might come in contact with the trolley wire. The single switch installations provide for an insulator in the trolley wire only, as it is not necessary to insulate or de-energize the track.

Labeling Parts in Storeroom Shelves

DUE to the miscellaneous character of maintenance parts stored in the storeroom of the Southern Pacific Company at its Beaverton, Ore., shops, a flexible method for installing labels is required. An entirely satisfactory method has been devised through the use of a long metal slide 2 in. wide which runs the entire length of the storeroom shelves. These slides per-

Metal Slides for Inserting Labels Are Used in the Storeroom of the Southern Pacific at Beaverton, Ore.

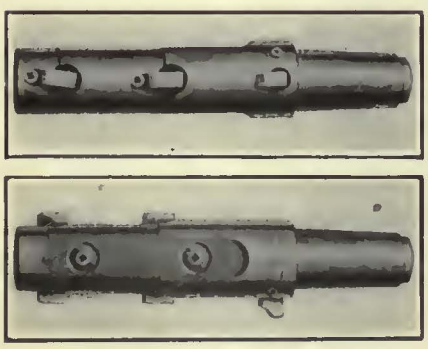
mit labels for the adjacent parts to be inserted where required, and after insertion they are protected with celluloid covers. This keeps them clean and gives a neat appearance.

Space required on the shelves for the storage of parts can be more economically used with this construction as the parts can be placed so as to make the best arrangement without regard to the location of labels.

New Equipment Available

Car Wheel Boring Tool with Wide Range Expansion

DESIGNED for the heavy-duty service of boring electric railway car wheels, a boring tool has recently been placed on the market by the Liberty Machine Works, St. Louis, Mo. The new boring tool has a triple arrangement of cutters, each set boring independently of the other. One set is for the rough-boring operation and a second for the finishing. The arrangement is such that the finishing cutters engage immediately after the roughing cutters clear the work. After the finishing cut is taken a third pair at the top of the tool chamfers the hub.



Heavy-Duty Car Wheel Boring Tool

Each pair of cutters is uniformly expanded to the desired size by means of a cam arrangement controlled by a micrometer dial graduated in thousandths. This insures close adjustment to the desired size. One of the features of the tool is the hardened cutter support, the purpose of which is to insure a rigid holder for the cutters and to prolong the life of the tool by preventing disintegration on the surfaces where the tips come in contact with the tool body.

These hardened cutter supports permit setting the roughing cutters to the correct rake and angle. The cutter is set at this rake instead of grinding away part of the surface, as is the general custom. By inclining the roughing cutters, their life is materially increased, the tendency to heat is decreased and faster speeds are permitted.

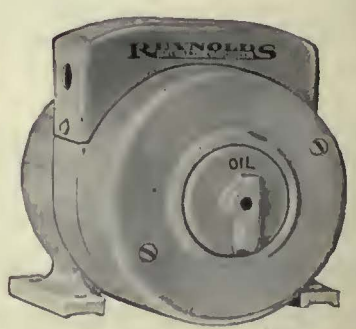
The new car wheel boring tool has a wide range of cutter expansion the purpose of which is to reduce cutter costs by using more of the high-speed steel on each set of cutters. The cutter locking device consists of a special screw lock which locks both cutters metal to metal. This arrangement insures uniformity of sizes and gives rigidity.

The tool is furnished in ten different sizes for boring steel, chilled or cast-iron car wheels. Sizes for the former range from 3¼ in. to 4¼ in. to 6¾ to 9½ in. and for the latter from 3 in. to 4¼ in. to 5¼ in. to 7¾ in.

Motor-Driven Flasher Unit for Warning Signals

RUGGED construction and small size are outstanding characteristics of a new unit flasher just brought out by the Reynolds Electric Company, Chicago, Ill. This flasher is for use with warning signals, crossing lights, blinkers, traffic guides, etc., as used by electric railways. The flasher mechanism is driven through a train of gears from a standard motor and all the mechanism is built into the special motor frame, so that the flasher is self-contained. The flasher is furnished with either one, two or three brushes, so as to handle a like number of circuits. The brushes ride the contactor drum without movement or vibration and special precautions have been taken which provide long life. The contactor drum operates on a quick make and break principle which is new in flasher construction and gives increased life and reduces failures.

The capacity of the unit is from 400 to 800 watts per circuit. The mechanism can be installed either inside or outdoors and its small size permits of mounting on a shelf against a wall if desired. The units are finished with two speeds, 60 r.p.m. and 7 r.p.m., so as to give respectively speed for flashing circuits on and off 60 times per minute or seven times per minute.



New Self-Contained Unit Flasher

Association News & Discussions

Bus Maintenance and Lacquer Painting Discussed by C.E.R.A. Master Mechanics

Annual Meeting of Central Electric Railway Master Mechanics' Association at Akron, Ohio, Was Attended by Fifty Men from Central District—Topics of Interest to Interurbans Discussed

LIVE topics of particular interest to master mechanics brought out 50 men for the annual meeting of the Central Electric Railway Master Mechanics Association held at Akron, Ohio, on Feb. 11. The business session began at 9 o'clock and with an adjournment of one hour for lunch continued up to 2:30 p.m., after which an inspection trip was made through the shops of the Northern Ohio Traction & Light Company, where demonstrations were witnessed of equipment and methods used in maintaining buses and a demonstration of lacquer painting of electric cars.

Of the various committee reports, that on uniform charges to interchange of equipment brought out considerable discussion. F. J. Foote, chairman of the committee, presented the report, together with a revised list of prices for air-brake equipment. The report, including the revised prices, was adopted.

A committee was appointed to arbitrate disputes as to the responsibility for payment of parts replaced in interchange freight service. C. W. Squier, secretary of the equipment committee of the American Electric Railway Engineering Association, presented a request for consideration by the Master Mechanics' Association of two specifications now in the Engineering Manual. These specifications were E 100-12 for automatic couplers for interurban cars and radial draft rigging, including M.C.B. specifications for couplers, and E 101-12 specifications for the location of the end connections on interurban cars used in exchange service. No revisions to these specifications have been made since 1912, and as both refer to interurban equipment it was thought that the Central Electric Railway Association men were in best position to recommend changes in revision. The matter was referred to the standards committee of the association for study and report at the May meeting.

D. A. Scanlon, general superintendent of the railway department of the Northern Ohio Traction & Light Company, referred to a request which he had received from the Cleveland Railways to provide lights on freight trailers which operate through the streets of Cleveland. It appears that several accidents have occurred from automobiles running into cars which were without light. A committee was appointed to study the subject of providing a satisfactory method of illuminating the freight trailers so that such accidents will be prevented and so that a uniform method can be used by all roads of the district. This committee is to report at the May meeting of the association. Mr. Scanlon also brought up the subject of providing containers for way bills in interurban freight cars. After some discussion of this subject, it was referred back as being out of the field of activities of the Master Mechanics' Association. Discussion of the subject of loading cars beyond the stenciled weight brought out the fact that sometimes cars were loaded far beyond what they are supposed to carry. More attention will be given to this subject, as the tariff is supposed to be based on the stenciled weight with 10 per cent overload allowed.

Several changes were suggested in truck construction for the standard freight trailer which was adopted by the association. These changes were presented by a representative of the American Car & Foundry Company, and included some points which will reduce cost of construction and also provide increased life to trucks. The changes were approved and drawings will be changed to correspond.

The new officers of the association elected are: P. V. C. See, superintendent of equipment Northern Ohio Traction & Light Company, president; E. B. Gunn, master mechanic Western Ohio Railway, vice-president; together with an executive committee consisting of Fred Heckler, superintendent of motive power Lake Shore Electric Railway; F. J. Foote, superintendent of motive power and equipment Indiana, Columbus & Eastern Traction Company; J. W. Osborne, superintendent of equipment Terre Haute, Indianapolis & Eastern Traction Company, and A. W. Redderson, superintendent of motive power Indiana Service Corporation. A resolution commending the work of the retiring president, T. H. Nicholl, superintendent of motive power Union Traction Company of Indiana, was presented and adopted. He was also appointed as new chairman of the standards committee in place of C. M. Bange, resigned.

Two papers were presented, abstracts of which appear elsewhere in this issue. The first was a discussion of the lacquer system of painting, presented by J. S. Spratt of the Valentine Paint Company. In the discussion following presentation of this paper, questions by the master mechanics brought out information that the manufacturers do not recommend the applying of lacquer paint on top of old painting, as the old surfaces vary greatly and consequently varying results are obtained, many of which are unsatisfactory. Where paint is entirely removed the lacquer does not penetrate the wood, therefore some appropriate filler must

Master Mechanics of Central Electric Railway Association in Attendance at Akron Meeting

be used. Mr. Spratt said that the fourteen hours time given for finishing an average car requires a room temperature of at least 65 deg. No special spray gun is needed for the application of lacquer paint, and there are no special requirements by the fire underwriters over what is required for varnish removers. The powder that settles from the use of lacquer painting systems is not an explosive. Where spots are slow in drying this is evidence that the surface to which the lacquer paint is applied has not been thoroughly cleaned. After the lacquer paint has been applied cleaning with a dry cloth or with water is recommended. Car cleaning preparations can be used with success, provided they do not contain an excessive amount of alcohol. There are some lacquers that can be applied with a brush, but the spraying method is more satisfactory and more economical. The brush lacquers are improving rapidly and there are some over which varnish can be used, but the large majority cannot have varnish applied with success. There was considerable discussion as to economies that could be expected from the use of lacquer painting. The principal one of these results from the rapid drying of the lacquer paint so that cars are not out of service for extended periods. The general opinion of the master mechanics present was that there is no particular saving in time of application over that which would be obtained by spraying paint or enamel. Lettering can be done successfully with either lacquer paint, oil type paints, or enamel. P. V. C. See said that he had nine different kinds of lacquer paint in use. These were all applied over old paint surfaces. None has been in use a sufficient length of time to show definite results for comparisons.

A very complete paper on bus maintenance and gas engine operation was presented by E. Wooton, sueprintendent of equipment Chicago Motor Coach Company, an abstract of which is published elsewhere. Questions to Mr. Wooton brought out information that he renews oil every 2,500 miles and that he does not attempt to reclaim oil. The amount of extra equipment required for maintenance and overhauling is about 2 per cent for wrecks, overhauling, cripples, etc., and an additional 2 per cent for inspection. Probably a total of 5 per cent would be a good average figure to use. During the winter season in Chicago, radiator covers are used, but no alcohol is placed in the radiators. Skid chains are not used. The cost of maintenance by the Chicago Motor Coach Company during the past year was approximately 5½ cents per coach-mile. Mr. Wooton said that his company hoped to reduce this to 5 cents during the coming year. Depreciation of buses now used in Chicago is figured on a ten-year basis. Of course, this would vary considerably in different localities. The company has a very complete record system, so that it can tell when maintenance costs amount to more than the interest would be on the investment for a new coach. This accurately determines the point at which it is economical to scrap old equipment. Present equipment used in Chicago does not have starters, but Mr. Wooton said that larger equipment of six-cylinder engines would need starters. The scheduled speed is 10 m.p.h. in Chicago. This is figured by taking the mileage operated by the buses and dividing by the payroll time.

D. P. Cartwright of the North East Electric Company, Rochester, N. Y., presented two reels of motion pictures showing the electric starting, generating and ignition systems of buses.

The business sessions of the Master Mechanics' Association were held in the Terminal Building of the Northern Ohio Traction & Light Company, and this company also furnished a very attractive luncheon at the Portage Hotel, which was attended by the master mechanics and their friends. After the business session was completed, buses conveyed the party through the downtown garage of the company and out to the Kenmore Shops, where demonstrations were given regarding methods used in maintaining buses and also a very complete demonstration of the lacquer painting system. This latter demonstration was given by representatives of the Valentine Paint Company and included the application of all the various coats to an electric car. The car had been previously prepared with sections partly finished, so that the application could be demonstrated in a short time. This demonstration was with the application over old paint, and also included work necessary for patching. The next meeting of the association was arranged to be held in Decatur, Ill., some time in May.

Lacquer Painting Reduces Time Needed for Drying*

By J. S. Spratt
Valentine Paint Company

PAINTING by the nitrocellulose system involves three principal materials, primer, surfacer and enamel—each a nitrocellulose product, engineered to perform correctly its special function and capable of combining the completed system into a perfect whole.

Nitrocellulose primer is a true nitrocellulose material and forms the foundation of the nitrocellulose system. It is a nearly clear material carrying only sufficient finely ground red oxide of iron to enable the operator to see whether or not he has applied an even coat over the entire surface and it possesses adhesive qualities equal to the best varnish or oil type primers. It is furnished ready for application and is applied with a spray gun in a thin, even coat. It is suitable for use on metal of all kinds or wood surfaces. However, on new wood it is necessary first to apply a coat of oil type primer or wood filler such as standard paste wood fillers. This is necessary because lacquers do not penetrate wood, forming only a protective film on the surface, and to prevent moisture creeping into the wood through some break in the film which would cause the nitrocellulose material to peel it is necessary to use a penetrating material of this type.

Nitrocellulose gun glaze or surfacer is the material that might be termed "the keystone of the arch of the complete nitrocellulose system." It clings perfectly to the nitrocellulose primer and forms a perfect surface on which to apply the nitrocellulose enamel. It takes the place of the usual lead, half and half glaze, surfacer or rough stuff and sealer coats, thereby greatly simplifying the system as well as increasing its durability. Nitrocellulose gun glaze or surfacer possesses remarkable filling properties and goes on very smoothly. For use on cars it can be applied to give a sufficiently smooth surface without sanding. However, on buses, or where a perfect surface is demanded, it may be sanded readily to extremely smooth surface. Gun glaze or surfacer may be double or triple coated at one operation, applying more material where surface conditions call for a heavier coat, or it may be applied one coat at a time as desired. It air dries in a few hours at ordinary room temperature, ready for water sanding. Where the surface is not to be sanded, nitrocellulose enamel may be applied within an hour after the application of the last coat of gun glazer or surfacer.

The third and final material of the nitrocellulose system is nitrocellulose enamel. It is applied by the usual spray methods and it will be found that it sprays on very smooth and with quite a sheen. It can be supplied in any color. All nitrocellulose materials are supplied by the different manufacturers in heavy liquid form and should be thinned with solvent to the proper consistency before spraying. This is done for the purpose of avoiding settling, and for this reason the primer is supplied ready to apply as it contains only sufficient pigment for a guide coat.

There are as many kinds of lacquer furnished by various manufacturers as there were kinds of varnish and paint material furnished in the old days, and you will secure as widely varied results as you would from the range of varnish materials.

In the use of nitrocellulose materials I would recommend that you secure the materials for the complete system from one manufacturer, so that they are properly engineered, one material with another, as I believe that this is the only way in which you can secure uniform results.

Standard practice for a complete nitrocellulose system is one coat of primer, two or three coats of gun glaze or surfacer and two or three coats of nitrocellulose enamel. On street cars this entire system can be applied in one day. You can secure nitrocellulose materials which are elastic enough so that if you desire they may be var-

*Abstract of paper presented before the C.E.R.A. Master Mechanics Association, Akron, Ohio, Feb. 11, 1926.

nished over. These materials may also be polished to a very high luster if desired.

Without polishing a complete nitrocellulose system can be sprayed on a 45-ft. street car in approximately fourteen hours. If it is desired to sand the surfacer or gun glaze this increases the total time to an average of twenty hours.

Nitrocellulose materials are nonporous and therefore very easily cleaned, as dirt settling on them does not grind in as it does on varnish and oil enamels. The material becomes extremely hard and each time it is cleaned acquires more luster, so that for a period of time the car is getting brighter, while with the varnish type system it is steadily perishing.

Bus Maintenance an Important Part of the Chicago Operation*

By E. Wooton
Superintendent of Equipment Chicago Motor Coach Company

NO TWO bus properties can be operated exactly on the same principle, nor can the equipment be maintained in the same manner. I think, however, that the operation and maintenance methods practiced in Chicago can be used as a basis. We operate approximately 420 coaches, which are housed in four different garages, besides the central repair shops where all major repairs and painting are carried out. Garage superintendents are held responsible for the mechanical condition of the equipment in their respective divisions. They report direct to the superintendent of equipment, so that each division is on a competitive basis. Each division superintendent has a clerk who takes care of the clerical work, which consists principally of ready reference records of the equipment, gasoline and oil consumption and individual coach mileages. All reports are sent direct to the chief equipment clerk, who examines and files them in proper order, and at the end of the month makes up various kinds of comparative statements.

All coaches are held in for inspection on a 2,500-mile basis and a garage operating 100 coaches will run approximately 10,000 miles a day, which would represent four inspections per day. Two of these inspections would be held during the morning rush, the other 98 coaches would be scheduled for service. All inspections are completed and coaches scheduled for the afternoon rush.

During these inspections units are examined on a regular routine system, and should any of them be found defective or not considered capable of running until the next inspection the unit is removed and replaced with an overhauled one, the defective unit being returned to the central shops for repairs. The mechanics making the inspection have a complete report of the performance of the coach since its last inspection, therefore if any unit has been giving considerable trouble, this report helps the mechanic to form his conclusions. A complete record of all units is kept at the central repair shops, unit change slips being sent through for all units removed from coaches.

Each garage has an auxiliary stockroom which is supplied daily from the central stores. All parts are carried on a maximum and minimum basis, but not in large quantities. For small parts, the minimum number to be carried is placed in a small canvas bag, so that the storekeeper knows, if he has to take the parts from the bag, that he is down to the minimum and should order replacements immediately. For large parts, the minimum number of pieces is tagged.

The inspection system, like that of all other railway equipment, is very important. It enables us to make up an estimated personnel based on an estimated mileage supplied by the transportation department, which gives a predetermined payroll. It assures that every man employed has something definite to do. He is occupied at all times carrying out work which avoids trouble, rather than waiting for trouble to develop in order to remedy it.

We find in most cases where failures occur that on analyzing the cause it was due to some apparently unimportant part failing first. We know that there are certain parts which deteriorate or wear. We will take, for example, the case of a radiator hose. During inspection the man who is accustomed to doing this work can tell very easily whether this connection is capable of running another 2,500 miles. If he is in doubt he will take it off and replace it with a new one, which will probably cost between 40 and 50 cents. If the old one is allowed to run along and give out on the road it would probably mean a ruined engine, and there are many like examples which apply.

Another feature of inspection is that it insures that all parts, such as universals, wheel bearings, etc., are lubricated at regular and proper intervals, which is very important. Do not neglect inspection of a vehicle which happens to be running perfectly to relieve something else which might be tied up, as this will finally spell disaster.

When a coach is held for inspection its oil and gas averages are referred to, as these are a good indication of the mechanical condition of the vehicle. Each division keeps on file a daily record of the gas and oil consumption of every coach, also the miles per gallon. Fuel and lubrication costs are among the highest items and should be watched constantly, coaches with low averages being given special attention.

When considering garage construction, we figure to allow 350 sq.ft. per coach and to build one inspection pit for every 20 coaches. We are very much in favor, where possible, of using the indirect heating system, which has the advantage of supplying a certain amount of circulation, also supplying the heat underneath the engines, where it is most beneficial in extreme cold weather, and can also be used for ventilating in the summer.

The central repair shops in Chicago are entirely self-contained and are connected directly with the purchasing department and the general stores, which is a great convenience, where such arrangements can be carried out. In these shops we maintain all the units, such as engines, clutches, transmissions, rear axles, etc. Schedules are arranged to bring all coaches through the shop once a year, the major work being replacement of panels, painting, etc.. Very little mechanical work is done, since our inspection system at the garages takes care of this work. We feel this is very much more economical than the old system of dismantling the chassis completely once a year, since there are no two units which have the same length of life. By using our present system we obtain the maximum mileage out of each unit before it is repaired.

We employ approximately 100 men at the central shops, which is about one man for each four coaches owned. In figuring space for the central repair shops we feel that about 100 sq.ft. for each coach owned is sufficient.

Through the courtesy of the North East Company, I have been able to obtain the services of D. P. Cartwright, with two of the company's films which

*Abstract of paper presented before the C.E.R.A. Master Mechanics Association, Akron, Ohio, Feb. 11, 1926.

COMING MEETINGS
OF
Electric Railway and Allied Associations

Feb. 24-26—Electric Railway Association of Equipment Men, Southern Properties, Mobile, Ala.

Feb. 25—New England Street Railway Club, Copley Plaza Hotel, Boston, Mass.

March 5 — Metropolitan Section, A.E.R.A., 29 West 39th Street, New York, N. Y.

March 8-11—National Railway Appliance Association, annual exhibition, Coliseum and Annex, Chicago, Ill.

March 9-11 — Oklahoma Utilities Association, annual convention, Mayo Hotel, Tulsa, Okla.

March 12 — Pennsylvania Street Railway Association, annual meeting, William Penn Hotel, Pittsburgh, Pa.

March 17-18—Illinois Electric Railways Association, Illinois State Electric Association and Illinois Gas Association, annual joint convention, Springfield, Ill.

March 23-25—National Conference on Street and Highway Safety, Washington, D. C.

April 13-16—Southwestern Public Service Association, Galveston, Tex.

June 2-4—Canadian Electric Railway Association, annual convention, Quebec, Canada.

Oct. 4-8—American Electric Railway Association, annual convention, location not yet determined.

give some of the elementary principles of the functioning of the gasoline engine and its electrical equipment. These explain several important points.

We have three different classes of motor coach operation, city service, interurban service and long-distance service, each of which is in a class by itself. Since my experience has mostly been in city service, I would strongly recommend that the equipment be constructed with independent units, such as engine, transmission, rear axle, etc., and that these units be built in such a manner that they can be removed quite readily without any undue mechanical work. This is of vital importance in order to keep down the maintenance cost and keep the coaches in revenue service.

American Association News

Uniform Dimensions for Cars Proposed

CONSIDERATION of uniform dimensions for cars was given by the manufacturers' engineering committee in a three-day session at association headquarters, New York, Feb. 15-17. A joint meeting with the committee on unification of car design was held on Tuesday. Those present at the meeting were G. C. Hecker, chairman of the manufacturers' committee, together with J. A. Brooks, C. A. Burleson, and W. J. Clardy; H. H. Adams, chairman of the committee on unification of car design, with the following members: L. J. Davis, H. F. Flowers, C. Gordon, J. W. Hulme, G. L. Kippenberger, C. W. Squier and V. Willoughby. J. A. Brooks of the manufacturers' committee is also a member of this committee.

After a careful study of various car designs submitted by car manufacturers, together with a review of weight, seating capacity, fundamental dimensions and salient features of cars purchased during the last five years, the manufacturers' committee has prepared four drawings embodying dimensions and features which it considered suitable to the requirements of average size city or interurban properties throughout the country.

It was the consensus of opinion that car and electric manufacturers, by agreeing on the general sizes, weights and arrangement of the cars suggested, would be in position to offer to the industry cars of essentially uniform type suited to meet the requirements of the average city or interurban operating conditions. It was thought that such general uniformity would not limit the application of individual initiative in the further development of appearance and structural details that would place each manufacturer's stamp of individuality on his product. The urge of competition, it was felt, would bring about the improvement and development of cars considered necessary from the standpoint of competition with other forms of transportation. The fundamental problem was held to be the construction of cars that would attract patronage and reduce operating cost. Second only to this in importance, it was felt, is that greater uniformity in basic dimensions could be brought about and would result in reducing both the first cost and maintenance cost of equipment.

In discussing the advantages of a general agreement among car builders and electrical manufacturers as to the proper sizes and weights of cars for average city conditions, emphasis was laid on the fact that such general agreement was eliminating much of the present confusion regarding the type of car best suited for service in a given city, particularly on the smaller properties.

For city service, the committee proposed a light weight double truck car arranged for four motors. Drawings of cars for double end and single end operation have been prepared, that for single end operation differing from the other only in the platform arrangement at one end. The car for double end operation is similar to that shown in the 1922 report of the committee on unification of car design with bodies having 10, 11 and 12 windows. The committee recommends arch type roof construction, tapered flush platforms, with a single folding step. The first step is 15 in. and the second 14 in. high. The height from the bottom of the sill over the roof boards is 8 ft. 10½ in., the over-all width 8 ft. 4 in. post centers 29½ in., aisle width 27 in., seat length 35 in. and wheel diameters 26 in.

These cars, with four 25-hp. motors and double end platform type control, together with all safety features, should have a maximum weight not exceeding 32,000 lb. The maximum weight with 35 hp. motors and double end train control with all safety features should not exceed 37,000 lb. In considering weight, the committee felt that in most cases these maximum weights would be materially reduced in cars as constructed.

The truck centers for the ten-window car is to be 16 ft. 6½ in.; for the 11-window car, 19 ft., and for the 12-window car, 21 ft. 5½ in. The wheelbase will vary from 4 ft. 10 in. to 5 ft. 4 in.

Drawings for light weight interurban cars for double end and single end operation similar to that for city service were also considered. These cars will be made for lengths requiring 10, 11 and 12 windows. Provision is made for a smoking compartment, the size of which can be varied by moving the partition a full window length or more. A lavatory can also be incorporated, occupying one or two windows. Other details agreed upon were a plain arch roof, straight flush platforms, with first step 15 in. and second step 14 in., height from bottom sill over roof, 8 ft. 10½ in., over-all width 8 ft. 6 in., post centers 33 in., aisle width 24 in., seat length 35 in., wheel diameter 26 in., length of platform 5 ft. 4 in. The design submitted had sliding doors and stationary steps, but the cars can be equipped with the folding doors and steps without radical changes in the design. Cross seats are provided, with longitudinal seats at the end seating two passengers each.

The interurban cars with four 25 hp. motors and platform control for single unit operation should have a weight not to exceed 30,000 lb. The maximum weight with 35 hp. motors and double end train control should not exceed 37,000 lb.

The committee has also given careful consideration to other types of city cars. It found that the trend of car purchases as shown by the statistical numbers of ELECTRIC RAILWAY JOURNAL show that the single truck car is being bought in decreasing quantities, and that the double truck, one-man, two-man car has become increasingly popular. The committee found that as far as the single truck car is concerned, practically every car builder is prepared to build the standard Birney car or a modified Birney car and they consider that little would be gained by attempting recommendations for a new type of single truck car.

Cars with both center and end doors were discussed by the committee, which brought out the fact that such cars are used on relatively few properties and most of these are large ones. It was also found that in each instance this type of car was designed particularly to meet certain local conditions and that there was practically no uniformity in design adopted by the different properties using them. The decision of the committee was that no single design of center and end door cars could be produced which would meet the requirements of the different properties desiring to use such a car. It was therefore agreed that the committee would not attempt to submit a design for this type of car.

Metropolitan Section Reviews Steel Industry

A TALK on the steel industry, illustrated by six reels of motion pictures, was delivered by George A. Richardson, manager of the technical division Bethlehem Steel Corporation, before the Metropolitan Section of the American Electric Railway Association. The meeting was held on Jan. 5 in the Engineering Societies Building, New York City.

Before the main speaker of the evening. R. F. Carbutt, railway engineer H. L. Doherty & Company, gave a brief report of the Central Electric Railway Association meeting held on Jan. 27 and 28 in Indianapolis. John A. Dewhurst, associate editor of ELECTRIC RAILWAY JOURNAL, also gave a report of the New York Electric Railway Association meeting held at the same time in the Hotel Commodore, New York. A clear note of optimism and a better understanding of the basic problems that have developed was the underlying thought of both meetings.

Despite the severe weather experienced, the membership list has constantly increased from 1,122 reported at the last meeting to 1,168 reported at the meeting of Feb. 5.

The News of the Industry

Fare Question Up

Adjournment Follows Hearing Before Commission on Application for Higher Fare in Utica

Following the introduction of several exhibits setting forth the financial condition of the New York State Railways, Utica lines, and purporting to show the deficits sustained under a 7-cent fare, the railway rested its case on Feb. 17 in its petition to the Public Service Commission for permission to charge a 10-cent cash fare with provision for the sale of ten tickets for 75 cents. An adjournment was taken to March 10 to permit the city to examine the figures presented by the company and to prepare its case in opposition to an increased fare.

COMPANY READY TO CO-OPERATE

Clarence M. Williams, corporation counsel of Utica, announced to the commission that the city had retained Dr. Milo R. Maltbie to aid in the city's case. Mr. Williams asked permission of the company to have Dr. Maltbie examine the books to check the figures, but such consent was refused on the ground that it would delay the proceedings. The company through its counsel, Warnick J. Kernan, promised to supply the city with any information it desired, and Chairman W. A. Prendergast of the commission told Mr. Williams that the commission's accountants were now examining the company's books. Chairman Prendergast said that the full results of the commission's examination would be available to the city.

The valuation claimed for the Utica lines as of Oct. 1, 1925, by the company is fixed at $10,726,427. The company estimated that the proposed fare would yield an additional revenue per year of $96,403. This estimate was arrived at by using the number of revenue passengers carried in 1925, amounting to 16,000,229, and deducting 5 per cent for possible loss in patronage because of the increased fare. Of the 15,200,218 passengers remaining, it was estimated that 20 per cent would pay the 10-cent fare, giving a return of $304,004, and that 80 per cent would use the token fare, giving a return of $912,013. This would yield a revenue of $1,216,017.

EIGHT PER CENT NOT EARNED

The company, through exhibits prepared and sworn to by J. N. Joel, general auditor, claimed that in 1923, 1924 and 1925 it fell considerably short of earning an 8 per cent return on its investment. It alleges that it failed to earn a fair return even on the rate base fixed by the commission, which it contends was far too low, and claims that the earnings would return only about 2 per cent on the present fair value claimed by the company. It was claimed that the earnings fell $32,074 short of earning an 8 per cent return on the commission's rate base in 1923, $105,203 short in 1924 and $102,765 short in 1925.

Mr. Williams stated for the city that he would reserve any rights he might have to question jurisdiction of the commission to hear the increased fare petition. In 1922 a special term of the Supreme Court denied the city a writ of prohibition, but Mr. Williams said that he was not satisfied the decision of the special term was in accord with recent decisions of the courts on the question of jurisdiction of the commission where there are fare restrictions in the franchises of railway companies.

Baltimore Commission Approves Traffic Changes

A definite plan for the rerouting of cars of the United Railways & Electric Company, Baltimore, was adopted by the Baltimore Traffic Survey Commission at a meeting on Feb. 10. The plan approved by the commission is a combination of several lists of proposed changes. It was approved as the plan best suited for all concerned. The next step to be taken is the filing of a detailed report of the changes with the Maryland Public Service Commission. Public hearings will be held and the traffic body will be called upon to show why the changes should be made. It is said that the approval of the United Railways depends upon further action on the part of the commission. In this connection it is pointed out that if cars are ordered off one street and placed on another other traffic should be regulated to take care of the changes. The commission has still to report on vehicular and pedestrian traffic. A report covering these subjects is expected to be completed in March.

One of the most important features of the plan approved by the traffic commission is the removal of all cars from the downtown section of Lexington Street. The other features include the removal of all but one line from Charles Street, removal of one-man cars from the Halethorpe line and other reroutings.

The Baltimore Traffic Commission adopted the proposed changes after an exhaustive survey made by Kelker, De Leuw & Company, Chicago. The cost of the survey is being met by city, state and the United Railways. It was brought about as a result of suggestions that were made at the time the hearings were in progress that were held before the Public Service Commission to fix the valuation of the United's property. Mr. Miles is chairman of the commission.

Fare Plea in Binghamton

Seven-Cent Fare Continued Pending Settlement—Old Dispute On Over Franchise Restrictions

The temporary continuance of the 7-cent fare in Binghamton, N. Y., on the lines of the Binghamton Railway was recently authorized by the Public Service Commission pending a final decision as to the merits of the company's application. As a result a controversy of long standing is waging anew in which the city, the commission, the railway and the courts play prominent parts. On Jan. 30 the city filed a notice of appeal to the Court of Appeals from the decision of the Appellate Division.

The issue goes back to 1919, when the former receiver applied to the old Public Service Commission for an increase in fare from 5 to 6 cents. The city of Binghamton questioned the jurisdiction of the commission on the ground that there were restrictions in the franchises which limited the fare to 5 cents, but the commission overruled the city's objections. The city then applied to the Supreme Court of the State of New York for a writ of prohibition restraining the commission from granting a rate of fare in excess of 5 cents and restraining the receiver from charging a fare in excess of 5 cents. The writ was finally granted and entered on Dec. 17, 1919.

The receiver immediately took an appeal to the Appellate Division of the Supreme Court, but early in 1920, before the appeal could be argued, the Common Council of the city of Binghamton adopted an ordinance authorizing the receiver to collect a 6-cent fare for a period of two years. This ordinance contained a provision which precluded the receiver or the company from prosecuting its appeal while the ordinance was effective. Similar ordinances were subsequently granted covering the years 1923 and 1924.

In 1925 the Common Council of the city granted an ordinance consenting to a 7-cent fare for a period expiring Jan. 15, 1926. This ordinance contained no provision prohibiting the company from prosecuting the appeal from the order granting the writ of prohibition. The appeal came up for argument at the May, 1925, term of the Appellate Division, and a decision was rendered reversing the decision of the lower court and authorizing the prosecution of the original application to the Public Service Commission. The decision of the Appellate Division was based largely upon the ground that the restrictive provisions of the old franchises were intended to apply only to horse cars, and that when the horse car lines became electrified the 5-cent fare limitations contained in the old franchises became ineffective.

Upon the adoption by the Common

Council of the city of each of the ordinances mentioned consenting to a fare in excess of 5 cents for a stated period an order was procured from the Supreme Court holding the writ of prohibition in abeyance for the period covered by the ordinance. An application was then made to the commission for permission to charge the fare permitted by the ordinance for such period. On Jan. 15, 1926, the authorization expired which had been passed early in 1925 by the commission to charge a 7-cent fare under the ordinance.

In view of the decision of the Appellate Division holding that franchises did not limit the rate of fare which might be charged, the company filed with the commission in December, 1925, an application to continue the 7-cent fare beyond Jan. 15, 1926, without asking for any consent from the city. The commission on Jan. 15 granted its temporary order.

Ten Cents in East St. Louis

The East St. Louis Railway, acting under a federal injunction restraining the Illinois Commerce Commission from interfering, advanced the basic fare in East St. Louis, Ill., from 8 cents cash to 10 cents on single fares, effective Feb. 14. The new schedule means single cash fares of 10 cents or five tokens for 40 cents. The old scale was 8 cents for single cash fares or two tokens for 15 cents. The interstate fare between St. Louis, Mo., and East St. Louis and to points beyond East St. Louis will not be affected by the change in the East St. Louis city fares for the present.

The railway took the matter before the federal court after the Illinois Commerce Commission had twice suspended action on the company's petition for increased fares. The company contended that the failure of the state body to take some action on the petition for increased fares was in violation of the United States Constitution. The petition was passed on by Federal Judges Page, Lindley and Evans and the injunction was granted by them on Feb. 5 at Danville, Ill.

The application for increased fares in East St. Louis was first presented to the state commission almost a year ago and final testimony in the case was heard in October.

$5,000,000 Program Awaits Cleveland Council's Action

John J. Stanley, president of the Cleveland Railway, Cleveland, Ohio, says that as soon as the amendments which have been suggested to the Tayler franchise are adopted he immediately will call for the sale of a large block of new Cleveland Railway stock to finance the first portion of the improvements.

The changes are very simple. It is intended to provide a wider range of fare limits to meet contingencies created by unusually expensive operating periods, to increase the interest fund from $500,000 to $1,100,000, and to set up a sinking fund for capital retirement.

The first offer will be to stockholders as usual. But if this fails to provide all the capital needed the amendments make it possible to offer the stock on the open market with a two point discount to encourage salesmanship on the part of banks and bond houses.

First call for stock subscriptions in the improvement program may run as high as $3,000,000, if present shareholders of the company subscribe as much as 10 per cent of their present holdings, and this probably will cover all the work that can be accomplished in 1926.

Here are some of the items in the improvement program:

Four new carhouses, one of the first being a new plant to replace the antiquated Cedar Avenue carhouse.

Rail extensions on Pearl Road to the city limits.

Bus extensions in all outlying parts of the city and the suburbs.

Purchase of at least 100 new cars and as many additional buses.

Beginnings on various new short cuts and private rights of way to speed up service on many congested lines.

Development of multiple-unit train service on heavy main lines.

Experiments with buses and street cars in various rapid transit combinations for express and local service.

The amendments are substantially those proposed last June by the metropolitan transportation commission.

Bay Cities Agitated Over Fare Increases

Recent Increases in Rates Authorized by Commission Result in Hatching of Fantastic Bus-Ferry Scheme—Oakland Commissioner Suggests Survey of Entire East Bay Problem

SHARP attacks are being directed at the California Railroad Commission by clubs and civic organizations of the East Bay as the result of a series of recent decisions raising rates on the Key System Transit Company's lines and ferry and the Southern Pacific ferry and denying the application of a new ferry company which wished to operate between Berkeley and San Francisco.

Berkeley is taking a leading part in the fight, because that city is very much interested in getting the new ferry for autos and pedestrians. Despite the inadvisability of provoking a ferry rate war and with it lower fares, this seems actually to have been the desire of some of the protestants.

The Railroad Commission found, however, that there is no present need for the new ferry, because the public is already adequately served by two competing lines. The commission found further that the new ferry would not lower rates, because the rate schedule filed with the franchise application was higher than on those of the competing lines. This decision, coming on the heels of two denials of rate rehearings requested by Berkeley and Oakland, stirred a storm of protest.

A. O. Stewart, president of the Golden Gate Ferry Company, denied a certificate by the commission, has asked for a rehearing. In the meantime he has suggested to Mayor John L. Davie of Oakland that Oakland and the ferry company go into partnership in a bus-ferry combination, the city of Oakland to finance a bus service to the waterfront and his company to run a ferry service to San Francisco from Oakland. This plan is now being considered by various civic bodies and may be put on the ballot at the next election.

In the meantime the higher rates are in effect on the Key and Southern Pacific ferries and the Key traction system. The Key got its increases as "emergency measures," following a higher wage award to carmen by an arbitration commission. Then, after this raise had been granted, the Southern Pacific requested a separate hearing, at which it demanded higher rates to jibe with those on its rival, the Key system. New rates for the Southern Pacific were approved by the commission and went into effect on Jan. 25.

Officials of Oakland and other East Bay municipalities attended these rate hearings and presented their side of the case. Their contentions were overruled and the increases granted by the commissioners, after due deliberation. Then followed a series of rehearing petitions, all of which were denied.

The plan hatched at Oakland to vote on a municipal bus proposition at the next election has many backers, among them the Mayor and at least one city commissioner. Whether the suggestion would appeal to two-thirds of the votes is doubtful. Taxes are high in Oakland. They went up last fall. Sentiment favors their reduction. A million dollar bus bond issue, such as has been proposed, would undoubtedly raise taxes, and for this reason many would vote against it. The same thing applies to Berkeley and Alameda, which would probably be asked to aid the bond issue. Berkeley is conservative. A municipal bond issue for buses would be unlikely to receive even a majority in that city. Alameda is small and its vote would be unimportant, so far as the general result is concerned.

City Commissioner Frank Colbourn of Oakland has suggested that a survey be undertaken at once of the entire East Bay transportation problem.

Monorail Discussion Revived at Detroit

Discussion of the construction of an elevated monorail system at Detroit has been revived, and a new request of the Michigan Elevated Railway to construct an experimental system has been taken under advisement by the Detroit City Council. Representatives of the company, members of the Detroit Rapid Transit Commission and of the Department of Street Railways were present at a recent hearing at which the proponents of the elevated system stated that the company was prepared to finance the undertaking without assistance. It was also proposed to furnish an indemnity bond insuring the city against expenses and accidents.

Similar requests have been received by the City Council during the past several years and an adverse report was referred to which was made by the Rapid Transit Commission after it had studied the proposed system.

Seven Cents Sought in Elkhart

The Chicago, South Bend & Northern Indiana Railway applied to the Indiana Public Service Commission on Feb. 8 for authority to increase the cash fare on its Elkhart city lines from 5 to 7 cents and to sell tickets at the rate of four for 25 cents. The company sets forth that after the payment of its operating expenses, taxes and paving assessments for 1925 there was a deficit of $10,466 without making allowance for any return on money invested in the local system.

The company says, indicative of the necessity for the rate increase, that since the year 1916 the taxes on its property in Elkhart have increased 141 per cent; that since that year the cost of labor has increased approximately 100 per cent, and cost of material used in the maintenance and operation had increased approximately 85 per cent, that the cost of operating and furnishing that city service had increased approximately 100 per cent, and that in 1925 the railway suffered a decrease of $4,066 in its revenue from the street raliway lines compared with its average revenues for the period from 1921 to 1925 inclusive.

R. R. Smith, vice-president and general manager, said the company was forced to face the fact that it was impossible to continue longer the 5-cent fare in Elkhart. It was hoped the cost of operation would so recede that it could feel justified in continuing the 5-cent fare, but there seemed no likelihood of any recession in prices which would make that possible. He said the increase in the use of the automobile and the bus had seriously affected the earnings of the interurban line. The company published an advertisement explaining the situation.

Increase in Pay for Detroit Shopmen

A flat increase in wage of 5 cents an hour has been granted by the Street Railway Commission in Detroit to about 325 employees of the department's Highland Park shops. The men had asked an increase of 10 cents an hour, free transportation and a week's vacation annually with pay. The requests for free transportation and vacations were denied and the 5-cent increase was granted to the employees. The new scale included those who formerly received 80 cents an hour and those who received less than that rate but had been in the employ of the department two years or more.

A few weeks ago it was announced to the men that they would be permitted to work Saturday afternoons at the old rate of pay, but this arrangement was not satisfactory to them. They wanted an increased wage rate rather than a longer week with its increased amount. Only a few men took advantage of the opportunity at that time. The later recommendation of the general manager of the department that the men be allowed to work Saturday afternoons from Oct. 15 to April 15, if they wish, was adopted by the Street Railway Commission.

New Railway Line for Toronto's Suburbs

A joyous occasion was the opening some time ago of the Weston-Mount Dennis Street Railway under the supervision of the Toronto Transportation Commission, Toronto, Ont. Official ceremonies, followed by a parade, elaborate floats and congratulatory speechmaking, marked the happy day which brought the suburbs of York, Weston and Mount Dennis nearer the realization that some day they will be part of Toronto. The only lugubrious feature of the celebration was the carrying of the corpse of the old Toronto Suburban Railway, which formerly supplied service to these townships.

One hundred and fifty vehicles were in the parade. The line of march was through Mount Dennis to the northern limits of Weston, returning to the boundary line between Weston and York Township, where the official opening was held. A conspicuous part of the parade was on old horse-drawn car labeled "In Service Before 1891." Driving this was James Scott, who has served 33 years with the railway. After the old car came three of the modern red cars of the Toronto Transportation Commission carrying officials.

George S. Henry, Provincial Minister of Public Works, was the first speaker. He said that the occasion marked the passing of another milestone by the metropolitan suburbs of the city of Toronto. The fact that the Toronto Transportation Commission had undertaken to operate the transportation facilities showed the interest the city was taking in the suburbs. P. W. Ellis, chairman of the Toronto Transportation Commission, assured the people that the time would come when they would be part of Toronto. He said: "If a private concern were to take over the transportation it would lose money. But you are a good municipality and have fine borrowing powers. The agreement is fair to both sides."

Continuation Transfers in Irvington Not Needed

Issuance of continuation tickets by the Public Service Railway, Newark, N. J., from short route cars on Springfield Avenue to through cars has been held unnecessary by the New Jersey Board of Public Utility Commissioners. The town of Irvington sought to compel the company to grant continuation transfers without charge. It alleged that a person boarding a westbound car downtown after riding through two fare zones as far as Elmwood loop and desiring to reach a point west thereof would have to alight and pay an additional 5 cents to reach his destination.

The railway said that fare zones had been laid out in accordance with a plan intended to apply to the entire district and that to issue continuation slips would establish a precedent, cause undue hardship to one-man car operations and burden the company financially. It offered in evidence traffic checks to show that between 6 a.m. and midnight on a typical day 190 passengers arrived at the loop on 123 westbound car trips, but that only 24 transferred at this point to through cars.

$10,000,000 for Rolling Stock Suggested for Detroit

Within the next three or four years the Department of Street Railways at Detroit, Mich., should spend approximately $10,000,000 on new equipment and repairs to present equipment. H. U. Wallace, general manager, made this statement before members of the North End Progressive Business Men's Association on Feb. 16. This sum, Mr. Wallace said, could be paid from the earnings of the system without increasing the fare. At least 150 cars are obsolete and should be replaced soon. He said:

> These 150 cars outlived their usefulness long ago. They cannot be repaired and we are forced to keep them in service because we have no others to replace them. There are cars that should be scrapped or rebuilt, and others that should be repaired at once, about 750 in all.
>
> Even the Peter Witt cars are obsolete in some respects. They lack certain safety appliances which I consider essential, and the seats and floors should be changed. The seats are too hard and uncomfortable. We have found that leather upholstered seats have twice the durability of cane upholstered seats.
>
> As for the change in the manner of building floors, the new specifications for street cars call for battleship linoleum floors. These are easier to clean than the present wood slat floors, they add warmth to the cars, they have a better appearance, and they afford better footing for passengers in wet weather.
>
> It would not, however, be necessary to scrap these cars. They could be rebuilt and repaired.

An Exhibit that Appeared in the Line of March at Toronto

Wage Agreement in Cedar Rapids

Negotiations over the wage scale of railway operators employed by the Cedar Rapids & Marion City Railway, Cedar Rapids, Iowa, came to an end recently when the carmen agreed to renew a trial agreement of six months ending July 1, 1926. On that date they will get an increase of 2½ cents an hour, providing the company's revenues come up to the estimates made last summer in the city audit. If the increase is granted, it will be retroactive to Jan. 1, 1926. A similar agreement was made last July, but the company opened its books to show that business had not been as expected when higher fares were granted by the city and when the men were given one raise of 2½ cents last summer. The top scale is 52½ cents an hour for the carmen.

Pension Plan Under Consideration in Portland

At the annual banquet of the "Twenty-Year Club" of the Portland Electric Power Company, Portland, Ore., it was found that twelve of those present, including President Griffith, belong to the still more exclusive group known informally as the "30-year men." The combined years of service of the 278 members aggregate 6,661 years, and more than 50 new members have been added during the past year. The first woman to be admitted is Miss Annie I. Warnock, since 1906 assistant paymaster of the company. In two instances father and son are represented in the club, each having been with the company for 25 years.

Official announcement was made at the meeting by Franklin T. Griffith, president, that a general plan for an employees' pension system was under consideration by the company.

Philadelphia Will Not Appeal Fare Decision

City Solicitor Gaffney of Philadelphia, Pa., declared on Feb. 9 that no appeal would be taken by the city in the Philadelphia Rapid Transit Company fare case, in accordance with instructions received from Mayor Kendrick.

Mr. Gaffney said the city in its attack upon increased fares had for its objective the reduction of the company's operating expenses. He said that in a printed brief it had got together testimony in support of a drive principally against the amount of $8,560,400 set up each year since 1921 for maintenance and renewals, the 77 cents an hour wage payment and the federal income and other taxes.

The commission rejected the city's contention relative to the first two items and found in favor of the company. The reasoning of the commission in support of its findings, he said, had not shaken the conviction of the city in the soundness of its own contention. He referred to the case of the City of Scranton vs. the Public Service Commission, in which the city of Scranton appealed the decision of the commission. Mr. Gaffney quoted in part what Judge Porter said in this case: "We are of opinion, after mature consideration, that we are without authority to set aside a finding of fact by the Public Service Commission which is supported by substantial evidence where no constitutional question is involved." Mr. Gaffney said that that case had been followed and approved in a number of later cases.

The United Business Men's Association, which was a protestant in the fare case, has decided that it would not appeal the decision of the Public Service Commission in upholding the Philadelphia Rapid Transit Company's petition for maintenance of the 7½-cent fare.

Suburban Passenger Report at New York Due Soon

Governor Smith of New York has signed the Webb bill as Chapter 2 of the laws of 1926, extending to March 15, 1926, the time in which the commission created in 1925 to investigate and report upon the suburban passenger transportation problem of the city of New York must report to the Legislature.

Waukesha-Milwaukee Franchise Approved

The public utilities committee of the Common Council of Milwaukee, Wis., recently approved the application of the Milwaukee Electric Railway & Light Company for a franchise to operate the new Waukesha-Milwaukee high-speed electric line. A dispute was in progress for some time between the company and the City Council over the legality of this new high-speed line. After the company had secured a certificate of convenience and necessity from the commission, the city said that a franchise was necessary in view of the fact that the line would block numerous streets in the city. The company argued that the new line was in reality an extension of the present Clybourn Street line, and would be entitled to operate under the franchise granted in 1910. The company has not yet signified whether it will accept the grant.

Reorganized Company in Ohio Resumes Operations

The Nelsonville-Athens Electric Railway started operations on Feb. 8 between Nelsonville and Athens, Ohio. This is the new company which grew out of the reorganization following the abandonment of the Hocking-Sunday Creek Traction Company. This line had been in receiver's hands for months and was out of operation for weeks. It was sold late last year to E. B. Young, former general manager of the company, for $41,500. At that time the bondholders purchased the railway through Mr. Young, who said that he would resume operation of the system.

The company will operate a bus line as an auxiliary to the traction line. Buses will meet each interurban car and operate over a scheduled route in the city of Athens, Ohio, thereby giving hourly service over the principal streets of the city.

Service in Syracuse Explained

Education of the public to a realization of the company's imperative need of greater revenue by an increase in fares in Syracuse, N. Y., has been undertaken by the New York State Railways. The company has a petition before the Public Service Commission asking for a 10-cent cash fare rate and a rate of 7½ cents for ticket riders.

The advertising campaign which the company is promoting consists of a series of statements designed to arouse interest in the public utility.

One of the advertisements consisted of a condensed financial statement for the three years ended Sept. 30, 1923, 1924 and 1925. In 1923 the company had a shortage of $404,013. In 1924 it was $387,522, and for 1925 $388,543. One of the advertisements says in part: "A shortage of $1,180,079.42 in three years. How would you like to run a business that couldn't make a reasonable profit? In the face of these figures we believe that you will agree that your trolley company is giving far more than ordinary public service." In other statements the company has explained its business in detail, what the cost of public improvements meant, how much it cost to maintain service, how much of the fare goes for wages, and other pertinent questions.

Tired of Playing Tacoma Mayor's Game

The Puget Transportation Company, operating buses in Tacoma in competition with the lines of the Tacoma Railway & Power Company, at a recent meeting of its board of trustees, defied Mayor A. V. Fawcett to make good his reported threat to revoke the bus permits issued the company. The action is a step in the quarrel between the Mayor and the bus company, declared by company officials to be a political move on the Mayor's part. George Vandeveer, attorney for the company, charges the Mayor with a plan to purchase the Tacoma railway for the city and of using the company as a club to beat down the price of the street railway system. The trustees of the bus company state they will continue to operate the buses as long as it is possible, in the hope of salvaging something for the stockholders.

Utah Association Does Work of Mercy

The Traction and Power Mutual Aid Association, a body composed of employees of the Utah Light & Traction Company, the Utah Power & Light Company, Phoenix Utility Company and Western Colorado Power Company, held its annual meeting on Dec. 16, 1925, at Salt Lake City and elected officers for the ensuing year. The secretary's report showed that the association paid death claims of $6,000 during the year 1925, and for sickness, accidents and service refunds the sum of $4,656. A surplus of $14,303 was divided among the members in the usual form of a Christmas dividend of $15 each for twelve months membership and fractional time at the same ratio, 979 members participating in this.

Interurban Station Ordinance at Kansas City to Be Rescinded

At a meeting of the City Council of Kansas City, Mo., on Feb. 8 an ordinance was introduced into the lower house of that body with a view to repealing the franchise of the Central Interurban Station Company. The repeal ordinance was referred to the conference committee.

The original franchise, granted on Jan. 9, 1918, provided for a union interurban station at the northeast corner of Tenth and McGee Streets. The building was to have been a combined station and office building to cost $3,000,000.

Work on the proposed structure was to have been started by the station company within one year of the granting of the franchise. Two of the interurban companies which were to have participated in the plan met later with financial difficulties and the Kansas City Railways was placed in receivership. Officials of the terminal company secured two extensions of the time limit passed by the city fathers, but continued financial obstacles and the advent of many bus services, both in the city and between it and other cities in this vicinity, gradually caused the dream of the central interurban station to fade almost beyond recall.

In an interview several month ago, C. C. Peters, president of the company, admitted the improbability of the project's ultimate consummation, due to the much-altered general conditions in this section since the World War.

A part of the ground which was to have been the site of the station has been leased by the company during the last several months for a parking station, at an annual rental said to be little more than enough to pay the taxes and interest on the realty. No announcement has been made of plans for selling the property, in the event the franchise is repealed.

Rhode Island Railway Seeks Market for Surplus Power

In a bill filed with the Rhode Island Legislature authorization is asked for the incorporation of the United Electric Power Company at a nominal capitalization of $100,000. According to the petition, the new corporation would take over the power house and transmission lines of the United Electric Railways, Providence, and provide for the power requirements of electric railways, lighting, transmission and manufacturing purposes. The incorporators are Albert E. Potter, president of the United Electric Railways; Zenas W. Bliss, George H. Newhall, Harvey A. Baker, Ralph S. Richards, Edward B. Aldrich, J. Cuncliffe Bullock and Harold J. Gross, all directors of the United Electric Railways.

Bond Legislation Likely in New York

It seems likely that the Legislature will pass at the present session an amendment to the Constitution giving to New York City an exemption from its debt limit of $300,000,000 which may be raised by bonds for the building and equipment of subways. The original proposition was for an exemption of $275,000,000, but the legislative leaders are inclined to go a step further and give an additional $25,000,000 exemption. The measure will have to be repassed by the Legislature of 1927. It can then be submitted to the people and the money made available under its provisions for construction work in 1928.

Increase in Fare Sought in Albany

The United Traction Company, serving the cities of Albany, Troy, Watervliet, Rensselaer and Cohoes, N. Y., has filed application with the Public Service Commission to increase its fare from 7 to 10 cents, with the sale of thirteen tickets for $1. Hearing on the application will be announced at an early date.

Discussion of New Franchise in Richmond, Va., Renewed

Negotiations are being conducted between the City Council in Richmond, Va., and the Virginia Electric & Power Company for a blanket franchise covering all of the lines operated by that company. Some of the franchises which the company now has it considers perpetual. Others run to 1940. One expired on Jan. 1. It is the purpose of the company and the city to try to draft in conference a complete franchise satisfactory to both. One objection to some of the present franchises is that they specify the routes. Some also specify the headway. These conditions have prevented the company from improving the service as much as it otherwise might have been able to do. If the new franchise goes through, the company will probably reroute its cars down town and extend some of its rail and bus lines.

The law requires new franchises to be offered at public auction, but it does not require the city to accept the highest bid. The city is permitted to accept the bid it considers best for the city from every point of view.

News Notes

Will Rehear Fare Application.—The Pacific Electric Railway has been granted a rehearing by the Railroad Commission on its application for an increase in railway and motor coach fares in the city of Pasadena, Cal. The rehearing will be held before Commissioner Seavey in the court room of the commission at Los Angeles on March 16.

Pass System in Effect.—The Kingston, Portsmouth & Cataraqui Electric Railway, Kingston, Ont., started selling the first of the year a weekly pass for 75 cents.

One Day Off Bill Reappears.—Under the provisions of a bill introduced in the New York Senate by James L. Whitley, Republican, of Rochester, in which city the traction and bus company are operating under a service-at-cost-plus plan, the railroad law is amended to require operators of street surface railroads, trackless trolley or omnibus lines in cities or villages to give employees one day of rest in seven.

New Paper Appears.—The Jacksonville Traction Company, Jacksonville, Fla., started recently the publication of a pamphlet called the "Palm Leaf." It is to be issued every month for the benefit and entertainment of the employees. E. Q. Brown is editor.

Change in Name Desired.—At a recent special meeting held in Cleveland the directors of the Northern Ohio Traction & Light Company, Akron, Ohio, voted to change the name of the company to the Northern Ohio Power & Light Company. The action must be ratified by stockholders and a special meeting to act on the recommendation has been called for March 15.

Wages in Spokane Increased.—J. E. E. Royer, assistant general manager of the Spokane United Railways, Spokane, Wash., recently announced that an increase of pay for 218 railway men had been granted by the company to date from Feb. 1. The plan of the company to increase the pay of its street railway operating force came out in the hearing of the street car fare increase at Olympia, when officials of the company testified that $26,000 had been set aside for that purpose in the 1926 budget, or approximately $10 per month per man on an average. Mr. Royer said that the men were entitled to share in the fare increase; that the public had accepted the increase without protest and it was well that it should know that the men are to get a share of the slight addition to the fare. The fare settlement has been referred to in these pages.

Ten Cents in Belleville Allowed.—Efforts of City Attorney L. N. Perrin of Belleville, Ill., to prevent the East St. Louis & Suburban Railway from collecting a 10-cent fare on its cars in Belleville failed on Feb. 9 when United States Judge Lindsey in Chicago overruled a motion of the city for a modification of an injunction granted to the company several years ago. The injunction restrains the Illinois Commerce Commission from interfering with the rate charged by the company. The state commission was restrained on the grounds that the restrictions placed by the commission were confiscatory and in violation of the constitutional rights of the company. On Jan. 24 the fare in Belleville was advanced from 7 cents to 10 cents over the protest of the city officials. The city had sought to reopen the injunction case on the ground that the character of the company's business had changed since the granting of the injunction due to an extension of the Belleville city limits.

Refuses Request for Terminal.—The City Commission of Trenton, N. J., has refused the request of the Public Service Railway to establish a trolley terminal at Liberty and Adeline Streets to relieve traffic conditions at State and Warren Streets, more than a mile away. The refusal of the commission was based on the likelihood that traffic would become congested at the proposed new terminal.

Recent Bus Developments

Irresponsible Bus Operators in Massachusetts Must Go

Acting under the new law of 1925, which gives it jurisdiction over buses, the Massachusetts Department of Public Utilities has prepared a tentative draft of rules and regulations which will cover all the operations of the passenger-carrying buses in the state. This draft will be submitted to the interested parties for suggestions and criticisms and a public hearing on it will be given at the State House on Feb. 24. In brief, the commission takes control over the licensing of the buses, will require the filing and publishing of rates, will prescribe definite routes for all buses and will require a timetable, just as is done in the case of railroads and electric railways.

Every owner of a bus or buses to be operated in the public ways in Massachusetts, and doing an intrastate business either in whole or in part, will be required to obtain licenses and meet the bond and other requirements of each city and town in which they operate. A permit from the Division of Highways and a certificate of public convenience from the Department of Public Utilities will also be required.

The schedules to be filed must show the regular starting time, the time for passing certain points en route and the time of arrival at the terminal, and the rules say that no schedule shall be provided or maintained which will require unsafe and unreasonable speed. The rules will hold the buses to the schedules and to the defined routes, and if a bus fails to operate for a certain length of time it automatically loses the license.

The rules prescribe dimensions and weight of the buses, the strength of the cars, what the reserve equipment shall be, the degree of maintenance, and the condition of the equipment, types of tires, diagram of gear shifts and hours of service.

The regulations go into the subjects of conduct by the operators, application of the rules and penalties.

The rules will not be put into final form until after the public hearing. They are the first rules proposed for the control of the jitney or bus business in Massachusetts.

Bus Lines in New York City by July 1

Another step in the plan for New York City-wide bus operation was mounted on Feb. 17 when an amicable agreement was reached by the subcommittee of Mayor Walker's transit conference on the bus routes. Speaking for the sub-committee, which includes members of the State Transit Commission and the Board of Transportation, Joseph V. McKee, Aldermanic President, announced his belief that franchises for bus lines in all the boroughs would be awarded by the Board of Estimate within a few weeks so as to give the successful bidders sufficient time to acquire equipment to be placed in service on July 1, the date on which Mr. McKee believes city-wide bus operation can be effectively realized. This belief he announced at the close of a conference held in the City Hall, in which the Board of Transportation was represented by Commissioner Daniel L. Ryan and the Transit Commission by Commissioner LeRoy T. Harkness.

The routes, numbering 55 in four boroughs, will first be presented to the Mayor's transit conference and later to the Board of Estimate for official adoption. The President of the Board of Aldermen said that the routes adopted by the committee followed closely those recommended in the latest report by the Board of Transportation, of which John H. Delaney is chairman, together with the incorporation of certain of the modifying suggestions made by the Borough Presidents for routes in their respective boroughs. He intimated that while it might be found necessary to incorporate in the scheme some minor alteration, the principal features of the routes as suggested by the Board of Transportation had found favor with all in the "get-together" conferences.

With an agreement on routes assured, the question of franchises and general operating policies will be taken up. The problem, in Mr. McKee's opinion, lay in determining upon a policy of awarding borough-wide franchises for the most part or of awarding franchises for only partial borough operation to individual bidders.

Thirty-five-Mile Bus Line Proposed in New York

The Buffalo & Erie Coach Corporation a subsidiary of the Buffalo & Erie Railway, proposes to operate buses between Jamestown and Westfield, N. Y., over a route now served in part by a line of the Chautauqua Traction Company soon to be abandoned by permission of the State Public Service Commission. The proposed line would be 35 miles long. The bus company will apply for franchises at once to the Jamestown Council, it was announced, following a conference on Feb. 8 at Jamestown of citizens, representatives of the Broadhead traction interests and of the Buffalo & Erie Railway. The corporation agrees to carry no local passengers within Jamestown and between Jamestown and Asheville or intermediate points, this territory to be served by the Jamestown Street Railway, a Broadhead Corporation, when the Chautauqua Traction Company ceases operation.

Higher Fares Allowed. — Increased fare schedules have been ordered by the Indiana Public Service Commission for the bus line operated by the Chicago, South Bend & Northern Indiana Railway, South Bend, Ind., and a suspension of service was authorized on part of the line where losses have occurred. The new fares are based on a rate of 3 cents a mile.

Buses Suggested for Relief.—The use of buses to supplement the Municipal Railways of St. Petersburg, Fla., was recommended recently to the City Commission by R. E. Ludwig, director of public utilities. Mr. Ludwig advised the purchase of a fleet of buses to relieve street car congestion during the remaining months of the winter. Meanwhile the railway is being extended.

Competing Buses Removed. — Bus competition with the Weston-York Township-Toronto electric railway line operated by the Toronto Transportation Commission has been discontinued by official order as far as buses operating between Weston and Toronto are concerned. However, a bus line giving a service parallel to the railway from Toronto to a short distance outside the city limits continues in operation. The opening up of the Weston-York Township line has been referred to in these pages.

Buses Authorized in Fort Worth.— The City Council of Fort Worth, Tex., has adopted an ordinance by unanimous vote authorizing the Northern Texas Traction Company to operate buses in Fort Worth in connection with its railway system. No restrictions were imposed on the routing of the buses in view of the fact that their operation is an experiment.

Seeks New Bus Franchise. — The United Traction Company, Albany, N. Y., is seeking a franchise from the Albany Common Council to operate a bus line over New Scotland Avenue. An ordinance has been introduced in behalf of the company. The action of the Common Council must be confirmed by the Public Service Commission. The Albany Transit Company, an independent, is seeking a franchise to operate over the same avenue.

Supplementary Service Under Consideration.—The Birmingham Electric Company, Birmingham, Ala., is contemplating the operation of a number of modern passenger buses to supplement its railway service in several sections of the city. One of the proposed lines would run from East Lake to Huffman, replacing the Roebuck car line, while another would extend from Fairview to Bellview Heights. The matter is now being considered by the City Commission.

New Line in Burlington.—The Iowa Southern Utilities Company will start a temporary bus service in the spring following the authorization to establish a bus line in Burlington, Iowa, to supplant the present South Hill street car line. New buses, of the type now used on the Agency and Mount Pleasant-Bluff road lines are to be ordered, John H. Chase, resident manager, announced. It is said no further replacement of street car lines with buses is contemplated at this time. The company will remove its tracks and pay $12,000 in a series of installments to the city for relieving it of the responsibility of replacing the pavement.

Financial and Corporate

Milwaukee Does Well

$513,110 Increase in Net for 1925—Bus Earnings Represent Substantial Part of Transportation Revenue

Operating revenues of the Milwaukee Electric Railway & Light Company, Milwaukee, Wis., from transportation of passengers, freight and express for the year ended Dec. 31, 1925, were $10,615,589, an increase of 2.17 per cent over the year 1924.

Operating revenues of the electric and heating departments were $13,377,063, an increase of 9.92 per cent over 1924.

The percentages of operating revenues of the various utilities appropriated for maintenance and depreciation of physical property were as follows:

	Per Cent
Railway	23.07
Electric light and power	12.34
Heating	17.96

Net income available for the payment of dividends was $2,838,831.

Net capital expenditures for additions to and betterment of property during the year were $4,536,653, after deducting replacements and property withdrawn from service. The principal items have been summarized by the company as follows:

Railway utility	$1,373,212
Electric and heating utilities	1,143,357
Power and miscellaneous	2,020,083

Expenditures in the railway utility include principally the addition of new track at the end of the Vliet Street and First Avenue lines, betterment of approximately 13 miles of track in the city and suburbs of Milwaukee, including heavier type of construction to meet the heavier present-day traffic conditions.

The company acquired a private right-of-way from 35th Street and St. Paul Avenue in a general westerly direction through the Menomonee Valley and the town of Wauwatosa to connect with its present Watertown interurban line at a point just east of the Northwestern belt line crossover in the town of Greenfield. Grading work has been started and some trestle work erected. This improvement, when completed, will permit of a more direct route to the Land O'Lakes over the Waukesha-Oconomowoc-Watertown interurban line and will considerably shorten the schedule running time.

Nineteen new buses were acquired for passenger service on the Wisconsin Motor Bus Lines.

The company purchased a 99-year leasehold and option to purchase on property situated at the southeast corner of Sycamore and Second Streets, directly east and across the street from the Public Service Building. With this acquisition the company now controls a valuable site, which, at present, is being used as a central parking station in connection with the operation of its bus service.

During the year the company continued to obtain a substantial amount of its capital requirements from the sale of preferred stock offered to investors through its securities department.

At a special meeting held Dec. 21, 1925, the stockholders approved the recommendations of the directors that the authorized capital stock be increased from $40,000,000 to $80,000,000, to consist of $40,000,000 preferred capital stock and $40,000,000 common capital stock and that the par value of the common capital stock be changed from $100 a share to $20 a share.

Subject to the approval of the Railroad Commission the directors authorized the issue of $4,000,000 par value of additional 7 per cent preferred stock, of which $700,000 was issued to acquire the capital stock and notes of the Wells Power Company. Of the total amount of $11,000,000 of 7 per cent preferred stock now authorized, $6,896,900 had been issued and was outstanding as at Dec. 31, 1925, and $803,100 par value additional had been subscribed for on the installment plan. The company now has approximately 12,000 holders of its preferred stock, exclusive of subscribers to stock on the installment payment plan.

The only financing done by the company during the year 1925 consisted of the issuance of $1,696,700 par value of 7 per cent preferred stock placed for cash at par. The net additional 7 per cent preferred stock subscribed for under the installment payment plan during the year was $504,800; $150,000 of 5 per cent serial notes matured on July 1, 1925, and were paid; $225,000 of refunding and first mortgage bonds were retired during the year through sinking funds; $6,500,000 of consolidated first mortgage 5 per cent bonds matured on Feb. 1, 1926, and were paid, the cash required therefor having been obtained by the issue and local sale of preferred stock, the purchase of $3,750,000 par value of additional common stock by the North American Edison Company and by cash advanced by the latter company.

At a special meeting held on March 23, 1925, the stockholders voted to accept the "service-at-cost and municipal contract" ordinance passed by the Common Council of the city of Milwaukee on March 2, 1925, and accepted by action of the board of directors of the company on March 9, 1925. This ordinance was approved by the Railroad Commission on March 24, 1925. At the special election held April 7, 1925, the ordinance was defeated by referendum vote of the electorate of the city of Milwaukee and finally rejected.

It is explained that in the transportation revenues of the company there is included a very substantial amount derived from bus operation.

William W. Coleman, Milwaukee, has been elected a director and member of the executive and finance committee to fill the vacancies in these offices created by the death of John I. Beggs, former president of the company.

STATISTICS OF RAILWAY OPERATION AT MILWAUKEE

	1925	1924
Miles of track owned	419.28	418.72
Miles of track leased	1.90	1.56
Miles of revenue track operated	391.49	391.08
Revenue passengers carried	150,591,216	150,857,684
Transfer passengers carried	53,635,554	52,306,065
Per cent transfer to revenue passengers	35.61	34.67
Receipts per revenue passenger	$0.0677	$0.0664
Number of passenger cars owned	861	870
Number of passenger motor buses owned	124	107
Kilowatt atstion demand (railway and light)	166,200	146,900

INCOME ACCOUNT OF THE MILWAUKEE ELECTRIC RAILWAY & LIGHT COMPANY

	1925		1924	
Operating revenues		$23,992,653		$22,559,912
Operating Expenses:				
Ordinary operating expenses	$14,415,619		$14,169,176	
Depreciation (reserve credit)	1,847,077		1,627,102	
Taxes	2,160,755		1,757,306	
Total operating expenses		18,423,452		17,553,585
Net operating revenues		$5,569,200		$5,006,327
Non-operating revenues		357,675		252,884
Gross income		$5,926,875		$5,259,211
Interest Charges:				
Interest on funded and unfunded debt	$2,574,457		$2,454,117	
Interest on depreciation reserve balances	471,814		438,978	
Interest on other reserve balances	41,772		40,393	
Total interest charges		$3,088,043		$2,933,489
Net income		$2,838,831		$2,325,721

Gross Off, but Net Larger, in Indianapolis

Gross earnings of the Indianapolis Street Railway, Indianapolis, Ind., in 1925, the first full calendar year in which a 7-cent basic fare prevailed, were $51,806 less than in 1924. This was made plain in a report for the twelve months filed on Feb. 13 with the Indiana Public Service Commission. The gross last year was $5,536,369. The shrinkage is attributed to increased bus competition and a substantial decline in the total number of passengers carried owing to unfavorable industrial conditions experienced for a part of the year.

Despite the lower gross revenue, however, the report shows a net revenue of $487,741 for the year. In 1924 the net revenue was $484,965. Operating expenses were lower last year than in

EARNINGS OF THE INDIANAPOLIS STREET RAILWAY

	1925	1924
Gross earnings	$5,536,369	$5,588,176
Operating expenses	4,032,821	4,083,749
Net earnings	$1,503,548	$1,504,427
Taxes	$386,624	$384,354
Fixed charges	629,182	635,107
Net revenue	$487,741	$484,965
Sinking fund	$146,566	$130,000
Dividend paid	150,000	300,000
Dividends accrued—not paid	150,000	.....
Total deduction	$446,566	$430,000
Surplus	$41,175	$54,965

1924. Two quarterly dividends during the year were deferred. A condensed statement for the two years is presented in the accompanying table.

Rehabilitation of Detroit United Makes Progress

No financial statement has been issued by the receivers of the Detroit United Railway, Detroit, Mich., for the year 1925. It is probable that some report will be made to the creditors, but the stockholders do not now figure to any extent since their failure to finance the reorganization. Reports have been made for various committees, including those representing the bondholders, but no complete financial report has been issued. Progress in rehabilitating the system is reported by the Security Trust Company, Detroit, receiver. Economies in operation are being effected, but no prophecies are made about the outcome. Rumors of reorganization plans are heard, but nothing definite has materialized.

Another St. Louis Reorganization Move

Rolla Wells, receiver of the United Railways, St. Louis, Mo., on Feb. 13 applied to the United States District Court for permission to enter into a contract with the reorganization committee for the railway whereby $4,200,000 of receiver's certificates will be paid in full in cash and $4,100,000 of underlying bonds will be exchanged for general 4 per cent bonds.

The plan is to have the receiver pay $2,300,000 in cash and the reorganization committee $1,900,000 to take up the receiver's certificates. The underlying bonds would be surrendered by the present holders in exchange for 4 per cent bonds. The reorganization committee would receive $6,000,000 in general 4s for its cash and the underlying bonds to be taken up. There are now outstanding $30,300,000 of the general 4s.

The question of issuing the $6,000,000 of additional general 4s held up the reorganization of the company. There was a serious question about exchanging the underlying bonds for general 4s, but Sam Mitchell, counsel for the bondholders of the St. Louis Transit Company, recently told the court that this objection had been removed. The application of Mr. Wells substantiates Mr. Mitchell's statement. It also indicates that the railway properties will shortly be foreclosed under the $9,790,000 transit bond issue.

The receiver regards it as for the best interest of the company that an early reorganization be brought about and adds that a plan for a friendly foreclosure under the transit company 5 per cent mortgage has been arranged by financial interests of the company.

Outstanding underying bonds due since Oct. 1, 1923, include $1,474,000 of Lindell Railway, $1,640,000 of Cass Avenue & Fairgrounds and $986,000 of Merchants Terminal Railroad.

Disposition of Ohio Interurban Undecided

Sale of the electric light and power properties of the Cleveland, Painesville & Eastern Railroad, Willoughby, Ohio, to the Cleveland Electric Illuminating Company, noted in the ELECTRIC RAILWAY JOURNAL for Jan. 23, page 174, naturally provoked questions about the probable disposition of the railway. It is understood now that this is a matter still to be decided. It will probably not work itself out until later. The electric light and power service was the more profitable of the two operations of the company. Since this end of the business has been sold it will remain for future developments to determine whether or not the railway service is to be continued. The railway operates 38 miles of track.

Commission Authorizes 13 Miles Abandoned in Chautauqua

The Public Service Commission on Feb. 5 authorized the Chautauqua Traction Company to abandon that part of its route between Ashville and Mayville, Chautauqua County, a distance of 13.4 miles. Two short sections of track of this company are to be retained, one section, from Lakewood to Ashville, being transferred to the Jamestown Street Railway and the other, in the village of Westfield, being transferred to the Jamestown, Westfield & Northwestern Railroad. The opinion of Commissioner Pooley, who heard the case, points out that the road has sustained substantial losses in every year since 1909, and it has not earned operating expenses in any year since 1918.

He said further that in the last abandonment proceeding it was claimed that the interests controlling both the Chautauqua Traction Company and the Jamestown, Westfield & Northwestern Railroad were diverting business from the traction company to the railroad, and while this claim was not made in this proceeding, the commission was in receipt of communications to that effect, with the intimation also that these companies were not receiving all revenues to which they were entitled by reason of the issuing of passes for free transportation to various persons. The commission has considered the facts and the evidence taken shows that the railroad has not been, and is not, earning its fixed charges; the deficit for the past two years being approximately $50,000 a year. As to free transportation it was shown that at the time the properties came under the control of the representatives of the estates of Messrs. A. N. and S. B. Broadhead, 120 passes were outstanding. This number has since been reduced to 40, and passes have been strictly confined to those who may receive them under the statute.

Syndicate May Purchase West Milton Line

A syndicate composed of residents and shippers living along its route is being organized to purchase the Dayton, Covington & Piqua Traction Company, West Milton, Ohio. The line was offered at a receiver's sale recently and no bids were made. The lowest bid possible for the line, which is 30 miles long, was fixed at $150,000. The syndicate, it was said, contemplates making arrangements with the special master in the receivership, and a new minimum rate may be set. Sale of the line must be approved by Federal Judge Smith Hickenlooper of the Southern district of Ohio before the sale can be consumated.

The commission authorized abandonment of the line a few months ago. In its petition for abandonment the company declared it had been operating at a loss due to automobiles and buses cutting down the patronage.

Receivers Sought for Rockford Properties

Suit for the appointment of a receiver for the Rockford & Interurban Railway and the Rockford City Traction Company, Rockford, Ill., because of non-payment of interest on bonds, has been filed by trustees on demand of the bondholders. The Union Railway, Gas & Electric Company is named a party to the bill. The petitioner is the Continental & Commercial Trust & Savings Bank, Chicago, trustees. The petition is returnable to the April term of court.

The two lines are subject to liens secured by bonds to the amount of $1,650,000. The first issue was in 1902 of $800,000 for construction of the railway and a further issue of $1,459,000 was made for equipment. From earnings, $574,000 bonds were purchased and set aside from time to time as a sinking fund. The entire issue was payable on Oct. 1, 1922, but an extension was arranged until Oct. 1, 1930, all holders, except those whose bonds totaled $32,000, accepting.

At that time, to prevent foreclosure proceedings and the loss of $400,000 of notes held against the company for equipment, the Union Railway, Gas & Electric pledged certain securities. These included notes for $83,675 and an open account for $374,857. Under the agreement for the extension, provision was made for annulment in case the company, as a party to it, did not pay the interest on the bonds. Payments were made until April, 1925, but in October of that year payment was again passed.

The Continental & Commercial Trust & Savings Bank, which is bringing action, has resigned as trustee for holders of the bonds against the interurban lines. The company, however, is still trustee for a $1,650,000 bond issue. In the name of the holders of these

bonds it is instituting the action. The bonds, originally issued to cover local properties and the Belvidere interurban line, also are a lien against the Rockford & Freeport and Rockford, Beloit & Janesville lines to the amount of $1,250,000, but no action is instituted in this case.

$99,929 Surplus at Pittsburgh

For the year recently closed the Pittsburgh Railways, Pittsburgh, Pa., reports a surplus of $99,929. Car riders last year paid an average of 5.77 cents for each ride, according to the railway. This compares with 6.62 cents as average fare for 1924. Weekly, Sunday and holiday passes were largely responsible for this reduction, and in the closing months of 1925 the average fare received was almost 29 per cent less than that for the same period the preceding year.

$1,700,000 in P. R. T. Certificates

Equipment trust certificates of the Philadelphia Rapid Transit Company, Philadelphia, Pa., to the amount of $1,700,000, bearing interest at 5 per cent and priced to yield about 4.75 to 5.35 per cent, are being offered by Dillon, Read & Company, New York. These certificates, known as equipment trust, series J, are issued under the Philadelphia plan and will mature in equal annual installments from Feb. 15, 1927, to Feb. 15, 1936. The purpose of the issue is to pay in part for new equipment to be constructed at a total of not less than $2,283,750. The equipment includes 50 standard double-truck vestibule street railway passenger cars, 75 double-deck motor coaches and 60 single-deck motor coaches. The par value of the certificates will represent less than 75 per cent of the cash cost of the equipment. Some facts about this equipment were given in the ELECTRIC RAILWAY JOURNAL, issues of Feb. 6 and Feb. 13.

Long Island Lines to Be Sold

The New York & Long Island Traction Company, New York, N. Y., will be sold at public auction at the County Court House at Mineola, L. I., on Feb. 25, following a ruling of the Supreme Court of Nassau County in pursuance of a judgment of foreclosure and sale brought by the Union Trust Company as trustee plaintiff. The property will be sold in five parcels, including franchises, rolling stock, real estate and certain trackage rights and personal property. The sale will also include the Long Island Electric Railway, which company is also controlled by the Long Island Consolidated Electric Companies. George Le Boutillier, vice-president of the Long Island Railroad, recently announced that the notice of the sale of these companies meant that operation of cars on both lines would be discontinued. The New York & Long Island Traction Compnay operated 41 miles of line, connecting Mineola, Garden City, Freeport and other important points on Long Island and the Long Island Electric operated 25 miles of line connecting Brooklyn and Far Rockaway.

Suit to Hold Up Seattle-Rainier Sale

Fight by Rainier Valley residents to block a referendum vote on the purchase by the city of the Seattle & Rainier Valley Railway was delayed in the Superior Court, when Judge Malcolm Douglas granted the motion of Arthur Schramm, assistant corporation counsel, for a continuance of the hearing on the show cause order issued against City Comptroller Harry W. Carroll. Judge Douglas did not set a definite time for the hearing.

Even if the court action had not been brought, the referendum could not go before the voters at the March 9 election owing to the legal requirement that its validity must be certified 45 days before a regular election. When the referendum is submitted to popular vote, if such proves to be the case, it must be at a special election.

Rainier Valley residents obtained a temporary restraining order preventing the City Comptroller from certifying the petitions to the City Council and restraining the making of a report on the petitions to the Council. The opponents of the referendum proposed assert that the petitions are illegal, that only the petitions which were filed on Dec. 26 and which contained only approximately 4,000 signatures are legal.

Quarterly Earning Statements in Philadelphia. — The income account statement of the Philadelphia Rapid Transit Company, Philadelphia, Pa., heretofore prepared and printed monthly for the information of stockholders, will hereafter be issued quarterly to coincide with the dividend period on P.R.T. common stock. The next income account statement will accordingly be issued during April for the first three months of 1926.

Deficit in 1925.—For the year ended Dec. 31, 1925, the gross income of the Portland Railroad, leased by the Cumberland County Power & Light Company, of Portland, Me., was $1,451,902, against $1,582,264 in 1924. The operating expenses and taxes for 1925 were $1,178,574, against $1,294,781 the year previous. The net income was $25,730 in 1925, against $39,885 in 1924. After the consideration of dividends, which for both years amounted to $99,950, operation in 1925 resulted in a deficit of $74,220, against a deficit of $60,065 in 1924.

Judgment of $110,535 Against Urbana Line.—Settlement of the affairs of the Kankakee & Urbana Traction Company, Urbana, Ill., is progressing rapidly. Judge Smith recently approved the report of the master, without objection, entering judgment for $110,535 against the road and directing its immediate and absolute sale. The date, however, has not yet been set. T. B. Webber, vice-president and secretary of the line, was recently appointed receiver. The property includes trackage and right-of-way from Urbana to Paxton, four cars and a station at Rantoul.

Loan Authorized.—The Indiana Public Service Commission recently approved a petition of the Hammond, Whiting & East Chicago Railway, Hammond, Ind., to negotiate a $20,000 loan and to issue three notes of $24,766 each. The notes will be taken by the Chicago City & Connecting Railways collateral trust. They represent a refunding of the unpaid balance of money advanced to the issuing company in 1918 by the United States Housing Corporation to extend lines and to buy new equipment for increased service to factories engaged in war work.

Business of Railway Concluded.—A decree approving the findings of the receiver in the case of the Alamance Railway and ordering distribution of funds was received recently to be filed in the office of the clerk of the Western North Carolina District Court at Greensboro, N. C. The decree is concerned with the winding up of the affairs of the company and distribution of funds to the bondholders, for whom the American Trust Company, Richmond, Va., is acting. The Alamance Railway formerly operated a street railway system in Burlington and Alamance and between these two towns. Cars have not been run for several years.

Net Income in Worcester, $349,735.—The net income of the Worcester Consolidated Street Railway, Worcester, Mass., for the year ended Dec. 31, 1925, was $349,735, or $7.77 a share, compared with $362,504, or $8.05 a share, in the preceding year. As of Dec. 31, 1925, current assets were $1,208,420 and current liabilities $569,129, leaving net working capital of $639,291. For the quarter ended Dec. 31, 1925, net income was $223,895 after charges, equivalent to $4.97 a share on the 45,000 shares of capital stock outstanding, compared with $53,144, or $1.18 a share, in the corresponding quarter in 1924.

May Discontinue Electric Line. — Contending the service is being operated at a loss of $5,000 a month, the Missouri Pacific Railroad contemplates the discontinuance of the Coal Belt Electric Railway, Marion, Ill. It is reported attorneys for the railroad are preparing briefs to present their case before the Illinois Commerce Commission to discontinue the service. The Coal Belt Electric Railway, operated by the Missouri Pacific, a steam road, is 14 miles long, extending through Marion, Herrin, Carterville and Energy.

Easements Should Be Included in Valuation.—An opinion has been given the Maryland Public Service Commission by Thomas H Robinson, Attorney-General of Maryland, holding that easements should be included in the commission's valuation of the property of the United Railways & Electric Company, Baltimore. Following shortly after the ruling the United made an announcement that no matter what valuation was placed on the property there would be no increase in fares. The present fare is 7½ cents. During the hearings Clarence W. Miles, people's counsel, said that if easements were included it was probable that he would take the case into the courts. Before the commission took any action it sought the opinion of the Attorney-General. Mr. Miles will make a close study of the ruling before he decides what action to take. The United placed a valuation of almost $18,000,000 on easements during the hearing.

Personal Items

John H. Hanna President Capital Traction

Chief Operation Official of Washington Property Made Executive Head of the Company

John H. Hanna, vice-president in charge of operations of the Capital Traction Company, Washington, D. C., for the last ten years, has been elected president to fill the vacancy created by the resignation of George E. Hamilton. His advancement will become effective on March 11, the date of Mr. Hamilton's resignation.

It has, indeed, been a strong combination of talent, this association of Mr. Hamilton and Mr. Hanna on the Washington property. George E. Hamilton knows finance and the law as few other men do. Equally as much can be said of Mr. Hanna about his familiarity with engineering and his knowledge of transportation. Under the new arrangement of personnel the responsibilities of the two men are readjusted, but the association remains, for, as explained elsewhere in this issue, Mr. Hamilton continues as chairman of the executive committee.

J. H. Hanna

George E. Hamilton makes no pretensions to being a street railway man as that term is generally applied. Neither does Jack Hanna, for that matter. No man, however, can escape the estimate put upon him by his contemporaries. In the case of Jack Hanna that estimate places him well up at the top, if not actually at the top. For 32 years now he has served the one company, a company that reflects, more than do many others, the ideas and ideals of a single officer, now made its head. If ever a property were well kept up, it is the Capital Traction. Remember, too, that it is an underground conduit road. As for the cars, they are the last word in both appurtenances and appearances. Jack Hanna was one of the first men in the industry fully to appreciate the pulling power of paint with the public. He is more than an operator—he is a pioneer. As one instance of this there is the use under his direction of the bus in de luxe service to Chevy Chase, treated in the ELECTRIC RAILWAY JOURNAL for Feb. 13.

It has not all been operation with which Mr. Hanna has had to deal in Washington. Legislators down there may be remiss about other things, but they never lose sight of the fact that Washington is the nation's capital. Civic spirit knows no limit. This is commendable, but it is also distressing at times. Commissions have a say in everything, for there is no elected government. It is in just such situations that Jack Hanna is a diplomat among diplomats. His public relations are of the very best. He is well known and well liked, two things that appear always to go together but do not always do so. With the boys of the district Jack Hanna is aces high, as they say. He is a member of the executive committee of the Washington Council of the Boy Scouts. As a matter of fact, there is not much that is planned for this organization in which Mr. Hanna does not take a hand.

Relation of this particular activity of the man may appear to be far removed from railway operation. It is. But every man is a composite. Few live by bread alone. Jack Hanna likes to fish and he likes to play golf. One of these predilections testifies to the ability of the man to amuse himself when thrown upon his own resources—a great test in this age—and the second testifies to the ability of the man to amuse himself when thrown on somebody else's resources.

Mr. Hanna has long been active in affairs of the American Electric Railway Association. He was president of the Engineering Association 1913-1914, and in addition to being a member of the executive committee in 1925 he had a prominent part in tre work of many other committees. Included among these were the 1925 committee of the mid-year meeting and dinner arrangements, of which he was chairman, the committee on national relations and the committee on subjects and meetings. He was the association's national councilor to the United States Chamber of Commerce. This year he is a member of the executive committee and chairman of its membership committee and chairman of the sub-committee of the national relations committee on depreciation.

After leaving college Mr. Hanna engaged in steam railroad engineering work and then entered the service of the Washington & Georgetown Railroad, predecessor of the present traction company. The following year he was appointed assistant superintendent and four years later became superintendent and assistant engineer of the company. In 1909 he was appointed chief engineer in charge of all construction and maintenance. Then in 1916 he became vice-president.

Mr. Hanna was born in Henderson, Ky., in 1871. He acquired his early education in the high and private schools of his home town, and was graduated from Princeton in 1892 with the degree of civil engineer.

C. C. Castle in New Post

Executive Well Known in Equipment Field Joins New American Car & Foundry Motors

C. C. Castle will become actively associated with the American Car & Foundry Motors Corporation on April 1. At that time he will sever the business affiliation with B. A. Hegeman, Jr., which has extended over a long period. For years one of the most outstanding figures in the railway field, Mr. Castle will carry to his new association an enormous amount of prestige and of good will. The name Charlie Castle is a byword on the lips of both old timers and newcomers alike in the industry.

He has been associated with Mr. Hegeman ever since May, 1910, and the milestone of each passing year has testified mutely to the progressive activity of that well-known partnership. As first vice-president of the National Railway Appliance Company, vice-president of the Hegeman-Castle Corporation, vice-president of the Anglo-American Varnish Company and one time vice-president of the Genesco Corporation, Rochester, N. Y., the force of Mr. Castle's personality has long made itself felt. Lately, the press of duties has made it impossible for him to continue as vice-president of the Genesco Corporation and he accordingly resigned from that office and became the secretary of the corporation.

C. C. Castle

Mr. Castle has for years taken an active interest in the affairs of the electric railway industry. While the American Electric Railway Manufacturers Association was still in existence, he served as president of that organization. He is a manufacturing member of the executive committee of the Railway Supply Manufacturers Association, a member of the finance committee of the New York Railroad Club and a member of the New England Street Railway Club. He belongs to the Railway Club of New York and is a member

of the admissions committee of the Lotos Club of New York.

Prior to his association with Mr. Hegeman, Charlie Castle was vice-president of the Hildreth Varnish Company. In fact, these have been the two principal business affiliations of his long and active career. He was born in Syracuse, N. Y., on a date known only to himself. He early exhibited a penchant for railway affairs. At the age of sixteen he entered the employ of the Merchants Dispatch Transportation Company, Syracuse, N. Y. After a brief period spent in this work, he became attached to the Sherwin-Williams Company and remained with that company for approximately three years. Then came an offer of an opening with the Hildreth Varnish Company and the growth of his extraordinarily wide acquaintanceship throughout the railway field.

R. J. Ritchie Advanced by Fitkin Interests

Ralph J. Ritchie, operating vice-president of the Jersey Central Power & Light Company, southern division, has been transferred to the New York office as operating manager of Fitkin Utilities under the management of the General Engineering & Management Corporation.

Mr. Ritchie's new assignment is a promotion for meritorious service. To him was assigned the difficult task of consolidating the various properties which now comprise the Jersey Central southern group. He had been a year and a half in the territory.

As operating manager Mr. Ritchie will have reporting to him the supervisors of the group divisions of Fitkin utilities.

George E. Hamilton Resigns at Washington

George E. Hamilton has resigned as president of the Capital Traction Company, Washington, D. C., effective March 11, which will be the eighteenth anniversary of his election to that office. His resignation was presented at a meeting of the board of directors on Feb. 11. It was accepted with the understanding that he would continue to serve the company as general counsel and as chairman of the executive committee. Mr. Hamilton gave as his reason for resigning his desire to devote more time to professional employment and personal matters.

When Mr. Hamilton took over the presidency of the Capital Traction Company in 1908 he succeeded the late George P. Dunlop. Mr. Hamilton continued, however, as senior member of the low firm of Hamilton, Colbert, Yerkes & Hamilton. Prior to his assuming the presidency of the company he was a director and legal representative in Washington City of the Baltimore & Ohio Railroad and lecturer on wills and legal ethics in the Georgetown Law School, of which he was formerly dean.

In his official resignation he said the eighteen years of his official life had been "eventful ones in the history of our company—years filled with difficulties overcome, dangers avoided and with fair accomplishment in a safe and useful direction."

W. H. Kennedy Auditor for Chicago Surface Lines

W. H. Kennedy has been appointed auditor of the Chicago Surface Lines, succeeding J. J. Duck, resigned. R. E. Eddy has been promoted from the position of auditor of receipts, which he has held for the past six years, to the position of assistant auditor.

Mr. Kennedy went to the Chicago

W. H. Kennedy

property from the Western United Corporation at Aurora. Previous to that he was for five years assistant treasurer of the Savannah Electric & Power Company, Savannah, Ga. He has been connected with Stone & Webster properties for 25 years, serving, in addition to those mentioned, with the Lowell Electric Light Corporation, Lowell, Mass.; Edison Electric Illuminating Company, Brockton, Mass.; Electric Light & Power Company, North Abington, Mass.; Cape Breton Electric Company, Sydney, N. S.; Keokuk Electric Company, Keokuk, Iowa, and the Houghton County properties, Houghton, Mich.

Previous to his Chicago connections

R. E. Eddy

Mr. Eddy served with so-called Hodenpyl-Hardy companies, including the Springfield Consolidated Railway and the Springfield Gas Company, Springfield, Ill., of which he was assistant secretary; Kalamazoo Gas Company, Michigan Light Company and Consumers' Power Company at Kalamazoo, Mich.

The positions of general auditor, auditor of receipts and auditor of disbursements, the latter held by I. C. Shellenberger, have been discontinued by the Surface Lines.

It is understood that Mr. Duck's status with the Chicago City Railway remains unchanged.

"Pop" Shepherd's Record

Versatile Employee of New Jersey Road in Service Thirty-five Years

Look to your laurels, men in electric railway work who pride yourselves on your records of continuous service in the industry! William H. Shepherd, Jersey City, doesn't actually challenge you, but his record is attracting much attention in New Jersey. Thirty-five years in the railway business with Public Service Railway and predecessor companies—that's the record of Mr. Shepherd. He started Jan. 9, 1891, as a conductor in Jersey City on the Erie Street horse car line of the Jersey City & Bergen Railway, and he is now assistant to the general superintendent of Public Service Railway.

Working as a conductor on various lines of the Jersey City & Bergen Railway and later the Consolidated Traction Company until 1894, Mr. Shepherd was then appointed an inspector. Subsequently, he was starter at various carhouses in Jersey City for the Consolidated Traction and the North Jersey Railway. When the Public Service Railway started in 1903 Mr. Shepherd took a position in the employment office in Hoboken, later was a clerk in the Hudson Division office and in 1904 was transferred to the time-table department. The headquarters of the company were moved to Newark that year and Mr. Shepherd went along to take a position in the passenger agent's department, soliciting special car business. The following year he was transferred back to the time-table department, also in Newark, and remained there until 1923, when he was appointed to his present position. Mr. Shepherd started in the time-table department as a clerk and rose to the position of assistant superintendent of the department.

Popularly known among the trolleymen as "Pop," Mr. Shepherd organized the Public Service Railway Athletic Association and was active in promoting track and field sports, baseball leagues and pool tournaments. The first annual outdoor meet of the association was held in 1912 at Hilton oval, near Newark, and an indoor track meet was held in the Fourth Regiment Armory, Jersey City, the same year. His own ability as an athlete qualified him for this work. In those days he wore the silks of the Scottish-American A. C. Later he joined the Wayne A. C. and gradually changed from distance runner to sprinter, hurdler and jumper. His best mark for the 100-yard dash was 10.1; for the standing broad jump, 10 ft. 3 in., and the standing high jump, 4 ft. 11 in., the latter two marks being made indoors.

As an indication of the popularity of Mr. Shepherd with the rank and file in Public Service Railway, it is recalled

that in 1915, when a New York newspaper conducted a contest to determine the most popular railway man in the Metropolitan district, Mr. Shepherd not only won first prize—a trip to the San Francisco Exposition, with all expenses paid—but, through the loyal support of the trolley men of the Public Service he polled 3,000,000 votes, beating his nearest competitor by almost 1,000,000.

Mr. Shepherd is a member of the veterans' organization of the Fourth New Jersey Infantry. He was a captain in the Fourth Infantry on the border during the Mexican trouble in 1916, and among his treasures is a watch fob given him by the enlisted men of his command, a further proof of the high esteem in which he is generally held.

W. L. Briar Made Shop Supervisor at Kansas City

W. L. Briar has been appointed shop supervisor of the Kansas City Railways, Kansas City, Mo., reporting direct to R. S. Neal, assistant superintendent of equipment. All shop foremen now report to Mr. Briar. To correlate the shop and division mechanical work, all division foremen report to Mr. Briar on all mechanical repairs and replacements. Reports, records, etc., are handled through the office of the assistant superintendent of equipment, with materials handled through the office of supervisor of materials.

Dean W. Flowers, formerly general superintendent for the St. Paul Gas Light Company, has joined the engineering staff of the American Light & Traction Company in San Antonio, Tex. That company at one time controlled the St. Paul Gas Light Company and now owns the San Antonio Public Service Company and other utility organizations.

H. G. Milson has been appointed director of personnel of the Toronto Transportation Commission, Toronto, Canada, replacing Dr. S. G. Mills, who has returned to private practice. W. H. C. Seeley, who served for some time as assistant to Dr. Mills, has been appointed assistant director of personnel.

Henri Camp, general secretary of the Union Internationale de Tramways, de Chemins de fer d'Intérêt Local et de Transports Publics Automobiles, has resigned to engage in business. The executive committee of the association, which is made up of electric railways and bus lines in western Europe, has appointed in his place André de Backer, engineer. Mr. de Backer's appointment dates from Jan. 1, 1926.

Paul Kayser, widely known in newspaper and business circles in Wisconsin, has joined the staff of the Milwaukee Electric Railway & Light Company to take charge of publicity work.

J. M. Markham, general agent of the Northwestern Mutual Life Insurance Company, has been elected president of the City Railway, Dayton, Ohio, succeeding Valentine Winters, who served as president since 1921 and has also been a member of the board for years. Mr. Markham accepted the nomination of the board only under condition that the position be an honorary one and that it carry no compensation. Heretofore the office of president carried a salary of $15,000 a year.

F. P. Snyder General Manager of Oakwood Street Railway

Fred P. Snyder has been appointed general manager of the Oakwood Street Railway, one of the five railway companies entering the city limits of Dayton, Ohio. In announcing his appointment directors of the company said that his experience made him the logical man for the position. Mr. Synder was appointed superintendent of transportation and equipment of the Oakwood Street Railway a few years ago, after several years in charge of the shops. For many years prior to his association with the railway he was associated with

F. P. Snyder

the Barney & Smith Car Company, Dayton. He brought to his railway position a thorough knowledge of car building, maintenance of rolling stock and technical data on electric transportation.

Ed Crawford was recently elected secretary-treasurer of the Shreveport Railways, Shreveport, La. Mr. Crawford is the son of the late Captain Crawford, who was vice-president of the company and one of the pioneers in the Southern transportation field. Captain Crawford was succeeded by Ed Jacobs.

Obituary

Donald McColl

Donald McColl, formerly general manager of the Shanghai Electric Tramways, Shanghai, China, died recently at Seaford, England. For a number of years he was connected with the Glasgow Corporation Tramways, but he left that position to go to Lisbon to become traffic superintendent and chief accountant of the tramways there. Later he returned to England and assumed the position of general assistant to his old Glasgow chief, the late John Young, who at that time was general manager of the London Underground Railways. Mr. McColl took part in the electrification and reorganization of the Metropolitan District Railway, and in the starting and development of three new tube railways in London. In 1908 he was appointed to the Shanghai tramways, owned by a British company. Under his management the tramways there were developed and transformed into a profitable undertaking. Mr. McColl was the author of a standard work on tramway bookkeeping and accounts.

Thomas E. Leahey, superintendent of the line department of the Public Service Railway, Newark, N. J., is dead. He was 59 years of age. Mr. Leahey entered the street railway field in 1889, when he became a lineman for the Newark Passenger Railway, one of the predecessors of the Public Service. When the several street railways merged to form the present traction company Mr. Leahey remained as an employee of the new corporation.

Anthony B. Calvin, well known as an attorney, at Youngstown, Ohio, died from heart disease on Feb. 7. For many years Judge Calvin was counsel for the Youngstown & Suburban Railway. He was born in Mahoning County on March 13, 1877, grew up on his father's farm and was educated in the district schools of the county. He was graduated from Northeastern Ohio Normal College at Canfield in 1897 and in 1900 from the law school of Ohio State University. Following this, he was admitted to the bar and had practiced his profession in Youngstown since that time.

David T. Goff, general roadmaster of the Southern Ohio Public Service Company, Columbus, Ohio, died recently at his home in Newark, Ohio. He had been associated with electric railways from the time of the first interurban lines in Ohio. He helped in the construction of the city lines in Newark and Zanesville and interurban lines connecting Columbus, Newark and Zanesville. With the exception of seven years during which he served as a motorman with the Ohio Electric Railway, he has been in the construction and maintenance of way department of the Ohio Electric Railway and its successor the Columbus, Newark & Zanesville Electric Railway and later the Southern Ohio Public Service Company. He was 64 years old.

Carter Miller, advertising manager of the Timken Roller Bearing Company, Canton, Ohio, is dead. Mr. Miller went with the Timken Company six years ago and was promoted rapidly to various positions both in the field with the Timken Roller Bearing Service & Sales Company and at the home office with the Timken Roller Bearing Company. Later he was placed in charge of the advertising department. Mr. Miller was born in Bay City, Mich. He attended the elementary schools in that city and was graduated from Kenyon College at Gambier, Ohio, in 1919. In the business world he was recognized as a keen analyst of advertising and business problems. His advice and counsel were frequently sought in a consulting capacity in matters connected with advertising and in solving publicity problems.

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

Oil Men Have Their Say

A Material Stiffening of Prices Is Anticipated—More Uniform Production for the Future

Characterizing as mere propaganda for big advances in prices the statements that the petroleum reserves of the country are in immediate danger of being exhausted, an official of one of the larger oil producing companies declared that such an eventuality need not be looked for now or in the near future. What the industry needs more than anything else at the present time, in his opinion, is a movement toward permanent stabilization of prices and production. The disastrous slumps in oil and gasoline prices and the periods of inordinate profits are alike unjustified.

This applies with telling force in the case of the railways. Whether oils are purchased on a basis of the gallon or on the basis of mileage, it is undesirable to be subjected to heavy fluctuations from one year to the next. The stabilized basis for prices will be arrived at only when all of the larger companies in the field have seen the light and have called off their respective entrants from the "industrial dog fight."

Prices, under this new order of things, will not be low. However, the quality of oils sold will average considerably higher and the various grades will be more uniformly standardized. It is often the case, at present, that an operator using a certain grade of oil will find enormous variations from one delivery to the next. This does not make for economical operation and for proper maintenance procedure. The distributing oil companies cannot be entirely blamed for such a condition at the present time, since the oils are obtained from such widely divergent spots and are produced under varying conditions.

This condition was mentioned by one official as an argument for a monopolistic control of the industry. Only under such an arrangement, he feels, can the shoestring operator be excluded, along with his production of oils of doubtful quality. Whether or not the companies which exercised this control would be content to allow prices to remain at a reasonable level is open to conjecture. However, in a free country, there is nothing to prevent the entrance of outside capital into drilling ventures, in case the leaders become unduly obstreperous in handling the situation.

Two are not one as yet, since one company is predicting an immediate stiffening of prices on both oils and gasoline, while another cannot see any prospect of such a move in the near future. The weight of opinion seems to favor the former view, however, although no one apparently anticipates a major advance within the next few months.

Oil companies are looking with considerable interest upon the ever-increasing adoption of co-ordinated bus and trolley service by the railways. Since the oils used in buses are of a much higher quality than the grades required for street car operation and, further, since buses require vastly larger quantities of oil than do their adopted cousins, the cars, it is quite natural that this new business should look very tempting to the producing companies. While the exigencies of bus lubrication are very complex, as compared with the trolleys, and require much careful study so that they may be properly handled, great strides have been and are being made in this direction.

S. M. Curwen Heads J. G. Brill Company—Other Officers

At an organization meeting of the board of directors of the J. G. Brill Company, Philadelphia, Pa., held on Feb. 11, the following officers were elected: President, Samuel M. Curwen; vice-president, James W. Rawle; treasurer, Edward P. Rawle; secretary, Edmund L. Oerter.

H. W. Wolff, vice-president of the American Car & Foundry Company, was elected a director to fill the unexpired term of Stephen J. Simon, resigned. The selection of Mr. Wolff gives the American Car & Foundry Company five of the nine members of the J. G. Brill Company board. This is in line with the recent formation of the Brill Corporation, a merger on the J. G. Brill Company and American Car & Foundry Company's motor subsidiaries. The Brill Corporation is controlled by American Car & Foundry.

The present personnel of the J. G. Brill Company board is as follows: Samuel M. Curwen, E. P. Rawle, Francis A. Lewis, W. Clarke Mason, W. H. Woodin, W. M. Hager, C. S. Sale, W. C. Dickerman, H. W. Wolff.

Electric Locomotives Now Completely Built in Japan

Japan is making rapid strides in the development of her home industries. As an illustration of this comes the announcement that the Kawasaki Shipbuilding Yard is now manufacturing electric locomotives for use on Japanese railroads. These machines are claimed by the makers to be purely Japanese in all materials, no parts having been imported for use in their erection.

In August last the yard received an order for four 25-ton electric locomotives from the Nippon Denryoku K. K. Two of these were delivered in December and the remaining two are now under process of construction. In addition orders are on hand for twelve units ranging from 41 tons to 73 tons. These will be delivered to various railways in the country, the largest order, for five 55-ton locomotives, going to the Fuji-Minobu Railway.

ELECTRIC RAILWAY MATERIAL PRICES—Feb. 16, 1926

Metals—New York

Copper, electrolytic, cents per lb.	14.275
Lead, cents per lb.	9.125
Nickel, cents per lb.	35 00
Zinc, cents per lb.	7.875
Tin, Straits, cents per lb.	64.25
Aluminum, 98 to 99 per cent, cents per lb.	27.00
Babbitt metal, warehouse, cents per lb.:	
Commercial grade	56 00
General service	31.50

Bituminous Coal

Smokeless mine run, f.o.b. vessel, Hampton Roads	$5.00
Somerset mine run, Boston	2 30
Pittsburgh mine run, Pittsburgh	2.05
Franklin, Ill., screenings, Chicago	1.575
Central, Ill., screenings, Chicago	1.125
Kansas screenings, Kansas City	2.30

Track Materials—Pittsburgh

Standard steel rails, gross ton	$43.00
Railroad spikes, drive, Pittsburgh base, cents per lb.	2.95
Tie plates (flat type), cents per lb.	2.25
Angle bars, cents per lb.	2.75
Rail bolts and nuts, Pittsburgh base, cents, lb.	4.25
Steel bars, cents per lb.	2.00
Ties, white oak, Chicago, 6 in. x 8 in. x 8 ft.	$1.35

Hardware—Pittsburgh

Wire nails, base per keg	2.65
Sheet iron (28 gage), cents per lb.	3.25
Sheet iron, galvanized (28 gage), cents per lb.	4.50
Galvanized barbed wire, cents per lb.	3.35
Galvanized wire, ordinary, cents per lb.	2.50

Waste—New York

Waste, wool, cents per lb.	12-18
Waste, cotton (100 lb. bale), cents per lb.:	
White	13-17.50
Colored	10-14

Paints, Putty and Glass—New York

Linseed oil (5 bbl. lots), cents per lb.*	11.70
White lead in oil (100 lb. keg), cents per lb.	15.50
Turpentine (bbl. lots), per gal.	$0.97
Car window glass, (single strength), first three brackets, A quality, discount*	84.0%
Car window glass, (single strength), first three brackets, B quality, discount*	86.0%
Car window glass, (double strength) all sizes, A quality, discount*	85.0%
Putty, 100 lb. tins, cents per lb.	4-6

* Prices f.o.b. works, boxing charges extra.

Wire—New York

Copper wire base, cents per lb.	16.00
Rubber-covered wire, No. 14, per 1,000 ft.	$6.25
Weatherproof wire base, cents per lb.	17.75

Paving Materials

Paving stone, granite, 5 in. New York—Grade 1, per thousand	$147
Wood block paving 3½, 16 lb. treatment, N. Y., per sq. yd.	$2.70
Paving brick 3½x8½x4, N. Y., per 1,000 in carload lots	51.00
Paving brick 3x8½x4 N.Y., per 1,000 in carload lots	45.00
Crushed stone, ¾-in., carload lots, N. Y., per cu. yd.	1.85
Cement, Chicago consumers' net prices, without bags	2.10
Gravel, ¾-in., cu. yd., f.o.b. N. Y.	1.75
Sand, cu. yd., f.o.b. N. Y.	1.00

Old Metals—New York and Chicago

Heavy copper, cents per lb.	11.875
Light copper, cents per lb.	10 00
Heavy brass, cents per lb.	7.375
Zinc, old scrap, cents per lb.	4 75
Lead, cents per lb. (heavy)	7 625
Steel car axles, Chicago, net ton	$17.75
Cast iron car wheels, Chicago, gross ton	17.25
Rails (short), Chicago, gross ton	17.75
Rails, (relaying), Chicago, gross ton	25.50
Machine turnings, Chicago, gross ton	9.00

*The method of selling linseed oil on a gallon basis has been changed and all sellers now quote on a pound basis.

Data on New Equipment for South Bend

Specifications on a considerable number of cars and electric locomotives ordered some time ago by the Chicago, South Shore & South Bend Railroad, Chicago, Ill., have just become available. This road, now an Insull property, has embarked upon an extensive campaign of modernization and the new rolling stock, which is detailed here, constitutes an important move in this program.

Regular passenger equipment ordered consists of ten combination baggage and passenger motor cars seating 44; six cars with inclosed smoking compartments, seating 48, and nine passenger cars without special modifications, seating 56. These cars are being built by Pullman Company. They were ordered on Aug. 1, 1925, for delivery on June 1 of this year. The specifications follow:

Seating capacity	56
Weights:	
Car body	62,500 lb.
Trucks	32,000 lb.
Equipment	25,500 lb.
Total	120,000 lb.
Bolster centers, length	38 ft. 0 in.
Length over all	60 ft. 0 in.
Truck wheelbase	7 ft. 0 in.
Width over all	9 ft. 9½ in.
Height, rail to trolley base	14 ft. 4⅝ in.
Body	Steel
Interior trim	Mahogany
Headlining	Steel
Roof	Arch
Air brakes	Westinghouse
Armature bearings	Plain
Axles	Standard Steel, heat treated
Car signal system	Faraday single stroke bell
Car trimmings	Adams & Westlake
Side bearings	Stucki
Compressors	D-3-F
Control	Westinghouse
Couplers	Tomlinson
Curtain fixtures	Railway Curtain Supply
Curtain material	Pantasote
Destination signs	Electric Service Supplies
Gears and pinions	Nuttall
Hand brakes	Peacock
Heater equipment	Peter Smith and Railway Utility
Headlights	Electric Service Supplies
Journal boxes	Symington
Lightning arresters	Westinghouse
Motors	Four Westinghouse No. 567-C-7, inside hung
Paint	Chicago Varnish
Sanders	Ohio Brass
Sash fixtures	O. M. Edwards
Seats	Hale-Kilburn
Seating material	Chase Fricze Plush, grade C
Slack adjuster	Westinghouse
Springs	Baldwin Locomotive Works
Step treads	Stanwood self-clearing
Trolley base	Westinghouse
Trolley shoes	Miller
Trucks	Baldwin
Ventilators	Railway Utility
Wheels	Steel, 36 in. A. R. A.
Special devices	One Westinghouse pantograph per car

Special rolling stock ordered includes two parlor-observation trailers with seating capacities of 21 and two dining car trailers seating 24 passengers. These units were ordered in December from the Pullman Company and are to be delivered in July. The specifications follow:

Length over all	64 ft. 0 in.
Truck wheelbase	11 ft. 0 in.
Width over all	9 ft. 9½ in.
Body	Steel
Headlining	Steel
Roof	Arch
Air brakes	Westinghouse
Axles	Heat-treated
Car signal system	Faraday
Car trimmings	Bronze
Side bearings	Stucki
Control	Westinghouse
Couplers	Tomlinson MCB
Curtain fixtures	Railway Curtain Supply
Curtain material	Pantasote, silk lined
Hand brakes	Peacock
Heater equipment	Peter Smith and Railway Utility
Headlights	Electric Service Supplies
Journal bearings	Plain
Journal boxes	Symington
Paint	Chicago Varnish
Sash fixtures	O. M. Edwards
Seats	Pullman chairs
Seating material	Leather
Slack adjuster	Westinghouse
Step treads	Stanwood
Trucks	Commonwealth Steel Co., six-wheel
Ventilators	Railway Utility
Wheels	36-in. A.R.A.

Four locomotives are also being constructed for this road. Baldwin Locomotive Works is the builder and delivery is expected to be made on June 1. They were ordered Sept. 21, 1925. Specifications for these units are given here:

Weights:	
Body and trucks	102,379 lb.
Equipment	57,621 lb.
Total	160,000 lb.
Bolster centers, length	18 ft. 4 in.
Length over all	39 ft. 4 in.
Truck wheelbase	8 ft. 8 in.
Width over all	10 ft. 7 in.
Height, rail to trolley base	12 ft. 1⅛ in.
Body	Steel
Air brakes	Westinghouse
Axles	Standard Steel
Compressors	Two Westinghouse D3-F
Control	Westinghouse
Couplers	Tomlinson M.C.B.
Gears and pinions	Nuttall, grade B-P
Hand brakes	Peacock
Heater equipment	Railway Utility
Headlights	Electric Service Supplies
Journal boxes	Symington
Lightning arresters	Westinghouse
Motors, type and number	4 Westinghouse No. 3553
Motors	Inside hung
Sanders	Ohio Brass, Form 1
Springs	Baldwin
Trolley base	Westinghouse
Trolley wheels or shoes	Miller and Pantograph
Trucks	Baldwin
Wheels (type and size)	42-in. tired
Special devices, etc.	Sirocco blowers, fan for motor ventilation

New Merger in Rubber Field

Financial interests of the Hewitt Rubber Company, Buffalo, N. Y., and the Gutta Percha & Rubber Manufacturing Company, New York and Brooklyn, have recently been merged. At a reorganization meeting held in Buffalo, N. Y., F. E. Miller was elected president of the Gutta Percha & Rubber Manufacturing Company, John H. Kelly and Amadee Spadone were elected vice-presidents and W. J. Magee became secretary and treasurer. The reorganization is the first step in the removal of the company's plant, office and other facilities to Buffalo. The company will continue the manufacture of corded fabric tires and mechanical rubber goods. It is expected that the personnel of the two merged companies will remain unchanged.

Turbine Drive for Boiler Feed Pump

Numerous advantages in favor of the use of turbine-driven boiler feed pumps are shown in the report of the Toledo, Bowling Green & Southern Traction Company, Findlay, Ohio. A year ago the company replaced two steam pumps with one General Electric 60-hp., style D-51, two-stage turbine-driven centrifugal pump. The total annual saving has been $663, a return of 28.9 per cent on the investment. The pumps are now held as standby.

Although the new unit has 50 per cent greater capacity than the two previous pumps, it occupies only one-fourth the floor space. Its water rate is approximately 20 per cent less than the water rates of the Duplex pumps. The turbine has required no repairs, whereas the pumps averaged $235 a year for repairs and renewal of parts. Only one-fifth as much time is now required for attendance, and the oil consumption has been cut from one gallon a day to one-half gallon a month. The turbine operates with a minimum of noise and vibration.

Temporary Relief for Shortage of Equipment in Detroit

Detroit Department of Street Railways has been authorized by the City Council to rent from the Peoples Motor Coach Company, a subsidiary of the Detroit United Railway, ten single-deck 25-passenger motor coaches on a basis of 8 cents per coach-mile.

H. U. Wallace, general manager of the D.S.R., is quoted as recommending the rental of the coaches until such time as the department is in position to add to its own equipment. The department is having difficulty to give proper service on existing coach lines due to lack of sufficient equipment. A large number of the street cars still in operation by the D.S.R. that were taken over from the Detroit United Railway are reported to be in very poor condition, and this condition enhances the need for new equipment including both street cars and motor coaches.

Mack Sales to Traction Companies

Among recent sales of Mack buses to electric railways by the International Motor Company are the following:

Beaver Valley Motor Coach Company, New Brighton, Pa., one 25-passenger city type, for operation between Leetsdale, Ambridge and Beaver Falls. Zone fare system, 5-mile route, 10 cents per zone.

Savannah Electric & Power Company, Savannah, Ga., one 29-passenger city type, trolley substitution in Savannah. Fare, 7 cents.

Twin City Motor Bus Company, St. Paul, Minn., seven 230-in. chassis, Eckland bodies, for operation between Minneapolis and St. Paul, a 12-mile route at a 25-cent fare.

Los Angeles Railway, Los Angeles, Cal., three 230-in. chassis, for operation at a 5-cent fare over a 3.06 mile route on Alvarado Street.

Yakima Valley Transportation Company, Yakima, Wash., a subsidiary of the Union Pacific Railroad, one 29-passenger city type, for operation on the Summit View line in place of trolley cars over a 3-mile route at a 10-cent fare.

Utah Light & Traction Company, Salt Lake City, Utah, one 29-passenger city type to operate as a feeder to trolley line over a 6-mile route between Sugar House and Mill Creek for a 10-cent fare.

Boston Elevated Railway, Boston, Mass., three 29-passenger city type, for operation on Boston and vicinity routes.

Rochester Railways Co-ordinated Bus Line, Rochester, N. Y., part of New York Railway System, one 25-passenger city type bus.

Cincinnati Gets 54 Buses

Cincinnati Street Railway is purchasing 29 Mack buses, equipped with Bender bodies; eighteen Six-Wheel chassis, with Kuhlman bodies, and seven Schacht chassis, the bodies for which have not been determined. Permits were issued on Feb. 18 for operation on all bus lines except route H.

Samuel M. Curwen Sees Enlarged Market for Transportation Vehicles

President of New Brill Corporation Outlines the Advantages of Recent Merger—Expresses Confidence and Optimism Relative to the Electric Railway Situation—Sees Dawn of New Era of Usefulness and Prosperity

AN INTERVIEW

By Charles Gordon

IT IS significant that the recent combination of Brill and American Car & Foundry resources comes at a time when the electric railway industry is just entering a new era; when concrete evidence is available of the opportunity for intensive development of facilities, and when interest in improved electric railway equipment is growing rapidly. The new Brill Corporation, which Samuel M. Curwen now heads as president, links enormous financial and manufacturing facilities for the construction of all forms of common carrier transportation—steam, electric and automotive vehicles for both highway and rail operation.

What are the advantages of this combination to the purchasers of electric railway cars and equipment?

How will it affect the design, manufacturing and sales organizations of the several companies controlled by the new Brill Corporation?

Are any changes contemplated in the character of work at the various Brill plants now building electric railway cars?

Does this consolidation indicate a belief that the electric railway field has arrived at a point where its recovery and expansion may be hastened by mustering to its service greatly expanded design, manufacturing and merchandising facilities?

Samuel Curwen

Outlines Plans of Company

Back of every great development is a strong personality. History itself is only a record of the lives of the men who made it. So, also, in following the development and expansion of great industrial enterprises, back of the physical framework and shell of the structure there is found a dominating personality which supplied the imagination, courage, will power and driving force to rear it and give it life. There the man is found.

The industry is naturally interested at this time in getting the viewpoint of Sam Curwen, as he is best known among his many close friends. Although busily engaged in clearing up the details connected with the present changes, he consented to outline the present plans of the companies now brought together and in addition expressed a view of the electric railway situation which in itself radiates confidence and optimism for the future.

To the purchasers of electric railway equipment, the advantages of the recent merger, while indirect only, are nevertheless of outstanding importance at this particular time, according to Mr. Curwen. The new Brill Corporation, control of whose common stock rests with the American Car & Foundry Company, is primarily a holding company, organized to take over the various subsidiary plants that are thus drawn together for greater co-ordination of effort. In this combination are included two groups of properties. One group consists of the J. G. Brill Company, with its subsidiaries — the G. C. Kuhlman Car Company, in Cleveland, the American Car Company, in St. Louis, the Wason Manufacturing Company, in Springfield, Mass., and the Cie J. G. Brill in France. The second group consists of the new American Car & Foundry Motors Company, made up of the Hall-Scott Motors Corporation and the Fageol Motor Car Company of Ohio. By drawing together these large facilities for the production of both rail and highway transportation equipment, he pointed out, additional impetus will be given to the development of both forms of vehicles.

RAPIDLY growing confidence in the electric railway situation and interest in the improvement of electric railway equipment give added significance to the recent merger of Brill and American Car & Foundry resources. This is the first of a series of interviews with car builders and other prominent manufacturers regarding the outlook for the industry.

Mr. Curwen shed further light on the plans for the immediate future. These do not contemplate any material changes in the functions of the various plants. While the future may dictate the combination of the present automotive rail car and bus body products of the Philadelphia and Cleveland plants of the Brill Company with the other automotive activity of the American Car & Foundry Motors Company, no changes of this character are contemplated for the present. He indicated that the products of the Philadelphia plant, the Fageol Company of Ohio and the Kuhlman plant in Cleveland will continue to be offered to the trade.

The J. G. Brill Company, Mr. Curwen explained, will continue its long-established policy of building electric cars and their trucks for both domestic and export shipment. Through many years these products have become known and have built up a reputation throughout the world. The process of development and improvement will be continued. The extent to which this has been carried on in the past, he pointed out, is attested by the many patents granted the company covering devices developed by its engineers for improving the performance of cars and increasing the comfort afforded passengers. The seaboard location of the Philadelphia plant and the facilities for shipment of electric railway and self-propelled cars adapt it admirably for export business.

So far as present plans contemplate, the four present Brill plants are considered to be so situated in their respective territories as to avoid unnecessary heavy freight charges in the shipment of their products to electric railways in various parts of the country. It seems logical that this territorial arrangement will continue to be advantageous.

Mr. Curwen expressed the utmost confidence in the future of the electric railway industry. He declared that there is no intention of subordinating electric railway car development and

production to bus or self-propelled cars. Through the combination of interests represented, it is the intention to develop and cultivate intensively every form of public transportation on steam railroads, electric railways and highways.

Buses to Play Important Part

Since the manufacture of buses looms as an important part of the new company's activities we passed to that subject. Mr. Curwen held that the extent to which the bus may in the future be applied as part of the transportation system of the country is as yet a matter for conjecture. He pointed out that the bus has been definitely proved to have an important part to play in feeder service and through districts where a de luxe service at higher fares than mass transportation agencies is desired. In new territories, where the character of future development is uncertain, the flexibility of the bus offers an opportunity of extending transportation service at minimum initial expense until such time as the volume of riding justifies the investment in rail and overhead line. Its more economical operation, and its apparent superiority of facilities for quick loading and unloading of passengers, makes the use of the street car imperative where the volume of riding approaches mass transportation conditions.

This answer was made to a question regarding the extent to which Mr. Curwen expected to see the bus play an active part in the future local transportation scheme of the country. But he went further. He pointed to increased parking congestion difficulties in large cities as a reason for a growing field for application of de luxe bus service at substantially higher fares than electric cars, and predicted that there would be a large increase in demand for such transportation agencies to replace the use of private automobiles for travel in the congested portions of large cities. There was little doubt in Mr. Curwen's mind of the future usefulness of the bus.

Has Intimate Knowledge of Car Development

Here the discussion centered more definitely on the electric railway car and the future of the industry itself. Mr. Curwen's knowledge of cars, trucks and equipment comes from detailed contact with their design, construction and operation. Prior to 1891, when he became a general salesman for the Brill Company under John A. Brill, he had worked his way through the drafting department to the position of chief draftsman. From the position of salesman he became assistant general manager and in 1903 was made general manager. In 1908, upon the death of John A. Brill, he became first vice-president, and in 1912 succeeded James Rawle to the presidency.

Not even after he was carrying heavy executive responsibilities did Mr. Curwen relinquish close contact with the improvement of the company's products. Careful study of the operating problems of the industry enabled him to foresee its requirements and resulted in the development of many of the valuable patents owned by the company.

With this background of experience to draw from, I sought his opinion on the status of car design and on the outlook for the electric railway industry.

"The car exhibits at the Atlantic City convention last fall to my mind showed that the electric car can be made as attractive as the automotive vehicle," he said. "It is necessary, however, in refining the electric car to bear in mind that its service is to the masses, and that while a part of the public would be willing to pay the higher rate of fare necessary to maintain such refinements, it is questionable whether passengers generally are not more interested in reaching their destinations with the quickest dispatch. While comfort is important, it is subordinated to the other functions of the electric car in handling large crowds quickly."

"What, in your opinion, is the outlook for electric railway car purchases during 1926?" I asked.

"From present indications the outlook is very promising and the large number of inquiries for new cars shows a tendency on the part of electric railways to recognize the advantages of up-to-date equipment. With the knowledge that it will be profitable to replace many of the obsolete cars now in service and with convenient financing facilities available, it is probable that electric railways will retire this year many of the cars which they know are costing them much more to operate in comparison with new equipment than the interest requirements on the investment in new cars."

How the operating managements in the industry can co-operate in bringing about improved design of cars and in lowering manufacturing costs seemed an important angle of the subject. In Mr. Curwen's opinion, precedent and purchasing methods have much to do with this question. He pointed out that it has been traditional in the industry to specialize in types of rolling stock to suit individual ideas of design. This, he explained, is not economical. Car builders are willing to build whatever the customer wants, provided the latter is prepared to pay the additional cost of special design and construction. He indicated that manufacturing costs would be lowered by more uniformity in design.

Interurbans Have Important Place

Our discussion closed on the subject of the outlook for the interurban lines of the country. Mr. Curwen was optimistic in his view of their future usefulness, except of course in those instances where conditions did not warrant the construction of lines in the first place. He pointed to the examples of roads in which the application of light-weight and modern equipment by greatly decreasing the cost of operation has resulted in vast improvement of situations formerly held to be hopeless. He is convinced that the spread of this process to other properties will be followed by a period of renewed prosperity and usefulness for many interurban lines. He held that the ease of maintaining schedules and the comparatively high degree of safety of the interurban make it a transportation agency which, with proper facilities, has a valuable function and service to perform.

Rolling Stock

Cleveland Railway, Cleveland, Ohio, has before the Council for action a program of improvement totaling $5,000,000 which calls, among other things, for the purchase of 100 new cars and a similar number of buses.

British Columbia Electric Railway, Vancouver, B. C., intends to order some new equipment. One authority states that the equipment will probably consist of four two-car trains and eight single cars.

Hydro Electric Railways, Toronto, Canada, is awaiting delivery of twelve cars for Windsor offered to the radial department of the Provincial Hydro Commission under $10,000 each. The cars have been inspected and pronounced suitable for use in Windsor. Five new cars have also been ordered by the company and will be delivered in three or four weeks.

Municipal Railway, San Francisco, Cal., plans to purchase fifteen or twenty cars, at a cost of $255,000 and $340,000 respectively.

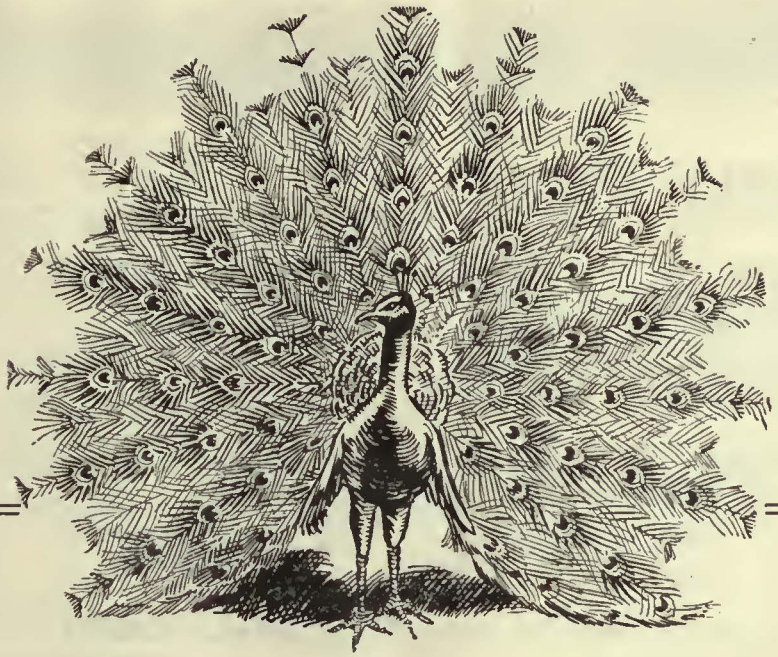
Union Traction Company of Indiana, Anderson, Ind., through Arthur W. Brady, receiver, has prepared a petition asking authority to purchase sixteen buses. The approximate cost will be $135,000. The purchase will include eleven of the large type passenger buses that have been in use on the Hoosier Stage line. The five others are to be buses for use on city lines in Muncie and Anderson, Ind. The transaction has been sanctioned by the Indiana Public Service Commission and all that now remains to complete the deal is the sanction of the Circuit Court at Anderson.

New York Railways Corporation is contemplating the purchase of 25 additional buses for experimental purposes in the co-ordination of bus and trolley service. These buses will be single-deck units of the same general type as the sample bus which was designed by the company last summer and described in detail in ELECTRIC RAILWAY JOURNAL of Sept. 5. No franchise has been received for the regular operation of buses as yet, but the application has been filed for some time.

Track and Line

Binghamton Railway, Binghamton, N. Y., will construct an extension along Floral Avenue in Johnson City from Askley Avenue to Riverside Drive. The evidence showed that the village authorities, the residents of Floral Avenue and the company have agreed on the paving of the street and the extension of the trolley line under its franchises. The Public Service Commission has approved the extension.

Philadelphia Rapid Transit Company, Philadelphia, Pa., has submitted plans for laying a double track on Erie Avenue from Second Street to Torresdale Avenue and on Torresdale Avenue to Frankford Avenue. The track extension will provide a cross-city route for the accommodation of the public in the northeast section.



An economical form of safety insurance

In order to provide the utmost safety for passengers and for rolling stock—at a minimum cost of installation and maintenance — many prominent electric railways have equipped their cars with

Peacock Staffless Brakes

The Peacock Staffless

These brakes will develop 1066 pounds braking power with a 16-in. handwheel. By using a 20-in. wheel the power can be increased to 2000 pounds.

Even though brake rigging may be loose and brake shoes worn, Peacocks have ample chain-winding capacity—144 inches—to take in all the slack and set the brakes.

The prevention of one serious accident by means of Peacock Staffless Brakes will more than offset the entire cost of installation. Such protection is real economy.

Write for further particulars

National Brake Co., Inc.
890 Ellicott Sq., Buffalo, N. Y.

Canadian Representative:
Lyman Tube & Supply Co., Limited, Montreal, Canada

Bankers and Engineers

Sixty-one Fageol Safety Coaches In Florida's Largest Fleet

The Stone and Webster organization, with a background of motor coach operating experience covering a large part of the United States, has just finished taking delivery of forty-two Fageol Safety Coaches for the Jacksonville-Miami Bus Lines.

To operate in conjunction with this line, they have also acquired the Orange Belt Auto Line, connecting Orlando and Daytona, the back-bone of whose fleet consists of nineteen Fageol Safety Coaches.

This large order, following their numerous repeat orders over the past four years, is an eloquent testimonial of satisfactory service.

FAGEOL SAFETY COACH

Territory West of the Rocky Mountains served by
Fageol Motors Company
Hollywood Blvd., at 107th Ave.,
Oakland, California

Territory East of the Rocky Mountains served by
The Fageol Company
(In the Akron District)
Kent, Ohio

Now—Many of the Nation's Great Bus Operators Are Using

Fisk Transportation *"Fillerless"* Cords

Today, only a few months after the announcement of the Fisk Transportation *"Fillerless"* Cord, many bus owners have already narrowed their equipment down to this remarkably economical tire.

Actual running has convinced these bus owners that the *"Fillerless"* Cord construction means very definite savings in operation costs and more comfortable and safer riding.

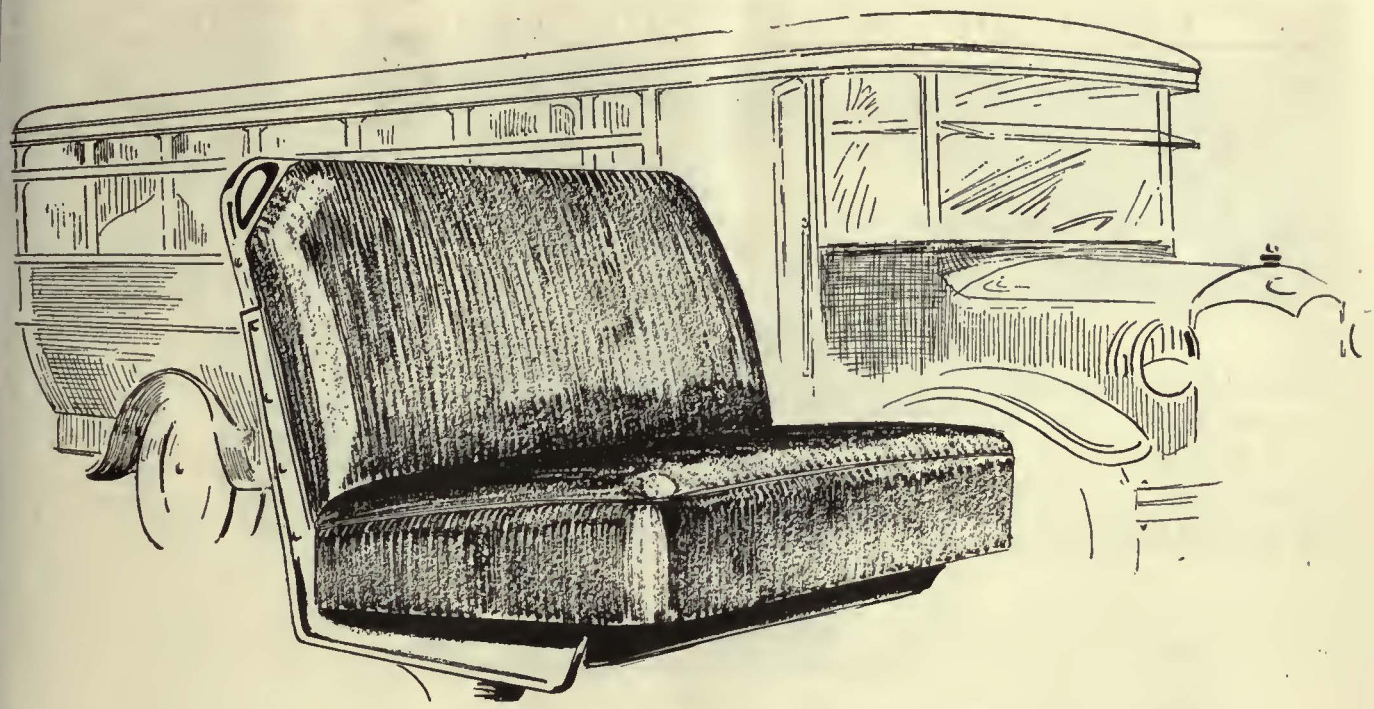
You, too, will be convinced if you will put one of your buses on Fisk Transportation *"Fillerless"* Cords and compare them with your other tires.

147 Fisk Branches serve Fisk dealers everywhere.

Time to Re-tire
Get a FISK
TRADE MARK REG.
U. S. PAT. OFF.

NOTE:—The Fabric in the Fisk Transportation *"Fillerless"* Cord is called *"Fillerless"* because this method of construction eliminates cross threads (fillers), controls the spacing and tension of cords and uniformly surrounds the cords with rubber.

FISK TRANSPORTATION *"Fillerless"* CORDS



PANTASOTE—

A bus seat and curtain specification established through 30 years of satisfactory railway service

Maintenance records, in the files of practically every steam and electric railroad in the country, stand proof of Pantasote wearing qualities.

So, in choosing a material for bus seats and curtains—where every cent saved on maintenance is vital, and where every added feature of comfort and appearance becomes a needed fare-sales argument—Pantasote is the railwayman's most logical and most convenient choice.

As a seat covering, Pantasote offers an extremely wide range of the richest and most appropriate grains, in all the wanted colorings. It is admittedly far superior, both in appearance and wearing qualities, to any split leathers, retains its fresh new appearance long after lower grade materials have become worn and shabby, is always soft and pliable, and will not crack or deteriorate under any climatic conditions.

As a curtain material the absolutely fade-proof and weather-proof qualities of Pantasote make for exceptional service, with the economical maintenance of a high standard of appearances.

But remember, in buying, that only *genuine* Pantasote has these Pantasote qualities. It will pay you to be quite specific and to insist on getting just what you specify—*genuine Pantasote.*

for bus Seats
for bus Curtains

THE PANTASOTE COMPANY, INC.
250 Park Avenue, New York City

PANTASOTE

100 · YEARS · OF · MANUFACTURING · EXPERIENCE ·

Order Snow Sweeper Rattan and Car Seat Webbing from your H-W Warehouse.

No. 8-C-5 Spl.

No. 325-S.C. Spl.

H-W Car Seat Types Meet Modern Travel Demands

Present-day competition in passenger transportation demands greater passenger comfort. The seating equipment of old as well as new cars must be modernized.

From its 100 years of seat-building experience, Haywood-Wakefield has designed many new models of Electric Railway seats which meet all phases of this demand.

H-W car-seating engineers can render valuable assistance in the solving of your seating problems. Their counsel is available to you through any of our sales offices. The service is free, and you are urged to use it.

No. 8-C-5 Special, is an example of stationary seat construction now being adopted by electric traction companies. It has double spring seat construction. Spring edge back is of the special H-W recessed type, built for maximum knee room without sacrifice of comfort. Seat and back are pitched for easy posture.

No. 325-S. C. Special, is of the reversible type. It may be had with 22- or 25-inch back; also with head-roll and arm rests. Seats are double and backs single spring construction, giving all the comfort of a Pullman Coach. Finish and upholstery as ordered.

Heywood-Wakefield

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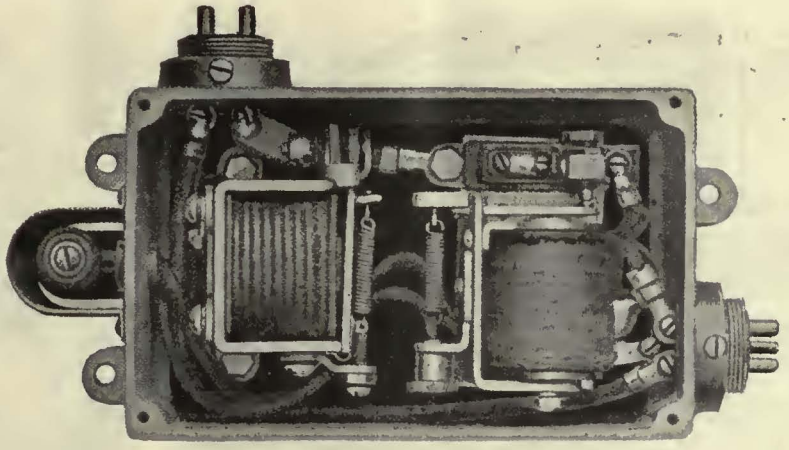
Houston, Texas

THE RAILWAY & POWER ENGINEERING CORP.
Montreal, Toronto and Winnipeg, Canada



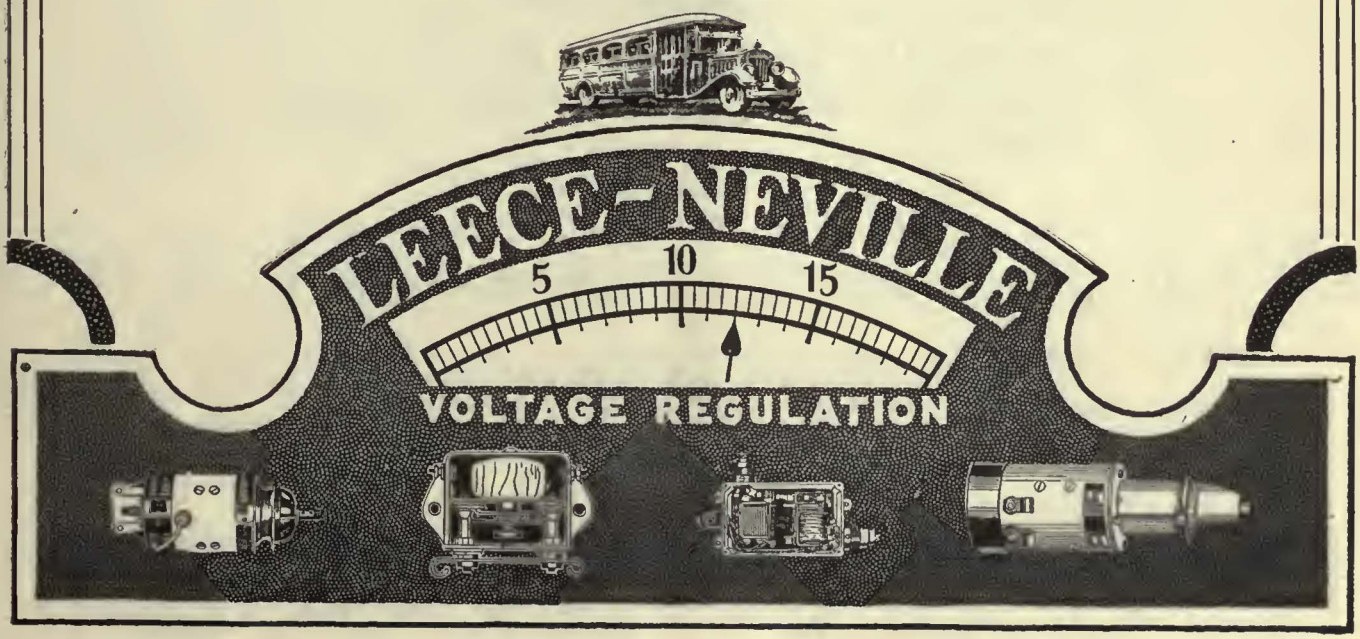
The Why and How of Voltage Regulation

Why do you need Leece-Neville Voltage Regulation on your buses? Because Leece-Neville Voltage Regulation is a scientifically designed and perfected 12-volt power plant which gives steady current for lighting, whether the bus is standing or running, and regardless of engine speed in operation. It charges the battery at an even and correctly proportioned rate. It cannot overcharge even though you drive from coast to coast. It will light your bus steadily, and at full candle power, direct from the generator, without risk of burning out the lamps. In short, it makes your bus electrical system as nearly perfect in operation, as nearly trouble-free, and as nearly fool-proof as human ingenuity can devise.

Voltage Regulation does this efficiently because every unit,—generator, magnetic switch, starting motor and Voltage Regulator,—is a specialized unit perfectly co-ordinated into a compact and well balanced system.

We will gladly mail our booklet, dealing with the subject in detail, on receipt of your postal card.

THE LEECE-NEVILLE COMPANY
CLEVELAND, OHIO



HASKELITE

the superior plywood
—ideal for
1. Roofs
2. Ceiling
3. Linings
4. Seats
5. Card racks
6. Floors.

When You Rebuild a Car Why Not Modernize it with Haskelite and Plymetl?

Old cars that are too good to scrap can be greatly improved by inserting HASKELITE and PLYMETL where needed. This practice, as followed by many leading companies today, cuts the weight thereby reducing operating costs; simplifies maintenance; and in many cases so improves the appearance and riding quality as to give the car many added years of profitable life. Our engineering data in blueprint form covers new construction and maintenance of street cars, buses and commercial bodies. A file of this data is yours for the asking.

Modern Equipment Builds New Business

Progressive operators are overlooking no chances to increase revenue. They are adopting cars, buses, and commercial bodies best suited to local conditions. Illustrated above is one of the twenty-two new one-ton Ford trucks in door-to-door express service on the Illinois Traction System. The special bodies built by Kratzer Carriage Company, Des Moines, Iowa, have $\frac{1}{4}$ in. 3-ply HASKELITE roofs and $\frac{5}{16}$ inch double faced PLYMETL side panels. The body has no framework, the side panels being supported only at the four corners.

HASKELITE MANUFACTURING CORP.

133 W. Washington St., Chicago, Ill.

PLYMETL

—the armored plywood. Unequalled for strength and light weight in side panels, vestibule linings, etc. for either old or new cars

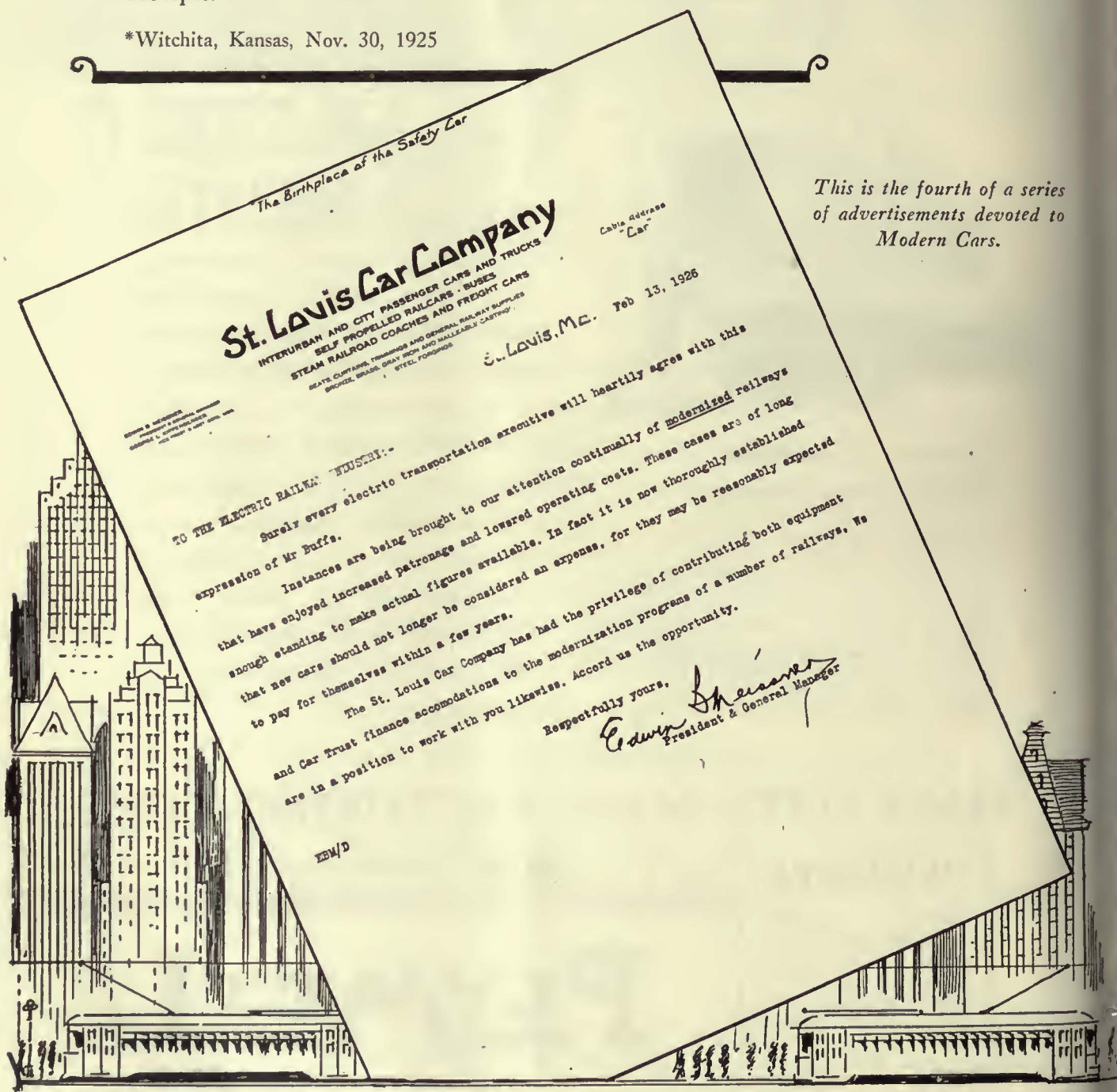
PLYMETL

MODERN CARS for

F. G. Buffe, *said:**

"Before we can make our service popular we must make it good. The comfort and convenience of passengers must come first—it has been proved in several cities that new, attractive equipment invites patronage and increases receipts."

*Witchita, Kansas, Nov. 30, 1925



This is the fourth of a series of advertisements devoted to Modern Cars.

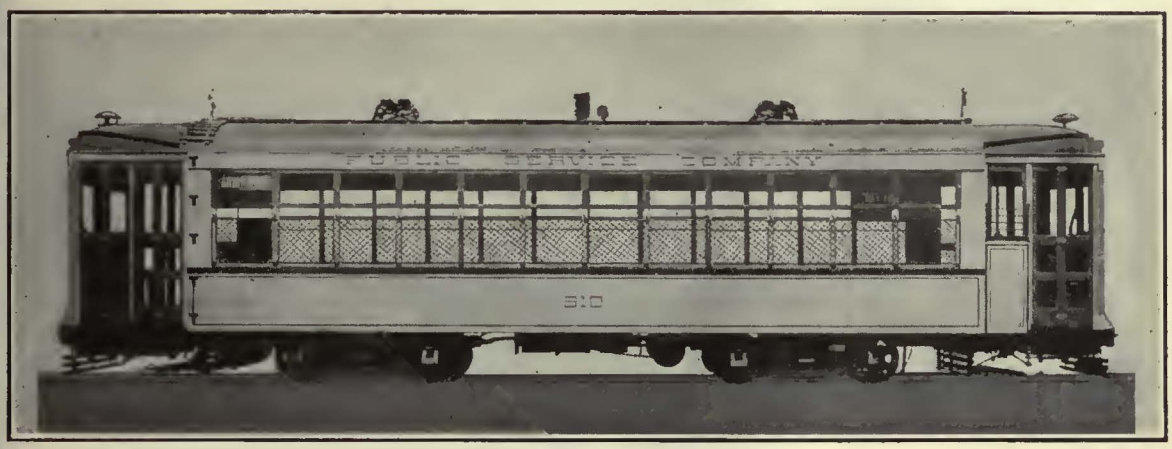
Modern Conditions—

Quality Cars

When placing orders for additional cars — improve your service by installing St. Louis Car Co. QUALITY Cars with such distinctive features as noise reduction, easy-riding upholstered seats and improved lighting facilities.

Actual tests with new modern type cars have shown increased business!

Further particulars furnished on request



New cars recently delivered to

SAN ANTONIO PUBLIC SERVICE CO.

SAN ANTONIO, TEXAS

by

St. Louis Car Company

St. Louis, Mo.

"The Birthplace of the Safety Car"

One hundred new surface cars recently put into service by the Philadelphia Rapid Transit Company are equipped with "STANDARD" Rolled Steel Wheels.

STANDARD STEEL WORKS COMPANY

PHILADELPHIA, PA.

BRANCH OFFICES:

Chicago, St. Louis, New York, Houston, Texas, Portland, Ore., Richmond, Va., San Francisco, Boston, St. Paul, Minn., Pittsburgh, Pa., Los Angeles, Cal., Mexico City, Mex.

WORKS: BURNHAM, PA.

Rolled Steel Wheels

Quenched and Tempered Carbon Steel Axles

Coil and Elliptic Springs

Proved!

By more than a million car miles

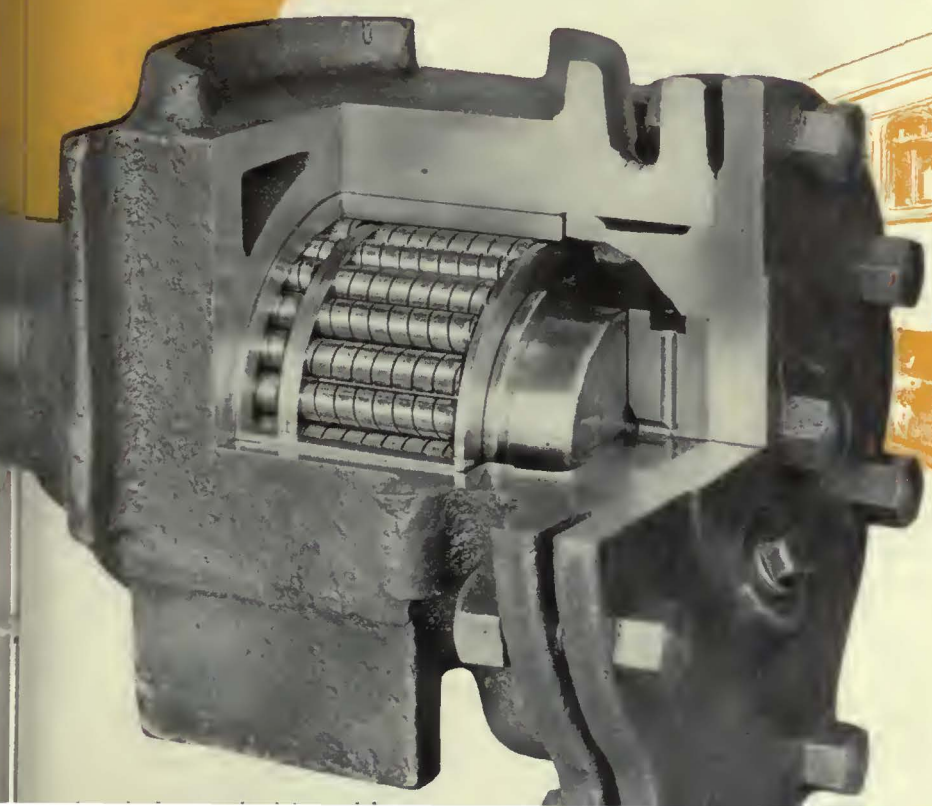
Hyatt equipped cars have accumulated 1,209,500 low cost dependable—quiet miles on 22 different properties.

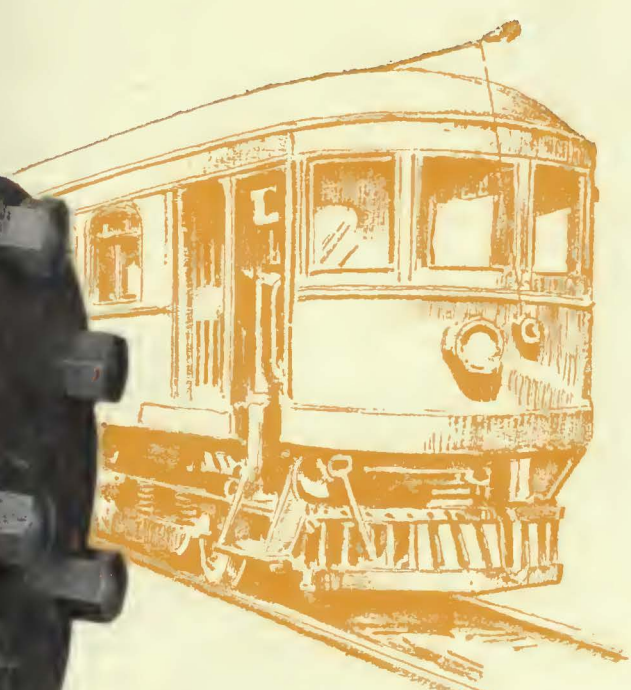
Individual cars are nearing the 150,000 mile mark without sho ing the least sign of journal bearing wear, and without requiri repairs, replacement or adjustment of any kind on the Hy equipment.

Records for maintenance economy—rigid adherence to schedu —and freedom from trouble—on light-weight city cars and heavy interurban express trains, together with names of roa are available for inspection.

Performance of this kind—in constant year-round servic successfully meeting every railroad requirement—is assuran that Hyatt Roller Bearings in the journals of your cars v return profitable miles.

Hyatt Roller Bearings meet every A.E.R.A. requirement. They carry full standard loads in boxes which fit all standard trucks without change.





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Quiet

ROLLER BEARING

he Universal Use of Hyatt Roller Bearin

In Every Branch of Industry

Electric Railways
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Steel Mills
Textile Mills
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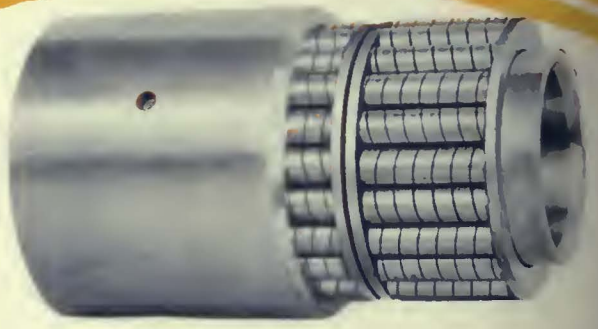
Material Handling Equipment
Agricultural Equipment
Mine Cars
Power Transmission
Lumbering Equipment



During the past third century the use of Hyatt Roller Bear g has gradually extended into every corner of the globe — t they are now accepted as standard in many types of m u facturing equipment and products.

Engineers trained in the industries served by Hya — together with extensive laboratory equipment—are at disposal of customers for solving their individual bea problems. Pertinent data on every initial Hyatt installa is considered before a recommendation is made.

That this deliberate practice has borne fruit is reflected in forward strides made by pioneer anti-friction bearing u among manufacturers of tractors—automobiles—mine cars industrial trucks.

An organization that has made anti-friction bearings a pract standard for efficiency in so many modernized units of tra portation, agricultural and manufacturing equipment, supplies a product of equal integrity for electric railway c

HYATT ROLLER BEARING CO., NEWARK, N. J.
(Division of General Motors Corporation)

Cars built for the Chicago Surface Lines

Light Weight Cars

all types—city or interurban service

Single or
Double Trucks

Snow Sweepers

GAS-ELECTRIC
MOTOR
COACHES

MOTOR
COACH
BODIES

Keeping in close touch with every development and new demand in transportation, Cummings Car and Coach Company are eminently fitted to build all types of rolling stock to meet present-day needs. A modern plant and highly skilled workmen are important factors in the production ability of Cummings Car and Coach Company.

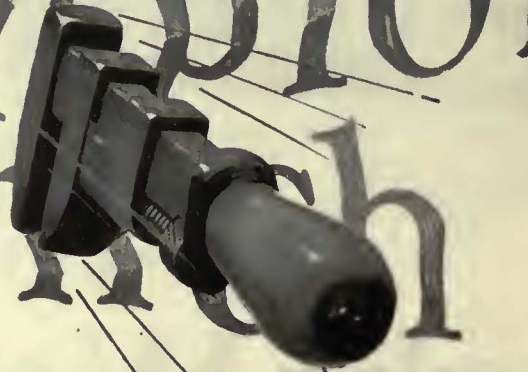
Our engineering department will gladly co-operate with transportation companies, planning new equipment and furnishing estimates, or we will submit proposals on specifications furnished.

CUMMINGS CAR AND COACH CO.

Successors to McGuire-Cummings Manufacturing Co.

GENERAL OFFICES: 111 West Monroe Street
CHICAGO, ILLINOIS

Waste!- World's Champion Wrench Thrower



WASTE throws wicked wrenches, in the form of excess friction, needless wear and misalignment. Put your machinery out of range with Timken Tapered Roller Bearings.

Timkens supplant sliding motion in the bearings with steel-to-steel rolling motion. The elimination of Power Waste alone may save you as much as 30%! And far less lubricant is needed.

Timkens also give machinery the high load capacity inherent in Timken Tapered design, absorbing thrust scientifically, withstanding shock and permitting compact, simple mountings.

Timkens alone have positive roll alignment to carry speed. Timkens alone are made of special Timken electric furnace alloy, as fine for its purpose as any steel in finest machinery.

Timken Bearings enter into the manufacture and purchase of so much modern mechanical equipment on the strength of proven savings. Some 150,000,000 Timken Bearings already are applied throughout manufacture, construction, mining, agriculture and transportation. Surely, Timkens are of immediate interest to you, whether you build or buy machinery.

Authentic Timken data on your business are available upon request. The universal technical experience of the largest bearing industry is ready to guide you to far-reaching improvements and economies in your working equipment and in your output.

THE TIMKEN ROLLER BEARING CO., CANTON, OHIO

TIMKEN *Tapered Roller* **BEARINGS**

"ATTENTION must be paid to noise reduction." Such was one of the statements made by F. G. Buffe, of the Kansas City Railways, in a recent address, in which he emphasized the fact that street railways must cater to today's public with modern equipment—that there are 25,000 obsolete street cars in service today which must be replaced.

Edwards Metal Sash fits in with all these modern ideas. It is true 1926 equipment.

It makes windows noiseless under any and all conditions! What annoys passengers more than a series of rattling windows?

Edwards Metal Sash makes windows air-tight in the coldest of weather. And yet the windows are easily opened! Edwards Metal Sash makes comfortable passengers, winter and summer.

Edwards Metal Sash gives a maximum of glass area. The sash is narrow, and because no lock racks are needed the posts too may be narrow. Here's plenty of daylight and ample vision for the passengers, and neat, trim windows with not even a dirt pocket to impede cleaning.

Edwards Metal Sash requires practically no upkeep. Its fine brass withstands time and weather, its construction withstands constant use. Edwards Metal Sash decreases maintenance costs and increases patronage.

Now used by a number of car builders, it can be installed to specification by any builder. Edwards Metal Sash makes better cars!

Interior of Scranton car built by Osgood Bradley Car Company. A maximum of glass area!

Write us for details, which we will give without any obligation on your part.

O. M. EDWARDS CO.

SYRACUSE, N.Y.

Canadian Representatives: LYMAN TUBE AND SUPPLY CO., Montreal and Toronto

For the modern car—a truly modern current collector

with five specific points of superiority

1. LESS WIRE WEAR, because less trolley tension is needed for absolutely safe operation. Full 3-inch contact surface of Miller Trolley Shoes "hugs" the wire as no wheel ever could. This in itself is vitally important with increased operating speeds.
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3. NO LUBRICATION, because there are no rotating parts to Miller Trolley Shoes. Unnecessary work and "shopping" time is thus eliminated.
4. NO ARCING. Arcing is a devastating waste. It is eliminated only with sliding contact.
5. AMPLE CURRENT CAPACITY, even for the fastest and heaviest modern cars, saves motors, ensures steady lighting.

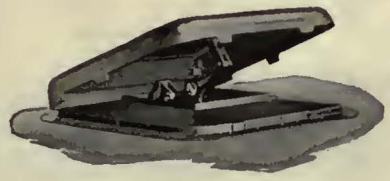
Make a trial under your own operating conditions.
We will gladly co-operate.

Miller Trolley Shoe Company

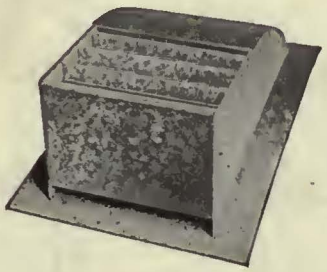
295 Columbia Road, Boston 21, Mass.

The "Aerating" for Buses

Type "C" for Street Cars



The "Dual" for Buses



Type "A" for Street Cars

A Rare Combination

IT IS one thing to design a ventilator that will ventilate ..... thoroughly. It is another to secure a pleasing appearance without a sacrifice in performance.

N-L Street Car and Bus Ventilators meet all requirements ..... and are surprisingly low in price as well. Without doubt, those are the reasons they're so universally specified, by operators as well as body builders.

N-L

The Mark of a Better Ventilator

THE NICHOLS-LINTERN CO.

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Over 70 per cent placed repeat orders which proves that "Tool Steel" gear & pinions are best by test

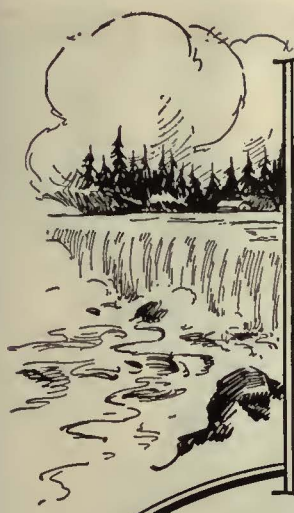
read the story

10 years ago our company gave free of charge 58 "Tool Steel" pinions to 58 different electric railway companies, who had not before used our product. They agreed to keep track of the pinions and report to us at intervals as to how they were performing.

After a lapse of 10 years we have checked up and find of the 58 companies, 41 have placed repeat orders with us and have bought a total of 607 gears and 1814 pinions as the result of the test they ran. 17 companies either failed to follow their records or did not place repeat orders. Of these 17—eight are not operating at the present time.

Tool Steel Quality T.S.Q. Tool Steel Quality

The Tool Steel Gear and Pinion Co.
Cincinnati, Ohio



From the First

THE average man—even the average trained operating engineer—does not realize the harm that may be done to machinery by even the occasional use of a poor lubricant. When a piece of machinery is run for a short time with a lubricant which does not provide an unbroken film of oil between the bearing surfaces, these surfaces become slightly roughened. However slight this roughness may be, it tends to break the protective film of lubricant, even when the correct grades of oil or grease are used.

The only way to make sure of getting full power and service from any piece of machinery is to prevent this first slight abrasion of the bearing surfaces by using the right grades of lubricants from the time the machine is put into operation. Whenever you install a new machine, get the advice of a competent lubricating engineer as to the grades of oils and greases to use, and provide a supply of these lubricants before permitting the machine to be used.

Standard Oils and Greases

are made in grades which cover the lubrication requirements of all machines in use in the industrial world. The lubricating engineers of the Standard Oil Company (Indiana) will be glad to make a survey of your plant and recommend the grades that are suited to your machinery.

No charge is made for this service. To make arrangements for such a survey, phone or write our nearest branch.

STANDARD OIL COMPANY

(Indiana)

General Offices: 910 S. Michigan Avenue Chicago, Illinois

K.O. for rail joint troubles

Joint troubles have increased in proportion to the growth of traffic until they have assumed heavy-weight proportions. They have increased in persistence until they have become a logical contender for the world's championship in annoyance value. They have encased themselves in the armor of old-fashioned prejudice which resists progressive ideas until the last.

The time has come to recognize that joint troubles can be overcome, but not by half-way measures or trifling improvements in rail joint practice. Administer the final knock-out once and for all, by Thermit Welding, which completely eliminates the joints.

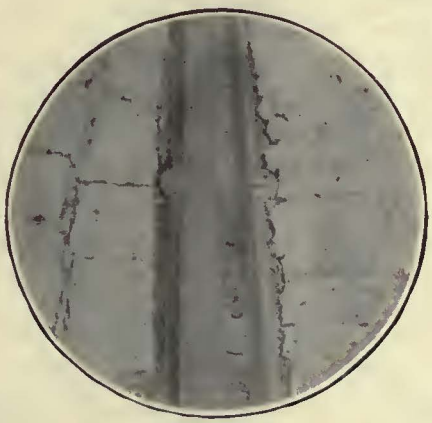


Illustration shows smooth unbroken rail, where once there was a "joint." Thermit Welding makes continuous rail out of standard lengths.

THERMIT

THERMIT

METAL & THERMIT CORPORATION

120 BROADWAY, NEW YORK, N.Y.

PITTSBURGH CHICAGO BOSTON SOUTH SAN FRANCISCO TORONTO

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Furnaces, Electric
American Bridge Co.

Fuses and Fuse Boxes
Columbia Machine Wks.
General Electric Co.
Westinghouse E. & M. Co.

Fuses, Refillable
General Electric Co.
Johns-Manville, Inc.

Gaskets, Asbestos
Westinghouse Tr. Br. Co.

Gas-Electric Cars
General Electric Co.

Gas Producers
Westinghouse E. &. M. Co.

Gates, Car
Brill Co., The J. G.
St. Louis Car Co.

Gear Blanks
Bethlehem Steel Co.
Standard Steel Works

Gear Cases
Chillingworth Mfg. Co.
Columbia Machine Wks.
Elec. Service Supplies Co.
Westinghouse E. & M. Co.

Gears and Pinions
Bemis Car Truck Co.
Bethlehem Steel Co.
Columbia Machine Wks.
General Electric Co.
Nat'l Ry. Appliance Co.
Nuttall Co., R. D.
Tool Steel Gear & Pinion Co.

Generating Sets, Gas-Electric
General Electric Co.

Generators
General Electric Co.
Lesee-Neville Co.
Westinghouse E. & M. Co.

Girder Rails
Bethlehem Steel Co.
Lorain Steel Co.

Gong (See Bells and Gongs)

Greases (See Lubricants)

Grinders and Grind. Supplies
Metal & Thermit Corp.
Railway Track-work Co.

Grinders, Portable
Buda Company
Railway Track-work Co.

Grinders, Portable Electric
Railway Track-work Co.

Grinding Blocks and Wheels
Railway Track-work Co.

Guard Rail Clamps
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co., Inc.

Guard Rails, Tee Rail and Manganese
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co., Inc.

Guards, Trolley
Elec. Service Sup. Co.
Ohio Brass Co.

Hammers, Pneumatic
Ingersoll-Rand Co.

Harps, Trolley
Elec. Service Supplies Co.
More Jones Brass & Metal Co.
Nuttall Co., R. D. & Co.
Star Brass Works
Thornton Trolley Wheel Co.

Headlights
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
St. Louis Car Co.

Headlining
Haskelite Mfg. Corp.
Pantasote Co., Inc.

Heaters, Car (Electric)
Gold Car Heat. & Light. Co.
Nat'l Ry. Appliance Co.
Smith Heater Co., Peter

Heaters, Car, Hot Air and Water
Elec. Service Sup. Co.
Smith Heater Co., Peter

Helmets—Welding
Railway Track-work Co.
Una Welding & Bonding Co.

Hoists and Lifts
Columbia Machine Wks.
Ford Chain Block Co.

Hoists, Portable
Ingersoll-Rand Co.
Sullivan Machinery Co.

Horns, Car
American Stromboe Co.

Ignition Units
Leece Neville Co.

Instruments, Measuring, Testing and Recording
Elec. Service Sup. 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.
Stand. Underground Cable Co.
Westinghouse E. & M. Co.

Insulating Silk
Irvington Varnish & Ins. Co.

Insulating Varnishes
Irvington Varnish & Ins. Co.

Insulation (See also Paints)
Electric Ry. Equipment Co.
Electric Service Sup. Co.
General Electric Co.
Irvington Varnish & Ins. Co.
Mica Insulator Co.
Okonite Co.
Okonite-Callender Cable Co., Inc.
Westinghouse E. & M. Co.

Insulation Slot
Irvington Varnish & Ins. Co.

Insulators (See also Line Material)
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Hemingray Glass Co.
Irvington Varnish & Ins. Co
Ohio Brass Co.
Westinghouse E. & M. Co.

Insulator Pins
Elec. Service Supplies Co.
Hubbard & Co.

Interior Side Linings
Haskelite Mfg. Corp.

Jacks (See also Cranes, Hoists and Lifts)
Columbia Machine Wks.
Elec. Service Supplies Co.

Joints, Rail (See Rail Joints)

Journal Boxes
Brill Co., J. G.
St. Louis Car Co.

Junction Boxes
Std. Underground Cable Co.

Lacquer Finishes
Egyptian Lacquer Mfg. Co.

Lamps, Guards and Fixtures
Elec. Service Sup. Co.
General Electric Co.
Westinghouse E. & M. Co.

Lamps, Arc and Incandescent (See also Headlights)
General Electric Co.
Westinghouse E. & M. Co.

Lamps, Signal and Marker
Elec. Service Supplies Co.
Nichols-Lintern Co.

Lanterns, Classification
Nichols-Lintern Co.

Letter Boards
Haskelite Mfg. Corp.

Lighting Systems
Leece Neville Co.

Lightning Protection
Electric Service Sup. Co.
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Line Material (See also Brackets, Insulators, Wires, etc.)
Archbold-Brady Co.
Dossert & Co.
Electric Ry. Equipment Co.
Electric Service Sup. Co.
Hubbard & Co.
More Jones Brass & Metal Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Locking Spring Boxes
Wm. Wharton, Jr. & Co., Inc.

Locomotives, Electric
Cummings Car & Coach Co.
General Electric Co.
Westinghouse E. & M. Co.

Locomotive Oil Engine, Electric Driven
Ingersoll-Rand Co.

Lubricating Engineers
Standard Oil Co. of Indiana
Texas Company
Universal Lubricating Co.

Lubricants, Oil and Grease
Standard Oil Co. of Indiana
Texas Company
Universal Lubricating Co.

Machinery, Insulating
Amer. Insulating Mach. Co.

Manganese Steel Castings
Wm. Wharton, Jr. & Co., Inc.

Manganese Steel Guard Rails
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co., Inc.

Manganese Steel Switches, Frogs and Crossings
Bethlehem Steel Co.
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co., Inc.

Manganese Steel, Special Track Work
Bethlehem Steel Co.
Wm. Wharton Jr. & Co., Inc.

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Mica Insulator Co.

Molding, Metal
Allis-Chalmers Mfg. Co.

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Motor Leads
Dossert & Co.

Motors, Electric
Westinghouse E. & M. Co.

Motors and Generator Sets
General Electric Co.

Motormen's Seats
Allis-Chalmers Mfg. Co.
Brill Co., J. G.
Electric Service Sup. Co.
Hale-Kilburn Co.
St. Louis Car Co.
Wood Co., Chas. N.

Nuts and Bolts
Bethlehem Steel Co.
Hubbard & Co.

Oils (See Lubricants)

Omnibuses (See Buses, Motor)

Oxy-Acetylene (See Cutting Apparatus Oxy-Acetylene)

Paint
American Asphalt Paint Co.

Paints and Varnishes (Insulating)
Mica Insulator Co.
National Ry. Appliance Co.

Paints and Varnishes, Preservative
Aluminum Co.
Electric Service Sup. Co.

Panels, Outside, Inside
Haskelite Mfg. Corp.

Pavement Breakers
Ingersoll-Rand Co.
Sullivan Machinery Co.

Paving Bricks, Filler and Stretcher
Nelsonville Brick Co.

Paving Guards, Steel
W. S. Godwin Co., Inc.

Paving Material
Amer. Br. Shoe & Fdy. Co.

Pickups, Trolley Wire
Elec. Service Supplies Co.
Ohio Brass Co.

Pinion Pullers
Elec. Service Supplies Co.
General Electric Co.
Wood Co., Chas. N.

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Pins, Case Hardened, Wood and Iron
Ohio Brass Co.
Sharp, Edw. P.
Westinghouse Tr. Brake Co.

Pipe Fittings
Standard Steel Works
Westinghouse Tr. Brake Co.

Planers (See Machine Tools)

Plates for Tee Rail Switches
Ramapo Ajax Corp.

Pliers, Rubber Insulated
Electric Service Sup. Co.

Plywood, Roofs, headlining, Floors, Interior Panels, Bulkheads, Truss Planks
Haskelite Mfg. Corp.

Pneumatic Tools
Ingersoll-Rand Co.

Pole Line Hardware
Bethlehem Steel Co.
Electric Service Sup. Co.
Ohio Brass Co.

Poles, Metal Street
Elec. Ry. Equipment Co.
Hubbard & Co.

Pole Reinforcing
Hubbard & Co.

Poles and Ties Treated
Bell Lumber Co.

Poles, Ties, Posts, Piling and Lumber
Bell Lumber Co.
Naugle Pole & Tie Co.

Poles, Trolley
Anderson Mfg. Co., A. & J. M.
Electric Service Sup. Co.
Nuttall Co., R. D.

Poles, Tubular Steel
Elec. Ry. Equipment Co.
National Tube Co.

Potheads
Okonite Co.
Okonite-Callender Cable Co., Inc.

Power Houses
American Bridge Co.

Power Saving Devices
National Ry. Appliance Co.

Pressure Regulators
General Electric Co.
Westinghouse E. & M. Co.

Pumps
A. S. Cameron Steam Pump Wks. (Ingersoll-Rand Co.)
Ingersoll-Rand Co. (A. S. Cameron Steam Pump Wks.)

Pumps, Air Lift
Sullivan Machinery Co.

Pumps, Vacuum
Sullivan Machinery Co.

Punches, Ticket
Wood Co., Chas. N.

Rail Braces and Fastenings
Ramapo Ajax Corp.

Rail, Brick
Nelsonville Brick Co.

Rail Grinders (See Grinders)

Rail Joints
Carnegie Steel Co.
Ludlum Steel Co.

Rail Joints—Welded
Lorain Steel Co.
Metal & Thermit Corp.

Rail Welding
Una Welding & Bonding Co.

Rails, Relaying
Hyman-Michaels

Rails, Steel
Bethlehem Steel Co.
Carnegie Steel Co.
Ludlum Steel Co.

Railway Paving Guards, Steel
Godwin Co., Inc., W. S.

Railway Safety Switches
Westinghouse E. & M. Co.

Rail Welding
Metal & Thermit Corp.
Railway Track-work Co.

Rattan
Brill Co., The J. G.
Cummings Car & Coach Co.
Electric Service Sup. Co.
Hale-Kilburn Co.
Heywood-Wakefield Co.
St. Louis Car Co.

Registers and Fittings
Brill Co., The J. G.
Electric Service Sup. Co.
Ohmer Fare Register Co.
Rooke Automatic Register Co.
St. Louis Car Co.

Reinforcement, Concrete
Amer. Steel & Wire 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
Electric Service Sup. Co.

Resistance, Wire and Tube
American Steel & Wire Co.
General Electric Co.
Westinghouse E. & M. Co.

Retrievers, Trolley (See Catchers and Retrievers, Trolley)

Rheostats
General Electric Co.
Mica Insulator Co.
Westinghouse E. & M. Co.

Roofs, Car & Bus
Haskelite Mfg. Corp.

Roofing, Car
Pantasote Co., Inc.

Rollers, Bearing
Hyatt Roller Bearing Co.

Sanders, Track
Brill Co., The J. G.
Electric Service Sup. Co.
Nichols-Lintern Co.
Ohio Brass Co.
St. Louis Car Co.

Sash Fixtures, Car
Brill Co., The J. G.
Edwards Co., Inc., O. M.
St. Louis Car Co.

Sash, Metal, Car Window
Edwards Co., Inc., O. M.
Hale-Kilburn Co.

Scrapers, Track (See Cleaners and Scrapers, Track)

Screw Drivers, Rubber Insulated
Electric Service Sup. Co.

Seats, Bus
Hale-Kilburn Co.
Heywood-Wakefield Co.
St. Louis Car Co.

Seats, Car (See also Rattan)
Brill Co., The J. G.
Hale-Kilburn Co.
Heywood-Wakefield Co.
St. Louis Car Co.

Seating Materials
Brill Co., J. G.
Hale-Kilburn Co.
Haskelite Mfg. Corp.
Pantasote Co., Inc.
St. Louis Car Co.

Second Hand Equipment
Electric Equipment Co.
Gerke, J. W.
Hyman-Michaels
Transit Equip. Co.

Shades, Vestibule
Brill Co., The J. G.

Shovels
Brill Co., The J. G.
Hubbard & Co.

Side Bearings (See Bearings Center and Side

Signals, Car Starting
Electric Service Sup. Co.
Nat'l Pneumatic Co., Inc.

Signal Systems, Block
Electric Service Sup. Co.
Nachod Signal Co., Inc.
U. S. Electric Signal Co.
Wood Co., Chas. N.

Signal Systems, Highway Crossing
Nachod Signal Co., Inc.
U. S. Electric Signal Co.

Signals, Indicating
Nichols-Lintern Co.

Slack Adjusters (See Brake Adjusters)

Sleet Wheels and Cutters
Anderson Mfg. Co., A. & J. M.
Columbia Machine Wks.
Elec. Ry. Equipment Co.
Electric Service Sup. Co.
More Jones Brass & Metal Co.
Nuttall Co., R. D.

Smokestacks, Car
Nichols-Lintern Co.

Snow-Plows, Sweepers and Brooms
Brill Co., The J. G.
Columbia Machine Wks.
Consolidated Car Fender Co.
Cummings Car & Coach Co.
Root Spring Scraper Co
St. Louis Car Co.

Snow Sweeper, Rattan
Heywood-Wakefield Co.
Johns-Manville, Inc.

Soldering and Brazing Apparatus (See Welding Processes and Apparatus)

Special Adhesive Papers
Irvington Varnish & Ins. Co.

Special Trackwork
Bethlehem Steel Co.
Buda Company
Lorain Steel Co.
Wm. Wharton, Jr. & Co., Inc.

Spikes
Amer. Steel & Wire Co.

Splicing Compounds
Westinghouse E. & M. Co.

Splicing Sleeves (See Clamps and Connectors)

Springs, Car and Truck
American Steel Foundries
Amer. Steel & Wire Co.
Brill Co., The J. G.
Standard Steel Works
St. Louis Car Co.

Sprinklers, Track and Road
Brill Co., The J. G.
Cummings Car & Coach Co.
St. Louis Car Co.

Steel Castings
Wm. Wharton, Jr. & Co., Inc.

Steel and Steel Products
Morton Mfg. Co.

Steps, Car
Morton Mfg. Co.

Stokers, Mechanical
Babcock & Wilcox Co.
Westinghouse E. & M. Co.

Storage Batteries (See Batteries, Storage)

Strain, Insulators
Anderson Mfg. Co., A. & J. M.
Electric Service Supplies Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Strand
American Steel & Wire Co.
Roebling's Sons Co., J. A.

Superheaters
Babcock & Wilcox Co.

Sweepers, Snow (See Snow Plows, Sweepers and Brooms)

Switch Stands and Fixtures
Ramapo Ajax Corp.

Switches, Selector
Nichols-Lintern Co.

Switches, Tee Rail
Ramapo Ajax Corp.

Switches, Track (See Track Special Work)

Switches and Switchboards
Electric Service Sup. Co.
General Electric Co.
Westinghouse E. & M. Co.

Tampers, Tie
Ingersoll-Rand Co.
Railway Track-work Co.

Tapes and Cloths (See Insulating Cloth, Paper and Tape)

Tee Rail Special Track Work
Bethlehem Steel Co.
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co., Inc.

Telephones and Parts
Electric Service Sup. Co.

Terminals, Cable
Std. Underground Cable Co.

Testing Instruments (See Instruments, Electrical Measuring, Testing, etc.)

Thermostats
Gold Car Heating & Lighting Co.
Railway Utility Co.
Smith Heater Co., Peter

Ticket Trippers & Destroyers
Electric Service Sup. Co.

Ties and Tie Rods, Steel
Carnegie Steel Co.
Godwin Co., Inc., W. S.
International Steel Tie Co.
Ludlum Steel Co.

Ties, Wood Cross (See Poles, Ties, Posts, etc.)

Tires
Fisk Tire Co.
General Tire & Rubber Co.
Goodyear Tire & Rubber Co.

Tongue Switches
Wm. Wharton, Jr. & Co., Inc.

Tool Steel
Bethlehem Steel Co.

Tools, Track & Miscellaneous
Amer. Steel & Wire Co.
Columbia Machine Wks.
Electric Service Sup. Co.
Hubbard & Co.
Railway Track-work Co.

Torches, Acetylene (See Cutting Apparatus)

Tower Wagons & Auto Trucks
McCardell & Co., J. R.

Towers and Transmission Structures
Archbold-Brady Co.
Westinghouse E. & M. Co.

Track Expansion Joints
Wm. Wharton, Jr. & Co., Inc.

Track Grinders
Metal & Thermit Corp.
Railway Track-work Co.
Rail Welding & Bonding Co.
Una Welding & Bonding Co.

Trackless Trollleys
St. Louis Car Co.

Track, Special Work
Bethlehem Steel Co.
Columbia Machine Wks.
Ramapo Ajax Corp.
Wharton, Jr. & Co., Inc., W.

Transfer (See Tickets)

Transfer Issuing Machines
Ohmer Fare Register Co.

Transformers
General Electric Co.
Allis-Chalmers Mfg. Co.
Westinghouse E. & M. Co.

Treads, Safety, Stair Car Step
Irving Iron Works
Morton Mfg. Co.

Trolley Bases
Anderson Mfg. Co., A. J. & J. M.
General Electric Co.
More Jones Brass & Metal Co.
Nuttall Co., R. D.
Ohio Brass Co.

Trolley Bases, Retrieving
Anderson Mfg. Co., A. & J. M.
Nuttall Co., R. D.
Ohio Brass Co.

Trolley Bases
Brill Co., The J. G.
General Electric Co.
Westinghouse E. & M. Co.

Trolley Material (Overhead)
Anderson Mfg. Co., A. & J. M.
Bates Expanded Steel Truss
Electric Service Sup. Co.
More Jones Brass & Metal Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Trolley Shoes
Miller Trolley Shoe Co.

Trolley & Trolley Systems
Ford Chain Block Co.

Trolley Wheels (See Wheels, Trolley)

Trolley Wheel Bushings
More Jones Brass & Metal Co.

Trolley Wheels and Harps
Electric Service Supplies Co.
More Jones Brass & Metal Co.
Thornton Trolley Wheel Co.

Trolley Wire
Amer. Electrical Works
American Steel Foundries
Amer. Steel & Wire Co.
Anaconda Copper Min. Co.
Bridgeport Brass Co.
Roebling's Sons Co., J. A.
Rome Wire Co.

Trucks, Car
Brill Co., The J. G.
Cummings Car & Coach Co.
St. Louis Car Co.

Truss Planks
Haskelite Mfg. Corp.

Tubing, Yellow and Black, Flexible Varnish
Irvington Varnish & Ins. Co.

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Four-tool Pneumatic Tamping Gang

Reducing the Labor Item

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A gang of four men employing Pneumatic Tie Tampers will accomplish as much per day as three times that number tamping by hand. With the untiring power of compressed air, a firm and solid bedding is secured which hand tamping cannot equal.

With Ingersoll-Rand Paving Breakers in use, the track foreman needs only about one-third as many men as are required by hand methods. In such work as cutting concrete, tearing up brick or asphalt paving, and breaking out old concrete track foundations, progress is faster and costs are cut in half.

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Ohio Brass Co.
Westinghouse Tr. Br. Co.

Varnished Papers
Irvington Varnish & Ins. Co

Varnished Silks
Irvington Varnish & Ins. Co

Vestibules, Car
Brill Co., The J. G.
Nat'l Ry. Appliance Co.
Nichols-Lintern Co.
Railway Utility Co.
St. Louis Car Co.

Vestibule Linings
Haskelite Mfg. Corp.

Welded Rail Joints
Electric Railway Improvement Co.
Metal & Thermit Corp.
Ohio Brass Co.
Railway Track-work Co.
Una Welding & Bonding Co.

Welders, Portable Electric
Electric Railway Improvement Co.
Metal & Thermit Corp.
Ohio Brass Co.
Railway Track-work Co.
Westinghouse E. & M. Co.

Welding Processes and Apparatus
Electric Railway Improvement Co.
General Electric Co.
International Oxygen Co.
Metal & Thermit Corp.
Ohio Brass Co.
Railway Track-work Co.
Una Welding & Bonding Co.
Westinghouse E. & M. Co.

Welding Steel
Electric Railway Improvement Co
Railway Track-work Co.
Una Welding & Bonding Co.

Welding Wire
American Steel & Wire Co.
General Electric Co.
Railway Track-work Co.
Roeblings Sons Co., J. A.

Welding Wire and Rods
Railway Track-work Co.

Wheel Guards (See Fenders and Wheel Guards)

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Wheels, Car Steel & Steel Tire
Carnegie Steel Co.
Standard Steel Works

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American Steel Foundries
Columbia Machine Wks.
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Electric Service Sup. Co.
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Wire Rope
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Pointing the Way to Success

WITH

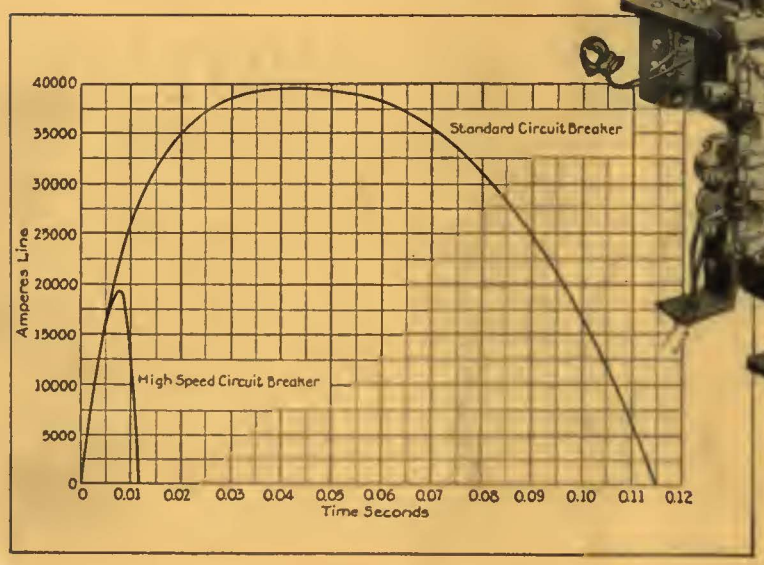
MODERN CARS

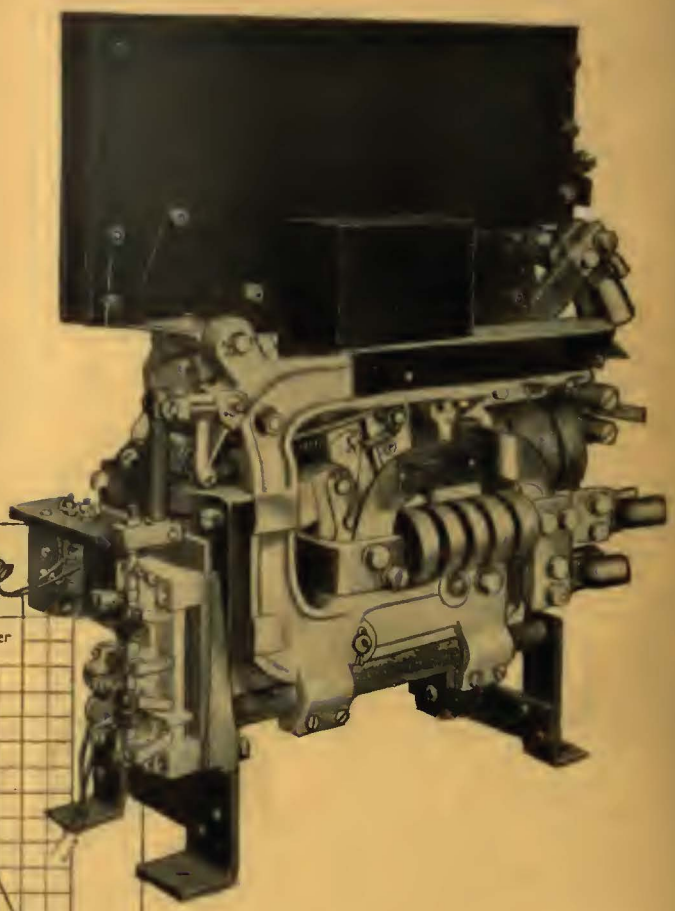
Brooklyn City Railroad, like many other enterprising electric railways, recognized the importance of bright, new and attractive cars to its future development.

An investigation will show what can be accomplished with MODERN CARS in reducing operating and maintenance costs, and increasing revenue by stimulating the riding habit.

THE J. G. BRILL COMPANY
PHILADELPHIA, PA.
AMERICAN CAR CO. ST. LOUIS MO. — G.C. KUHLMAN CAR CO. CLEVELAND, OHIO. — WASON MANF'G CO. SPRINGFIELD, MASS.

The G-E High-Speed Circuit Breaker





—and the measure of its greater protection

Even a hasty glance at these two curves impresses one with the extremely high speed and the effectiveness of this breaker for limiting short-circuit currents. G-E high-speed Breakers have been giving ideal protection in hundreds of installations since 1917.

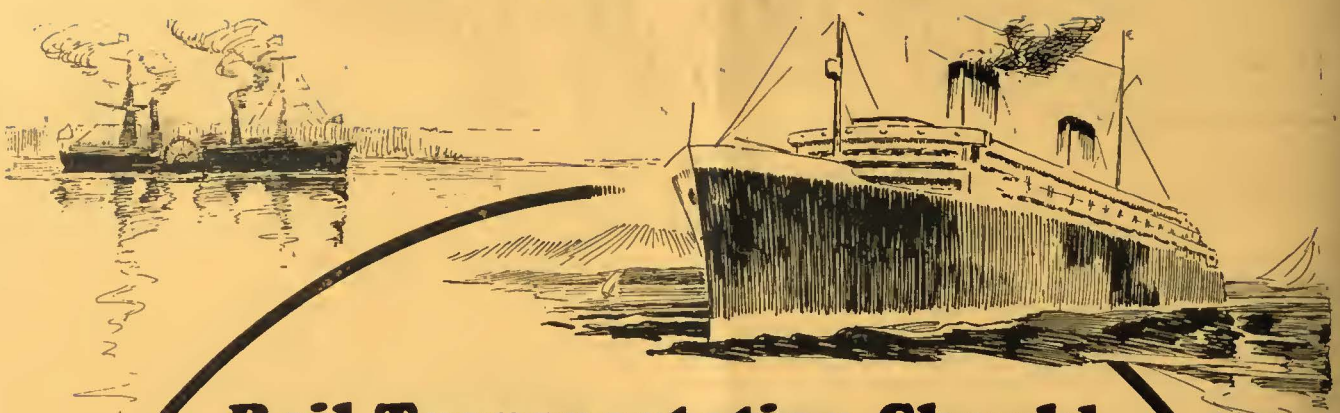
This type of circuit breaker has been uniformly successful in protecting substation apparatus, substation feeders, and electric locomotives. The reduction in current and flashing that results from its use greatly decreases wear of commutator and brushes and practically eliminates damage from internal grounding. It also insures greater reliability and lower substation maintenance.

3-14

GENERAL ELECTRIC

McGraw-Hill Publishing Company, Inc. February 27, 1926 Twenty Cents per Copy

ELECTRIC RAILWAY JOURNAL



Rail Transportation Should Be Up to Modern Standards

Where there is a determination there is a way to retire obsolete cars

Since Fulton, in 1807, built his steamboat "Clermont" the development in the marine field has been rapid. First ships with one propeller, driven by reciprocating steam engines, then turbine driven ships with three propellers and now Diesel-electric driven motor ships. Throughout this development it has been necessary to rapidly replace the obsolete with the new.

And, as in the marine field,—

so with the electric car, since first operated forty-one years ago, the development has been tremendous until today electric traction is recognized as the most economical method of mass transportation.

But to retain this prestige—

it is essential to replace obsolete rolling stock with modern light-weight cars.

Many railway companies have consistently adhered to this policy. In referring to the 28,000 obsolete street cars now in service J. N. SHANNAHAN, past president of the American Electric Railway Association, has said "I would relegate to the scrap pile the old, heavy and obsolete cars, replacing them with new, brighter and lighter cars. Of our immediate needs, possibly none is greater than that of improved service, through the installation of new equipment".

How many of the 28,000 obsolete cars have you?

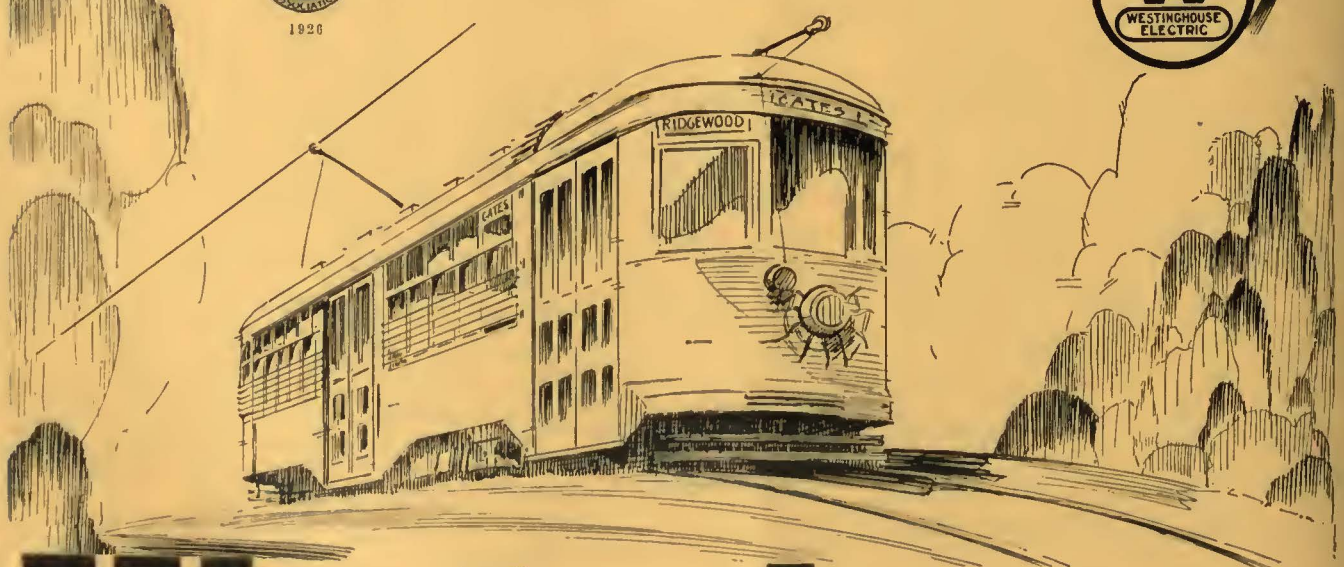
Modern street cars attract patronage.

Westinghouse Electric & Manufacturing Company
East Pittsburgh Pennsylvania

Sales Offices in All Principal Cities of the United States and Foreign Countries

MEMBER AERA 1926

W WESTINGHOUSE ELECTRIC



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London, England

Vol. 67
No. 9

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AN INTERVIEW BY CHARLES GORDON.
Mr. Elliott, vice-president and general manager of the Cincinnati Car Company, places responsibility for the future on both manufacturers and operators. He holds that the unlimited power that is available is the chief cause of heavy equipment.

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Facts Have No Bias

REAL service can be rendered to the readers by a technical publication only when it adopts for its motto the oath required of a witness in court, to tell "the truth, the whole truth and nothing but the truth." While it is within the proper sphere of such a paper to have and express definite opinions of its own on controversial subjects, it would be unjustifiable to suppress facts because they tend to contradict the paper's opinion. Such has always been the policy of ELECTRIC RAILWAY JOURNAL.

Evidence comes to hand from time to time showing that this attitude is widely recognized. Recently a letter was received from the secretary of a city commission which is considering the purchase of its local street railway system. The letter said in part:

I have information through the medium of..... that articles containing interesting and valuable information relative to ownership and operation of street railway systems by municipalities have appeared in ELECTRIC RAILWAY JOURNAL during the past two or three years. This publication is not on file in our public library, and if it would not be too much trouble, I will appreciate your referring me to the issues which contained articles based on first-hand investigations of the situation in Detroit and other cities.

Municipal ownership in this country has not been favored by this paper. For years that has been one of its editorial policies. Nevertheless, facts have been published regardless of whether they were favorable or unfavorable to municipal ownership. So the city commission which is seriously considering this subject naturally turns to the JOURNAL as a source of unbiased information.

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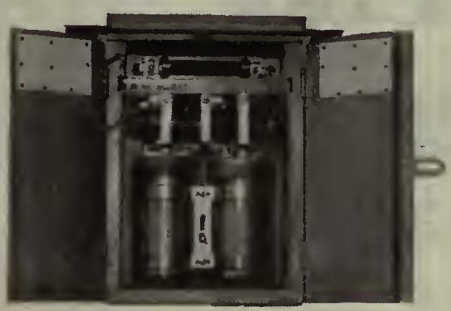
Advertising Index—Alphabetical, 54; Classified, 50-52; Searchlight Section, 49

Assured Protection

for your cars—your line—your stations is obtained by installing

Westinghouse Direct-Current Lightning Arresters

MP Arrester, 100-750 Volts



Type AR Electrolytic Arrester
For Voltage up to 3800

Type K-3
For Voltage up to 1500

MP Arrester

This low-priced arrester is adequate for the protection of cars under all ordinary conditions, one to the car and five to the mile of line. It is easy to install and, once installed, requires practically no attention.

The MP arrester has a long life and affords greater freedom of discharge than any other type using series resistance.

For extra severe 600-volt, and all 1200 and 1500-volt service, for car and pole mounting, we recommend the

AR Arrester

This is an electrolytic arrester having a high discharge capacity. It is recommended for station service where it can easily be given the required periodic maintenance and is not subjected to freezing temperatures. It is also used extensively on cars.

K-3 Arrester

This is a condenser arrester of high capacity. It requires no attention whatever after installation. It stays on the cars the year round, having no liquids to freeze, no moving parts to wear out, and no glass parts to break.

For further details ask for a copy of Descriptive Leaflet 20021.

Westinghouse Electric & Manufacturing Company
East Pittsburgh Pennsylvania
Sales Offices in All Principal Cities of the United States and Foreign Countries

W WESTINGHOUSE ELECTRIC

MEMBER AMERICAN ELECTRIC RAILWAY ASSOCIATION AERA 1926

Westinghouse

X 86428

Another report from the field!

Our eastern representative writes in " . . . last reports I had from B . . . *, show that our ears had passed the 325,000 mark."

*Note: Name on request of Superintendent of Distribution of a large eastern railway system.

O-B Marathon Ears

are making enviable records for endurance where service is frequent and conditions severe. A trolley ear like this, which will endure over three hundred thousand car passes, means many months extra usefulness in the busiest city streets, before replacement is required.

O-B Marathon Ears wear longer because of the extra thickness of the metal lips. This metal is unusually tough and durable, yet ductile enough to form readily when peened on the under side of wire.

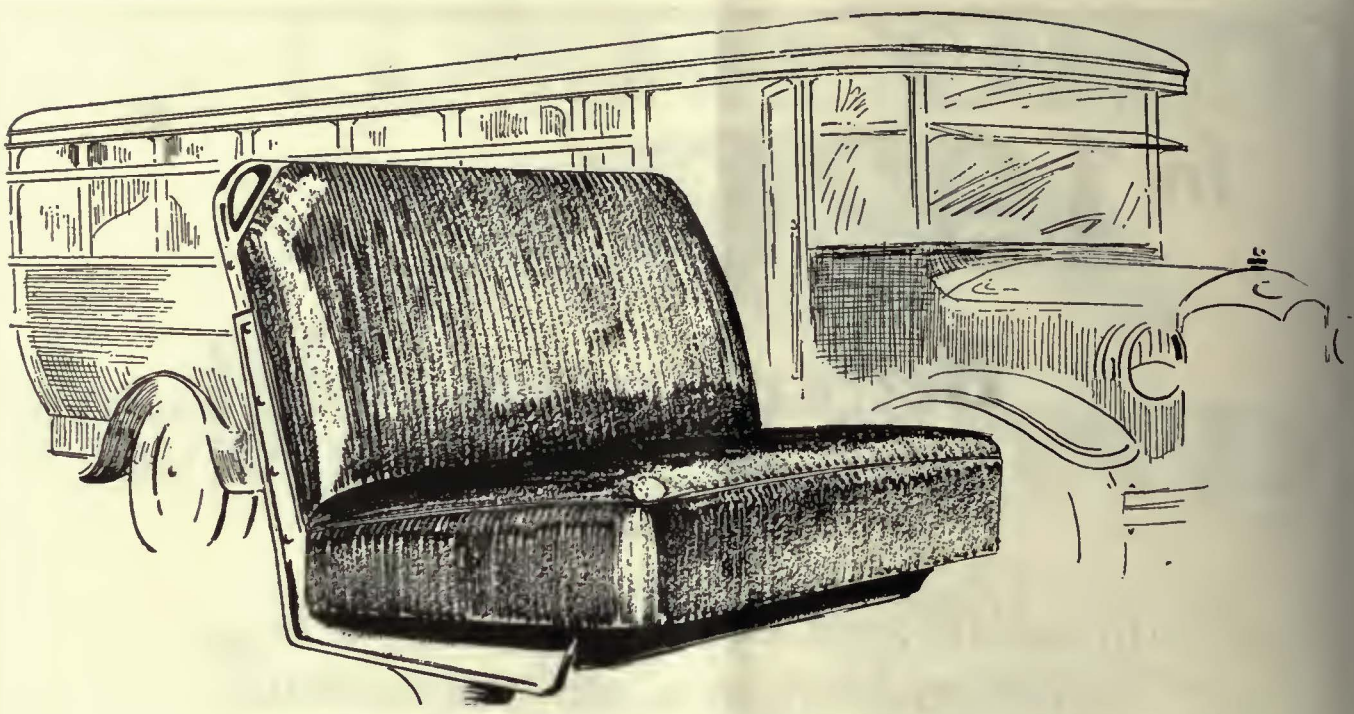
The body of the ear is a model of slender gracefulness, without a bump or hump anywhere to obstruct the passage of the wheel. Lips are trimmed off toward the end with a V-shaped cut to insure easiest transition from wire to ear.

Ohio Brass Company, Mansfield, O.
Dominion Insulator & Mfg. Co., Limited
Niagara Falls, Canada

34B

Ohio Brass Co.

PORCELAIN INSULATORS LINE MATERIALS RAIL BONDS CAR EQUIPMENT MINING MATERIALS VALVES



Both seats *and* curtains of PANTASOTE

Comfort to please the most fastidious passenger; and as sound an economy as any business man can demand

If the riding public is expecting comfort and good appearance in street railway cars, it is looking for an equally high, if not a higher standard in the buses operated as part of a street railway system.

For the bus is still a new form of transportation; it has promised much to the prospective rider, and it must live up to its promises.

Seats are important. So are curtains. Both are intimately associated with every passenger's riding comfort. Both can be either an eyesore or the keynote of a comfortable, attractive interior.

That is why so many railway-men have saved themselves the expense and risk of taking chances on doubtful materials by specifying Pantasote for bus seats and bus curtains, just as they specify Pantasote for use on their electric cars.. They know Pantasote by reputation and experience. They know that the very people who ride the buses have already appreciated Pantasote on the street cars.

And they know too that it pays well to specify a material which is admittedly far superior in wearing qualities to any lower grade leathers or "leather substitutes"; which retains its fresh new appearance through a long life of service; and which is unaffected by any climatic conditions.

But remember, in buying, that only genuine Pantasote has these Pantasote qualities. It will pay you to be quite specific, and to insist on getting just what you specify—genuine Pantasote.

for bus Seats
for bus Curtains

THE PANTASOTE COMPANY, INC.
250 Park Avenue, New York City

PANTASOTE

Look ahead to the year 1951

There is no substitute for experience

YELLOW COACH
plus
GENERAL MOTORS
marks a new era
in building for
STABILITY-

What about the *stability* of the motor coach manufacturing organizations with which you are doing business today?

Estimate your losses arising from "orphan equipment."

Weigh carefully the value of protecting your investment.

Today, 1926. Tomorrow, 1951.

What factors will govern your selection of motor coaches during the years that lie between?

Realizing the stability of the motor coach as a means of transportation, two great organizations have combined all their transportation experience and vast technical resources pertaining to manufacturing so that as the years pass their service may be stronger, their product better, their moral responsibility to the field secure.

Hence, the amalgamation of Yellow Coach and General Motors, recognized as the most significant transportation development of a decade.

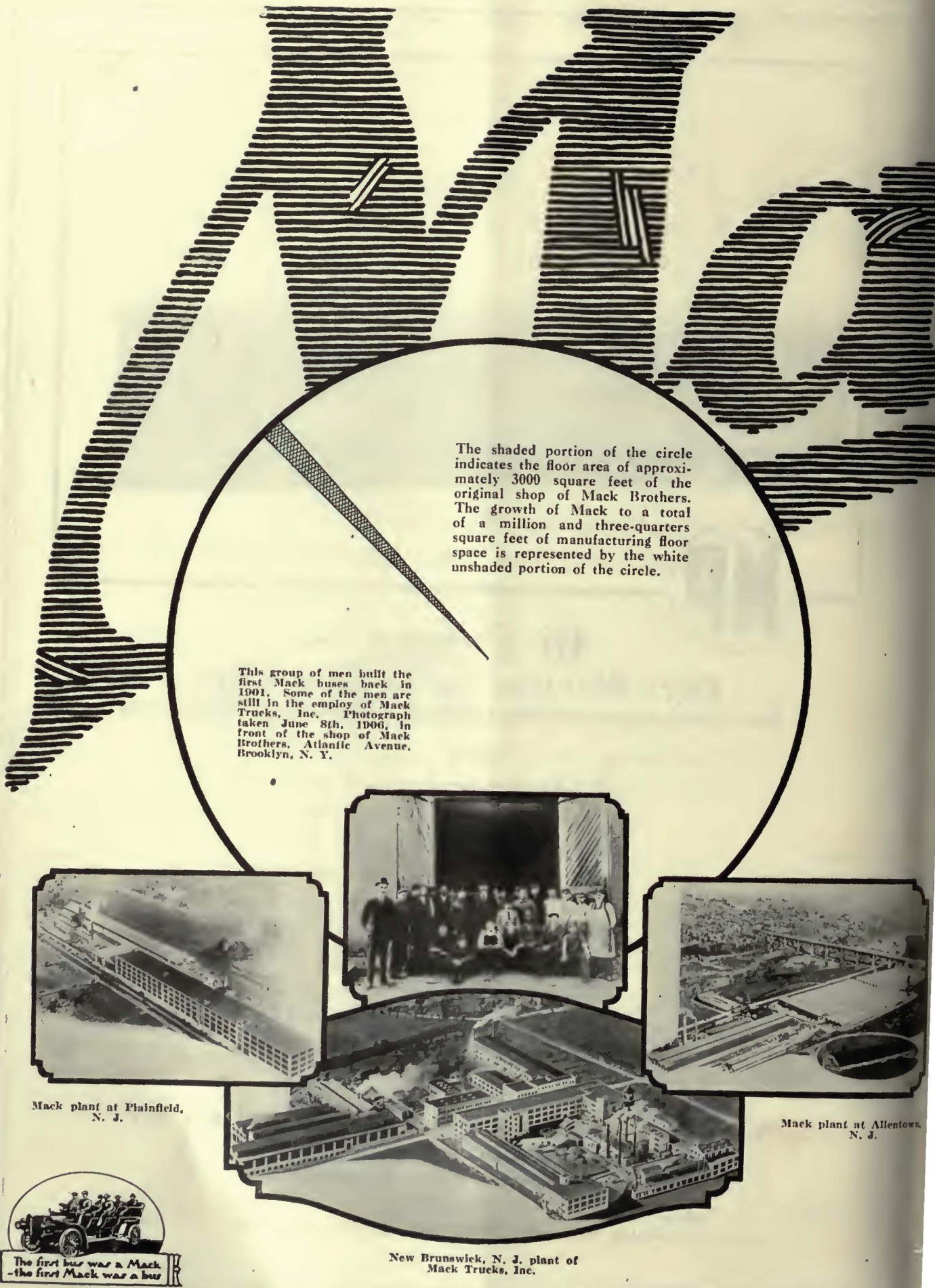
Each of these tremendous organizations brings something to the other—and to *you*.

Yellow Coach—Vast operating experience with its resultant assurance of *low-cost, profitable miles.* Manufacturing experience that places Yellow Coaches *on the road,* where they may earn. The famous Yellow Knight Sleeve Valve Engine; the master gauge for power, performance and economy.

General Motors—Unlimited technical resources. Manufacturing experience which can be found only in the greatest automotive manufacturing organization in the world. Such an alliance places *financial stability* back of the coaches you operate. It passes along to you the substantial economies in engineering, manufacturing and merchandising operations which result because of this welding of resources. It places Yellow Coach in an impregnable position, better than ever and assuring a permanent investment in profitable experience.

Yellow Coach and General Motors are *building for security* so that you may buy and *operate with security* for long years ahead, unclouded by doubt or uncertainty.

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


The shaded portion of the circle indicates the floor area of approximately 3000 square feet of the original shop of Mack Brothers. The growth of Mack to a total of a million and three-quarters square feet of manufacturing floor space is represented by the white unshaded portion of the circle.
This group of men built the first Mack buses back in 1901. Some of the men are still in the employ of Mack Trucks, Inc. Photograph taken June 8th, 1906, in front of the shop of Mack Brothers, Atlantic Avenue, Brooklyn, N. Y.
Mack plant at Plainfield, N. J.
Mack plant at Allentown, N. J.
New Brunswick, N. J. plant of Mack Trucks, Inc.
The first bus was a Mack -the first Mack was a bus

What's behind the Bus you buy?

From a blacksmith shop to 157 acres of manufacturing!

Just one thing built the tremendous manufacturing and service facilities of Mack—

Demand on the part of Mack users

Twenty-six years ago a small shop and a small corps of men turning out a good product. Today, 1,730,000 square feet of manufacturing space, and on the front line 100 Mack direct factory branches serve the needs of Mack users.

That's growth! Growth built by one thing—the demand for more and more Macks.

Mack *users* have built the Mack bus. Mack demand has erected three great plants and studded the country with Mack service stations. In short, Mack performance, speaking through Mack owners has done this thing.

Mack supplied the engineering knowledge and manufacturing facilities, but *you* have built the Mack bus and the organization behind it.

MACK TRUCKS, INC.
INTERNATIONAL MOTOR COMPANY
25 Broadway, New York City

One hundred direct MACK factory branches operate under the titles of: "MACK-INTERNATIONAL MOTOR TRUCK CORPORATION," "MACK MOTOR TRUCK COMPANY," and "MACK TRUCKS of CANADA, Ltd."

The Mack Bus

MODERN ROLLING STOCK

pays for itself!

Figures are available to prove it. More inviting in appearance, more comfortable to ride in, making faster trips and shorter stops, the modern car creates increased patronage and reduces the competition of the private automobile. It builds revenue.

Lighter and faster, it operates at less cost and entails lower maintenance expense.

By increasing revenue and reducing costs, the new car pays for itself in a very few years.

Our engineers are thoroughly conversant with the modern features of car design and construction. Let them co-operate with you in working out plans for your projected new equipment—or we will quote on your specifications.

Cummings Car and Coach Co.

Successors to McGuire Cummings Mfg. Co.

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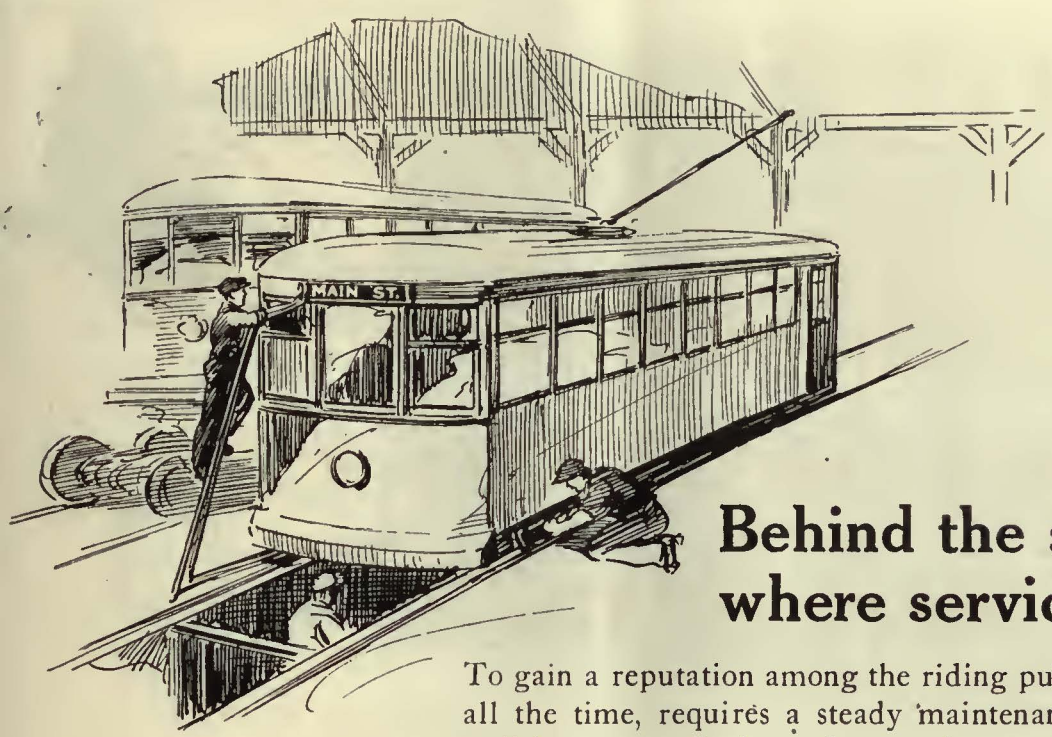
LIGHT WEIGHT, SINGLE AND DOUBLE TRUCKS

SNOW SWEEPERS AND PLOWS

GAS-ELECTRIC MOTOR COACHES



Behind the scenes is where service begins—

To gain a reputation among the riding public for being on time all the time, requires a steady maintenance of schedules with well-kept cars. Such service may be traced back to the efficient repair shop—of which the equipment is an all-important factor.

Keystone Shop Equipment, designed and built for car-shop use, puts a repair shop on a thoroughly modern basis.

Check the list below for items you may need. Then ask for further particulars.

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PITTSBURGH 839 Oliver Building | BOSTON 88 Broad Street | SCRANTON 316 N. Washington Ave. | DETROIT General Motors Building

Lyman Tube & Supply Co., Ltd., Montreal, Toronto, Vancouver

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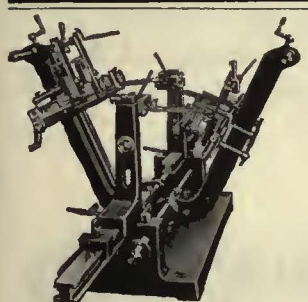

Peerless Coil Spreader

PARTIAL LIST OF SHOP SPECIALTIES

- Segur Taping Machines
- Peerless-Segur Coil Spreaders and Winders
- Peerless Armature Repair Machines
- Electric Baking Ovens
- Century Type Testers
- Peerless Pinion Pullers
- Peerless Floor Cranes
- Peerless Pit Jacks
- Portable Lamp Guards
- Simplex Jacks
- Reading Car Replacers
- Electric Drilling Machines
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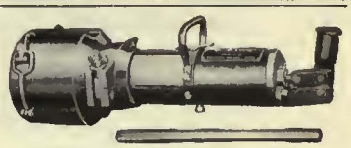
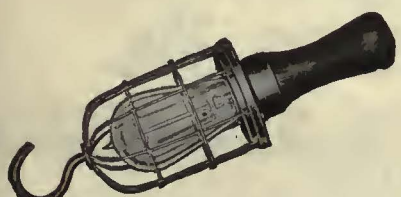
- Cass Commutator Stones

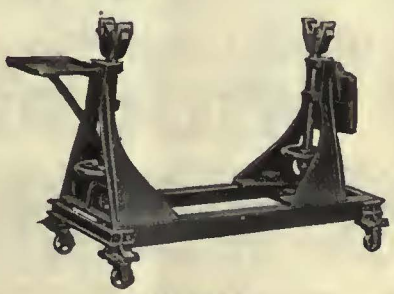


Peerless Pinion Puller

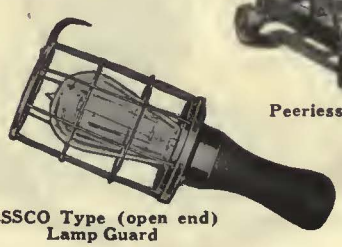
Peerless Pit Jack



New Keystone Type Lamp Guard



Type A Armature Stand



ESSCO Type (open end) Lamp Guard

The Selector Valve permits independent control of entrance and exit doors.

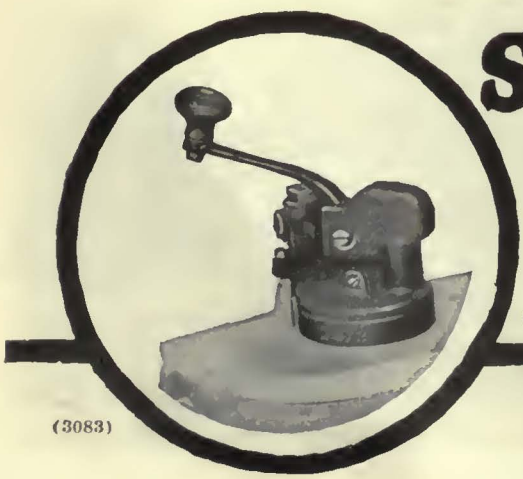
What makes a Safety Car Safe?

The A. E. R. A. committee on Safety Car operation in 1921 defined a Safety Car as "any type of car equipped with *adequate* safety devices for one man operation."

Interlocking of car control, brakes, doors and steps, by means of the Safety Car Control Equipment, meets the requirement stipulated.

It prevents opening the doors before a stop is completed, prevents a start before the doors are closed, and automatically makes an emergency brake application and shuts off the power if the operator releases the controller handle through carelessness or disability.

Experience has demonstrated that safer transportation is assured when operating responsibility is centralized in one man whose duties are thus safeguarded and simplified by complete protective and labor-saving devices.



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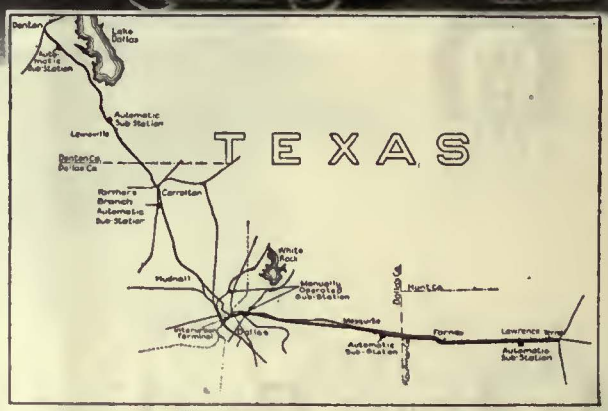
SAFETY CAR DEVICES CO.
OF ST. LOUIS, MO.

Postal and Telegraphic Address:
WILMERDING, PA.

CHICAGO SAN FRANCISCO NEW YORK WASHINGTON PITTSBURGH

13,000 Cars now have our complete Safety Car Control Equipment

Greater attractiveness and better performance are essential to increased revenue and reduced expense. Both are being achieved by those progressive companies which are operating modern cars.



Three years' operation proved the value of one-man light-weight cars on the Texas Interurban Railway

To meet the requirements of modern rolling stock as exemplified by light-weight, high-acceleration cars, the General Electric Company manufactures motors, control, air brake apparatus, and many smaller items of car equipment. The notable achievements of modern cars thus equipped are written in scores of lowered-maintenance records, and attested by many repeat orders.

Operating costs per car-mile, 1925

Maintenance of way and structure	2.9 cts.
Maintenance of equipment	1.0 cts.
Power	6.2 cts.
Conducting transportation	5.8 cts.
General and miscellaneous	11.6 cts.
Total	27.5 cts.

Modern equipment used

Weight of cars complete	31,530 lb.
Motors (4-35 h.p.)	GE-265
Control (single-end)	G-E type K-35
Air Brakes—G-E straight air with emergency feature	
Compressors	G-E type CP-27B

11-72

GENERAL ELECTRIC

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Publishing Company, Inc.

CHARLES GORDON, *Editor*

Volume 67 New York, Saturday, February 27, 1926 *Number 9*

Speeding Up Railway Operation Helps Local Merchants

ELIMINATION of automobile parking in congested districts will aid retail business rather than injure it. That is an old story to the experienced transportation men of the electric railway industry, but the local merchants usually refuse to believe it. Without taking the trouble to analyze the situation carefully, the average storekeeper jumps to the conclusion that his trade will suffer if customers are not allowed to park their automobiles in front of his door. That the users of public transportation vehicles outnumber the users of private vehicles in the ratio of three or four to one is overlooked.

In Pittsburgh, however, the experiment of prohibiting all parking on certain downtown streets was made in the early part of last year and the results have demonstrated that the apprehension of the merchants was groundless. Checks made by the research department of the Pittsburgh Railways show that there has been a substantial reduction in the running time of street cars since the new parking restrictions have been in effect. Detailed figures are published elsewhere in this issue. It is even more interesting to note that the downtown retail trade has prospered more than that in the outlying sections since the change was made. Industrial depression which prevailed during 1925 resulted in a slight decrease in trade throughout the Pittsburgh district. In the downtown section, however, the effect was less noticeable than in the district as a whole, the volume of business being only 0.8 per cent lower than in 1924, whereas for the entire area the decrease was nearly 3 per cent.

The conclusion seems fairly obvious that the downtown merchants prospered by the enactment of traffic regulations that made it easier for the majority of people to reach their stores. This result is probably no different from that which has followed the establishment of similar regulations in other cities, but Pittsburgh is particularly fortunate in being able to establish the fact by such convincing figures.

New Cars Are Desirable Because They Will Earn More

REPLACEMENT of 28,000 electric railway cars has seemed to some persons such a radical proposal that in certain quarters it has been questioned. "We cannot throw away more than a third of the rolling stock of the industry," say these managers. "How can we finance the purchase of new cars for the purpose when money is not to be had for much-needed extensions?"

Such an attitude naturally does not take into account the real purpose of the plan for using new cars instead of old. No one contends for a moment that these cars can or should be replaced all at once. It will tax to capacity all the car building plants in the country for several years to carry through such a program, to say nothing of the new cars which are needed for extensions of service.

The real point is that new cars are urged because they will earn their keep. Cars twenty years or more old were built prior to the development of modern equipment and devices, and before steel was used to any considerable extent in framing. Nearly all such cars are heavy for their carrying capacity. Platforms, doors, aisles and step heights were not designed to get riders in and out quickly or efficiently. Provisions for fare collection are inadequate. The trucks and motors are relatively inefficient. Then, too, with twenty years or more to their credit they are not able to give the quality of service they once could, nor to operate at the same cost for maintenance.

It can be shown easily that new cars are an economy. Mr. Storrs has done that in several addresses. Mr. Budd in his Indianapolis paper before the Central Electric Railway Association not only gave a few examples of what new cars have done, but he listed a dozen roads that have increased their revenue, both gross and net, in the past five years. A factor of no inconsiderable importance in each case was the substitution of new cars for old. What does the cost of new cars matter if the net revenue can be increased materially due to their use?

Merger of Electric Railway and Bus Manufacturers Should Speed Co-ordination

TRANSPORTATION men should view with favorable interest the recent consolidation of the American Car & Foundry, Brill and Fageol interests. Here large builders of steam railroad and electric railway cars have added to their interests a going bus manufacturing business of considerable size and importance. The new company now stands in the unusual position of being prepared to sell transportation vehicles of practically every type now seriously considered. The principal men in the new company have wide experience in their respective fields. By combining their knowledge and financial resources as they have, the way is opened for constructive thinking of the kind that should prove helpful to the industry at this time.

Never before in the history of the transportation industry has there been more need for care in the selection of the type of vehicle to be used, particularly in local systems. While engineers may estimate the results to be anticipated with this or that method, it remains for the builder to produce the vehicle which will carry out the proposal. It has been seen repeatedly that such elements as vehicle weights and operating speeds spell the difference between success and failure. The manufacturers' engineering committee, recently formed

under the auspices of the American Electric Railway Association by car builders and equipment men, can do much in pointing out these things. But the result must necessarily lie with the company that actually builds the equipment.

Consideration of the bus in connection with many of the problems of local transportation makes it essential that its use be given careful study and fair and unbiased treatment. For the first time a manufacturer is in the position to build either cars or buses as desired. This gives it the opportunity to study in a practical and unbiased way the advantages and the limitations of each method of transportation under different operating conditions. This it can do if it will reveal its findings without fear or prejudice. By grasping its opportunities it is in an enviable position to aid the movement for co-ordination and modernization of transportation methods. Through the wide and diversified experience of its personnel, it can give a greater measure of constructive help than was possible when the companies were divided and operated individually.

Skillful Public Relations Work Made Part of a Rehabilitation Program

METHODS by which transportation revenue has been increased 65 per cent in three years on the Chicago, Aurora & Elgin Railroad are told of elsewhere in this issue in the first of several articles describing the rehabilitation of the property. Many factors have contributed to the development. The territory is a highly competitive field in which four steam railroads operate suburban service in addition to that provided by the electric line. It has been necessary, therefore, to use every available means of building up the traffic.

Of greatest importance in the success which has attended the efforts of the company has been the really high-class service rendered by the Aurora-Elgin line. Many new and modern cars have been bought. Track has been thoroughly rehabilitated, using stone ballast in place of gravel. Old stations have been spruced up and attractive new stations built. Power facilities have been improved. Signals and additional crossing protection devices have been installed.

Besides the great improvement which has been made in the physical plant, skillful work has been done in fostering good public relations. Among the interesting steps taken in this direction might be mentioned the issue of special low-rate homeseekers' tickets. These have been used to encourage residents of Chicago to go out into the Aurora-Elgin territory to examine its possibilities as sites for future homes. Many people whose first knowledge of this electric railway was acquired in this manner have now become regular patrons.

Commutation tickets have furnished another means of cultivating public relations. Whenever a new name appears on the list of buyers of monthly tickets, the management sends a special message of greeting expressing the hope that the new ticket buyer will find the service satisfactory and requesting his co-operation in finding ways to improve it. In case an old name disappears from the list of commutation ticket buyers a representative of the management calls to find out why the former user has dropped out. In this way many minor shortcomings of the service have been discovered, and by the exercise of tact and diplomacy former customers have been won back to the railway. The possibility of copying these particular methods does not exist on every railway, but alertness to take advantage of the opportunities that do exist, however, will usually do much to improve public relations and build up traffic.

Boston Figures Deserve Careful Study

LIGHTLY to pass over the record of the Boston Elevated Railway for 1925 as disclosed by the digest of the annual report in the issue of the JOURNAL for Feb. 13 would be a mistake for others engaged in the work of the industry. That report as presented by the public trustees to the state reflects not only the record of the road itself, but it contains in its statisics many unit figures that are of immeasurable value for comparative purposes. Of the value of these to him each reader must judge for himself. Aside from all this, however, there are certain points which should perhaps be emphasized.

Of particular interest is the attitude of the company on the matter of buses. The management is ready to furnish bus service wherever it appears desirable to do so. It might at first be thought that this was only a generality, but that is not so when the record of increase from 63,937 bus passengers in 1922 to 2,472,456 passengers in 1925 is considered. The chartered bus is also becoming a factor at Boston. Of interest, too, is the plan made for parking automobiles outside of congested centers and inducing their users to journey into the city on the car lines. Particularly proud are the trustees of the record that shows that only 12.7 per cent of the passenger cars now in service on their lines are more than twenty years old compared with the fact that of the 82,340 cars in the United States in similar service 34 per cent are of greater age. The accident record also reflected the intensive work that is being done to decrease the hazard to the passenger.

One of the saving features at Boston is that a broad discretion is vested in the trustees to change the rates of fare when necessary, but their acts are subject at all times to the principle of service at cost. True, $2,327,816 is due to the cities under the provisions of the public control act that if in any year the established rates of fare do not meet the cost of service and the reserve fund of $1,000,000 is used up, then any loss above that amount will be paid over by the state to the trustees. Any such amount paid by the state is assessed upon the cities and towns in which the lines are operated in proportion to the number of persons in such cities and towns using the service at the time the payments are made by the state. If, in later years, receipts exceed the cost of service, any amount in the reserve fund in excess of the $1,000,000 with which it was started is paid over by the state to be repaid to the cities and towns until any assessments have been repaid. Thereafter, any such excess remains in the reserve fund until needed to meet the cost of service. Fares are then to be reduced as described above.

These are terms that have been stated many times before. Sight should not be lost of them in any study which is made of the mass of data contained in the report of the trustees as presented to the Legislature.

Under the conditions that prevail at Boston it was no ordinary performance on the part of the management that resulted in the showing of $502,195 in 1925 as the balance of receipts above the cost of service compared with a deficit of $636,696 for 1924. In fact, the more one studies all the circumstances the more is the truth borne home that the residents of Boston are the real subjects for congratulation.

Staggered Hours Again Proposed to Relieve New York Transit Situation

RELIEF from the almost intolerable conditions on the rapid transit lines of New York is proposed by the Health Commissioner and the head of the Transit Commission through the adoption of the staggering of working hours. The plan was proposed in Washington and in New York during the war, and was actually put in practice for a short period in each city. Its use was abandoned, largely because the workers had not accustomed themselves to the adjustments necessary in their daily routine. In Washington it is said that the difficulty of obtaining negro maids who would prepare breakfast at several different periods had much to do with the disfavor into which the plan fell.

Outside of the transportation industry, it is not generally realized that peak-load conditions have become much worse during the past few years. Evidence to this effect is readily available, however. Study of the load curves of a number of the large electric generating stations illustrates in a striking way the change that has taken place. Between 1920 and 1925 there has been a marked improvement in the load factors of stations which supply no railway power, while in the case of generating stations serving the electric railways the load factor has become worse during this period.

Undoubtedly the present situation is a serious one. Congestion in the streets, overcrowding of transportation vehicles, excessive investment cost for equipment needed only in rush hours and uneconomic use of power station facilities all indicate the imperative need for some form of relief. Staggered working hours will afford a measure of such relief if the public is willing to accept this solution of the problem.

Reduction in Hours of Labor Has Increased Rush-Hour Congestion

ACCENTUATION of the sharpness of the rush-hour peak demands on the urban transportation systems is due in a considerable part to reduction in the hours of labor. The time for starting work has been set later, so that the executives, clerks and laborers begin and end their business day more nearly at the same time. This has meant that to carry the people on the transportation systems additional equipment has had to be put in service as far as possible. Beyond that, overcrowding has been the only way out.

Shifting of the hours of work slightly will make it possible for the transportation companies to give better service than under present conditions. If the spread of working hours is over only a limited period, the plan will tend to increase rather than to decrease the cost of rush-hour service, as the maximum loads per vehicle will be reduced. Real relief can be obtained if the hours can be spread sufficiently so that the cars and trains can make more than a single round trip during the rush hour, which is all the most of them can make under present conditions. In case enough spread in the peak can be obtained so that two or more trips can be made it will mean that much better service can be provided at a cost no greater than the present. It will mean that construction of rapid transit lines, now sadly behind due to the policies of ex-Mayor Hylan, will be given a chance to catch up with the growth in population.

The same plan can be used to advantage in any city where there are sharp rush-hour peaks. As a means of getting more transportation it has such merit that, barring the construction of new lines, it warrants serious consideration.

Detroit Will Pay for Its Cars Out of Earnings

INTEREST in the suggestion of H. U. Wallace, general manager of the municipal railway at Detroit, Mich., to acquire 300 more new cars and 150 new buses goes beyond the proposal itself. True, that suggestion reflects the growth of the demand for transportation, but it is his remarks about the inadvisability of keeping old cars in service that show the modern trend in selling transportation. The information available does not indicate the age of the equipment which Mr. Wallace would replace. It would be interesting to know that. Of greater significance is the fact that the department at Detroit has been assured it will be able to secure new cars and buses, on terms that will permit it to pay for all of the cars out of earnings or out of the savings that the department will be able to make in the cost of operating the new, light, modern rolling stock as compared with the present heavy and obsolete units.

Mr. Wallace is not given to making rash statements or to holding out promises that are not likely to be fulfilled. His task at Detroit is a difficult one. He knows that. If other evidence of his ability correctly to diagnose the needs of Detroit were needed it is furnished in the paper presented by him before the Highway Engineering Congress at Ann Arbor on Feb. 17, a digest of which is published elsewhere in this issue. That shows his grasp of the general situation. More recently, however, he went on record with respect to the need for up-to-date rolling stock before the North End Business Men's Association. He knows what the public wants. As the disposition of the Board of Street Railway Commissioners is favorable to his proposal the riders of Detroit will probably get what they want. Not only that, they will apparently get it on terms and conditions that should appeal to the railways elsewhere confronted with similar problems of providing adequate rolling stock, some of which have heretofore been loath to believe that the plan which he has in mind was workable.

The Detroit proposal is, of course, not new. Its sponsors would not claim credit for that. But the credit is theirs of putting the matter before the public in its present light and of being prepared to subject the matter to the acid test of daily experience. The equipment trust obligation, in which the cost of new equipment is amortized over the years out of earnings, is an old device, but resort to it has been all too infrequent in the electric railway field.

Depreciation as an Operating Expense

FIRST ARTICLE

Definition of the Problem—Service Life Is Difficult to Determine, and on This the Whole Structure Rests—Illustrations Given to Show Several Viewpoints—Creation of a Depreciation Reserve Is Vitally Important

By W. H. Maltbie
Late General Counsel United Railways & Electric Company of Baltimore

SOME months ago, as the result of a conversation with one of the editors of this paper, the author undertook to prepare a series of articles on the subject of depreciation. This series was looked forward to with great interest, as Mr. Maltbie was an outstanding authority on the subjects of valuation and depreciation. After his death, the manuscript was located and forwarded to this paper through the kindness of J. H. Hanna, chairman of the A.E.R.A. committee on national relations sub-committee on depreciation, of which Mr. Maltbie was a member.

These articles were written from the viewpoint of the present investigation by the Interstate Commerce Commission of the whole subject of depreciation of electric railway property. This investigation was undertaken with a view to establishing definite rules and regulations covering the allowance of charges for depreciation as an operating expense on all roads subject to its jurisdiction. Since there is a possibility that any regulations of this sort established by the I. C. C. may be accepted as a precedent by various state commissions it is important that all street railway executives should be familiar with the present situation.

These three articles, dealing respectively with causes of depreciation, methods of setting up funds to provide for depreciation and practical methods of building up a retirement reserve, constitute a valuable contribution to the literature on the subject. They were probably the last creative work of the author.—EDITOR.

THE interstate commerce act, as amended Feb. 28, 1920, contains in Sec. 20, paragraph 5, a direction to the Interstate Commerce Commission to determine for all carriers subject to the act the classes of property for which depreciation charges might properly be included under operating expenses and the percentages of depreciation that should be charged with respect to each such class of property with power to the commission to classify carriers for this purpose and thereafter, if necessary, to modify these items. The act further provides that carriers subject to the act shall not charge to operating expenses depreciation on any classes of property except those included by the commission or charge for any class of property a percentage of depreciation other than that prescribed by the commission.

There is some dispute as to the real intent of this section of the law. Some hold that Congress was fearful lest certain railroads should use their previous freedom as to the setting up of depreciation reserves as a means of absorbing income which would otherwise be subject to recapture, and passed the section in question solely with a view of preventing overcharges for depreciation. Under this interpretation of the act the charging of depreciation upon any particular class of property is optional with the company, but if charged it can be only upon those classes of property which the commission has selected, and at the rate which the commission has fixed.

Others hold that it is the intent of the act that the Interstate Commerce Commission should set up classes of depreciable property and fix percentages for each class, and that thereafter carriers subject to the act shall set up depreciation at the fixed percentages upon all property classed as depreciable.

In carrying out the provisions of the act the Interstate Commerce Commission has created a depreciation section in its Bureau of Accounts and instructed this section to make a study of depreciation for each class of carrier subject to the act and prepare a report to the commission which will be made the subject of subsequent testimony, brief and argument.

Reports upon carriers by water, telephone companies and steam railroads have already been prepared and filed by the depreciation section, and the study of electric railway property is now in progress. No decision has been handed down by the Interstate Commerce Commission in any of these cases.

While the depreciation section, of course, is not compelled to follow in its electric railway report the precedents established in its other reports, the reports already published indicate the general point of view of the section.

The American Electric Railway Association has undertaken to give the Interstate Commerce Commission the fullest possible co-operation, and with that end in view has created a sub-committee of the committee on national relations to handle the problem, with J. H. Hanna of the Capital Traction Company, Washington, D. C., as chairman, and on the recommendation of this sub-committee employed the writer as its attorney to study the collected information, prepare the case for the association and submit it to the Interstate Commerce Commission.

DEPRECIATION A TWOFOLD PROBLEM

The problem is so complex and the information already furnished to the commission and the association indicates such a wide divergence of views, and in some cases such a complete misunderstanding of the situation, that it seems wise to accept the invitation of the JOURNAL and attempt to clarify matters by a discussion of the problem now under consideration.

Depreciation is in reality two distinct problems. The

difference between them will perhaps be more clearly understood by considering the executive who has bought a new car and confining our attention for the moment to the single car. It is a reasonably safe bet that at some future date that car will be retired and replaced by a new one. When that time comes the company should have at hand a sum equal to the cost of the retired car, accumulated during the life of the car. A determination of the annual contribution to this retirement fund is therefore nothing more than the simple operation of dividing the cost of the car by the number of years of its service life.

But what is its service life? It may go out at any time through an accident; it may wear out at some future date, which may be almost indefinitely deferred by proper maintenance or hastened by lack of proper care; a change in the art may make it so uneconomical a unit to operate as to force its retirement; it may no longer meet with the approval of public taste; or it may become inadequate on account of its speed or loading limitations and be retired for that reason. No matter how skilled and experienced the executive, his answer to the question is a guess, based upon a consideration of those causes which tend to shorten and those causes which tend to lengthen the useful life of the car in question.

The executive, if he is wise and his revenues will stand the strain, having made his guess as to the service life of his one car, will deliberately shorten it in order to protect himself in case its ultimate retirement comes earlier than he anticipates. Even then, if he is dealing with a single car, he is liable to lose a large part of his investment, since it is impossible to accumulate a reserve with sufficient speed to protect the owner against all possibilities of accidental destruction.

Depreciation Must Be Treated as an Operating Charge

The annual payment into this reserve will be treated as an operating charge, and the problem which the executive has now solved is the problem of depreciation as an operating expense.

Now let us assume that ten years have elapsed and that the executive desires to know the value of the car, which has not yet been retired. His problem is: "How much is the car worth to me; how much will I take for it and purchase a new car?" And the answer to the question is to be found in a comparison of the expected life of the car as it stands with the expected life of a new car replacing it. The original life expectancy was a guess based upon an estimate of the length of life till retirement through accident, the length of life till retirement through obsolescence, the length of life till retirement through wear, and the length of life till retirement through inadequacy. Ten years have elapsed, but withdrawal through accident is no nearer than it was ten years before. If the art has been changing, retirement through obsolescence may be at the very door; if the art has not been changing, it is probable that the life until obsolescence retirement estimated today will be as long as the life estimated ten years before.

The danger from removal through inadequacy may be as indefinite as it was ten years before, may be much greater, or may even be more remote. The amount of remaining wearing life depends on the present condition of the car. It would seem evident, therefore, that the question of the present value of the car cannot be answered merely by a computation based upon the executive's original guess as to service life and the elapsed period of ten years.

A Second Illustration

The distinction will perhaps be clearer if we use more definite quantities in our illustration. Let us assume that the car in question was a double-truck, four-motor equipment with a seating capacity of 40, and that the company operated an interurban line connecting a number of smaller communities with a larger center, but had no urban division. The executive, on the basis of his own experience and such information as he can collect elsewhere, decides that in the long run, so far as mere wear is concerned, cars may, with proper care and maintenance, be kept in active operation for a period of 50 years. Therefore his protection demands an annual appropriation of 2 per cent. He is one of those who believe that the gradual progress of the art will continue and that passenger cars in general will become obsolete after 20 years. Protection from this demands an annual appropriation of 5 per cent. Finally, believing that his central city is about to develop as a manufacturing center to which the smaller communities which he serves will become suburban areas, he reaches the conclusion that within ten years this car will become inadequate and must be replaced either by cars of larger capacity or by multiple-unit trains. He therefore, for this reason, assigns a ten-year life and sets up a reserve of 10 per cent annually.

Since the reserve for inadequacy will provide the entire cost of the car before either obsolescence or use demand its removal, the latter elements are entirely ignored, and the depreciation reserve of 10 per cent set up on account of inadequacy is the sole reserve set up, and the service life is estimated, therefore, at its minimum figure of ten years.

Now that the ten years have elapsed, however, the car would have, if original conditions had continued and the original estimates been correct, no value except scrap or resale. As a matter of fact, however, the executive's expectations as to the development of his central city as a manufacturing area have not been realized. Instead, it has developed as a jobbing and educational center. His 40-seat unit passenger car is as adequate today as when it was first installed, and there is practically no probability that it will ever become inadequate. Moreover, the executive has acquired in the ten-year period an urban division, and therefore if the inadequacy should by any chance occur, he is prepared to shift this car to meet the constantly increasing demand for urban service. It is, therefore, so far as inadequacy is concerned, just exactly as valuable as it was at the beginning of the ten-year period.

So far as obsolescence is concerned he finds that the manufacturer is still building the same car and selling it, and that he himself, if he desired to increase his service with new cars, would probably buy identical equipment with that which he already operates. He still believes that in the long run cars will go out through obsolescence in an average of 20 years, but there is certainly no difference, so far as obsolescence is concerned, between this car and the new cars which are being turned out by the factory, and therefore, if he assumes that this car has lost half of its value because ten years of the assumed 20-year life have elapsed, he is driven to the ridiculous conclusion that

new cars coming from the factory are worth only half what they cost.

So far as wear is concerned, while he anticipated 50 years of usefulness, the car may actually have done better or worse than he anticipated, and the only thing to do is to examine it and determine whether or not it has probably more or less than 40 years of life remaining.

Suppose that on examination he finds that it is wearing about as he expected. He has then a car which will presumably wear for 40 years; is probably good, so far as obsolescence is concerned, for 20 years, and is in no danger of inadequacy. Its probable service life, at the end of the ten years originally estimated, is therefore 20 years, and the car for which a reserve of the full difference between cost and resale value has been accumulated bids fair to render the same service, and therefore to be as valuable, as a new car.

In other words, present-day value is not to be measured by elapsed life, or by the deduction of the existing reserve from the present value. In the words of one of our federal courts, depreciation reserves "represent what observation and experience suggested as likely to happen, . . . with some margin over . . . The law requires deduction only for actual depreciation, just as actual as the present value, and the extent of that depreciation must be ascertained by the same kind of evidence; in the last analysis opinion based on contemporary investigation." U. S. District Court, Southern District, New York, New York Telephone Co. vs. Prendergast. Rate Research Vol. 25, No. 11, page 165.

The pending case before the Interstate Commerce Commission is related entirely to the first of these two depreciation question, namely, how much shall street railway companies set up year by year as a reserve with which to care for the retirement of property?

The answer to this general question involves the answer to several subordinate questions which we will now consider.

What Property Needs a Reserve?

First—For what property shall a reserve be created?

The obvious answer to the question is to create a reserve for all property which must eventually be retired and to make the reserve equal to the difference between the original cost and the value of the property when retired. In other words, there will be no reserve created for land; very nearly 100 per cent reserve for cars which it is expected will be retired through obsolescence or wear, since scrap value is small, and a smaller reserve for a car which it is anticipated will be retired at an early date through inadequacy, since the resale value of such a car may be considerable.

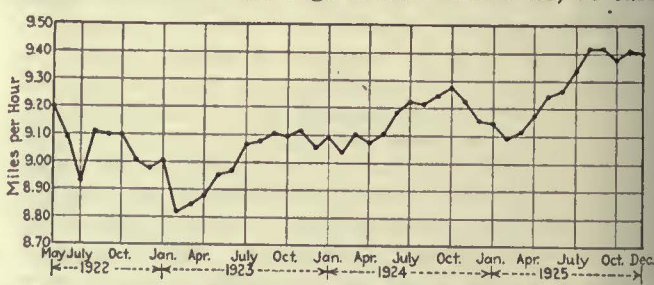
The answer to the question is not, however, so simple as it seems. Consider the trackage of a large steam railroad system. It is obviously impossible to set up a depreciation reserve for each rail or each tie. Rails and ties wear out, however, and are, as they wear, replaced from year to year. But, as a matter of fact, current repairs and current maintenance leave the system, generally speaking, with the same or a greater value at the end of each calendar year than it had at the beginning. It is true that the appropriation might be made to the depreciation reserve year by year, and the amount expended for rails and ties entered as charges against this reserve, but on a large diversified system the annual charges would approximately equal the annual appropriation, and the only practical result of the application of the depreciation theory to this trackage is a complication of the accounting requirements of the company. Considerations such as these have led the Interstate Commerce Commission, in its dealings both with the steam and with the electric lines, to make it optional with the carrier as to whether a depreciation account shall be set up for trackage; have led the depreciation section of the Interstate Commerce Commission, in its recommendations with regard to steam roads, to suggest that no depreciation reserve be set up for rails, ties and track construction, and have led the Treasury Department, through the Income Tax Division, to refuse to make any allowance for depreciation on track structure.

While this ruling is entirely satisfactory to the larger electric railway systems, which, because of their age and large total mileage, do approximately the same amount of track reconstruction work each year, it is not satisfactory to the smaller companies, and particularly to the smaller companies of recent origin. These smaller companies may run for several years without any important reconstruction program, and then be compelled to reconstruct a large percentage of their entire trackage, or, as in a case recently presented to the Income Tax Division, a new road may find itself at the end of its first life cycle compelled to face practically a 100 per cent track reconstruction program.

It is obvious that a heavy burden of this sort cannot be absorbed by operating expenses of a single year, and good business dictates that a company which foresees an expense of this sort shall accumulate out of earnings an adequate reserve.

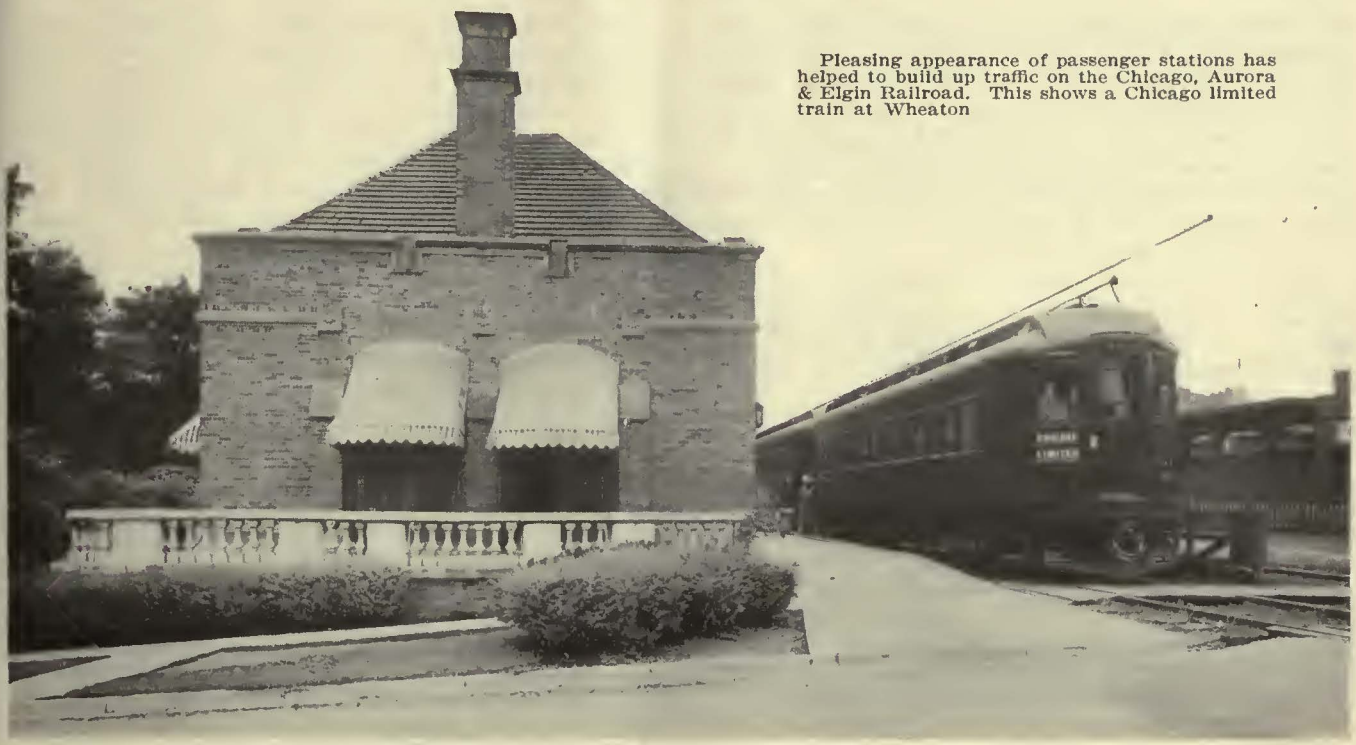
Operating Speed Increased at Detroit

DURING the year 1925 the Department of Street Railways, City of Detroit, increased the operating speed of its cars from 9.10 m.p.h. in February to a maximum of 9.42 m.p.h. in August and September. During the fall months there was a slight retrogression. The increase in average speed is attributed by H. U. Wallace, general manager, to the electrification of switches, which were formerly manually operated; widening of certain streets and the work of the Mayor's traffic committee, which has brought about many improvements in traffic regulations. Moreover, 90 cars



Operating Speed by Months of the Department of Street Railways, City of Detroit

which formerly used storage air were equipped with compressors. Birney cars, which were formerly operated on some of the principal streets of the city, have been removed and are now used in outlying districts. It is felt by the management that a continuation of the present program will make possible a general average speed of about 10 m.p.h. The operating speed of the Department of Street Railways is shown in an accompanying chart by months from May, 1922, to November, 1925.



Pleasing appearance of passenger stations has helped to build up traffic on the Chicago, Aurora & Elgin Railroad. This shows a Chicago limited train at Wheaton

From Receivership to Prosperity in Three Years

FIRST ARTICLE

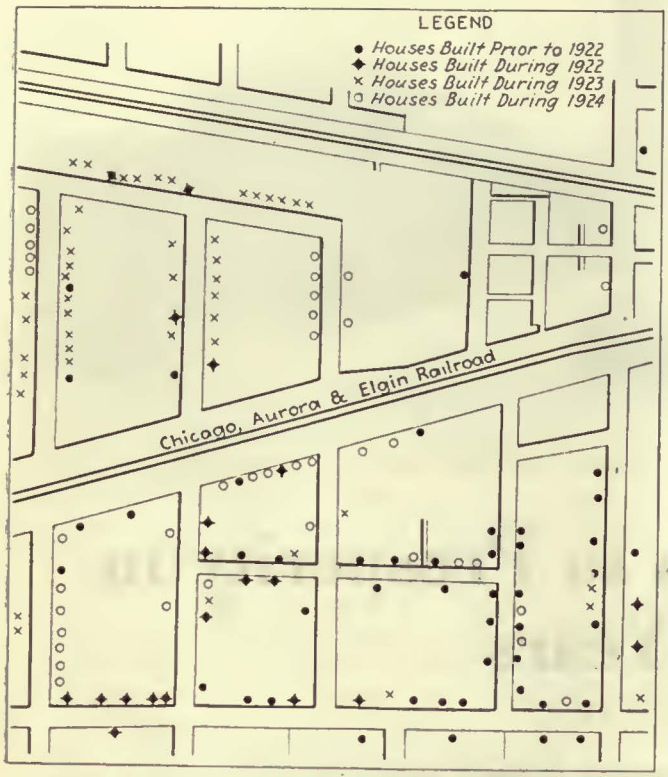
Development of Territory, Reconstruction of Track and Operation of New Cars on the Chicago, Aurora & Elgin Railroad Have Increased Transportation Revenue 65 per Cent in Three Years—Fares Are Higher on Electric Line than on Competing Steam Roads

FROM out the wreck of the receivership of the Aurora, Elgin & Chicago Railroad a new company was born in the summer of 1922 and has forged ahead rapidly since that time. The plan of reorganization was formulated by Dr. Thomas Conway, Jr., who became president of the new company, known as the Chicago, Aurora & Elgin Railroad. While considerable work had been done during the receivership to improve the physical condition of the property, it was far from being up to the standard desired by the new management. An extensive program of rehabilitation was undertaken immediately, including the reballasting of the line from Wheaton to Chicago, a distance of 25 miles; purchase of new passenger and freight equipment, construction of additional substations and improvements to passenger stations along all its lines. The resulting substantial increase in traffic has fully justified the expenditure of $1,500,000 for these improvements. The story of the development of traffic is told in this issue. Details of the track reconstruction, new rolling stock, improvements in power facilities and the development of a profitable freight business will be told in future articles in this paper.

At the time the Conway management assumed control, the property was dependent mainly upon the through business between Chicago and the five terminal cities located in the Fox River Valley, Aurora, Elgin, Batavia, Geneva and St. Charles. No sustained attention had been given to the development of the intermediate territory. The Aurora-Elgin property, as it is called, is faced with competition as keen as any to be found in the United States. The territory through which it runs is served also by the suburban lines of the Chicago & Northwestern, the Chicago, Burlington & Quincy, the Illinois Central and the Chicago, Milwaukee & St. Paul railroads, which render suburban service of the first quality, both as regards comfort and frequency. The traveling public has a free choice of using either steam or electric service, depending upon which seems most attractive. The new management decided that a rehabilitated and modernized electric railway had certain advantages, which if properly exploited would enable it to command a fair share of the competitive business. The plans, however, did not contemplate building up the Aurora-Elgin property solely by taking traffic away from the steam railroads. The objective of the new management was primarily the upbuilding of the territory served, thus creating more traffic and simultaneously increasing the prosperity of the railway and the various communities.

As soon as the work of physical rehabilitation of the property has been sufficiently advanced to constitute a

self-evident demonstration of the good faith of the new management and of its ability to carry out its promises, Dr. Conway called together all the real estate dealers and municipal officials of the several communities served by the railway, to acquaint them at first hand with the plans of the new company and enlist their support in a co-operative effort to build up the territory adjacent to the company's lines. He pointed out that in the decade



Section of Permanent Record Map Showing Houses Built Each Year Since Reorganization of the Railway

which ended in 1920 the population of the city of Chicago had increased 23.6 per cent, while the population of the suburban belt, known as Metropolitan Chicago, increased 76 per cent. The Chicago, Aurora & Elgin Railroad territory did not receive its share of the growth which occurred, because none of these suburban communities on the line showed an increase in population of as much as 76 per cent. Opportunity existed, he said, not only to attract a proportionate share of the future growth of the suburban belt but also to catch up and secure a part of the growth which should have occurred from 1910 to 1920.

Close and cordial relations were established between the management and the real estate interests and municipal officials. For the purpose of assisting in the suburban development, the Chicago, Aurora & Elgin Railroad put into effect a system of homeseekers' tickets, sold in lots of 100 to real estate agents, at rates approximately equal to the 25-ride ticket rate applicable to the same point, which averages between 1.4 cents and 1.5 cents per mile, depending upon the distance from Chicago. In a short time all of the real estate dealers in the territory were purchasing these tickets and distributing them to prospective home buyers to enable them to make inspection of the property which the dealers had to sell.

The railway believed that this ticket would not only assist in attracting people to the territory but it would also introduce them to the Aurora-Elgin service, which, if it proved acceptable, would win the new settler as a regular patron. It soon became apparent from a study of the development of the territory and the traffic of the property that the use of homeseekers' tickets constituted an almost exact index of the rate at which lots and homes were being sold. The accompanying chart shows graphically the collection (not sale) of these tickets by months from July, 1922, to the end of 1925.

From the beginning the company has given the closest attention to the rate of development of its territory, by periodically making a comprehensive and detailed survey of the situation. In July, 1922, a few days after the new management assumed control, instructions were given to the engineering department to make a detailed survey of the entire suburban territory to furnish a basis for future comparisons. The results of a house-to-house field canvass were plotted upon permanent maps, thus furnishing a permanent record of all buildings then constructed within a distance of 1 to 1½ miles on either side of the company's lines, the distance depending upon the degree to which the road might expect to attract traffic in competition with other transportation agencies. A similar field canvass was made in December, 1922. Observers were furnished with photostat copies of the original map showing the results of the July canvass, with instructions to indicate thereon all new houses. Similar checks, the results of which were compiled in like fashion, were made in December, 1923; in December, 1924, and in June and December, 1925. A portion of a typical office map showing all houses constructed in a section of the town of Villa Park from 1922 to 1924 is shown in another column.

Records of this kind have proved useful in estimating growth in traffic, in planning schedules and future cap-

COMPARATIVE INCOME STATEMENT FOR TWELVE-MONTH PERIOD ENDED JUNE 30, 1922, AND FOR CALENDAR YEARS 1922, 1923, 1924 AND 1925, CHICAGO, AURORA & ELGIN RAILROAD

	1925	1924	1923	1922	Twelve Months Ended June 30, 1922	% Inc. 1925 Over 12-Mos. Period Ended June 30, 1922	% Inc. 1925 Over 1924
Gross revenue railway operations	$2,707,616.91	$2,315,638.45	$2,184,121.93	$1,910,472.11	$1,632,815.50	65.8	16.9
Railway operating expenses, including maintenance, rentals and general taxes	2,061,442.35	1,813,374.03	1,722,795.35	1,569,197.24	1,378,859.72	49.5	13.67
Net railway operating revenue	$646,174.56	$502,264.42	$461,326.58	$341,274.87	$253,955.78	154.4	28.6
Net operating revenue from the sale of power (exclusive of power sold to Chicago Suburban Power & Light Company, included above)	.....	1,356.38	94,823.31	107,179.17	113,598.92		
Other income	30,444.57	16,820.42	8,703.76	280.57	127.44		
Total income	$676,619.13	$520,441.22	$564,853.65	$448,734.61	$367,682.14	84.0	30.0
Interest on bonds and other interest and deductions	191,653.06	203,839.21	165,414.02	126,381.75	120,430.44	59.1	
Balance available for depreciation, amortization and surplus	$484,966.07	$416,602.01	$399,439.63	$322,352.86	$247,251.70	96.1	53.1
Appropriation to renewal and replacement reserve	165,000.00	165,000.00	165,000.00	121,924.65	120,764.67		
Balance	$319,966.07	$151,602.01	$234,439.63	$200,428.21	$126,487.03	153.0	111.0

ital requirements, particularly as regards the need for additional substation capacity, rolling stock, shop facilities, etc., in outlining the annual program for crossing protection, in determining what new station facilities are required, in keeping track of the progress of real estate development and in determining whether the company was receiving its proportionate share of the growth of the business in each community.

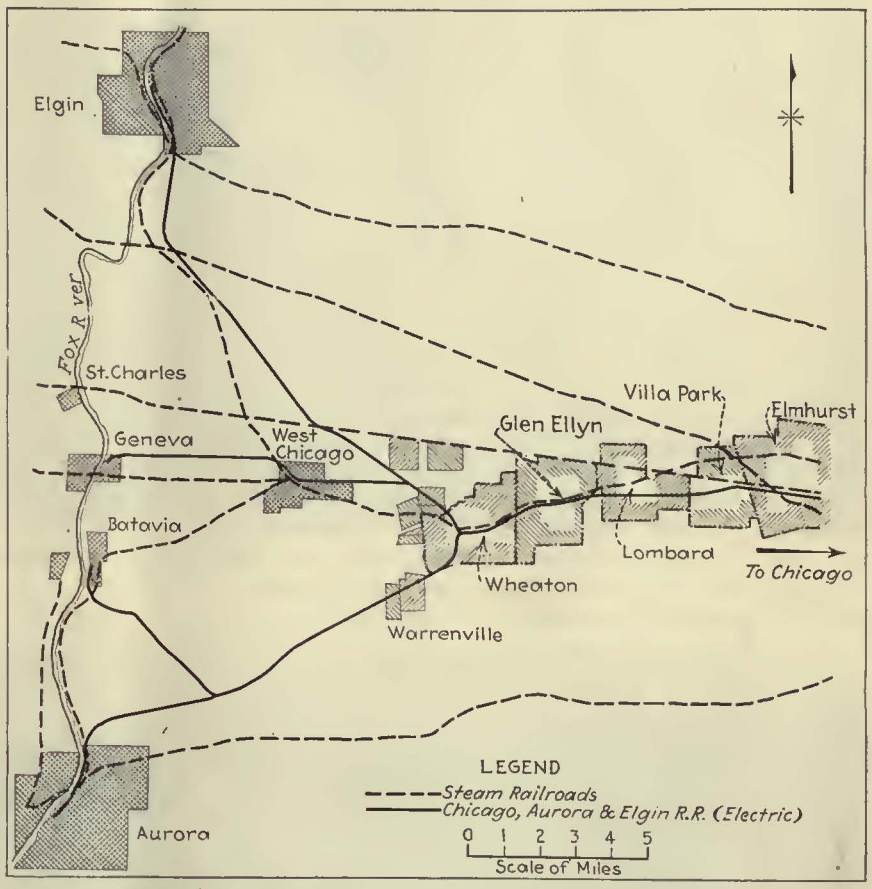
The tabulation on page 360 shows the tremendous progress which has been made during the last four years in the development of the suburban community between Wheaton and Chicago on the main line of the Chicago, Aurora & Elgin. The per cent increase in the number of houses in each suburban town for each year over the number of houses in existence at the end of the preceding year is given.

Perusal of this tabulation shows that the increase in the number of houses in the various suburban communities from July 1, 1922, to Dec. 31, 1925, has ranged from 53 per cent to 379 per cent. Through the territory as a whole, the average increase in the number of houses within the area tributary to the lines of the Chicago, Aurora & Elgin Railroad over the 3½-year period has been 136 per cent.

In consequence of the close cooperation established between the real estate developers and the management, it has been possible regularly to secure from many of the former the names and addresses of home buyers about to settle in the territory. These prospective customers have been promptly added to the mailing list of the Aurora-Elgin and effective publicity literature has been sent to them. The advantages of the electric service and ticket rates prevailing have been called to the attention of the new residents at or shortly after the time they move into the community.

All ticket agents are required to report monthly the names of persons who for the first time have appeared on their records as purchasers of commutation tickets. A personal letter is written by J. H. McClure, general manager, to each new commuter, welcoming him as a patron of the company, expressing the hope that he will find the service satisfactory and that if he has any complaints or suggestions to make he will do the company the favor of giving it the benefit of his opinion. This letter also calls attention to the ten and 25-ride tickets sold by the company and their uses and advantages to the other members of the family. It has been found that these letters give a personal touch to the relationship between the management and the new commuters, as evidenced by hundreds of letters written by the recipients of such communications and many valuable suggestions that have been made by them.

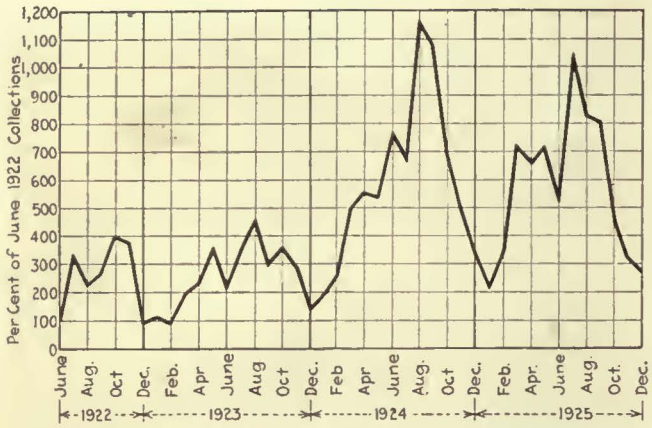
Ticket agents of the company are also required to report each month the names of all commuters who purchased tickets in the preceding month, but who do not appear in the records as having purchased monthly tickets for the period in question. A representative of the transportation department is immediately assigned personally to interview these individuals and to report results of this interview to the general manager. Many discourtesies or lapses in service have been brought to the attention of the general manager. In a large majority of these cases, personal interviews resulted in ironing out the irritations of passengers and in winning back the business temporarily lost. The knowledge that every passenger who discontinued the use of the line would be interviewed by a representative of the management and a written report made thereon has had a salutary effect in promoting uniform courtesy and thoughtfulness on the part of the trainmen.



Suburban Territory Served by the Aurora-Elgin Lines. Shaded Areas of Communities Between Wheaton and Chicago Are Developments of Past 3½ Years

Unlike many electric railways whose fares are lower than those of competing steam carriers, the rates on the Chicago, Aurora & Elgin Railroad between Chicago and most of the suburban towns were substantially higher than those which prevailed upon the lines of its competitors before the increase made by the latter in December, 1925. The ten-ride ticket rates prevailing between Maywood and Wheaton on the one hand and Chicago on the other have ranged from 15 per cent to 35 per cent higher than those on the steam lines. The 25-ride ticket rate has been from 28 per cent to 35 per cent higher than similar rates on the steam lines.

It was believed by the management that if a superior standard of service could be established business would be attracted to the electric railway at higher rates than those charged by its competitors. Moreover, it has been well known for years that the steam railroads operating out of Chicago were running suburban service at a loss. The present management of the Aurora-Elgin decided



Collection of Homeseekers' Tickets Has Been Found to Be an Accurate Index of the Development of the Suburban Territory Served by the Railway

that traffic to be worth while must pay reasonable rates, and it therefore determined not to inaugurate any new fares at the ruinous figures prevailing upon the steam lines. Faith in the ability of good service to attract patronage has been justified by the fact that railway operating revenues have increased more than 65 per cent in three years, while railway operating expenses, including maintenance, rentals and general taxes, increased only 49½ per cent. Net earnings from railway operations have increased more than 154 per cent in 3½ years. Percentages of total traffic handled by the Aurora-Elgin from various towns, passenger revenue by month and a summary of revenues and expenses by year are shown in accompanying tables.

The company has recently marketed successfully a $5,000,000 bond issue, involving the purchase in the open market of more than 90 per cent of an underlying bond issue secured by a closed non-callable mortgage. The old bonds were deposited under a new first and refunding mortgage. The new $5,000,000 25-year, 6 per cent bond issue provides funds for the retirement of the 7 per cent, series A, refunding and improvement bonds issued at the time of the reorganization, and also for an issue of $750,000 in two-year, 6½ per cent notes sold in December, 1924. It provides also a substantial amount of new capital for additions and betterments to be made in the near future. Provision is made for future necessary junior financing through the creation of a prior preferred stock issue and the issuance at this time of $500,000 of such stock.

Municipalities through which this road operates have been growing so rapidly that frequent schedule changes have been necessary in order that adequate service should be furnished. A new schedule has recently been completed which calls for 221 passenger trains per day, divided into three different classes, limited, express and local. This is a slight increase over the previous winter schedule and provides a headway varying from ten minutes to 30 minutes during the entire day for municipalities within a distance of 26 miles of the Loop district of Chicago. Such service enables patrons living in Wheaton, a distance of 25 miles from the Loop district of Chicago, to reach their destinations within the same time or in even less time than they would be able to were they living in certain parts of the city of Chicago.

Running time between Wheaton and Chicago is 45 minutes on limited trains and one hour on local trains. The intervening municipalities are reached in proportionally less time. During the morning and evening rush hours this schedule provides for limited trains every twenty minutes, or less, between Chicago and the western terminals of Aurora, Elgin, Geneva, St. Charles and Batavia, and an hourly limited service to each western terminal the balance of the day. Elgin is more than 41 miles from the Chicago terminal and the total running time of the fastest trains from Chicago to Elgin is 65 minutes. Twenty-six minutes is consumed in going out over the elevated structure to the end of

Well-Maintained Rock-Ballasted Track Permits High-Speed Operation

INCREASE IN HOUSES, IN TOWNS AND VILLAGES CONTIGUOUS TO THE CHICAGO, AURORA & ELGIN RAILROAD, WHEATON TO MAYWOOD

	Wheaton, Per Cent	Glen Ellyn, Per Cent	Lombard, Per Cent	Villa Park and Ardmore, Per Cent	West Elmhurst to Stratford Hills, Per Cent	Total, Per Cent
1922 over 1921	14.5	24.5	24.9	43.5	19.8	22.2
1923 over 1922	9.1	18.4	22.1	52.3	19.3	20.0
1924 over 1923	7.3	19.2	27.2	52.8	23.2	22.4
1925 over 1924	14.4	32.2	32.8	43.7	41.3	31.3
Cumulative 1925 over 1921	53	133	157	379	148	136

Boarding or Alighting at	Percentage of Total Traffic Handled by the Aurora-Elgin 1922	1925
Elgin	59.8	69.2
Geneva	25.9	40.1
Wheaton	39.9	61.0
Glen Ellyn	48.2	57.3
Lombard	55.2	68.6
Elmhurst	16.3	32.8

Attractive Brick Station at Chicago Golf Club on the Aurora Branch

joint operation at Forest Park, a distance of 9 miles. The remaining 32 miles is run in 39 minutes, including stops to take on and discharge passengers at Lombard, Wheaton and Glen Ellyn.

In spite of these most difficult operating standards an analysis shows that of the total number of trains operated under the present schedule, approximately 100 per cent depart from their terminals on time, and that 95 per cent of them arrive at their destinations on time or less than three minutes late.

Below is a list showing the number of trains operating between Chicago and the larger municipalities along the road:

Stations Between	Miles from Chicago	Number of Trains
Maywood and Chicago	11	95
Bellwood	13	90
Berkley	14	90
Elmhurst	16	91
Villa Park	18	86
Lombard	20	141
Glen Ellyn	23	143
Wheaton	26	144
Geneva	37	34
St. Charles	40	34
Batavia	40	50
Aurora	40	52
Elgin	42	49

Wheaton, Glen Ellyn and Lombard enjoy service which provides 71 trains daily to the Chicago Loop and 73 trains outbound daily from the Loop, this service being operated from 5:45 to 1:30 a.m. Thirty-eight of the 73 trains are fast expresses. In the rush hours these communities enjoy a service approximating a 7½-minute headway. At the east end of the Aurora-Elgin line, where there is a convergence of the fast high-speed limited trains from the Fox River terminal cities, the Wheaton expresses and the Elmhurst short service there now is a train on the average of every 3½ minutes in the direction of heaviest travel, these trains ranging in length from two to six cars each.

Trains operating into and out of the Wells Street Terminal, Chicago, are made up of two to six cars each. In cases where more than six cars are operated, the trains are run in sections, due to the present platform limitations in Chicago. During the summer months, in addition to the regular scheduled trains, excursions ranging from 60 to 120 cars each are operated between Chicago and the park owned and operated by the company in the Fox River Valley.

Six-Car All-Steel Limited Trains Operated on the Main Line Are Run in Three-Car Sections on Aurora and Elgin Branches

The company has capitalized its natural advantages in popularizing its service. In its advertising literature it has continuously featured "No Smoke, No Dust, No Cinders" and has constantly called to the attention of the people in the communities served the remarkable accessibility of its Chicago terminal as compared with those of the steam railroads and the ability of passengers to change under cover and without walking up or down stairs from Aurora-Elgin trains to elevated trains, taking them to any department store or most business establishments or places of amusements in the Loop district of Chicago without setting foot in the street.

RECORD OF PASSENGER REVENUES BY MONTHS

	1922	1923	1924	1925
January	.....	$126,988.58	$132,643.25	$149,011.26
February	.....	109,022.48	125,600.91	133,259.93
March	.....	122,951.70	137,172.30	143,676.82
April	.....	131,406.62	140,052.71	149,478.47
May	.....	155,092.68	164,222.16	175,388.65
June	.....	158,081.20	158,236.75	173,140.55
July	$163,599.29	174,809.50	173,981.65	179,920.47
August	164,427.63	176,490.23	177,800.94	187,382.04
September	145,037.74	158,908.83	159,934.14	166,787.56
October	139,147.59	143,694.39	154,521.47	160,552.54
November	130,709.52	140,849.78	151,900.52	164,335.84
December	138,223.80	146,716.09	152,008.65	168,641.72
Totals	$881,145.57	$1,745,012.08	$1,828,075.45	$1,951,575.85

Great emphasis has been placed upon the cleanliness of the cars, keeping the seats in first class repair and condition, spotless toilets and other like features demanded by a discriminating public.

STATIONS HAVE BEEN MODERNIZED

The management has carried out a program of thorough rehabilitation and modernization of its terminal stations in Aurora, Batavia, Geneva, St. Charles and Elgin and has painted and put into first class condition all other passenger stations. Lately a new brick station has been built at Seventeenth Avenue, Maywood, and the company is now constructing an artistic passenger station at Glen Ellyn.

These are the more important principles evolved and applied by the management in building up the passenger traffic of the property. The faith shown in the ability of an electric railway to hold its own in competition with steam railroads of the highest class when the most modern type of facilities are provided and modern methods of operation and improvements in service are employed has been strikingly justified.

Railway Turns Tables on Auto Dealers

SOME time ago the Mobile Light & Railroad Company published an advertisement in the local papers calling attention to the expense of using private automobiles for business and the economy of street car riding. An article by R. S. Kellogg, secretary of the News Print Service Bureau, published in the *Nation's Business* was quoted showing automobile operating costs, as follows:

	Car 1	Car 2	Car 3
Cost of car	$792.90	$1,379.74	$2,238.22
Mileage	14,000	13,494	33,100
Years used	2.5	3.16	3.71
Depreciation per mile, cents	3.0	4.9	5.0
Repairs, upkeep, etc., per mile	2.6	4.7	2.0
Tires per mile	2.0	2.4	1.9
Insurance, licenses, etc., per mile	1.5	2.4	1.6
Gasoline	1.5	1.9	1.0
Garage	.4	1.7	1.0
Total, cents	11.0	18.0	12.5

Ford dealers in Mobile came back at the railway with an advertisement stating that a Ford can be operated for 3.92 cents per mile. This figure was arrived at by the following calculation:

Fire and theft insurance	$12.00
Liability and property damage insurance	29.40
License	12.00
Taxes	12.00
Tires	84.00
Gasoline	201.60
Oil	39.60
Mechanical and oiling	72.00
Battery	13.80
Depreciation	125.40
Total operating cost	$601.80
Miles run	15,120
Cost per mile, cents	3.92

Not to be outdone, the railway retorted:

We challenge the statement that the depreciation on said car was only $125 for 15,120 miles, or $0.0082 + per mile. At that rate a Ford car would run approximately 62,445 miles before scrapping.

The depreciation on a car is the difference between original cost and the amount received for the car after use.

We advise all owners of Ford cars to take their cars to a Ford agent, after they have run their cars 15,120 miles, and show the agent his ad in the *Register* of Oct. 31, 1925, and demand a new car, turning the old car in at original cost of $516.35 less $125.40 depreciation, they to receive $390.95 for the old car. The agent will do this, because he advertises the depreciation is only $125.40 on a Ford for 15,120 miles.

The result of the controversy was that the automobile dealers were overrun with people demanding an exchange at the figure mentioned in the advertisement. This they were not prepared to do and consequently were compelled to acknowledge their mistake in publishing the figures.

Parking Restrictions Speed Up Cars and Aid Retail Trade

CHECKS made by the research department of the Pittsburgh Railways show that there has been a substantial reduction in the running time of street cars since the new parking restrictions have been in effect in the downtown district. Detailed information concerning these regulations was published in ELECTRIC RAILWAY JOURNAL for May 30, 1925, page 847. Time saved by cars routed over various loops is shown in the accompanying table.

TIME SAVED BY CARS ROUTED OVER VARIOUS LOOPS

Loop Number	Number of Cars During Maximum Hour	Average Decrease in Time, Minutes
1	26	1:01
2	84	2:47
3	81	3:51
4	27	5:21
5	57	2:55
6	23	:25
7	20	:56
8	52	:35
9	159	3:17

It is significant also that retail trade in the downtown district has prospered more than that in the outlying sections since the change was made. Comparisons are given below of the buying power of the Pittsburgh district, as represented by bank payrolls in 1924 and 1925; retail sales for the entire district and downtown sales, as represented by seven large department stores.

Three Months Ended	Buying Power, Per Cent	Retail Trade	
		Entire District, Per Cent	Downtown, Per Cent
March 31	—9.01	—1.87	—2.53
June 30	—1.77	—5.90	—2.37
Sept. 30	—3.67	—6.20	—2.77
Dec. 31	—8.13	+1.50	+3.47
Year	—5.72	—2.80	—0.80

Industrial depression resulted in a slight decrease in buying power and trade, but the decrease in the downtown section, 0.8 per cent, was much less than that of the district as a whole, which was 2.8 per cent. The fear expressed by some downtown merchants that their business would be injured by the stringent parking regulations appears to have been without foundation.

Earnings of the Pittsburgh Railways decreased 1.67 per cent as compared with a decrease of 5.72 per cent in buying power for the district.

Impressions of European Tramways

Conditions and Practices in Several Continental Cities Indicate that in Some Essential Things, Such as Courtesy, the Europeans Excel—Short Four-Wheeled Cars Are Standard Nearly Everywhere, but Operation Is Almost Noiseless—Few Abandonments of Tramway Lines Noted, but the Bus Is a Factor in Extensions

By James A. Emery
Vice-President Ford, Bacon & Davis, Inc., New York

The Royal Exchange, London, a Heavy Traffic Point. Tramways Do Not Operate in This Part of the Business District

CITY transportation systems abroad appear to be in much better shape than other lines of industry. On the Continent, particularly, tramway cars are noticeably crowded; that is, carrying many standing passengers, even during off hours. The general condition of the physical property is good. Cars are clean and well painted, and track, with a few exceptions, is excellent. The large traffic volume can probably be ascribed to the movement of population from country to city that has taken place since the war in spite of unemployment. The physical condition is undoubtedly due to good habits of maintenance, high standards of design and cheap labor.

It is hardly likely, notwithstanding good appearances, that the tramway lines are generally prosperous, as fares are very low measured by our standards, for rides of average length. In a large proportion of European cities the tramways are owned and operated by the municipalities, so that the necessity of paying all expenses and a satisfactory return on the investment is not so urgent as with private companies.

Mr. Emery's observations were made on a somewhat hasty pleasure trip through England, Belgium, Holland, western and southern Germany, Austria, Italy, Switzerland and France. No attempt was made to study the urban transportation situation, so that only such matters are covered as naturally attract the notice of one interested in the business.
—EDITOR

The zone system of fares is very common, and as the platforms are open the conductor is a busy man. He wears a little satchel or wallet for his tickets and change and gives every passenger a punched ticket or receipt, which, however, is not collected when the passenger leaves the car. In Vienna, and probably in some other cities, a monthly pass is sold for about $3.25 (U. S. equivalent).

It is probably in part due to the zone fare system that the use of one-man cars has not been attempted to any great extent.

In England the traffic is noticeably lighter than on the Continent, but municipal systems, particularly in London, seem to be operating more service than the volume of traffic warrants. This may be due to the unemployment situation. The London tramways are

said to be hardly earning their working (operating) expenses.

Tramways are not permitted in the inner or principal business sections of London and Paris.

To an American the prevalence of narrow gage track is interesting. Perhaps two out of every three systems are narrow gage, 3 ft. in Great Britain and 1 m. (39.38 in.) on the Continent. Narrow grooved rail is universally used in paved streets. The substructure is integral or identical with the paving base, and the rails are held by steel ties or cast-iron chairs imbedded in the concrete base and spaced about 5 ft. apart. Heavy flat tie rods are used and no joint welding was observed, although it is understood that welding has been practiced to some extent. As the wheel loads are light this construction preserves its line and surface for a long time, and if it goes bad, repairs are made at once so that there is very little rough track or paving in evidence.

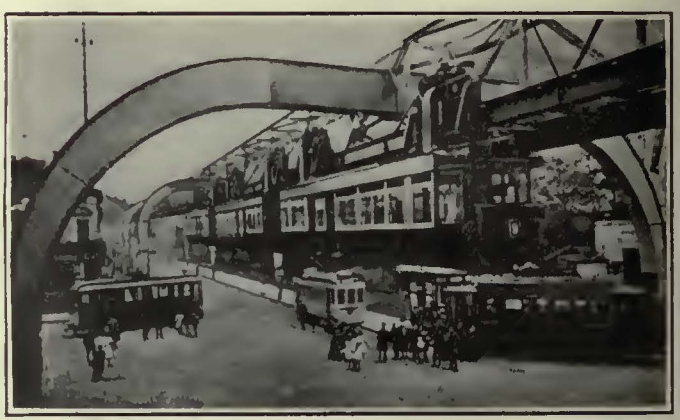
Overhead wires are kept in first-class shape. Nothing is used but steel or iron for poles and structural or built-up poles are common. Concrete protection for poles around the base is often seen. Sliding contacts are used almost altogether on the Continent instead of trolley wheels. In the zones immediately surrounding the inner sections of London and Paris there is much slot construction, and in Paris the slot is formed along the inner side of one of the running rails.

Short four-wheeled cars are standard nearly everywhere on the Continent, with a notable exception in Paris, and in the larger cities they are operated in trains all day long with one motor car and from one to three trailers. Some of the trailers are very light with very small wheels and low floors. In Great Britain double-deck cars are used on all the larger systems. The stairs lead up from the rear platform and the upper deck is inclosed. On the Continent they have a fancy for delicate colors. Such colors would be fantastic in our cities, but in the clean, picturesque European streets they are rather pleasing and not at all out of place. Of course it is necessary to keep such paint clean, and the paint and varnish must be well looked after. The finish often looks like a furniture job.

Compared with American operation, the cars are almost noiseless. While much of the credit for this is due the track, yet it speaks for close fits and frequent tightening of all truck parts and for close attention to gears and pinions.

There are no inclosed platforms on city cars. This, together with operation in very narrow streets, would seem to look bad for the accident account, but it is probably not as important with them as it would be with us. In some streets the rail cannot be more than 3 ft. from the building line. Street traffic even in London is nothing like as great a problem as it is with us, because automobiles have not come into such general use. In Rome, for example, a city of 900,000 population, there are very few traffic policemen. Pedestrians seem to be more wary than here, for automobiles and taxicabs go tearing through the narrow streets tooting their horns most urgently, but nothing happens.

Next to their standards of maintenance the most important particular in which European tramways excel ours is in route signs. All routes are numbered. The numbers show in big figures on the signs and are so well advertised that every one is familiar with them. In addition, the destination and generally the principal streets operated on are named on the outside signs. Inside, the complete route and rates of fare are conspicuously displayed. In the subways each car carries several large cards showing the line diagrammatically with every station and transfer point. In the subway stations the signs are so complete that it is not necessary for the stranger to ask a single question. Folders and small scale maps are widely distributed describing the routes in detail and giving directions for reaching all points of interest. The routes are so well advertised that the public, particularly hotel people and policemen, are surprisingly familiar with them. In London and Paris stopping points are indicated by neat, distinctive signs.



Suspended Railway Running from Vohwinkle to Barmen in the Rhine District of Germany

On the Continent buses are not used to any extent, except in the largest cities. This is probably due to municipal operation of so many tramways and to lack of funds. In England bus lines are fairly common in the principal cities, but do not seem to be permitted to poach on the tramways to the extent that they have done in London.

Of much interest to an electric railway man is the extensive program of electrification of steam railway lines that is in progress. A large portion of the suburban service around London and Paris has been electrified, and in Switzerland and the mountain districts of Italy where coal is dear and water power plentiful much work is going on.

Tramway men acknowledge that future extensions of service will have to be provided for by buses as the cost of tramway construction is prohibitive as compared with bus installation.

There has been very little abandonment of tramway lines and no cases of bus substitution came to notice.

The suspended railway (Schwebebahn) running from Vohwinkle through Elberfeld to Barmen in the lower Rhine country is a novel and interesting system of transit. The cars are suspended by gooseneck hangers from a single rail, there being two hangers per car, each attached with motor to a two-wheel truck. The rails are carried by latticed trusses running longitudinally and hung on cross-frames shaped like an inverted U or V. The line is about 6 miles long and the greater part of it is located over the Wupper River, a small stream from 100 to 120 ft. wide. The river bed is very crooked so that the railway alignment is a succession of curves. This, together with the frequent stations, results in a rather low average rate of speed. There is an intensive industrial development all along the line, so that two-car trains were well filled on five-minute headway during off-peak hours.

This suspended railway has been in operation for over 25 years, so that its practicability is well proved. It is much less costly to build than an elevated railway of standard type and makes comparatively little obstruction. It has favorable operating features in point of comfort, quietness and minimum stair climbing. In view of the apparent success of this system, from a technical standpoint, and its several advantages, it seems singular that it has not been used or seriously considered in many cities where rapid transit is needed but where the traffic is not heavy enough to support a subway or elevated line of standard type.

While definite conclusions can hardly be drawn from "horseback" observations, it seems fairly clear that European tramways are far ahead of American in car signs, advertising, maintenance standards and courtesy of operatives. They have made a quicker "comeback" since the war than other industries so far as volume is concerned, but in spite of this they are not earning cost of service, so that a part of their support must be coming out of general local taxes. Future extensions will be taken care of by buses. Municipal operation is apparently efficient under European conditions in so far as quality of service is concerned.

Wages on European Electric Railways

WAGES paid to motormen and conductors on the tramways in Europe are far less than those prevalent in this country. Statistics giving information up to date on European wages were presented in a report at a meeting held in Brussels in July, 1925, of the personnel connected with European tramway companies. This report gives for all the principal European countries the average hours per week or per day of the employees in the transportation and maintenance service, with wages paid, accident and sick benefits awarded, and other similar information.

In Great Britain a motorman is paid somewhat more than a conductor and averages, according to the size of the city, from $12.84 to $15.24 a week. These wages are based on a standard week of from 48 to 52 hours. The conductors get about a dollar less per week. These statistics are taken from the reports of 142 tramway systems, of which 90 are municipally owned and 52 under private operation. The tramways in Great Britain employ more than 50,000 persons, of whom 12,620 are employed in London.

In Holland there are nine tramway systems, of which five are municipal, and the transportation employees in Holland earn from 30 to 40 kronen a week, or from $12 to $16. They work from eight to eleven hours per day.

In Italy the wages are considerably lower. For transportation employees they average 780 lire, or about $28 per month, and the men work from 8½ to twelve hours a day. Italy has 44 city tramway systems, with about 30,000 employees.

In Sweden the wages of the men seem to be as high as anywhere in Europe. That country has eleven tramway enterprises, of which eight are municipal, and 2,402 men are employed. Forty-eight hours a week is the standard period of work and the wages average from $54.67 a month in the small towns to $72.36 in Stockholm. After about twelve years of service a man in the small town can work up to a monthly wage of $67.80, while the motorman in Stockholm can expect $89.80 a month after twelve years of service.

There is only one railway system in Alsace-Lorraine, that in Strassburg. The men make from $21.18 to $24.75 per month. Married men get $2.50 more a month, as well as 75 cents a month extra for each child under fifteen years. Overtime is paid at the rate of 14 cents an hour before midnight and 24 cents an hour after 12 p.m.

Accident Record Good in St. Louis

ACCIDENTS for the year 1925 on the lines of the United Railways, St. Louis, numbered 19,171, which is the lowest figure of the last four years. Of this total 10,775, or 56.2 per cent, were collisions with other vehicles. This, the largest class of accidents, has grown steadily from 323 in 1907 to a maximum of 12,609 in 1923. Starting organized safety work in 1924, the company was able to check the increase and accomplish substantial decreases in 1924 and 1925. This has been done despite the fact that the number of motor vehicles in St. Louis has increased from 80,556 in 1923 to approximately 150,000 at the present time. Except for the item of collisions with motor vehicles, the accident record of the railway for 1925 is the lowest in the nineteen years, beginning with 1907, for which records are available. All other accidents total 8,396, as compared with a maximum of 22,167 in 1909.

Accidents for the past year are classified as follows:

Type of Accidents	Number
Collisions with wagons	444
Collisions with persons	531
Collisions with animals	41
Car collisions	270
Car derailments	130
Boarding and alighting	2,046
Falls in car	951
Disturbances	534
Car equipment failures	42
Miscellaneous	1,966
Transportation employees injured	115
Power plant and line employees injured	216
Maintenance of way injuries	419
Shop injuries	307
Electrolysis	31
Struck by car doors	353

Fatal accidents in which the United Railways was involved numbered 31. The low record of fatalities occurred in 1920 with 25, and the high record in 1910 with 70. Car-miles numbered 2,465 and passengers carried 23,831 per transportation accident in 1925. Per passenger injury, the car-miles averaged 11,542 and the number of passengers carried 111,595.

Association News & Discussions

Diesel-Electric Locomotives Discussed in Joint New York Meeting

SOMEWHAT conflicting views were presented at the meeting held in New York on Feb. 18 when the Metropolitan Sections of the four great engineering societies—civil, electrical, mechanical and mining and metallurgical—met to discuss the Diesel engine and its effect on heavy traction. This is not strange because the Diesel locomotive is a newcomer in the railroad field.

C. A. Stein, general manager Central Railroad of New Jersey, was the first speaker. Progress of the steam locomotive was depicted in stating that the present locomotives are 34 times as heavy and 52 times as efficient as the first 8-ton, 2,000-lb. tractive effort locomotives used in the United States in 1829, almost 100 years ago. For the first 70 years the railroads expanded and grew in size, but made few changes in the design of the steam engine used for propelling the locomotive. Since 1900, however, many improvements have been made, until now almost too many things are placed on the locomotive. Mr. Stein inferred that the steam locomotive has almost reached the limit of its development.

The speaker mentioned several objections to electrification, the first and principal one being its high cost. He feels also that there is a danger in the third rail and the high voltage overhead trolley. Sleet and ice have proved a real interference to third rail operation and also, to some extent, to overhead trolley. Troubles at the power house and on the transmission lines cripple electric operation of the entire zone rather than of one unit only. While the thermal efficiency of the electric engine is greater than that of the steam locomotive, he believes that it is not as efficient as the Diesel engine. The Diesel engine undoubtedly will find an important place in steam road operation, particularly in terminals, whether electrified or not, until one standard system of railway electrification can be determined upon.

The Central Railroad of New Jersey is operating one Diesel locomotive in its Bronx terminal. It is self-contained, requiring no heavy investment to provide for peak conditions. One unit is just as efficient as it would be if Diesel locomotives were used throughout. In other words, a changeover from steam to Diesel engine can be made gradually, as conditions warrant.

High grade mechanics are not necessary in Diesel engine maintenance, according to the speaker. In common with electrification, the steam road is freed of water tanks, cooling stations, water scoops, ash-handling equipment and other similar necessities to steam locomotives. This one Diesel locomotive operating in the Bronx yards has a fuel cost of only one-fifth that of the steam locomotive it replaced, because on account of smoke reduction the steam locomotive had been burning anthracite at $8 a ton. Mr. Stein feels that the Diesel-electric or oil-electric locomotive is going to find a very definite place in steam road operation and will be a considerable competitor to electrification.

Hart Cooke, of the McIntosh-Seymour Corporation, stated the case for the Diesel locomotive. Mr. Cooke's paper is abstracted elsewhere in this issue.

Electrification Favored by Mr. Storer

N. W. Storer, general engineer Westinghouse Electric & Manufacturing Company, delivered an outstanding paper in favor of electrification. Mr. Storer's paper will be found elsewhere in this issue.

Edward B. Katté, chief engineer electric traction New York Central Railroad, read into the records a few remarks, reproduced elsewhere, and showed several tractive effort curves of the freight and the passenger Diesel locomotives designed for the New York Central, in comparison with steam locomotives. These are the first Diesel locomotives used in this country for road service.

W. B. Potter, chief engineer railway department, General Electric Company, in a brief discussion, said that the electrical engineer must think of electrification in the terms of transportation. The speaker has long been interested in both electrification and internal combustion engines, and while he believes that the Diesel locomotive will find an important place in steam road operation, because of its high thermal efficiency, he sees no fear for heavy electrification of trunk lines because of this unit. Mr. Potter looks forward to the future of steam road operation as being capable of absorbing all of these forms of locomotion in their proper place.

Sidney Withington, electrical engineer New York, New Haven & Hartford Railroad, rose to the defense of the electrical operation of his road between New York and New Haven, saying that its reliability had been greater than under steam locomotive conditions, despite the dependability upon a power station and transmission line. Also, he is not alarmed as to the personal injury possibilities mentioned by one of the other speakers, saying that it is only a matter of education to warn people of the dangers of the third rail and the high-tension trolley. During the shopmen's strike a few years ago it was a very significant fact that the electric locomotives were better maintained by the unskilled labor available than were the steam locomotives, an important point in favor of electric locomotive operation.

Mr. Withington said that the system of electrical operation should be standardized, particularly in the East, where the steam roads of one company come in contact with others so frequently that it would be an annoyance and an expense if many of these other roads were electrified by different systems.

Even in the congested districts in New York the sum of all rated power of the New Haven electric locomotives is four times the capacity of the power house, indicating clearly the effect of the diversity factor. Diesel locomotives would be more expensive, not only because of the greater expense of the Diesel engine per horsepower, but because it would be necessary to supply so much more generating capacity than would be possible under full electrification operated from central power stations. Likewise, the future oil supply may seriously affect the economic status of the Diesel engine in the future, in the opinion of Mr. Withington.

W. S. Murray said that the final answer was an economic one, and that the annual charge composed of the two factors, one of operating and the other of fixed charges, must determine the usefulness of any type of locomotion. He has little fear for electrification as a whole, but sees an opportunity to use the Diesel engine in yards, branch lines, and perhaps on road work on long light lines that do not require heavy trains and are not encumbered by heavy grades.

Several others discussed various points that were raised by the speakers. The entire meeting showed a great interest in the subject and a desire for some type of engine to replace the steam locomotive under conditions that are not favorable to its operation and maintenance.

The Diesel Locomotive Must Prove Itself*

By E. B. Katté
Chief Engineer Electric Traction
New York Central Railroad

SUCH a locomotive as the Diesel should promote the extension of heavy electric traction in that it may be considered a competitor of the electric locomotive in certain fields, and as such, should tend to reduce the cost of electric locomotives.

The most promising field for the Diesel locomotive is in switching service in non-electrified yards, or between yards operated under different systems of electrification; also on railroads

*Abstract of discussion before a joint meeting of A.S.C.E., A.S.M.E., A.I.E.E., and A.I.M.&M.E., New York City, Feb. 19, 1926.

with relatively infrequent service, or on branch lines where the traffic is not heavy enough to provide an operating saving sufficiently large to cover the increased fixed charges incident to electrification. To compete successfully in either of these fields the Diesel locomotive must operate practically noiselessly and smokelessly; the economy in operation must at least equal that of the electric locomotive and the first cost must be less than the combined cost of the electric locomotive and the working conductors.

During the preliminary exposition of the advantages of the Diesel locomotive, railroad engineers have accepted without argument the first three requirements, knowing that the contract trials will demonstrate their truth or fallacy. With regard to the ultimate cost of the unit there is still grave question. The prices thus far quoted are excessive, considering the small capacities offered. It is only in the hope that prices will be very materially reduced when Diesel locomotives are built on a mass production basis that railroad engineers have been able to recommend the trial orders thus far awarded.

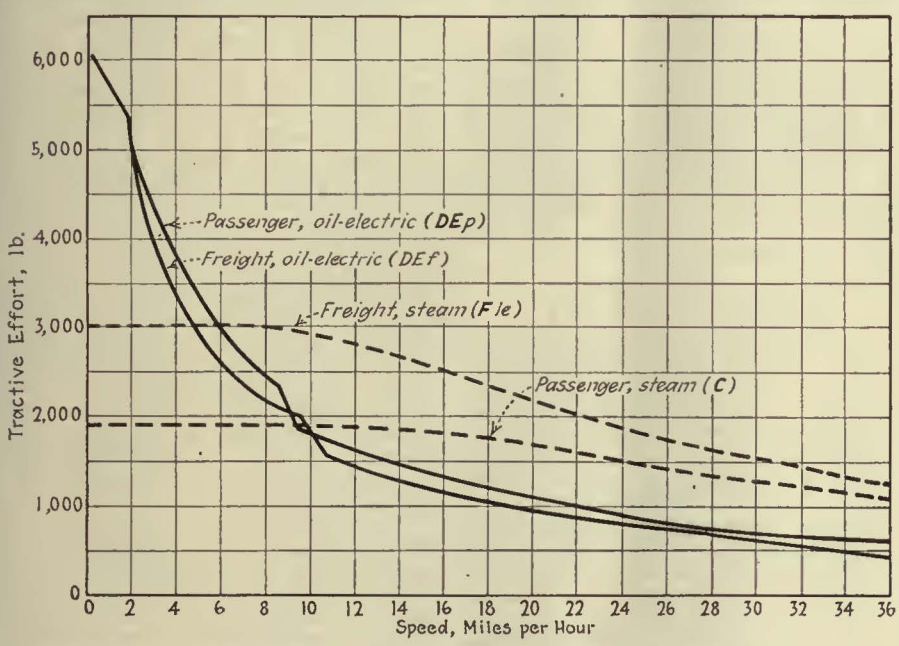
Like all other railroad problems this is one of economics. There is no question but there is a field for the Diesel locomotive adjacent to and bordering those fields now occupied by the steam locomotive and the electric locomotive, but its economic advantage over both must be firmly established before the railroads can invest very heavily in this new type.

Thus far the principal development of Diesel locomotives in this country has been for switching, in relatively small sizes. Such a locomotive was tested by the New York Central Railroad during the summer of 1924. These tests were very encouraging but clearly indicated that a locomotive of greater capacity was desirable.

Since that time the engineers of the New York Central have diligently endeavored to interest manufacturers in the production of an oil-electric locomotive weighing about 100 tons and capable of developing about 1,000 hp. As a result of their activity two orders have been placed for Diesel-electric road locomotives. The one for passenger service will contain an 800-hp. McIntosh-Seymour engine. The weight of this locomotive is about 148 tons. It is intended for light passenger service on the main line of the Putnam division. The freight road locomotive will weight about 128 tons, and the power will be furnished by a 750-hp. Ingersoll-Rand engine.

Tractive effort and speed characteristics of these locomotives, and of the steam locomotives which they are intended to supplant, have been plotted to the same scale and are shown on the curve reproduced elsewhere. Both the passenger and the freight locomotives will be equipped with four General Electric motors, each having a continuous rating of 266 hp. The locomotives will be arranged for multiple-unit operation, two or more being coupled together for hauling heavier trains.

The speed of the passenger locomotive hauling average trains on the Putnam division will be between 15 and 50 m.p.h., depending upon the weight of the train. The maximum safe running speed of this locomotive light will be 60 m.p.h. The freight locomotive is designed to haul the average weight trains on the Putnam division between 8 and 35 m.p.h., with a maximum safe speed of 45 m.p.h.



Comparison of Tractive Effort, New York Central Steam and Oil-Electric Locomotives

Effect of Diesel-Electric on Railroad Electrification*

BY HARTE COOKE
McIntosh-Seymour Corporation

PROBABLY the best way to get an idea of the effect of Diesel-electric locomotives on the electrification of steam railways is to look into the characteristics of the different types of motive power and take up the requirements of some of the special kinds of railway service, so that we may see what the special conditions are and what motive power would be best suited for the service.

The tractive effort curve has a maximum value which is limited by the weight on the driving wheels. This total weight on the driving wheels is limited by the axle loads permissible for any given track structure and also the number of driving wheels which can be used. A steam locomotive will maintain this maximum tractive effort practically constant up to about 10 m.p.h. Then the tractive effort falls off approximately inversely as the speed, approaching a hyperbola which is limited by the horsepower which can be developed by the cylinders and the boiler capacity of the locomotive. With this form of tractive effort curve the locomotive can pull at considerable speed any load which it can start. Full horsepower capacity is only developed at relatively high speeds.

As a matter of reference we will refer to the weight, first cost, fuel cost and time the engine is in service of the steam locomotive as 100.

The Diesel-electric locomotive has the important peculiarity of being able to develop its full horsepower at any speed, and this with the even torque of the electric motor gives very high tractive effort at starting. The weight of the locomotive is such that practically all of this can be utilized.

The tractive effort of a Diesel-electric locomotive varies in general inversely as the speed, the curve being approximately a hyperbola equivalent to the net horsepower that the locomotive is able to deliver. This gives the locomotive ability to start very easily any load it can draw at a reasonable speed and this large tractive effort at starting also gives high accelerations. In regard to weight, the Diesel-electric locomotive will weigh about 50 per cent more per horsepower than the steam locomotive; say we will represent this by 150. The cost per horsepower will be in the neighborhood of three to four times as much as the steam locomotive, which we will represent as 300 to 400.

In regard to maximum output, this type of locomotive can be arranged for multiple-unit control, so any amount of output desired can be provided.

With this type of locomotive the fuel and water necessary for a great many miles can be carried on the locomotive so that no tender is required. With the same relative leeway as used for the steam locomotive, and allowing for the absence of standby losses for the Diesel locomotive, we find that the fuel cost will be represented by 30.

Because of the freedom from operating delays and those caused by servicing and maintenance, the time in active service of a Diesel locomotive would be represented by 200, about twice what is usual with a steam locomotive.

On the same basis the electric locomotive would have a weight per horsepower equivalent to 75 as compared to steam, a cost of 300 to 600, depending upon the power station requirements; a fuel cost of 37 and a time in actual service equivalent to 225.

*Abstract of discussion before a joint meeting of A.S.C.E., A. S.M.E., A.I.E.E. and A. I. M. & M. E., New York City, Feb. 19, 1926.

From a detailed analysis of the various fields in which the Diesel locomotive might be used we conclude that for very light traffic the freight and through passenger traffic can best be handled by the steam locomotive and the local passenger traffic by gas rail cars to keep the capital expenditure to a minimum, as the traffic is not heavy enough to allow the savings accruing from the more economical operation of Diesel-electric locomotives or full electrification to balance the increased capital cost.

As traffic increases, changed conditions should be carefully analyzed to see when the steam locomotive should be supplemented by Diesel-electric, the Diesel-electric making the best showing when it can operate the most miles per day.

The capital cost for full electrification is variable and becomes less as the traffic density increases. It is a rugged arrangement and can give much service at a low fuel cost if used in heavy traffic. Under these conditions the capital costs are reduced to an amount which the fuel saving justifies.

The Diesel-electric has an important difference from full electrification in that the investment can be made gradually and the benefits obtained at once and in proportion to the extent to which it is used.

All of the above shows that the three kinds of motive power are supplementary:

For light traffic, steam.

For heavier traffic, Diesel-electric.

For very dense traffic, full electrification.

Some Features of the Diesel-Electric Locomotive*

By N. W. Storer
General Engineer Westinghouse Electric & Manufacturing Company

RAILWAY people the world over show a tremendous and widespread interest in the Diesel-electric locomotive. This is simply indicative of the need for a locomotive which, while having all the advantages of steam as an independent motive power unit, avoids many of its disadvantages. The Diesel electric avoids much of the smoke, dirt and noise, the frequent trips to the roundhouse for attention to fires and boilers, and for fuel and water. It has four times the thermal efficiency of the steam locomotive and adds to that all the flexibility and easy control of the electric.

The steam locomotive is one of the greatest machines in the world but the interest aroused by the Diesel electric shows how anxious the railways are to get something better, how thoroughly everyone has come to believe that it is only a question of time when it will be superseded. Whether the Diesel engine is to displace it is another matter.

After the engine itself the great problem is the transmission of the energy developed to the driving wheels. Direct mechanical connection is more or less satisfactory for very small outputs, the hydraulic with a little larger capacity; and a combination of the two is being exploited in Europe. Practically everyone in this country who is working on a locomotive to be operated with the Diesel engine is using the electric system of transmission, indicating that there are serious limitations to the mechanical and hydraulic systems and that the great superiority of the electric is generally accepted. On the face of the matter, it would seem that a direct connection between the engine and the drivers would be the simplest and most efficient, but since the Diesel engine is not self-starting and does not operate satisfactorily at very low speeds, a direct connection is impracticable and any mechanical or hydraulic means, while possibly satisfactory and reasonably efficient when new, will continually develop troubles and will lose its efficiency with age. The electric transmission system, while admittedly being more or less expensive and heavy, is extremely simple to operate, absolutely flexible in its speed-torque characteristics and maintains the same efficiency throughout its life.

*Abstract of discussion before a joint meeting of A.S.C.E., A.S.M.E., A.I.E.E. and A.I.M.&M.E., New York City, Feb. 19, 1926.

Similarity of Diesel Electric to Motor-Generator Type

The Diesel-electric locomotive is very similar in its characteristics, performance and equipment to the motor-generator type of alternating-current locomotive which takes power from a single-phase trolley and utilizes a synchronous motor to drive a direct-current generator which furnishes current for the driving motors. The Diesel electric substitutes the engine with its auxiliaries for the synchronous motor, transformer and all other parts of the equipment pertaining to them. The equipment, from and including the direct-current generator to the motors, is or may be practically the same. Speed regulation is by voltage control of the generator in both cases. The motors for both are low-voltage, direct-current series machines, with all of their rugged characteristics. The main difference between the Diesel electric and the motor-generator type is that the output of the former is limited to a very definite value which may be carried for long periods, while the synchronous motor, which the same continuous rating, has a great power house back of it and may carry very heavy overloads for short periods. The Diesel electric in this respect has almost the same limitation as the steam locomotive. Its horsepower capacity is limited. It can exert the same maximum tractive effort as the all-electric because of the motor drive, but only at very low speeds.

On a Diesel-electric locomotive, the generator and motors must be considered as a unit in calculating the output of the locomotive. The most important features of the electrical equipment are:

1. The ability to utilize the full capacity of the engine at whatever train speed it is needed or desired.
2. A high efficiency so as to transmit the maximum amount of energy from the engine to the wheels.
3. Simplicity of control.
4. Light weight.

What are the characteristics of the electrical equipment that will best utilize the engine capacity? Voltage control of the generator has already been mentioned as giving the maximum flexibility for control of speed and tractive effort. This, however, is operative only up to the normal voltage of the generator and over most of the range while overloading the motors and generator. Over-voltages are sometimes secured by forcing the generator field. Where the voltage is limited, as is necessarily the case with a generator designed for a definite voltage, further speed control may be secured by weakening the fields of the motors, and there is no reason why a very considerable range of speed cannot be covered in this way. Difficulties from commutation of the motor at weak fields and high speed might be serious with motors taking current from a trolley with all its fluctuations and surges in voltage, but it is much less serious where the power plant goes with the motors. It must be remembered that neither generator nor motor is overloaded while operating with weak fields on the motors.

The efficiency of the electrical equipment is of the utmost importance, not simply on account of the fuel consumption, but because the higher the efficiency the greater will be the energy of the locomotive available at the wheels. Every effort should be made to make it as high as possible. The electrical equipment, when properly designed, will have an excellent all-day efficiency.

With all of the complications of the Diesel engine and its auxiliaries to contend with, it is all the more necessary to have a simple electrical control system. There are a number of ways to secure this feature. The one most commonly used provides an automatic control of the generator voltage which limits the output of the generator to the capacity of the engine so that the engine is in no danger of being stalled. This is usually combined with engine speed control. It is very desirable with the Diesel engine to keep the speed as low as possible for the output that is required, as low speed means lower maintenance, and especially lower consumption of lubricating oil, which is usually one of the most expensive items of operation. It is fortunate that this idea of variable engine speed combines very readily with a good control system for the electrical units of the power plant.

The auxiliaries on a Diesel-electric locomotive are like the auxiliaries on other kinds of locomotives—very important and very annoying. The Diesel engine requires pumps for water circulation and for lubrication. It requires air filters and radiators with a thorough ventilating system for cooling the engine. There must be ample

capacity of air compressors for the brakes and control. These are preferably driven electrically, either from the main generator or from an auxiliary supply system. Means must be provided for starting the engine. This is a matter of the greatest importance, since if the engine cannot be started, it is useless. It is usually started by compressed air, a pressure of from 200 to 500 lb. being necessary. In some cases the engine is started by current from a storage battery using the generator as a motor. Of course, a comparatively small amount of control equipment for the electrical apparatus will be necessary, but the sum total of the auxiliary equipment amounts to quite a large proportion. Last, but not least, is a good supply of fuel, oil and water.

Weights of Diesel Locomotives Are High

Diesel locomotives that have been built thus far range in weight per horsepower from 207 lb., which was in practically the first locomotive built, to 400 lb. The largest one built in this country to date, the 1,000-hp. Diesel electric built by the Baldwin Locomotive Works, with electrical equipment manufactured by the Westinghouse Electric & Manufacturing Company, weighs 275 lb. per horsepower. It is probable that it will be some time before locomotives weighing less than 200 lb. per horsepower can be built regularly with Diesel electric equipments.

Therefore, when I give 200 lb. per horsepower as the low limit for the Diesel-electric locomotive, I give a figure which has never yet been attained and which will require all of the ingenuity and refinements available to secure. For the present, it is much safer to figure on a weight of 250 to 300 lb.

The Field of the Diesel-Electric

Is the Diesel-electric locomotive going to displace all of the steam locomotives and eliminate the electric from further consideration? It is quite unnecessary for anyone in the steam or electric locomotive business to be alarmed at this time. Samuel M. Vauclain has said that much time will elapse and many millions of dollars be expended to develop the Diesel-electric locomotive to a point where it will figure to any great extent in transportation service. While Mr. Vauclain is probably right so far as trunk-line service is concerned, it undoubtedly will have a definite field in transportation circles. The first and probably the most important field will be on branch lines of railroads in service such as the Canadian National Railways is handling with its Diesel-electric cars. Switching is a most desirable place for the Diesel electric. The ordinary steam switchers used around buildings are a great nuisance on account of the noise, smoke and dirt which they disseminate. They are also expensive to maintain. The Diesel-electric eliminates a great part of the nuisance, is able to stay on the job for many hours at a time and probably will require little maintenance when it is taken to the roundhouse. These features, together with the flexibility of the electric transmission and the fuel economy, make it a most desirable successor to the steam locomotive. It is preferable in some situations in large cities to the electric switcher, since it eliminates the necessity for the overhead wires or third rail which are extremely difficult to apply in and around buildings and represent a high investment from which little return is possible.

The Diesel-electric will probably find a certain field in main-line service, especially for low-speed freight haulage, where the weight per horsepower is no particular disadvantage. It will be particularly useful in this respect on branch lines where the traffic is comparatively light. Further than this, no one can speak with any degree of certainty at this time, but in general it is not probable that it will be used to any extent for other than low-speed traffic for some years to come.

There is one point concerning it which cannot be too often emphasized; its use does not eliminate the fundamental limitation of the steam locomotive, namely, that its power is limited to the amount that can be generated on the locomotive itself, while the electric always has all the power it can utilize.

Electrification

Electrification will go forward in terminals and on the railways having heavy traffic where the investment in overhead lines and substations does not represent a considerable part of the cost of electrification. The Diesel-electric and the straight electric locomotive will move side by side in improving the transportation of the railways of the world. The steam locomotive will still roll along for many years, as it has advantages which are hard to overcome. It must be understood, however, that the steam locomotive is not the simple machine it once was. The improvements which have so greatly increased its capacity and efficiency have made it a very complicated machine and one which is most difficult to maintain. These are the reasons which will ultimately compel the retirement of a large part of them in favor either of the all-electric, the Diesel-electric or some other independent type of locomotive.

COMING MEETINGS
OF
Electric Railway and Allied Associations

March 5 — Metropolitan Section, A.E.R.A., 29 West 39th Street, New York, N. Y.

March 8-11—National Railway Appliance Association, annual exhibition, Coliseum and Annex, Chicago, Ill.

March 9-11 — Oklahoma Utilities Association, annual convention, Mayo Hotel, Tulsa, Okla.

March 12 — Pennsylvania Street Railway Association, annual meeting, William Penn Hotel, Pittsburgh, Pa.

March 17-18—Central Electric Traffic Association, Portage Hotel, Akron, Ohio.

March 17-18—Illinois Electric Railways Association, Illinois State Electric Association and Illinois Gas Association, annual joint convention, Springfield, Ill.

March 23-25—National Conference on Street and Highway Safety, Washington, D. C.

April 13-16—Southwestern Public Service Association, Galveston, Tex.

June 2-4—Canadian Electric Railway Association, annual convention, Quebec, Canada.

June 28-July 2 — Central Electric Railway Association, summer meeting, S. S. South American, Buffalo, N. Y., to Chicago, Ill.

Oct. 4-8—American Electric Railway Association, annual convention, location not yet determined.

Track Saturation Problem in Detroit*

By Col. H. U. Wallace
General Manager Department of Street Railways, City of Detroit

DETROIT has much in common with other large cities in its transportation problems, but it also has many problems which are peculiar to itself and are perhaps unique in the urban traction field. The intensive industrial life of the city not only lengthens the peak periods but increases the customary two periods to three distinct periods, with some three or four semi-peak hours in the intervals.

The city extends along the north bank of the Detroit River for a distance of approximately 12 miles and is solidly built up from the river in a generally northwesterly direction to a depth of about 9 miles. It is nearly rectangular in shape. The business center is on the city's southerly edge, approximately in the center of its river frontage, extending about ¾ mile along the riverfront and about the same distance inland.

One line of railroads enters the city in the southwesterly corner and extends diagonally across it from the business center. A second line of railroads extends from the westerly limits of the city, running southeasterly in a diagonal line to the business center. In addition to these, a belt line extends around the city approximately 6 miles from the center. Naturally the manufacturing district follows very closely along these railroads, which brings this district in an approximate semi-circle 3 miles from the business section, while some of the larger plants lie in a circle from 5 to 6 miles from the center of the city.

Our traffic surveys indicate that the majority of our people live on the side of the city opposite to which they work; that is, people engaged in plants on the westerly side of the city live on the easterly side, and vice versa, thus making it necessary for them to travel across the city to get to their work.

Many of the industrial plants work either two or three eight-hour shifts

*Abstract of a paper presented at twelfth annual conference on highway engineering, Ann Arbor, Mich., Feb. 17.

per day, employing thousands of men. There are probably very few railway systems in the world outside of Detroit that have a peak hour between 11 p.m. and 1 a.m. This peak is followed by the usual morning peak period from 6 to 9 to the business and industrial centers, and another in the afternoon from 3 to 6 o'clock. Since the starting time of these eight-hour shifts in our various industrial plants is not standardized, we find several periods which may well be termed semi-peaks. This lack of standardization, however, is helpful to the department, since if the hours were standardized we would require a tremendous increase in our rolling equipment to handle the armies of men who would pour into the streets.

While the transportation given by the department is fundamentally electric car service, a co-ordinated coach service is being developed rapidly. The growth and expansion of the city has made it imperative that we go into the coach business to serve newly populated areas on the outer edges of the city where the density of population is sufficient to warrant organized transportation but does not warrant the heavy investment incident to the construction of rail lines.

Coach lines run generally as extensions to the car lines in territory not directly served by the street car. Others are laid out as belt lines through newly developed territory intersecting existing car lines, thus giving a similar service through the transfer to that maintained where the car lines exist. This co-ordinated service works out to the benefit of the city, since the patrons originating their ride on a coach line can transfer, without additional cost, to a car line, and then, upon payment of 1 cent, can obtain a transfer to other existing car lines in the city.

The great expansion of the city demands some form of rapid transit. This may be rendered in two ways: First, of course, by a system of subways or elevated lines, or by a co-ordinated express and local street car and coach service. We are studying at the present time plans for such a co-ordinated service. These plans, which are still very much in the laboratory stage, would provide an express service by running street cars with stops approximately 1 mile apart. This service would be supplemented with a local coach service, or the reverse might be carried out with the coach in the capacity of an express.

One of the advantages of having the local service given by coaches is the ability of the coach to load and unload at the curb, thus avoiding a delay in the general flow of traffic, at the same time protecting passengers from the necessity of crossing through the traffic line to the center of the street to board the cars. The matter of protecting passengers either leaving or intending to board the cars is a serious problem because of the many unusually wide thoroughfares in Detroit. We have several streets of 100-ft. width and our main east and west artery, Jefferson Avenue, is 120 ft. wide. It will be seen from this that the distance from the curb to the car tracks is equal to the width of the average street.

Since, from necessity, the street car stops should be at intersecting street car lines, which means that usually these stops would be where the main traffic on the highway would also stop, there would be an advantage in having the street cars make only such stops, and if a substantial saving in time is made by these express cars, it is not inconceivable that local passengers would transfer from local coaches to the express street cars at these stops in order to get to the center of the city more rapidly.

Such a co-ordinated local coach and express car service would naturally be given only in the more densely populated areas. In other words, the coach routes would terminate approximately 4 miles from the center of the city, at which point the street cars would take up the local schedule to the end of the line. Studies of this co-ordinated service which have been made by this department indicate that on the longer lines reaching into the outlying sections a saving of ten minutes can be made in the run from the center of the city to the terminus of the line.

Since the city is paying for the railway system and its operating costs from the fares received and from no other source, one of the questions which must be answered is whether a line of coaches as outlined above would serve as a feeder to the car lines or act as a competitor, thus cutting down income and defeating the plan of purchase and operation. The studies made so far, however, indicate that the business is sufficient to warrant both classes of service, particularly since the service would be so attractive that competing privately owned jitney and bus companies will be forced out of business. It appears that this may be the solution for the present problem of tract saturation.

Oklahoma Utilities Speakers Announced

PROMINENT men in the different branches of the public utilities field have been selected to speak before the eighth annual convention of the Oklahoma Utilities Association to be held in the Mayo Hotel, Tulsa, Okla., March 9-11. Among those listed on the program are R. B. Campbell, president Midwest Electric Railway Association; Thomas F. Kennedy, member of executive committee H. L. Doherty & Company, New York City; J. E. Davidson, president National Electric Light Association; F. B. MacKinnon, president United States Independent Telephone Association; E. P. Dillon, general manager Research Corporation, New York City; Gen. Charles Keller, Byllesby Engineering & Management Corporation, Chicago; J. W. Gleed, general attorney Southwestern Bell Telephone Company, St. Louis; A. W. Leonard, president Natural Gas Association of America, Tulsa, Okla., and R. H. Sniffin, manager power department, Westinghouse company.

In addition to the general sessions, there will be division meetings for the electric railway, public relations, electric, gas and telephone sections. Ample opportunity for discussion will be afforded on the program.

Central Traffic Meeting

ON MARCH 17 and 18 the Central Electric Traffic Association will hold its next regular meeting at the Portage Hotel, Akron, Ohio.

The morning session on March 17 will be in the nature of a round-table discussion. The afternoon session will be given over to the transaction of committee work. It is the desire of the association, however, that so far as possible all committee work may be completed before the meeting in order to give more time to the transaction of business at the meeting. The session of March 18 will be devoted to reports of committees and such other business as may properly be presented.

American Association News

Mr. Trigg Proposed for Director of Chamber of Commerce

IN A LETTER addressed to member railway companies of the American Electric Railway Association, Executive Secretary J. W. Welsh calls attention to the coming election for directors of the United States Chamber of Commerce, which will be held at the annual meeting in Washington on May 11 to 13. He states that the industry's support has been asked for the election of Ernest T. Trigg, president and general manager of John Lucas Company, Philadelphia, Pa., who is a candidate for re-election from the second district. It is suggested that members communicate with their local Chambers of Commerce and also with any other organization members of the United States Chamber of Commerce in an endeavor to enlist their support in the above election.

Mr. Trigg has been connected with his firm since 1908. He has been general manager since 1912 and was elected president in 1922. He has been on many important boards and commissions of a public character, and was twice president of the Philadelphia Chamber of Commerce. Mr. Trigg is a director of the Philadelphia Rapid Transit Company and the Philadelphia Belt Line Railroad.

Metropolitan Section of the A.E.R.A. Meets March 5

FURNISHING transportation will be the subject of the next meeting of the Metropolitan Section of the American Electric Railway Association. W. B. Wheeler, assistant superintendent of transportation Third Avenue Railway, will present a paper on this subject. It will be discussed by M. J. O'Connor, superintendent of transportation New York Railways, S. S. Hamilton, assistant superintendent of transportation Brooklyn City Railroad, and D. K. O'Rourke, trainmaster Interborough Rapid Transit Company. Entertainment will be supplied by a well-known saxophone quartet from Connecticut.

Maintenance of Equipment

Right-Turn Signals at Louisville

IN ORDER to avert collisions caused by automobilists while attempting to pass to the right of a car when that car is turning into a street to the right, the Louisville Railway, Louisville, Ky., has installed right-turn signals. Similar signals have been installed at other points where cars are likely to back on the main line and create a condition where vehicles should not approach too closely. The equipments were furnished by the Nachod and United States Signal Company and include a red projector, a floodlighted sign, a clearing contactor in the trolley wire and a relay in a box mounted on a pole.

Signals in Connection with Floodlighted Signs Warn Motorists When Cars Are to Take a Turn. At Left, Pole Mounting for Sign. At Right, Pipe Bracket Mounting

When used in connection with a Cheatham switch, the same operation of the car under the Cheatham contactor that throws the switch-point for the diverging route shunts out a relay in a normally closed circuit. This causes its armature to drop to a back contact, closing a circuit to illuminate the red projector and to floodlight a sign reading "Car Turns." The projector is equipped with a 50-watt lamp in a 9-in. parabolic glass reflector with red cover glass and makes a brilliant effect even in daylight. The floodlight reflector has a 50-watt lamp also in series with the projector. This display of signals not only gives an arrestive warning, but explains the reason for it.

After the car has made the turn, it passes under a normally open contactor of the short type, which picks up the "stick" relay again, and thus removes the indication. The railway has installed six of these in various parts of the city. One is used to give warning that a car is about to back over a piece of double track while wye-ing; in this case the sign reads "Car Backs." It is controlled by two independent contactors. Another is placed where the car line swings across the street to make a terminal loop. One illustration shows the outfit mounted on 1½-in. pipe bracket, extending from the pole with sign and projector at the outer end of the bracket. The other shows a sign and projector mounted against the pole.

Fixture for Edgewise Bending of Rings

FINISHING rings for flush type headlights are made of ¾-in. flat stock ⅛ in. thick in the shops of the Eighth Avenue Railroad, New York, N. Y. The rings are formed by bending the stock edgewise in a special fixture, which is shown in the accompanying illustration. The fixture has a central portion, around which the bending takes place. A slot in this central ring keeps the stock in place and prevents it from turning up. A clamp to hold the end of the stock is pivoted from the central part of the ring, and the forming arm has rollers, with a groove to hold the edge of the flat strip. These roll the ring into position. This forming arm is also pivoted from the central part of the ring.

Fixture Used to Form Headlight Finishing Rings from Flat Stock. A Finished Ring Is Shown in the Background

To form a ring, the stock is heated so that it will bend readily, and the end is then placed in position and held firmly by the clamp of the fixture. By rotating the arm, the rollers force the flat stock into the groove of the central ring of the fixture and so bend it into circular shape. After the rings are formed, the ends are scarfed and welded by a blow from a hammer.

Changeable Sign for Front and Rear Entrance

DURING rush hours cars of the United Electric Railways, Providence, R. I., are operated with two men, but at other times many one-man cars are in operation. Passengers may board cars at the rear end with two-man operation, but must, of course, enter at the front of

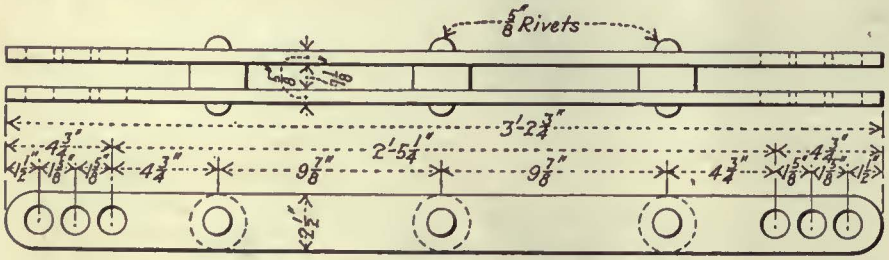
one-man cars. It was thought desirable, therefore, to install a sign to tell passengers at which end to board the car. Immediately below the destination sign in the front vestibule window a translucent sign has been installed. One end reads "Enter Front" and the other side reads "Enter Rear." A movable metal slide can be so placed that either end of the sign is concealed. Thus it can be made to read simply "Enter Front" for one-man operation or "Enter Front or Enter Rear" for pay-leave, two-man operation or "Enter Rear" for pay-enter, two-man operation. The sign itself consists of a piece of cloth spread on a metal frame attached to the window posts. The light of the car body is sufficient to make the sign readable from the street at night.

Maintenance Practices of Union Street Railway, New Bedford

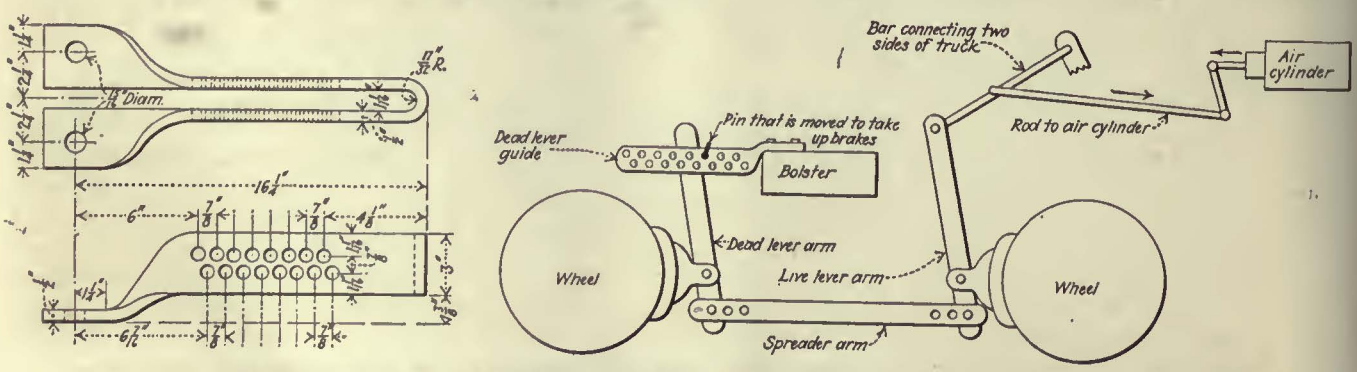
Dead Lever Guide Aids Brake Adjustment

IN ORDER to insure proper braking at all times, the Union Street Railway, New Bedford, Mass., uses a somewhat novel brake-adjusting device. A piece of ½-in. steel 36 in. long and 3 in. wide is bent U-shaped and bolted to the truck bolster. Through this U-shaped piece of steel two or three rows of ⅞-in. holes are drilled. There are usually eight or ten holes in a row and they are so aligned that they provide a ⅛-in. distance between holes, thus permitting a ⅛-in. take-up of the brakes. The dead lever arm is passed through the center of this U-shaped dead lever guide and is held in position by means of a steel pin that is passed through a pair of these drilled holes. Adjustment for brake shoe and wheel wear can readily be made. The spreader arm which extends between the live and dead lever arms is provided with three bolt holes to take care of the adjustment made necessary when equipping the car with new or turned down wheels. G. H. Bonner, shop foreman, was the originator of this device. Details are shown in accompanying drawings.

Cars of this system have been placed on a systematic inspection basis by use of the Sangamo Economy power-saving meters. The meters are equipped with inspection dials to determine when cars should be inspected or overhauled. When a car has operated approximately 750 miles it is given a brake inspection. This has been found frequent enough to keep a car which is provided with this brake-adjusting device in proper braking condition at all times.



Spreader Arm Used Between Live and Dead Levers



At Left—Detail of Dead Lever Guide. At Right—Brake-Adjusting Device Used on Cars of the Union Street Railway, New Bedford

Journal Box Shims Save Wear

AS A means of holding the journal box housings in their proper place the Union Street Railway, New Bedford, Mass., makes a practice of placing steel shims between the journal box housing and the truck frame.

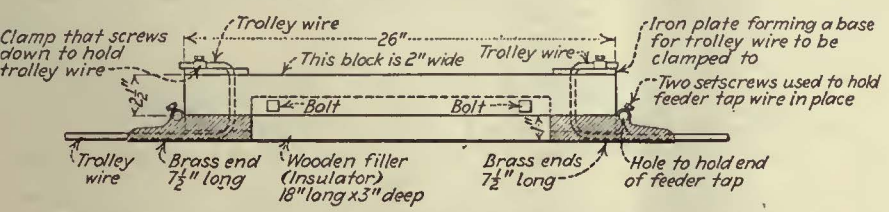
Shims Bolted to the Truck Frame Save Wear on the Journal Box on Cars of the Union Street Railway

A through bolt at the bottom of the truck frame holds these shims in a vertical position, while side motion is prevented by the presence of the journal box housing on one side and the bolt heads of the truck frame on the other side. As these shims are of softer metal than the journal box housings they absorb whatever wear there is and thus leave the truck frames and journal box housings in their original condition. Ordinarily shims ¼ in. thick are used, but in exceptional instances a ⅜-in. shim is installed. The surfaces of these shims are kept lubricated by applying old crank case automobile oil. Use of these shims has almost eliminated the breaking of truck and journal box parts and has resulted in holding the frame, journal, axle bear-

ng and wheel in proper alignment. This has necessarily aided in eliminating worn journal box bearings, worn axle heads and grooved truck and journal box housings.

Long Section Insulator Used by Union Street Railway

A 26-IN. wood section insulator designed by Peter Dupuis, line foreman, is used by the Union Street Railway, New Bedford, Mass. It has an oak filler 18 in. long, which makes a positive breaking of the current. This filler is driven into a slot in the breaker and is held firmly in position by two through bolts. The brass approaches are



Section Insulator Designed to Prevent Damage to Ends of Trolley Wire

7½ in. long and are ordinary except for the special device for holding the ends of the feeder wires. These are not soldered, but are held in a socket provided with two setscrews. This method insures proper contact and at the same time the feeder wires can be easily removed. The ends of the trolley wire are passed through a gradual curve on the ends of the breaker and firmly held on the top of the breaker by means of an iron plate equipped with an iron clamp provided with two bolts. This method avoids damaging the ends of the trolley wire. Another advantage of this type of breaker is that the ends of the trolley wire are of sufficient length so that they are held in such a position that a maximum of strength is obtained.

Special Work Made by Thermit Welding

SEVERAL simple pieces of special work have been made in the Rochester shops of the New York State Railways by using their new thermit welding outfit. In this work, measurements of the old frogs which are to be replaced are taken in the ground by the railway engineering department. A sketch is made up from these measurements, and the work is done in the blacksmith shop under the direction of Louis Kubiak. The accompanying illustration shows two frogs being constructed. These are made in one piece to avoid joints. The guard rail is cut to the proper length and is then bent to the radius desired. The rails are fitted together and a slight space is left between the rails of the central points where the welding is done. After the work is set up, measurements are checked against the drawings before the pieces are finally bolted down to timbers for the welding operation.

A mold constructed in standard manner is placed around the point where the thermit metal is to be deposited, and a crucible is set over the junction of the rails. The thermit welding is done in the usual manner. The illustration shows the metal as freshly deposited at one of the frog points of the double frog being made. The sand about the mold has been removed. After the metal is cooled properly, it is ground to a smooth surface at the top and the proper groove is ground to permit the passage of wheel flanges.

The cost of constructing special work as indicated is much less than what would be required to buy the pieces from manufacturers, but of course these frogs will not last as long, as they contain no solid manganese points to take the excessive wear at the centers.

Discarded Headlights for Indirect Park Lighting

SOME 18 miles north of Toronto, along the main highway and the route of the Toronto & York division of the Hydro-Electric Railways, lies a fine pleasure resort comprising a lake of more than 50 acres and another 165 acres of adjacent beach and woodland. When this park was in the hands of the original Toronto & York Radial Railway it was operated directly by the railway at a substantial loss. Under the Hydro-Electric Commission, however, the grounds have been turned over to a professional amusement concern, with the result that the railways are in a fair way to be relieved not only of the former operating expense, but of interest on the investment as well. This desirable end will be aided by a housing development scheme whereby cottage builders will be able to secure lots at a distance of only 300 ft. from the lake, their homes being made accessible by a 30-ft. roadway to be built at the rear of the cottages and going round the lake.

One of the features that has helped to popularize the park is a novel and economical scheme of indirect illumination. At the lake end nearest the highway is a power house and plenty of shrubbery. Concealed in this shrubbery is a battery of discarded arc headlights. These headlights produce illumination similar to that of a monster searchlight of an excursion steamer and of course attract the favorable attention of the thousands of travelers on the main highway near by. As the power used is entirely off-peak, the principal cost is for replenishing carbons.

Two Special Work Frogs Set Up for Welding in the Rochester Shops of the New York State Railways

The News of the Industry

Wage Change in San Francisco

The Market Street Railway employees of San Francisco, Cal., have received a voluntary wage increase of 2 cents an hour, effective Feb. 28, while the San Francisco supervisors have just denied more pay to the employees of the Municipal Railway. Under the new scale Market Street Railway employees will receive 56 cents an hour. Commensurate increases were given in all other departments, including shops, substations and track repair men. Samuel Kahn, executive vice-president of the road, said that the raise was entirely voluntary on the part of the management and would cost the company about $200,000 annually. About 2,500 men are affected. This action followed shortly after similar action by the California Street Cable Company. It is in line with the policy of restoring wages to the pre-war maximum.

The decision of the supervisors denying Municipal Railway employees an increase in wages from the present scale of 67½ cents to 75 cents an hour was attended by a series of bitter attacks by representatives of the men. The combined finance and public utilities committees of the San Francisco Board of Supervisors said, in effect, that it wanted to give the raise but it could not find the money for the purpose. The spokesmen for the employees said the money should be found even if a 6-cent fare were necessary.

It was agreed by the committees that there was at hand a sum amounting to $343,000 which might be used to pay the wage increase demanded, but they also pointed out that this would last for only two years and that afterward there would be an annual deficit. Expert accountants retained by the employees declared that the figures quoted by the supervisors were obtained through erroneous bookkeeping methods and that there was money enough to meet the increase. They urged rectification of the accounting system. In the end it was agreed that there must be some changes in the financing before any pay increase could be recommended.

Committee to Study Atlanta's Needs

Mayor Sims of Atlanta, Ga., following a councilmanic resolution, has named a new committee to consider the "relief petition" of the Georgia Railway & Power Company. The petition of the company was filed early in December and suggested seven different remedies of relief. One of these, the elimination of jitney buses from the streets, has already been granted, and another, that of eliminating certain unnecessary street car stops, has been recommended by the Council and is now before the Public Service Commission for action. The other suggested remedies are: Elimination, to the extent necessary, of the gross receipts tax and street paving assessments; 10 cents for cash fares, with a special rate for riders who use tickets, and a 2-cent charge for transfers.

Railway and Bus Company Unite in Bid

New York City Companies Would Abandon 25 Miles of Track and Run 50 Miles of Bus Routes at Five-Cent and Ten-Cent Fares with Transfers on Latter

AN EXCLUSIVE franchise to operate an extensive bus system in Manhattan on which 5 cents would be charged on crosstown lines and 10 cents on longitudinal lines was sought in a joint petition presented on Feb. 24 to the Secretary of the Board of Estimate of New York City by the Fifth Avenue Bus Company and the New York Railways. The two companies announced an amalgamation for the purpose of bus operation and offered in return for the franchise to eliminate 25 miles of street car tracks, remove 200 cars and to give up perpetual franchises owned by the railways.

A summary of the main points of the new petition, follows:

(a) Marks first move toward the installation of a comprehensive motor coach service through co-operation of effort and co-ordination of facilities of existing surface car companies.

(b) Discontinuance of the use of 25 miles of street car tracks.

(c) Surrender of perpetual franchises to operate street cars on those tracks.

(d) Removal of over 200 street cars from the congested city streets.

(e) Operation of ten crosstown motor coach lines—23.96 miles of route—for a 5-cent fare.

(f) Operation of three longitudinal motor coach lines—24.58 miles of route—at a 10-cent fare.

(g) A universal transfer system, under which by means of transfer and retransfer for a single fare of 10 cents a person may ride from any point on the system to any other point thereon.

(h) A modern motor coach system covering about 50 miles of routes in Manhattan.

(i) Service to be started at once on certain lines and full service to be in operation in 90 days on the remainder of the system.

(j) Provision made for recapture by the city after five years for the purpose of municipal ownership and operation.

(k) Efficiency of service guaranteed by a staff of men experienced in omnibus operation and familiar with local transportation conditions in Manhattan.

Through John A. Ritchie of the Fifth Avenue Coach Company as spokesman, it was disclosed that controlling interests of that corporation and of the New York Railways had effected the amalgamation through the formation of a company just incorporated as the New York City Omnibus Corporation, of which Mr. Ritchie is president and J. M. McCarthy secretary.

The consolidated company withdrew the previous applications made by the Fifth Avenue Coach Company and the New York Railways and submitted its new joint plan, which calls for a virtual monopoly of bus operation in Manhatton with extensions into the Bronx.

The corporation also makes provision for recapture in the interest of municipal operation by the city after five years of private operation, if the city should so elect.

A statement by the sponsors for the new application concerning their proposal follows:

Under this plan presented by the New York City Omnibus Corporation, headed by John A. Ritchie, the new system can be put into immediate operation, first, because the new corporation has available the unique facilities of the Fifth Avenue Coach Company, including buses, equipment, personnel and organization, to put such a system into immediate operation, and, second, because all danger of litigation between the interests involved would be at once eliminated, and the city would, moreover, without expenditure, regain control of many of the streets, its use of which is now restricted by existing perpetual franchise grants.

Traffic all through the Borough of Manhattan would be vastly speeded up; congestion due to unnecessary duplication of routes would be eliminated, and the transit facilities of the borough would be placed in a more plastic state, whereby the city would mold them more nearly to meet the needs of the changing conditions.

The new company proposes that as soon as practical other street car lines of the New York Railways shall be motorized and the street-car tracks taken out. The ultimate object of the new company is to extend this plan to all street-car operation in Manhattan when and as soon as possible and practicable.

Sixth, Seventh and Columbus Avenue, three of the traffic arteries, would be immediately freed of street-car tracks under the plan, and Eighth Street and 116th Street for the most part would be immediately similarly cleared of inflexible street railway lines.

The crosstown routes, ten in number, would be operated at a 5-cent fare. The longitudinal lines would be operated at a 10-cent fare. Free transfers would be issued from the 10-cent lines to the 5-cent lines and to the other 10-cent lines, and a 5-cent transfer would be sold on the 5-cent lines for use on the 10-cent lines. The transfer privilege would allow a person by use of a transfer and retransfer to ride from any point on the system to any other point on the system for a single fare of

10 cents. This is the most comprehensive transfer arrangement which has been submitted with the proposals for bus operation in the Borough of Manhattan.

The proposal provides for the recapture by the city for municipal operation after five years at a valuation to be agreed upon by arbitration.

The routes proposed not only include substantially all of those laid out by the City Board of Transportation, but also additional routes provided for by the surrender of part of the perpetual franchise routes of the New York Railways—that is, Sixth, Seventh and Columbus Avenues and other thoroughfares. Service on some of these routes can be started immediately and the entire system can be completed and placed in operation within ninety days.

Approximately 200 surface cars would be eliminated by the plan and the passenger-carrying capacity of the borough's surface lines would be increased vastly by the installation of 210 double-deck and 202 single-deck motor coaches on the superseded electric lines and the additional new lines contemplated, which buses would be of the finest and most modern type and practically noiseless.

Consideration was given in the plan of the system to the elimination of inconveniences of unnecessary transferring by making provisions for the through routing of vehicles between extreme points in the borough at a maximum cost of 10 cents to the passenger.

The most of the afternoon of Feb. 24 was devoted to conferences with representatives of three of the principal competing bidders for bus franchises in Manhattan and to a general study of the terms and conditions offered in their respective petitions. The three applicants were the Service Bus Corporation, the Fifth Avenue Coach Company and the People's Electrobus Corporation.

It is said that the Fifth Avenue Coach Company also plans to combine a new bid with that of the Third Avenue Railroad subsidiary in the Bronx and may file a joint supplemental petition for the Bronx. The Third Avenue bus subsidiary is known as the Surface Transportation Company. The Third Avenue Railway now enjoys the greater part of all the road surface transportation in the Bronx.

Mayor Walker said on Feb. 25 that no action on the application of the New York City Omnibus Corporation could be taken until after consideration of the other applications for bus franchises and after the statutory hearings on the petitions yet unheard. The Board of Estimate fixed March 11 to hear the omnibus corporation.

Jersey Paving Bill Laid Over

After a fight in the Legislature, Senator Frank D. Abell of Morristown was compelled on Feb. 23 to lay over his bill to relieve street railway companies from paving obligations. On three roll calls he was able to get only ten of the eleven votes necessary for the passage. Although several Senators joined in the debate against the measure, Simpson of Hudson County and Roberts of Burlington County were the only ones to vote in the negative, the others remaining silent as their names were called.

Senator Abell said that the obligations originally assumed by the traction companies had become obsolete, and he charged that it was unfair to continue to compel them to help keep up the roads used by competing jitneys and motor buses. He declared that the Morris County Traction Company was in bankruptcy and that unless relief were granted trolley service would be lost to the working people. He argued that eight states have relieved trolley companies of such obligations.

Senator Simpson led the attack on the bill. He said that the utility companies, in order to obtain their valuable franchises, had agreed to certain things that they were now finding expensive and that if they were allowed to escape the burden it would have to be borne by the municipalities. He said in the next six years it would cost Jersey City $2,500,000 and Hoboken would have to pay several hundred thousand dollars on paving that had been neglected by the Public Service Railway.

New Deal Suggested for Worcester

Special Committee Named by Mayor to Investigate City's Street Railway Needs Favors Transportation Monopoly as Best Policy, with One Company Operating Trolleys and Buses

THE entire passenger traffic of the city of Worcester, Mass., should be handled by the Worcester Consolidated Street Railway, whether by trolley cars or buses used in conjunction with the trolley cars. Changes should be made in the regulation of the routing of buses so used, so that every emergency of traffic might be met with the least inconvenience. These are the principal recommendations submitted to Mayor O'Hara by the special commission appointed to investigate.

Among the most vital needs are given the speeding up of the trolley service in the city, provide new and up-to-date cars equipped with proper safety devices, that will permit the company to meet the new conditions that have come with the fast-moving automobile competition. At present the average speed of trolleys is a trifle more than 8 m.p.h.

An interesting feature of the report is the finding, based upon an actual count of passengers carried at the busy hours in Worcester, that buses cannot take the place of trolleys, but only aid in the carrying of traffic because the streets could not accommodate sufficient buses to handle the problem.

The report was drafted by Prof. Albert S. Richey of Worcester Polytechnic Institute and was adopted by the full committee, which included Frank H. Willard, City Solicitor William C. Mellish, William J. Flickinger for the New Haven Railroad, Clark V. Wood, president of the Worcester Consolidated Street Railway.

The report came as a result of the study made by the special commission of Worcester trolley needs, prompted by the appeal of the officials of the New York, New Haven & Hartford Railroad for co-operation from the city of Worcester in the effort of the railroad company to have legislation enacted at the State House that would permit the railroad to take back control of the trolley lines of the state, and on which the railroad officials in return promised to expend large sums of money in rehabilitation. Worcester was slated to have $1,000,000 of the proposed amount to be so expended in improving the service, and more if needed.

Professor Richey says the competition of the privately owned automobile has very seriously reduced the patronage of the railway in Worcester, as it has in every other comparable city of the country. It is believed, however, that with the proper rehabilitation of the railway, including the substitution of a considerable number of comfortable, convenient, attractive, and thoroughly modern cars, and especially if some improvement can be made in operating speed, a great deal of this lost patronage can be regained.

Among other things the report as presented says:

One of the most vital factors entering into proper street railway transportation is speed, and there should be a proper co-operation by the city officials toward its attainment. There is no question but that the larger part of the traveling public is served by the street cars, or that the street car is by far the most economical user of street space. Both of these facts are demonstrated by counts made within the past two weeks and referred to later, herein. Any steps taken to expedite the movement of street cars are for the general good of the entire city.

The company owns about 168 closed cars, most of which are less than 20 years old, and which are suitable for present service, with the exception of 25 cars which have been remodeled from open cars, have high platform, two steps and narrow doors, and which for those reasons unduly slow up service and consequently should be retired. This leaves about 145 closed cars which I agree with Mr. Wood are suitable for present operation, and deducting this number from the requirement of 220, Mr. Wood arrives at his number of 77 new cars to be purchased. He speaks of the proposed new cars as "lightweight one-man two-man cars," which agrees with the Day & Zimmermann statement as to a suitable type of car for this property, and with which I also agree, except that in the light of recent experience elsewhere, I believe practically the entire operation can be with one man, especially if the cars are designed to facilitate the movement of passengers and the collection of fares, including such devices as the treadle-operated rear exit door.

Equipment Should Be Overhauled

The purchase of new cars should be accompanied by a complete overhauling and repainting of all of the existing equipment which is retained in the service, and the future policy should and of course will include that of good housekeeping to the extent that cars are kept well painted, clean, safe and comfortable in operation, and manned by operators who at all times consider themselves as enthusiastic salesmen of a proper transportation service as much as the servants of the public as though in its direct employ.

The additional bus service suggested by Mr. Wood in substitution for railway service on the Worcester & Webster and Webster & Dudley lines and the Blackstone Valley division, south of Millbury, are matters which are most important to the city of Worcester. Such lines as these can be served best by bus, and in my opinion such substitution should be made.

Within the city of Worcester, it is doubtful if there is any section which at present is not served properly either by street cars or buses, but the street railway should be ready to provide one service or the other as soon as the need for it is demonstrated, and it is shown that a reasonable patronage is ready for the service.

With traffic which requires as does Park Avenue operation the use of street cars as frequently as 22 in a period of 1½ hours, there can be no question but that such operation is much more economical than would be that of buses, even if there were street room for the latter.

Relative to the reconstruction of various tracks in the city comprising about 34,000 feet of track in twelve locations, there is no question but that a proper rehabilitation of the railway would include such reconstruction. The railway should co-operate with the city in connection with all track reconstruction, to the end that where such reconstruction is necessary and the street is to be rebuilt, the work be done simultaneously, and at such time as

the city is ready to proceed with its work. In connection with track reconstruction and betterment, automatic electric switches should be installed at all points where track switches require movement in the operation of one-man cars.

In order to determine the relative use of the street by automobile and street car, I arranged for counts to be taken on South Main Street at Wellington Street, on Jan. 26, 1926. All outbound traffic was listed during the period between 4 and 6:30 p.m., and during that period the following outbound traffic was noted:

Six hundred and ninety-four private automobiles, with 1,144 passengers.

One hundred and thirty automobile trucks, with 196 passengers.

Twenty-two taxicabs, with 41 passengers.

Eight hundred and forty-six total automobiles, with 1,381 passengers.

Seventy-one street cars, with 3,127 passengers.

Professor Richey says it is probable that this count represents a fair cross-section of all cars and riding persons leaving the downtown section in all directions. He directs attention to the fact that although less than 8 per cent of the vehicles were street cars, they handled 70 per cent of the persons; also that the average number of passengers per automobile was 1.63, while the average number of passengers per street car was 44. He says that when it is considered that the street car occupies no more street space than two automobiles, the remarkable efficiency of street cars as a transportation agency as compared with the automobile is manifest, together with the fact that it is handling many more than double the number of passengers traveling by all other agencies. True, the above observations were taken wholly within the rush hour, but Prof. Richey says it must be remembered that this is the time during which the traffic problem is most serious.

School Regulations in Chicago Expedite Railway Travel

A step in curbing the exuberant youth in car loading at the high schools of Chicago, Ill., has been taken as a result of the ingenuity of the leaders of one school who devised and caused the adoption of regulations to get the students on their way home in orderly fashion. The regulations have been published as a model and are the product of Tilden Technical High School students. The school is one of a number at which several thousand students clamor for street car service, mostly at the same time. The regulations follow:

On each corner will be about four cadets with one senior cadet in charge. As soon as a car is available, one cadet will call the destination of the car, as, for instance, "Halsted and 79th." When the car is loaded a director will give signal for car to start. If there is a car superintendent present, he will give signal for the car to start.

Follow These Instructions

1. Line up in a single file parallel to the street car.
2. Do not get on the car while it is in motion.
3. Do not stand on the rear platform of the car unless it is impossible to enter the car.

Purpose of Regulations

Develop a well-regulated system of boarding street car and passing between periods which will:

1. Safeguard the lives of the students.
2. Save time.
3. Prevent congestion.
4. Give Tilden a good name.

Slogans

"Have fare ready"
"Line up" "Speed up"
"Move Along"

Goal

"To make the best better"

Willing to Surrender Massillon City Franchise

Heavy losses sustained in the operation of its city lines in Massillon have led the Northern Ohio Traction & Light Company to ask the Council of that city for permission to discontinue its city service. Such application has no bearing on the interurban service between Massillon and Uhrichsville on the south or Canton, Akron, Cleveland on the north.

The company does not desire to be placed in the attitude of attempting to evade its contract, and for that reason has hesitated to suggest an abandonment of the system to the City Council and citizens of Massillon. It develops, however, that a bus company has been organized with capital sufficient completely to motorize the city. In view of this, the company has expressed a desire to abandon its so-called city lines, leaving the interurban line through the city.

The company has felt for some time that the people of Massillon wanted a bus transportation system for the city, but it does not now desire to extend its bus operations to that extent, nor has it in the past desired to do so. The company which has proposed to put in a bus system is experienced in bus operation.

On its part, the Northern Ohio Traction & Light Company has offered to aid the city and applicant company to establish a permanent bus system. The company believes that in cities the size of Massillon a bus system can be operated which will be of greater benefit than the present rail system, and meet more adequately the needs of the public than does the railway. The company's present contract has only a few years to run. The lines have been operated year by year at considerable loss.

The proposal of the bus company, headed by Frank Booth, fixes a rate of fare at 8 cents cash, two tickets for 15 cents. It is intended to operate upon the principal streets of Massillon, and particularly to serve the steel mill district.

The application of the bus company and the one for abandonment will come before the Council on March 1.

$11,000,000 Milwaukee Budget

Approximately $11,000,000 will be spent by the Milwaukee Electric Railway & Light Company, Milwaukee, Wis., and its associated companies under the 1926 budget adopted at the annual meeting on Feb. 17. The program provides for these disbursements:

Milwaukee Electric Railway & Light Company, $6,100,000; Wisconsin Electric Power Company, which owns the Lakeside power plant, $2,300,000; Wisconsin Gas & Electric Company operating in Racine, Kenosha, Waukesha and other communities in southeastern Wisconsin, $1,600,000; Wisconsin Traction Light Heat & Power Company, operating in Appleton, $800,000; Badger Public Service Company, operating in Elkhart Lake and other Sheboygan County communities; Peninsular Power Company, operating in the northern peninsula of Michigan, and the Milwaukee Northern Railway, $200,000 among them.

The greatest single expenditure will be $2,300,000 for equipment to increase the output of the Lakeside pulverized fuel plant. Approximately $2,000,000 will be expended on the electric railways, exceeding by $600,000 the expenditure during 1925. About $1,000,000 will be required to complete the Waukesha interurban cut-off. Reconstruction of track in Milwaukee will require approximately $885,000.

New Problem in Jacksonville

In view of an adverse opinion from Austin Miller, city attorney, of Jacksonville, Fla., no referendum on the proposal that the city acquire by purchase and operate the Jacksonville Traction Company will be called by the City Commission, according to Frank H. Owen, chairman. The popular vote, which was requested by the City Council, was scheduled for April.

According to the opinion by Mr. Miller, it would be illegal for the city to spend public funds to determine "whether or not the city should do something it is not authorized to do by its charter." If any individual or group wants to press for a referendum, according to the opinion, it will be necessary to go to the Legislature for an act empowering the city to engage in street railway ownership.

So the Public of Baltimore May Know

The United Railways & Electric Company, Baltimore, Md., is conducting an advertising campaign through the Baltimore newspapers which gives the public intimate details of the street car system and how it is operated. Several of these advertisements have appeared.

The United takes the view that this advertising, if steadily and consistently presented, will greatly benefit the city, the patrons and the company.

The following benefits are listed:

A better understanding of the street car company's problems.

More street car riders and increased revenue for the company.

Better street car service.

A quickening of the city's progress, which is bound to be dependent upon the quality of its transportation facilities.

The company says:

Big improvements in street car service are expensive—more expensive now than ever. And yet rapid transit must grow and improve if the city is to grow and improve. In order to increase its capacity for improvement the company must increase its revenues. The sole source of a railway's revenue is its riders. Its income consists entirely of individual car fares. It cannot have more income until more Baltimore people ride the street cars. With increased riding and increased income there must come major improvements in service.

For years and years street car companies have been almost inarticulate. Other institutions, public and private, with problems to be solved and work to do have taken the public into their confidence and have asked their help and understanding. Street car men have worked in silence. Being in closer contact with the exacting and critical public than any other public utility they have leaned in the direction of taciturnity under fire. Work hard, take your medicine, keep quiet. That was the creed of the old time street car man.

It was a praiseworthy and creditable creed and it still is. But today "keep quiet" is a principle easily carried to extremes. The United intends to continue to live up to it. But it will amend the principle to this extent—it will not require the Baltimore public any longer to guess at the truth about its affairs or to accept misstatements in place of the truth.

These are the reasons for the United's advertising.

Franchise Memorandum on File at Louisville

A tentative memorandum regarding abolition of the present franchise and fare ordinance, under which the Louisville Railway, Louisville, Ky., now operates, and replacement of it with a new one, with a higher cash fare and slightly lower than present ticket fare, has been placed in the hands of Mayor A. A. Will. It is expected the memorandum will be made the basis on which something tangible may be worked out.

Experience seems to have proved that the present modified service-at-cost ordinance under which the company operates could well be modified in its provisions to the benefit of the city and the company.

News Notes

Metal Tokens in Use.—The Beech Grove Traction Corporation, connecting Indianapolis, Ind., and Beech Grove, has discontinued the sale of its five two-zone tickets for 50 cents and is now using metal tokens and Johnson fare boxes. The majority of patrons, it is said, prefer the metal tokens.

Seeks Increase in Fares.—The Union Traction Company, Coffeyville, Kan., has petitioned the Public Service Commission for an increase in its fares in the cities of Parsons, Cherryville, Independence and Coffeyville. The company requests a boost in local fares to 8 cents or two tickets for 15 cents, with a book fare of 25 rides for $1.65. The present rate is 6 cents with a 5-cent book fare. The case was set for hearing at Topeka March 1.

Books Extended to Fourteen Days.—The Public Service Commission has approved an amended local passenger tariff of the Geneva, Seneca Falls & Auburn Railroad, Inc., Seneca Falls, N. Y., changing the limit on 20 trip commutation ticket books from ten to fourteen consecutive working days. This amendment was effective Feb. 15 under special permission of the commission.

Metal Tokens Again in Louisville.—The Louisville Railway, Louisville, Ky., which has been issuing paper tokens since Feb. 1, has gone back to the metal tokens, following complaints of patrons. The tokens are the same as those previously used by the company. There is no saving for the consumers in buying tokens. They are sold at the rate of seven for 35 cents.

Higher Fares Discussed at Hearing.—The railway division of the Illinois Power Company, Springfield, Ill., is making less than 3½ per cent of its investment and last year fell $96,719 short of earning the 7 per cent return allowed by the State Commerce Commission, according to reports of accountants and engineers presented at a recent hearing. The increased fare proposed would retain the 10-cent cash fare, with tokens increased from four for 25 cents to seven for 50 cents and family fare books from $2 to $2.50 for strips of 40 tickets.

Foreign News

Bermuda to Have Electric Railway

Permission has been granted for the construction of a tramcar line in Bermuda, and it is planned to start work on it in the next few months. The ban has not yet been lifted on automobiles and motorcycles, so the single motor truck to carry freight remains the only representative of the automotive family.

"Antiquity, even in transportation facilities, is part of the stock in trade of Bermuda," says a bulletin from the Washington, D. C., headquarters of the National Geographic Society. "To the visitor this is one of the chief sources of its charm. There are no industries other than agriculture and catering to the tourist trade. The steamboat whistle and the clatter of horses' hoofs on the smooth hard roads are the only foreign noises that disturb the Sabbatical quiet of the island."

Plans Approved for Lisbon Subway

Concessions for the construction of a metropolitan subway in Lisbon, Portugal, has been granted by the Municipal Council of that city to a Spanish group. This concession comprises eight lines radiating from the Rocio Square over a total area of about 16½ miles. The hilly nature of the city will necessitate deep construction, but stations will be near to the surface and elevators need not be installed.

Vignole rails, 59¼ ft. long with fish plates and weighing 90 lb. per yard, will be used, with a gage of 4.72 ft.

It is planned to build this subway in eight sections, each costing approximately $2,250,000. The Spanish engineers are now seeking an initial loan of foreign capital in the amount of $200,000 to defray the expenses of the first section built. It is proposed to finance the successive sections by capital flotations and local loans in Spain and Portugal.

National Electric Scheme for Great Britain

The general electricity supply plan which the British government is contemplating has some interest in the realm of electric traction, because if it is carried out many small power stations will be closed and energy taken from great economical stations.

The three main features of the new government scheme are large generating stations, a national board and distributing stations. The generating stations are to number about 60. The electricity produced by them is to be purchased by the board and sold to the distributing stations. Interconnecting power lines will be established by the board between the generating and distributing stations. Many small power stations will disappear. To allow interconnection between generating stations, it is proposed that a standard frequency of 50 cycles per second should be set up for the whole country. Cheap and abundant supply for all purposes is the goal, but it is recognized that a good many years must elapse before much benefit can accrue.

Many municipalities which have power stations and the steam railway companies which contemplate electrification will probably oppose the plan. If the plan is successful, many of the smaller tramway undertakings in the country should benefit from having a power supply from the national mains at a cheaper rate than they can produce for themselves.

Underground Railways for Manchester.—Proposals for the construction of underground electric tube railways in Manchester, England, are again being revived. The plan is for a circle railway with a central station, from which radiating lines would be constructed to the outside areas. The estimated cost is from £250,000 to £300,000 per mile.

Liverpool to Purchase Tramway System.—Purchase of the Waterloo & Great Crosby tramway undertaking has been decided upon by the Liverpool, England, City Council. This railway has been operated by the Liverpool Overhead Railway, but its lease on the lines will soon expire.

Electrification Planned in Czechoslovakia.—Contracts were placed recently for the first electrifying project of the Czechoslovakian State Railways. This comprises the electrification of the Prague railway stations and the connecting lines. A considerable part of this contract work has been placed with the Skoda Works, whose special department for electric railways has developed into the largest and most modern undertaking of its kind in Czechoslovakia.

Electric Train Test in Sweden.—Successful trial runs with electric goods trains took place recently on the Moholm-Falkoping section of the line between Stockholm and Gothenburg, Sweden, the electrification of which will soon be completed. Four trains were dispatched simultaneously in each direction, the longest consisting of 50 trucks. A fully loaded train maintained a speed of 37½ m.p.h., even on the steep grades on the line.

Trackless Trolley in Darlington.—Inauguration of the trackless trolley system in place of the tramways in Darlington, England, is now taking place. This is a complete substitution. The financial position of the municipal tramways would not permit the extensive renewals required. This tramway system was opened in 1904 and has never been financially successful. The type of trolley bus adopted is a single-deck, 31-passenger vehicle with a central door. The interior is divided into two compartments, one being used as a smoker.

Recent Bus Developments

Plan at Buffalo Collapses—Railway Renews Offer

Plans of Ernest M. Howe, Detroit, and the American National Omnibus Corporation, New York, to establish 5-cent bus service in Buffalo over thirteen routes covering 71.5 miles of streets have collapsed following the failure of the company to complete its financing arrangements as ordered by the Public Service Commission. The company lacked $300,000 of the necessary $1,500,000 paid-in capital on the last day allowed by the state utilities board to complete its financing and appear before the commission for a hearing on its application for a permit.

With the announcement that the Howe plan had collapsed, Bernard J. Yungbluth, president of the International Railway, Buffalo, and its subsidiary company, the International Bus Corporation, said the traction interests plan to carry out the first steps of the co-ordinated bus-trolley plans filed with the Buffalo City Council last summer. These plans were held up by the municipal authorities when Mr. Howe entered the field with his 5-cent bus proposal, for which he later secured a franchise from the city.

The application of the International Railway and the International Bus Corporation on file with the city covers five of a dozen steps in a general plan for co-ordinated bus-trolley service. These are:

Establishment of a Best-North Street bus line and abandonment of the Best Street car line; establishment of a Richmond Avenue bus line and abandonment of the Hoyt Street car line; extension of the Bailey Avenue bus line from Kensington Avenue city line to East Seneca Street and over McKinley Parkway after the parkway is completed and abandonment of the Bailey Avenue car line; extension of the Delaware Avenue bus line from the Terrace to Shelton Square at Main Street; rerouting Delavan Avenue bus line, a cross-town service, over Potomac Avenue from Chapin Parkway, which will allow abandonment of part of the Forest Avenue car line from Delavan Avenue to Niagara Street.

There will be little opposition to the establishment of new bus routes and the extension of existing bus lines, but it is understood the City Council is opposed to the abandonment of car lines which have been long established, on the basis of the plan outlined in the Yungbluth proposals.

Allentown Bus Service Planned

In furtherance of a statement made some time ago by the Lehigh Valley Transit Company, Allentown, Pa., of its intention to adapt the bus to the transportation problem, comes the announcement from H. F. Dicke that a bus line operating on Turner Street, between Nineteenth and Seventh Streets, would be established as soon as the Public Service Commission granted the permit. The plans as they now stand call for a fifteen-minute service for two periods of three hours each in the morning and evening and a 30-minute headway during the rest of the day. Two buses will be used to maintain the former schedule and one during the so-called off-peak hours. A 10-cent fare will be charged. This will include transfer privileges to any of the company's lines. In opening the new line the company had in mind the accommodation of customers living far from present car lines.

In December of last year the company applied for a certificate to operate buses for "group and party service."

Railway Pays State Biggest Bus Bill

A check for $50,009, the largest bus license ever paid in the State of Minnesota and one of the largest ever paid in the United States, was delivered on Jan. 27 by the Twin City Motor Bus Company, Minneapolis and St. Paul, to Mike Holm, Secretary of State of Minnesota. This company is a subsidiary of the Twin City Rapid Transit.

The check is in payment of the 1926 license for 94 buses and four service cars operated by the bus company on its intercity lines as well as several suburban lines. This is a tax of 10 per cent on the list price, with a depreciation allowance of 10 per cent a year with a minimum tax of $350 for each bus operated.

The average fee is approximately $500 a bus. In addition to this state tax the company pays federal taxes of $20 a bus for the year May 1, 1925, to April 30, 1926. This is an additional tax of more than $8,000, or an aggregate tax of approximately $58,000.

Abandonment and Bus Petitions Before Utah Commission

The Utah Light & Traction Company, Salt Lake City, Utah recently applied to the Public Utilities Commission for permission to abandon its Davis County line, serving the towns of Centerville and Bountiful and intermediate territory. The application was in the form of a petition in intervention before the commission at the hearing of the application of the Bamberger Electric Railroad, which is seeking a permit to operate an automobile passenger and express line between Salt Lake and Ogden. It is requested that if the order of abandonment is permitted to the railway the bus line application of the interurban should be allowed provided the bus service will not pick up passengers in Salt Lake for discharge within the corporate limits of the city. If, however, the commission should refuse the petition in intervention, it is asked that the petition of the Bamberger company be denied.

Holyoke Railway Wins Point

The Holyoke Street Railway and the Interstate Bus Corporation, both of which have aired their differences in the county criminal and civil courts, have had their case settled by a triple bench of the federal court. Massachusetts bus control statutes were found to be constitutional, and the Interstate Bus Corporation is to be restrained from operating buses through Massachusetts cities without a license to do so. An injunction has been issued.

The Interstate Bus Corporation operates lines in all of the New England states except Maine. Its principal field of operation is in Boston and Providence. It recently brought proceedings into the federal court against the Holyoke Street Railway alleging collusion in interfering with the bus business in Holyoke, Mass. The suit was a counter one against the railway, which sought an injunction to prevent the bus company from operating.

The litigations began with a suit by the Holyoke company to prevent the operation of buses between Greenfield and Springfield, Mass. The suit was removed to Boston and warrants for the arrest of the bus company's chauffeur's followed. The bus company filed a complaint in an equity suit and obtained an order to show cause why an injunction to restrain the criminal prosecutions should not be granted. This order was given only after a long-drawn-out hearing.

Judges George W. Anderson, John A. Peters and Elisha H. Brewster ruled:

> These two cases have, by agreement, been heard together on agreed facts. They are, in effect, cross suits, and involve a single issue—the constitutionality of the Massachusetts statutes regulating the operation of buses in Massachusetts highways. These statutes are stated, construed and sustained by the full court of Massachusetts in Barrows vs. Farnum's stage line, and need not here be restated.

Interstate Bus Service Curtailed in New Jersey

Acting on the complaint of the Public Service Railway, Newark, N. J., the Board of Public Utility Commissioners has ordered the Pierce Coach Corporation to discontinue the transportation of passengers between points within the state in connection with the operation of a bus line between Morristown and Orange and New York. In the absence of municipal permits authorizing local service, the carrying of passengers whose journeys begin and end in New Jersey was held to be illegal.

Gasoline Tax Increased in Kentucky

The Kentucky Legislature on Feb. 20 passed a bill in which the gasoline tax is increased from 3 to 5 cents a gallon. It was approved with a wide majority in both the House and the Senate. The measure was recommended by the Governor. The law is to become effective at once and continue until July 1, 1928, provided no succeeding Legislature may change the time limitation. Other bills are before the state to increase license taxes on buses and taxicabs, on the basis of a seat charge, greater than that now in effect.

Cross-town Line in Fond du Lac.—The City Council of Fond du Lac, Wis., has accepted the proposition of the Wisconsin Power & Light Company to operate a cross-town bus line in that city. This bus system would work in harmony with the company's railway with interchangeable transfers. The application of the company was referred to in the ELECTRIC RAILWAY JOURNAL, issue of Feb. 13, page 299.

New Line to Run.—The Lordship Railway, Bridgeport, Conn., has been authorized by the Public Utilities Commission to operate a new bus line between Avon Park, Stratford, and Bridgeport, connecting with its present bus route from Lordship to Bridgeport. Two buses are now operated on a one-hour headway.

Line to Be Replaced with Bus.—The Southern Public Utilities Company, Anderson, S. C., plans to replace its line to North Anderson with bus service. The line to North Anderson has been in service since the development of the northern suburb began several years ago. It was not stated whether the line had been operated at a loss or not, but it was said that the bus would prove more beneficial to the residents of that suburb.

More Buses at Asheville.—Any day now seven new passenger buses costing $11,000 each and seating 29 people will be put in operation in Asheville by the Asheville Light & Power Company. Some of the equipment will be put on the run between Asheville and West Asheville. The purchase brings the total number of buses owned and operated by the company up to nine. Decision to utilize buses rather than cars was reached after a conference with city officials in regard to the traffic situation.

Bus License Sought Again in Westfield.—The Springfield Street Railway is still seeking a bus license to operate in Westfield, Mass. The City Council has not yielded despite numerous meetings and long arguments. At least two members of that body are holding out for assurance that the railway will maintain one crosstown trolley line. The railway says such a line does not pay and will not promise to continue operating any line at a loss. To further the interest of the city of Westfield the Springfield company has signified its intention to replace all highways to the satisfaction of the highway department, if licenses are granted to operate buses.

Fare Increased from Eight to Ten Cents.—The Public Utilities Commission of the District of Columbia has authorized the Washington Railway & Electric Company to increase the fare on its Burleith bus line from 8 cents cash, six tokens for 40 cents and 2 cents for transfers between intersecting car and bus lines to 10 cents cash with tickets sold at the rate of six tickets for 50 cents provided that a free transfer, good on any intersecting car or bus line of the company, be issued in payment of 10 cents cash fare or on payment of one ticket fare and 2 cents. Transfers to the Burleith bus line will be issued by connecting car and bus lines for 2 cents only upon the payment of an 8-cent cash fare.

Financial and Corporate

$1,043,401 Net Income for Chicago Rapid Transit

Company Operating Elevated Lines Reports Progress During 1925—Expenses $199,600 Less than 1924

Gross revenues of the Chicago Rapid Transit Company, Chicago, Ill., for the year ended Dec. 31, 1925, representing combined operating and non-operating revenue, were $19,281,887, an increase of $505,954 over the previous year. Total expenses, including taxes and $241,906 for retirement reserve, were $14,967,509, or $199,600 less than the year before.

Net earnings were $4,314,378, an increase of $705,554. Interest, rentals and amortization of discount totaled $3,270,977, leaving net income of $1,043,401, an increase of $242,025 over the year 1924.

Dividends on the company's outstanding 7.8 per cent prior preferred stock were declared and paid to the extent of $308,529, leaving $734,871 as unappropriated surplus earnings for the year, no interest having been declared or paid on the company's adjustment debenture bonds. To this surplus should be added other net credits to profit and loss of $38,169 and the surplus of $958,672 from the previous year, making a total surplus at the end of the year 1925 of $1,731,713.

INCOME STATEMENT OF CHICAGO RAPID TRANSIT COMPANY FOR THE YEAR ENDED DEC. 31, 1925

Passenger revenue		$17,786,474
Other transportation revenue		1,245,338
Gross operating revenue		$19,031,812
Operating Expenses:		
Maintenance of way and structures	$1,778,749	
Maintenance of car equipment	1,444,216	
Power	1,979,684	
Conducting transportation	7,006,823	
General and miscellaneous	1,135,721	
Total operating expenses		*$13,345,194
Net operating revenue		$5,686,618
Taxes, city compensation, etc.		1,622,314
Operating income		$4,064,303
Non-operating income		250,074
Gross income		$4,314,378
Deductions:		
Rentals	$881,282	
Interest on mortgage debt and equipment obligations	2,277,380	
Other interest	†55,498	
Amortization of discount	56,816	
Total		$3,270,977
Net income for the year 1925		$1,043,401

SURPLUS ACCOUNT

Balance, surplus Dec. 31, 1924		$958,672
Net income for the year ended Dec. 31, 1925 (as above)	$1,043,401	
Less dividends paid on prior preferred stock	308,529	
Surplus earnings for the year unappropriated		$734,871
		$1,693,544
Miscellaneous debits and credits (net)		38,169
Surplus, Dec. 31, 1925		$1,731,713
*Total operating expenses include credited to retirement reserve.		$241,906.92
†No interest declared or paid on adjustment debenture bonds.		

The rapid transit lines carried 216,045,575 revenue passengers in 1925, an increase of 3,144,551 compared with 1924.

One hundred new steel motor cars, ordered Dec. 19, 1924, were placed in service, the last of these being delivered on Nov. 23, 1925. These cars provide the maximum of comfort and safety and cost $2,268,840. The company now has 1,906 cars in service, including 1,862 passenger cars, of which 456 are all-steel construction. For the last ten years the company has been purchasing steel equipment in anticipation of a subway being built.

In September, 1924, the company requested the city for permits to extend all station platforms so as to allow eight-car train operation, which would substantially improve the service. Permits were obtained from time to time, but it was not until the city passed an enabling ordinance on July 22, 1925, that authority to extend all platforms was secured. The work was started the day following the passage of this ordinance and has been carried on continuously ever since. The work of extending the platforms on the Loop, Ravenswood-Kenwood, Howard-Jackson Park, Lake Street and Garfield Park lines has been practically completed. On the Douglas Park, Logan Square and Humboldt Park lines extensions will be completed soon.

While the number of passengers carried on the elevated lines in 1925 showed an increase, the ill effects of the handicap of inadequate loop terminal facilities became increasingly apparent. The company put into effect the only remedy available to it in the extending of loop platforms to accommodate eight-car trains. This has proved of considerable benefit in the rush-hour periods, but far from meets the situation.

On Sept. 27, 1924, the company publicly announced its policy of extending and enlarging its service by formally requesting the City Council of Chicago for consent to construct about 40 miles of specified elevated extensions, estimated to cost approximately $31,500,000. If such consent is obtained it is the company's intention to commence the work of constructing the extensions without delay and to complete the same as soon as practicable.

In addition the company, in order to obtain much-needed additional capacity for handling passengers in the central business district, has proposed to the City Council that if the city would build and grant the company the use of a rapid transit subway running from 22d Street north through the Loop district to North Avenue and connecting at both ends with the elevated lines, the company stood ready to enter into an agreement to pay to the city for the use of such subway a fair compensation

either by way of fixed rental or a division of earnings. It is estimated the use of such a subway would enable the company, during the rush periods, to carry about twice the number of passengers it is now capable of carrying in such periods in and through the Loop.

On Nov. 16, 1925, work had progressed to the point where a considerable number of eight-car trains could be added to the service. The cost of this improvement, inclusive of platform extensions, changes in structure and car equipment and new equipment as previously stated, is $3,322,063.

On March 28, 1925, rapid transit service was extended to Dempster Street, Niles Center, the Chicago Rapid Transit Company having leased trackage rights over the new Skokie Valley line of the Chicago, North Shore & Milwaukee Railroad. This new line extends westward from the Howard Street station of the Evanston division and north to Dempster Street, Niles Center, a distance of 5 miles. It is believed that the territory tributary to this line will be rapidly built up and that it will soon become a valuable addition to the company's system.

A trackage lease was negotiated with the Chicago, Aurora & Elgin Railroad under which rapid transit service will soon be extended over that railroad to additional western suburbs of the city, including Maywood, Bellwood and the new community of Westchester.

For the purpose of defraying the cost of the new cars and platform extensions above mentioned and other corporate purposes the company during the year sold $2,212,000, par value, of first and refunding mortgage 6½ per cent gold bonds (series due 1944).

During the year the company paid off or acquired its underlying bonds and equipment obligations aggregating $1,117,000. This includes $231,000 first mortgage bonds of the Northwestern Elevated Railroad acquired for the sinking fund.

Attitude of Government on Non-Voting Stock

The government doubts if there is any way in which it can legaly meet the situation visualized by Professor Ripley in his campaign against non-voting stocks. Sec. 240 of the revenue bill, having to do with the consolidated returns of affiliated corporations, was before the Senate. The test of affiliation was a certain percentage of the voting stock. The Senate, by amendment, struck out the word "voting." High legal opinion is that this amendment resulted from the Ripley agitation and that "it will increase the tax difficulties of public utilities." Another view is that it sets up as a precedent the theory that the total stock is the test of affiliation, wherefore, in anti-trust suits, a similar test should lie, in which case unity of control through ownership of management, or "B" stocks would not be subject to attack if the "A" stocks were widely held. The argument seems a little far fetched, but it is worth noting.

Increase in Illinois Power & Light Preferred Stock

A special meeting of stockholders of the Illinois Power & Light Corporation was held on Feb. 23 for the purpose of submitting to the vote of the stockholders the question of increasing the authorized capital stock of the corporation by increasing the authorized par amount of the 7 per cent cumulative preferred stock from $30,000,000 to $40,000,000.

The sale of 7 per cent cumulative preferred stock of the corporation has been successfully continued during the past year to customers residing in the various communities in which the company's properties are located and through other channels, with the result that the present authorized amount of 300,000 shares of the par value of $100 each has now been nearly all sold and issued. The increased amount can only be issued upon approval by the Illinois Commerce Commission and upon condition that net earnings are not less than twice the annual dividend requirement on shares now outstanding and to be issued, and that the assets of the company after deducting liabilities shall not be less than $125 for each share, including the consideration to be paid for the new stock.

On Feb. 23 Blyth, Witter & Company, New York, offered $2,000,000 of the 7 per cent preferred issue of the company for subscription at $100 a share and accrued dividend. The balance for bond discount, depreciation and dividends in 1925 was $5,403,301 compared with $4,621,000 in 1924.

East Avenue Bus Operation at Rochester Unprofitable

The report of James F. Hamilton, president, for the year 1925 on the operations of the East Avenue Bus Company, a subsidiary of the New York State Railways, Rochester (N. Y.) lines, shows a deficit of $4,495.

The net operating expenses exceeded the revenues by $12,361, which, with taxes imposed, brought the net operating deficit to $13,226. Offsetting this loss in part was the sum of $10,290, which represents the non-operating income or the difference between the results of the operation of the Browncroft line, a part of the company's system, and the return of the 8 per cent guaranteed under the company's five-year contract with the Browncroft Realty Corporation.

The East Avenue Bus Company operates the East Avenue line, purchased in 1924 from an independent company. This route connects the heart of Rochester's business section with the suburban village of Pittsford, 10 miles to the east. It traverses East Avenue throughout, a street which for a mile is the center of the fashionable shopping district and thereafter the most exclusive residential street in Rochester.

The Browncroft line was established about a year ago, linking the business section with the exclusive subdivision of Browncroft, a 6-mile route. This line is patronized chiefly by well-to-do business men and their families and by late theater crowds, for whom special service is provided. At first a 25-cent

SUMMARY OF OPERATIONS OF THE EAST AVENUE BUS COMPANY, ROCHESTER

Operating revenues	$44,666
Operating expenses	57,028
Net operating deficit	*$12,361*
Taxes assignable to bus operation	864
Operating deficit	*$13,226*
Non-operating income	*10,290
Gross income	*$2,936*
Deductions from gross income	1,558
Net deficit	*$4,495*

*This item represents the difference between the results of operation of the Browncroft Bus Line and the return of 8 per cent guaranteed under the five-year contract with the Browncroft Realty Corporation.

Figures in italics denote deficit.

	Latest	Month Ago	Year Ago	Since War High	Since War Low
Street Railway Fares* 1913 = 4.84	Feb. 1926 **7.35**	Jan. 1926 **7.32**	Feb. 1925 **7.24**	Feb. 1926 **7.35**	May 1923 **6.88**
Electric Railway Materials* 1913 = 100	Feb. 1926 **155.3**	Jan. 1926 **154.3**	Feb. 1925 **153.1**	Sept. 1920 **247.5**	Oct. 1924 **148.5**
Electric Railway Wages* 1913 = 100	Feb. 1926 **223.8**	Jan. 1926 **223.8**	Feb. 1925 **221.0**	Sept. 1920 **232.0**	March 1923 **206.8**
Am. Elec. Ry. Assn. Construction Cost (Elec. Ry.) 1913 = 100	Feb. 1926 **201.9**	Jan. 1926 **202.2**	Feb. 1925 **203.9**	July 1920 **256 4**	May 1922 **167.4**
Eng. News-Record Construction Cost (General) 1913 = 100	Feb. 1926 **206.6**	Jan. 1926 **207.2**	Feb. 1925 **209.7**	June 1920 **273.8**	Mar. 1922 **162.0**
U. S. Bur. Lab. Stat. Wholesale Commodities 1913 = 100	Jan. 1926 **156 0**	Dec. 1925 **156.2**	Jan. 1925 **160.0**	May 1920 **246.7**	Jan. 1922 **138.3**

Conspectus of Indexes for February 1926

Compiled for Publication in this Paper by

Albert S. Richey

Electric Railway Engineer

Worcester, Mass.

	Latest	Month Ago	Year Ago	Since War High	Since War Low
Bradstreet Wholesale Commodities 1913 = 9.21	Feb. 1 1926 **13.72**	Jan. 1 1926 **14.01**	Feb. 1 1925 **13.89**	Feb. 1 1920 **20.87**	June 1 1921 **10.62**
U. S. Bur. Lab. Stat. Retail Food 1913 = 100	Jan. 1926 **164.3**	Dec. 1925 **165.5**	Jan. 1925 **154.3**	July 1920 **219.2**	Mar. 1922 **138.7**
Nat. Ind. Conf. Bd. Cost of Living 1914 = 100	Jan. 1926 **170 4**	Dec. 1925 **171.4**	Jan. 1925 **167.1**	July 1920 **204.5**	Aug. 1922 **154.5**
Steel Unfilled Orders (Million Tons) 1913 = 5.91	Jan. 31 1926 **4.883**	Dec. 31 1925 **5.033**	Jan. 31 1925 **5.037**	July 31 1920 **11.118**	July 31 1924 **3.187**
Bank Clearings Outside N. Y. City (Billions)	Jan. 1926 **19.63**	Dec. 1925 **20.20**	Jan. 1925 **18.59**	Oct. 1925 **20.47**	Feb. 1922 **10.65**
Business Failures Number	Jan. 1926 **2073**	Dec. 1925 **1628**	Jan. 1925 **2340**	Jan. 1924 **2231**	Aug. 1925 **1353**
Liabilities (Millions)	**48.23**	**43.11**	**64.44**	**122.95**	**27.22**

*The three index numbers marked with an asterisk are computed by Mr. Richey, as follows: Fares index is average street railway fare in all United States cities with a population of 50,000 or over except New York City, and weighted according to population. Street Railway Materials index is relative average price of materials (including fuel) used in street railway operation and maintenance, weighted according to averags use of such materials. Wages index is relative average maximum hourly wage of motormen, conductors and operators on 144 of the largest street and interurban railways operated in the United States, weighted according to the number of such men employed on these roads.

fare was charged with no stops. After a few months the company cut the fare to 15 cents and stopped buses on signal.

The equipment is carried in the assets at $73,091.

Deficits in Portsmouth Must Be Wiped Out

The Portsmouth Public Service Company, Portsmouth, Ohio, suffered a deficit of $62,346 in 1925. This, added to the other deficits of the past three years, makes a total of $137,374 reported to City Auditor Ralmadge Edwards. James F. Loftus, general manager, in a letter accompanying the financial statement, declared that unless there was some "material change" in the number of car riders the outlook for the railway, as a money-making investment, was "far from encouraging." With a view to reducing the loss, the company is considering a number of changes, among them one-man car operation. This new system will likely go into effect on March 1. The company operates 37 miles of line and charges 7 cents for fare. No change in this rate is contemplated during the present year.

Receiver Liquidates First Mortgage Issue.—The entire issue of $50,000 Flushing & College Point Electric Railway first mortgage 5 per cent bonds due June, 1925, have been liquidated by the receiver of the New York & Queens County Railway, New York, N. Y. An order of the New York State Supreme Court authorized the receiver to pay not more than $850 for each $1,000 bond with all unpaid coupons attached. Fisk & Roberts, New York, negotiated the settlement with the bondholders, some of whom were represented by a protective committee.

$159,176 Decrease in Net at Detroit

Extraordinary Expenditures for Repairs and Advance in Wages Cut Down Municipal Railway Earnings

During the year ended Dec. 31, 1925, the balance of net income of the Department of Street Railways at Detroit, Mich., was $566,793, while for the year ended Dec. 31, 1924, it was $725,969, a decrease of $159,176. The balance of net income for the first six months of 1925 was $306,623, while for the last six months it was $260,169, but in the latter period $257,787 more was expended for repairs to tracks and cars than was expended in the first six months of 1925. Of this amount $102,207, is classed as extraordinary; another important matter was the increase in wage granted to the platform men, which amounts to about $150,000 increase over what was paid in the first six months for like service performed. Had no more been expended on repairs in the last six months than in the first six months, the balance of net income would have been $517,956.

The facts are taken from the financial statement of the Department of Street Railways of the city of Detroit, covering December, 1925, and the year ended Dec. 31, 1925, issued by W. M. Hauser, auditor. The system that has now been finally adopted by Mr. Hauser is to give the general balance sheet at the close of business on the last day of the month, and an income and statistical statement for the month compared with the corresponding month of the preceding year.

The balance of net income for December, 1925, is $78,876, after the payment of sinking fund charges. The balance of net income for the month of December, 1924, was $74,823, so that the past month shows an increase over that for December, 1924, of $4,052, or 5.4 per cent.

During the year ended Dec. 31, 1925, 481,236,694 passengers were carried by the rail lines and 10,951,951 by the coach lines, a total of 492,188,645 passengers, compared with a total of 458,540,992 for the year ended Dec. 31, 1924, divided 457,562,210 rail lines and 978,782 coach lines, so that the Department of Street Railways carried 33,647,653, or 6.8 per cent, more passengers in the year 1925 than in the year 1924.

Mr. Hauser points out that accrued depreciation has been provided in the accounts in the amount of $3,179,111, equal to about 3 per cent a year on the value of the depreciable property. This amount represents a transfer from surplus to a separate account and is invested in property.

In considering the subject of depreciation it should be remembered that this account admits of several definitions and usages, depending upon the purpose of its use and the attitude of mind of the user. In point of fact depreciation implies a decline in value; that is, diminution of productive or net earning capacity, it is cited. Obsolescence or inadequacy are not results of age or upkeen, for the reason that a street car or any other physical unit of the property, regardless of its age or maintenance condition, may become obsolete or inadequate, or both, at any time when in the best of judgment of the owners it is unsuitable for the service required.

With reference to the operating reserves for injuries and damages, the amount has been adjusted to $774,267; $700,000 has been credited back to surplus. Price, Waterhouse & Company, in their report rendered on Nov. 9, 1925, on the accounts of the Department of Street Railways stated that "from the information so obtained the reserve as at June 30, 1925, is more than 100 per

INCOME AND STATISTICAL STATEMENT OF THE DEPARTMENT OF STREET RAILWAYS AT DETROIT

Income	Year Ended Dec. 31, 1925	Year Ended Dec. 31, 1924
Operating Revenue		
Railway operating revenue	$22,413,689	$21,678,906
Coach operating revenue	818,328	51,282
Total operating revenue	$23,232,017	$21,730,188
Non-operating income	184,273	141,766
Total revenue from all sources	$23,416,291	$21,871,955
Operating Expenses		
Railway operating expenses	$16,572,497	$15,383,494
Coach operating expenses	786,557	41,701
Total operating expenses	$17,359,055	$15,425,195
Net revenue from all sources	$6,057,235	$6,446,760
Deduct		
Taxes assignable to operation	$705,615	$716,616
Other deductions	935	105,548
Interest on funded debt:		
On purchase bonds	$155,380	$161,033
On construction bonds	785,875	785,875
On addition and betterment bonds and notes	137,305	152,613
On purchase contract (D. U. R.)	854,662	916,810
Total interest	$1,933,224	$2,016,332
Total deductions	$2,639,774	$2,838,496
Net income	$3,417,461	$3,608,263
Disposition of Net Income		
Sinking funds:		
For purchase bonds	$133,000	$133,000
For construction bonds	571,351	565,654
For addition and betterment bonds and notes	358,798	396,121
For purchase contract (D. U. R.)	1,787,518	1,787,518
Total sinking funds	$2,850,667	$2,882,293
Balance for the period	$566,793	$725,969

Statistics	Year Ended Dec. 31, 1925	Year Ended Dec. 31, 1924
Railway revenue car-miles	52,863,111	48,248,330
Coach revenue coach-miles	3,529,795	157,540
Railway revenue car-hours	5,692,190	5,267,176
Coach revenue coach-hours	.....	.....
Railway revenue passengers	357,926,168	346,116,298
Railway transfer passengers	123,310,526	111,445,912
Railway total passengers	481,236,694	457,562,210
Coach revenue passengers	10,564,723	978,782
Coach transfer passengers	387,228	.....
Coach total passengers	10,951,951	978,782
Total revenue and transfer passengers	492,188,645	458,540,992
Railway operating revenue per car-mile, cents	42.40	44.93
Coach operating revenue per coach-mile, cents	23.18	32.55
Railway operating expenses per car-mile, cents	31.35	31.88
Coach operating expenses per coach-mile, cents	22.28	26.47
Railway operating revenue per car-hour	$3.94	$4.12
Coach operating revenue per coach-hour	.....	.....
Railway operating expenses per car-hour	2.91	2.92
Coach operating expenses per coach-hour	.....	.....
Ratio of transfer passengers to revenue passengers—railway, per cent	34.45	32.20
Ratio of transfer passengers to revenue passengers—coach, per cent	3.66	.....
Railway revenue passengers per car-mile operated	6.77	7.17
Railway transfer passengers per car-mile operated	2.33	2.31
Total railway passengers per car-mile operated	9.10	9.48
Coach revenue passengers per coach-mile operated	2.99	6.21
Coach transfer passengers per coach-mile operated	.11	.....
Total coach passengers per coach-mile operated	3.10	6.21
Ratio of railway operating expenses to railway operating revenue, per cent	73.94	70.96
Ratio of coach operating expenses to coach nperating revenue, per cent	96.12	81.32

cent in excess of the indicated requirement at that date."

In view of this it has been found proper, the auditor states, to effect an adjustment in this account. Claims paid and charged to the reserve account during the period from Sept. 1, 1921, to June 30, 1925, amounted to $582,001, while claims paid since July 1, 1925, to Dec. 31, 1925, amounted to $194,411, of which $134,881 was for accidents prior to June 30, 1925, and $59,529 for accidents subsequent to July 1, 1925.

While up to June 30, 1925, it was not the practice of the Department of Street Railways to set aside funds for the specific purpose of liquidating claims for injuries and damages, the basis of accounting has now been changed in this respect and appropriations of cash are now being made for the purpose of liquidating liabilities of this nature. At Dec. 31, 1925, $106,758 had been set aside in cash, so that of the $774,267 shown as reserved $106,758 is actually set up in cash.

The balance of net income at Detroit for January, 1926, is $56,698 after the payment of sinking fund charges. The balance of net income for January, 1925, was $52,551, so that the past month shows an increase of $4,147, or 7.9 per cent over January, 1925.

During January, 1926, 43,162,941 passengers were carried by the rail lines and 1,692,191 by the coach lines, a total of 44,855,132, compared with 40,145,926 in January, 1925, divided 39,889,805 rail lines and 256,121 coach lines. In other words, 4,709,206, or 11.7 per cent, more passengers were carried in January, 1926, than in January, 1925.

The five years of operation at Detroit since Feb. 1, 1921, is summed up by Mr. Hauser, auditor of the department, as follows:

In five years $45,327,701 was provided for capital cost. Of this amount $41,080,000 was provided by vote of the electorate now represented by $37,131,000 debt, $3,949,000 having been paid off from earnings. The sum of $4,007,971 was provided out of earnings, of which $3,691,113 represents accrued depreciation, the accrual being invested in property. The amount of $316,868 shown as profit and loss balance and $239,729 received from the sale of property go to help make up the total amount of $45,827,701, which is represented in the capital costs as follows:

Of the amount of $45,560,410, $44,293,545 represents road and equipment, $114,600 working funds and $1,152,264 material and supplies. In other words, the system fully equipped to do business has cost $45,560,410. This amount is in excess of the provisions made for it by $232,708. It represents the amount that the current and working liabilities are in excess of the current and working assets.

All sinking fund and operating reserves and interest requirements are funded 100 per cent, and specific cash and securities are now carried in funds to protect the sinking fund and operating reserves and interest requirements up to and including Jan. 31, 1926. In the case of the reserve for injuries and damages, the diversion of these funds by the former management for construction purposes has been replaced and made good.

The close of five years finds the department with the following:

Sinking fund, consisting of cash and securities for debt purposes	$5,392,290
Special deposits, consisting of cash for interest purposes	409,720
Insurance and other funds, consisting of cash for:	
(a) Injuries and damage purposes	798,845
(b) Repairs and renewal purposes	30,000
Total	$6,630,855

Outlook for Iowa Interurban Improved

The protective committee representing the holders of the first mortgage bonds of the Waterloo, Cedar Falls & Northern Railway, Cedar Falls, Iowa, has submitted to the bondholders a three years condensed comparative statement of operations of the company, as follows:

	1925	1924	1923
Gross earnings	$827,353	$860,308	$896,104
Operating expenses	750,899	792,602	828,385
Taxes	48,166	38,612	38,659
Net income applicable to first mortgage bonds	$28,288	$29,093	$29,060

The amount necessary to pay the annual interest on the outstanding $5,773,000 first mortgage 5 per cent bonds is $288,650.

The committee says that while on the surface the net income in 1925 was less than that of 1924, it is significant that the last quarter of 1925 showed a gross increase of $23,835 over the similar period of 1924, which encourages the hope that business conditions in Iowa—long depressed—have at last turned the corner. Earnings in January, 1926, exceeded those of December, the best month of 1925.

Long continued unfavorable business conditions in the territory served by the company, combined with aggressive bus competition, the general use of the automobile, and a falling off in coal and grain freights, are advanced as reasons for the decrease in gross earnings, while the high cost of operation and necessary outlays for maintenance, together with the necessity for meeting accumulated taxes and equipment obligations, have reduced the net income to about one-tenth of the amount required to pay the first mortgage bond interest. These considerations explain why the committee has thus far been unable to submit to the bondholders a plan of reorganization.

Up to date there have been deposited with the protective committee $5,188,000 out of a total of $5,773,000 outstanding first mortgage bonds and $2,170,000 out of a total of $2,333,000 outstanding common stock.

Receiver Appointed at Rockford

Adam Gschwindt, general manager of the Rockford Electric Company, was appointed receiver for the Rockford City Traction and Rockford & Interurban Railway, Rockford, Ill., under action instituted recently by trustee for bondholders of the two systems. Mr. Gschwindt has announced that his general policy will be to abandon profitless interurban lines and gradually to separate them from city lines, but there will be no immediate change in operating policy of the city lines. It was generally understood that the receiver had reference to the Rockford, Beloit & Janesville and Rockford & Freeport interurbans as lines to be abandoned. The receivership followed default of the interest payment on $1,650,000 of bonds, but bondholders are reported to have assured Mr. Gschwindt that they stand ready to back such improvements as he may determine. The Rockford Electric Company is one of the largest creditors of the traction systems. There was no opposition to the court's selection of the receiver.

New Directors in Alliance.—New directors of the Stark Electric Railroad, Alliance, Ohio, were chosen recently as follows : N. F. Glidden, Howard Morris of New York, James Bertran, W. S. Chittenden, L. W. Popp, E. W. Sweezy, O. K. Ayers and Charles Sebring.

Electric Plant Acquired.—Announcement has been made of the purchase of the Marengo Public Service Company, an electric company of Marengo, Ill., by the Illinois Northern Utilities Company, Freeport, Ill. R. T. Fry, Marengo, has been in charge of the local plant. The purchaser will take possession on March 1.

Companies Consolidated. — Seven companies which have been operated as subsidiaries of the Wisconsin Public Service Corporation have been consolidated with the main system and will conduct all business as the Wisconsin Public Service Corporation. Included in the group are the Green Bay Park Railway, serving Bay Beach Park and the River View Motor Bus Company, supplying interurban service between De Pere & Green Bay and city service in Manitowoc.

Receiver Sought.—Suit asking that the Indianapolis, New Castle & Eastern Traction Company, Anderson, Ind., be placed under control of a receiver and that Arthur W. Brady, present receiver of the Union Traction Company of Indiana, be named receiver, has been filed in the Circuit Court at Muncie, Ind., by the Fidelity Trust Company, trustee, holder of bonds aggregating $1,500,000 issued in June, 1912. The action was ordered transferred to Anderson, Ind. The Indianapolis, New Castle & Eastern Traction Company is operated under lease by the Union Traction Company.

Authorized Issues Under 1924 Amount. — During the twelve months ended Dec. 31, 1925, the California Railroad Commission authorized the issue of $132,036,749 of stocks, bonds, notes and other evidences of indebtedness. The total issue was below the amount for the last few years, $237,875,848 having been authorized in 1924 and $196,802,936 in 1923. Electric railway issues totaled $3,610,461 in 1925 compared with $13,067,496 in 1924.

City's Share Lower.—Ralph E. Carley, manager of the western division of the Illinois Power & Light Corporation, supplying Quincy, Ill., with traction service, recently submitted a report of the finances of the company's operation in that city, under terms of the ordinance which requires payment of 2 per cent of the gross earnings annually. The 1925 payment to the city was $5,226 from $261,343, the company's gross, which included $252,350 from street car lines and $8,993 from buses. Comparisons show a gradual and continued decline in earnings since 1920, when the city's share was $6,443; 1921, $5,682; 1922, $5,456; 1923, $5,470, and 1924, $5,238.

Personal Items

J. R. Ong at Cincinnati

ormer Railway Consultant Placed in Charge of New Department of Street Railway

Creation of a new department, to be nown as transportation engineering, in harge of Joe R. Ong, has been an- ounced by Walter A. Draper, president the Cincinnati Street Railway, Cin- nnati, Ohio. For several years Mr. ng has resided at Piqua, Ohio, where has engaged as a consulting electric ilway transportation engineer. In s new capacity he will have charge of l traffic surveys, the making of sched- es and will devote considerable time studies in economies of operation. He so will have charge of general sta- stical data of an operating nature.

J. R. Ong

Mr. Ong has made a number of ex- austive traffic surveys in different parts f the country which have brought him nto prominence as a consulting engi- eer. Notable among these was his ork in Los Angeles, Cal.; Winnipeg, anada, and Atlanta, Ga. He goes to he Cincinnati Street Railway with a ecord of accomplishments in all under- akings in which he has been identified. He has already assumed his new duties nd is co-operating with J. B. Stewart, r., general manager, in working out a lan to secure the contemplated results f the new department.

From 1911 to 1912 Mr. Ong was su- erintendent of substations and assist- nt electrical engineer for the Fort Dodge, Des Moines & Southern Rail- oad, with headquarters at Boone, Iowa. The following year he assumed the uties of electric railway engineer, serv- ng jointly the Railroad Commission of Visconsin and the Tax Commission of hat state on appraisals of public utility roperties and in traffic and service tudies on street railway properties in Milwaukee and other cities of the state.

In 1918 he became electric railway ransportation engineer for the Board f Control of the Kansas City Railways nd from 1919 to 1920 held a similar osition with the Winnipeg Electric Railway, Canada. The following year he became electric railway transportation engineer for the Georgia Railway & Power Company, Atlanta, Ga., and held that post until 1923, when he became a consulting engineer with, headquarters at Piqua. In that capacity he made an exhaustive survey for the management of the Los Angeles Railway and studies in economies of operation for a number of other electric railways throughout the country.

Before going to college Mr. Ong served with the Indianapolis & Cincinnati Traction Company and the Chicago, Lake Shore & South Bend Railway. His first work after leaving college was done for the Westinghouse Electric & Manufacturing Company at its main plant in East Pittsburgh. Later he was transferred to the company's Philadelphia sales office.

Mr. Ong was born at Columbus, Ind. He was graduated from Purdue University in 1909 as an electrical engineer.

E. M. Hervey in Consulting Work

E. M. Hervey, connected with the Wisconsin Power & Light Company as manager of its Sheboygan electric and railway properties for the last three years, has resigned to enter business for himself as a consulting engineer in the power transmission field. In that work he has specialized for the past twenty years. Prior to his promotion as manager Mr. Hervey was the company's electrical engineer at Sheboygan.

Personnel Changes in Dayton

The annual meeting of the stockholders of the City Railway, Dayton, Ohio, was held on Feb. 11. As the company personnel is now constituted the officers are: J. M. Markham, president, whose election was referred to in the ELECTRIC RAILWAY JOURNAL, issue of Feb. 20; H. S. Mead, vice-president; W. S. W. Edgar, secretary, and T. A. Ferneding, treasurer. The directors are: W. S. W. Edgar, T. A. Ferneding, J. M. Huffman, W. H. Kuhlman, J. M. Markham, H. S. Mead and V. Winters.

Thomas E. Howell remains as general manager and Edward H. Hartman continues as superintendent of transportation.

L. P. Fessenden Manager at Sheboygan

L. P. Fessenden, chief engineer and superintendent of the Sheboygan central station since 1912, has been selected to succeed E. M. Hervey as manager of the Sheboygan electric and railway properties of the Wisconsin Power & Light Company. Mr. Fessenden's responsibilities at the same time will be widened to include the district managership of all the company's properties in Sheboygan and Plymouth.

F. A. Richards Vice-President and Sales Manager American Car

Ford A. Richards, sales manager of the American Car Company since 1918, has been honored by the directors by also being elected to the vice-presidency. As sales manager Mr. Richards has enjoyed a wide acquaintanceship, particularly throughout the territory west of the Mississippi River, covered by his company for the Brill organization.

His affiliation with the electric railway industry dates back to 1898, when he entered the employ of the Peckham Manufacturing Company, then builder of electric railway trucks. During the intervening 28 years he has been engaged in various capacities, including that of assistant to the vice-president and foreign sales manager of the Peckham company and later as a member of a partnership under the name of the J. A. Hanna Company, formed to promote the sale of both cars and trucks.

Mr. Richards joined the Brill organization in 1909 as Pacific Coast sales manager with headquarters in San Francisco. He continued in this capacity until 1918, when he was transferred to St. Louis as sales manager of the American Car Company, which had become a Brill subsidiary in 1904.

F. A. Richards

As vice-president and sales manager Mr. Richards will continue, just as he has in the past, to devote his attention to the problems of the industry in that part of the country where he is so well known.

A native of Ohio, Mr. Richards was educated at the Uniontown High School, from which he was graduated in 1893, and at Mount Union College, Alliance. It may well be said that he has devoted his entire business life to the electric railway and affiliated manufacturing industries. His success is attested by his recent promotion.

Ernest Hatton has resigned as general manager and engineer of Newcastle-on-Tyne Corporation Tramways, owing to ill health. The municipality received the news with great regret. Mr. Hatton has held the post since 1905. During that period he has been responsible for carrying out important developments of the system. Before he went to Newcastle he occupied a similar position at Salford and was in

charge of the work of electrifying the horse tramways there. Under his charge the Newcastle tramways have shown highly satisfactory financial results.

C. R. Harte A.E.R.E.A. Head

Impressive Career of Connecticut Company Engineer Dates Back to 1893 —Active in Association Work

Charles Rufus Harte, who has succeeded Roy C. Cram as president of the American Electric Railway Engineering Association, has been connected with the New York, New Haven & Hartford Railroad and the Connecticut Company continuously since 1893 except for a short period during 1901-04. All his life Mr. Harte has been active on the firing line. He has gone from one big construction job to another until one marvels at the capacity of the man to carry on uninterruptedly for so many years. He was really drafted into electric railway work as a result of the New York, New Haven & Hartford taking over the trolley lines in Massachusetts and Connecticut, and he had foisted upon him engineering and other problems which he himself readily admits he could not have solved had it not been for the co-operation of the officers of the company, notably Messrs. Storrs and Punderford, and his immediate associates.

It would, indeed, be interesting to recount each of the man's achievements, but it is impossible to do more than to indicate them by giving the facts with respect to the various positions he has held. As the bare biographical data are disclosed the background will unfold itself not only to the engineer but to the non-technician. The degree of appreciation of the work of the man will vary between the two sets of readers, but each of them will finish with a keener realization of the abilities of the new president than he had before.

Mr. Harte was graduated from Columbia University School of Mines with the degree of civil engineer in 1893. He at once entered the construction department of the New York, New Haven & Hartford Railroad, being employed from 1893 to 1901 in positions of steadily increasing responsibility on the four-tracking and elimination of grade crossings between New Haven and the Housatonic River; on the elevation of the Providence Division and the new four-track connection, including the Back Bay station from Dartmouth Street to the South Station, Boston, and on the double-tracking of the Naugatuck Division from Derby to Naugatuck.

In 1901 he accepted a position with Stone & Webster. For them he put under construction the 33-mile urban and interurban electric railway at Sydney, N. S., extending into the adjacent mining settlements and to Glace Bay. This work included the construction of a power house and carhouse. For the same firm he supervised work on the heavy interurban extension from Terre Haute to Clinton, Ind.

He returned to the New Haven in 1904 and was placed in charge of the extensive improvements at New Haven. He developed the plans and started this work, but in 1906 he was placed in charge of the immense trolley construction program of the New Haven. In the four years that followed he supervised work on more than 100 miles of interurban type of trolley, the electrification of 50 miles of steam railroad track and the construction of more than 150 miles of transmission lines, together with power houses and substations, carhouses and miscellaneous structures. One of the carhouses included in this program of expansion was that at James Street, New Haven, with a capacity of 400 45-ft. cars. So far as is known, this was the largest single carhouse built up to that time.

In 1910, with the establishment of the

C. R. Harte

Connecticut Company as the trolley holding and operating subsidiary of the New Haven Railroad, Mr. Harte was transferred to it with the title of construction engineer, a position he has since held. Not long thereafter opposition began to develop to the New Haven's policy of developing the electric railway system to feed the steam road. When this opposition culminated in the separation decree of 1914, the construction program was correspondingly cut down, and the work of his department has been largely directed toward valuation, real estate and tax matters. Under the department, however, there was designed and built, among other things, the New Haven bus garage, one of the most up-to-date and best equipped electric railway garages.

Meanwhile the lack of any specification for overhead construction led to an immediate study by Mr. Harte along this line and the development of specifications which are the basis of the present A.E.R.E.A. standards, a result due very largely to the fact that manufacturers of material and contractors for its erection were invited to assist in the preparation of the code and did so.

Reverting to Mr. Harte's association affiliations he has been an active member of the A.E.R.E.A. since 1910, in which year he was a member of the committee on power distribution. Later he served two years as its chairman. He has been president and sponsor of the A.E.R.E.A. committee on heavy electric traction, joint sponsor of the engineering-accounting committee of that association and chairman of the standards committee of that association. He is senior electric railway representative on the American Engineering standards committee, American inductive co-ordination committee and the committee on revision of the national electrical safety code. He is vice-chairman of the A.E.S.C. and chairman of the rules committee of the A.E.S.C. He is electric railway vice-chairman of the American induction co-ordination committee. In addition he is a member of the A.E.R.E.A., American Society of Civil Engineers and an associate member of the A.I.E.E. Particularly in his work for the American Electric Railway Association Mr. Harte has striven to bring about the acceptance of standard practices. One of the things that he proposes to do in his new office is actively to promote the wider general application of the standards that have been evolved.

Journal Staff Expanded

Both the business and editorial staffs of ELECTRIC RAILWAY JOURNAL are strengthened by changes in the organization of the transportation unit, which comprises the JOURNAL and *Bus Transportation.*

L. F. Stoll, who has been sales manager of the engineering group of McGraw-Hill papers, comprising *Engineering News-Record, Coal Age, Chemical and Metallurgical Engineering* and *Engineering and Mining Journal-Press,* has been transferred to take executive charge of the transportation unit with the title of assistant vice-president.

Charles Gordon has been relieved of other duties in order to take direct charge of the editorial staff of ELECTRIC RAILWAY JOURNAL, with the title of editor. Morris Buck will continue as managing editor.

David Cameron, formerly sales manager of the two transportation papers, has been made a member of the advertising counselors' staff of the company.

T. F. Mueller is transferred from field work in the Detroit territory to the position of assistant sales manager in New York.

R. A. Feldon has joined the business staff as advertising representative in the Detroit territory.

These changes are part of a broad program for expanding the JOURNAL'S service to its industry.

C. D. Foltz Westinghouse Representative in Chicago

C. D. Foltz, representative of the Westinghouse Air Brake Company in charge of the Denver and Salt Lake City offices, has been appointed assistant western manager of the company, with headquarters at Chicago.

When only fifteen years old Mr. Foltz entered railroad work as a telegraph operator on the Wabash. In 1910 he became an inspector for the Westinghouse company in Salt Lake City and was afterward promoted to mechanical expert and representative at that office. In this position his field of activity was widened by the inclusion of the Denver office. His headquarters were moved from Salt Lake City to Denver during the year 1923.

Tom Elliott Talks on the Electric Railway Outlook

Vice-President and General Manager of the Cincinnati Car Company Places Responsibility for the Future on Both Manufacturers and Operators—Holds Unlimited Power Available to Be Chief Cause of Heavy Equipment

AN INTERVIEW

By Charles Gordon

THOMAS ELLIOTT, vice-president and general manager of the Cincinnati Car Company, stands today with a background of experience that rivals fiction in its romance and typifies the rugged road over which many of the outstanding figures in the industry have traveled. Though entitled to rank as a veteran, he has retained a freshness of viewpoint and an enthusiasm that belie the marks which pioneering years have left.

His accomplishments as a car builder are too well known to require repetition. He has been a courageous advocate of light-weight construction and has consistently sought improved designs to give strength without excessive weight. Some of the outstanding installations of light-weight equipment that have made enviable records in reduced operating and maintenance costs have been the products of his enterprise.

I had frequently discussed the subject of car development with Elliott, but not for publication. Now that he had consented to an interview, I sought to sound the keynote of his thinking on structural design. My first question was fortunate in the sense of the response it provoked.

"What has constituted the greatest limitation to car construction development?" I asked.

"Lack of necessity and incentive," was the prompt reply. "There has been available with electric power an almost unlimited source of energy. Cars have consequently been merely assembled rather than scientifically designed. Excessive weight and high operating cost have been the result.

"As a mechanical and economic proposition," he continued, "transportation of people by rail is cheaper than on the highway, except when traffic is so extremely light that the investment in track is not justified. In view of the development of automotive vehicles and the rapid improvement of the bus, the time is getting short for railways to bring their properties up to date and for manufacturers to save their businesses by further improvement of their products. The opportunity will not continue indefinitely. Electric railways must be brought up to the modern idea of good transportation service."

This was, indeed, a frank statement on conditions in the industry. But Tom did not stop there. I had broached a subject in which he was keenly interested, and before I could put my next question he took me back a jump.

"Take the bicycle," he said. "In its day it was the finest designed and built transportation machine of which we have an example. It was largely instrumental in introducing the development of anti-friction bearings. Early bicycles weighed 175 lb. In their final form they were developed to the point where a 17-lb. vehicle carried a 200-lb. man with ease. This development took place when high grade material was scarce, but dependence on human motive power forced progress, because the bicycle which was easiest to propel was easiest to sell."

Thomas Elliott

Thus we traveled back in mind to a period beyond the advent of the automotive vehicle to the beginning of modern individual transportation machines. It is a habit Tom Elliott has of drawing illustrations for the analysis of modern problems from a sometimes forgotten experience of the past.

But despite this practice of drawing on past experience, he would not tell me his age. Nor would he allow me to guess it except on condition that I first matched my skill against his on fairway and green. But I knew his hobby and something about his score. Consequently I decided to omit his age. I can, however, record that he was born on a farm in the north of England. He landed his first job in the United States with the Hazzard Manufacturing Company at Wilkes-Barre, Pa. This company manufactured wire rope and cable. In those days wire rope for the propulsion of cable cars was coiled in continuous lengths on several flat cars for shipment. It was in one of these gangs that Elliott, with much ambition and little experience, entered what in an indirect way was a part of the transportation business.

For several years following he was employed in the shops of the Lehigh Valley Railroad. About 1888 he went to Tennessee to run a mine locomotive. He was delighted with the job, but it lasted only a week. His natural curiosity to know all about any piece of machinery with which he comes in contact led him to examine the inside of the boiler, and the next day he decided to look for work with a more attractive future.

Following this his experience was varied. He worked in a roundhouse at night. Then he took a job with the Knoxville Car Wheel Company. Later, a brief experience in dredge boat construction was brought to a sudden end by a flood which occurred on the Tennessee River.

As I proceeded to marshal my questions to draw out expressions of opinion, my mind reverted frequently to those early days of the Tom Elliott who now sat before me, still mentally objecting to the procedure of an interview for publication. But my interest lay largely with the future. I wanted his views on current tendencies and trends. So I asked about the status of the interurban roads of the country, which some people have claimed are headed for the scrap pile.

"There is no question but that they fill a fundamental need," he said. "Except in those instances where the lines were unjustified in the first place and should never have been built, they can be put on a profitable basis."

"Does properly designed light-weight equipment afford ample safety and comfort for average interurban condi-

THIS is the second of a series of interviews with the heads of car building plants and other prominent manufacturers. Rapidly growing interest in the improvement of electric railway equipment throughout the industry makes the views of these manufacturers particularly significant at this time. An interview with Samuel M. Curwen, president of the Brill Corporation, was published last week.

tions," I persisted, wishing to draw him out further on this topic.

Apparently my question was well directed and touched on a subject to which he had given much careful thought. Tom leaned across the corner of his desk, and though he spoke deliberately, as is his custom, he raised his voice slightly and answered without mincing words.

"One of the reasons for the heavy cars operated on some interurban lines is the fear and dread of assuming the responsibility of our own convictions that is inherent in all of us. This has resulted many times in blind adherence to weight, not because it has been proved that heavy cars are safer in a collision or derailment, but rather because this has generally been considered as justification for relief from responsibility."

I was impressed by this answer. Here was the basis on which Tom Elliott has built many light cars for interurban service—some for operation at speeds up to 60 m.p.h. I began to probe deeper for some of the earlier experiences and associations that lay behind this courageous statement.

Won to Electric Traction

It was while working as master mechanic and chief engineer of a cotton mill in Knoxville that Elliott began to hear about strange experiments on electric cars in Scranton. He listened at that time with a mixture of skepticism and interest. It may have been his early association with local transportation in the cable coiling days, or merely that strange fascination which the romance of transportation weaves, but in any event Tom continued to follow the news of these experiments.

W. G. McAdoo, later Secretary of the Treasury in Woodrow Wilson's Cabinet, bought the horse car lines in Knoxville and began to electrify them. Elliott watched with particular interest the construction of the power house. When the first car was finally operated under the new power in the streets of Knoxville he was convinced that he wanted to be a part of this new industry. M. R. McAdoo, brother of the owner, was the manager of the railway. Tom hunted him up and landed a job running the power plant.

That did not keep him busy long. With characteristic thoroughness he soon had leaky steam pipes tight and commutators bright. The job of welding an oil can looked like only a side line to one with as many ideas as Elliott. He bought a lathe and set it up in the engine room. Later he fixed up a brass furnace in one corner and started casting and finishing trolley wheels. Soon he began to rewind motor armatures in the power house. Ultimately, all of the car repair work was turned over to him.

In 1891 Elliott went to Atlanta with McAdoo. Here, two years later, he used what were then, so far as he knew, the first solid gears applied to car axles without keys. Some time later he began to build cars in the Atlanta shop. On the first of these the width of the customary side sill plate was increased from 6 in. to 18 in. In 1896 this plate construction was extended to the belt rail to form the continuous side girder type of construction that is even now so generally used. The idea came from watching a repair man who used a wide plate to cover a gash in the side of a car.

During this early car building experience Elliott began to favor the use of steel as a material for increasing strength and reducing weight in cars. On the interurban line operated at that time by the Atlanta company the single-truck cars had proved unsatisfactory from the standpoint of riding qualities and ability to stay on the track at satisfactory speed. Tom built some double-truck cars. As cars go today, they were heavy. They had four 50-hp. motors each, but their excessive weight made it impossible to run them to the end of the line due to the limited distribution copper available. "Here," Tom says, "was born a high regard for the importance of weight reduction in cars."

Having again thus built up the background, I swung once more to present-day conditions.

"Is there any difficulty in financing purchases of new cars where a railway is otherwise limited in its ability to sell its securities?"

"There is no difficulty. Proper financing arrangements for cars can be readily consummated."

Still I was not satisfied.

"Do you have any difficulty in disposing of electric railway equipment trust paper?"

"None whatever."

There were no qualifications in these answers; thus encouraged, I put my next question.

"In your opinion, does demand for individuality or inertia on the part of railway managements stand in the way of car development?"

Railways After Improvements

"My experience has been that railway managements are eager for new developments and that they will take any good scheme—and half of the bad ones—suggested by a car builder. They are looking for improvement and are willing to assume a large part of the trouble and expense of experimenting with new developments. The railways are hungry for new ideas."

Thus Tom Elliott proceeded to explode any assumption that operators are not interested in new developments advanced by the manufacturers. He had told me before this of his experience back in the days when the mechanical men in operating companies frequently worked with the crudest of facilities. Consequently, to me, his optimistic outlook on the demand for development was refreshing.

There are interesting anecdotes of Tom's early experiences as a master mechanic in Atlanta. When he first went to work there he found that the master mechanic was provided with a stable, several horses and a negro driver. Elliott had little use for these trappings of Southern luxury. He decided that the stable would make a good foundry. Acting on this idea, he succeeded in buying an old cupola for $35, incidentally including in the bargain a three-chime steamboat whistle, worth at that time about $200. He used trainmen apprentices who were sent to the shop for instruction to move his cupola and set it up. When the general manager discovered the character of training his new platform men were receiving Tom lost a fine source of cheap labor. He finally rigged up the cupola with an old railway motor and a good housing for a blower and began to make chilled iron wheels that had a life varying from three weeks to five years. Sand for molds was dug in a lot near the foundry.

Elliott left Atlanta in 1901 with M. R. McAdoo and went to the West Penn Railway, first as superintendent of motive power and later as manager. In 1903 he accepted a position with the Cincinnati Traction Company, some two years after W. Kesley Schoepf had taken charge of the property as president. Tom was chief engineer in charge of car maintenance, overhead line and power stations.

A short time before the Cincinnati company had started building cars in its new shops, a plant much larger than was needed for maintenance work alone. Tom became engaged in many outside jobs for his superiors, in addition to his regular duties. He was frequently brought into contact with the car building plant. Finally he was delegated to find a man to take charge of car building. After ten days, without success, he was called into the office and given the job himself. As a result he began devoting his entire attention to the car plant.

Co-operation Needed by Buyer and Builder

I asked Elliott whether, in his opinion, operating railways are justified in building their own cars under present conditions. There are several interesting thoughts in his reply.

"This depends entirely upon whether they can build a better car than they can buy. It is apparent that an operating management never makes its reputation by car building. Its primary job is to give good transportation service. When it engages in the work of building cars it diverts the attention of much of its personnel from operation and maintenance to manufacturing. Proper co-operation between operating companies and the car builders will result in better equipment than either can produce alone. Car builders are more familiar with the engineering features of design. Operators have the necessary experience to suggest improvements that make equipment popular with passengers and low in operating and maintenance cost.

"One primary disadvantage in a railway company building its own equipment," he continuel, "is that it does not get the benefit of the constructive criticism of other operators that is freely made to car builders."

Here seemed to be good thinking, unbiased by commercial expediency. It suggested another question.

"What, in your opinion, is the life of electric railway cars?"

"With proper maintenance, their life is indefinite. Retirement will take place due to factors outside the cars themselves. These include more suitable dimensions and operating and maintenance economies made possible by improvements in design, to say nothing

of increased attractiveness of new equipment resulting from development of the art. These factors, rather than the actual wearing out of the cars themselves, will dictate replacements."

Tom had shown throughout our discussion a definite tendency to place on the shoulders of the manufacturers themselves a large part of the responsibility for the future progress of the industry. As we came to the final question on the outlook for car building business in 1926, he maintained this position by summarizing his viewpoint in these words:

"There is now an active demand for new and improved types of cars. The extent of the business that will be placed during the year 1926 is largely dependent upon the efforts exerted by car builders to develop and sell their products."

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

Bids Asked for 300 Cars and 150 Buses at Detroit

Awards impend at Detroit for more than $4,000,000 of car and bus equipment. H. U. Wallace, general manager of the Department of Street Railways at Detroit, Mich., has emphasized to the Board of Street Railway Commissioners the urgent need of the department for additional equipment. In a letter to the board on Feb. 22 Mr. Wallace said that every unit owned by the Department is now in constant service and in addition the department is renting 50 additional motor cars and trailers from the Detroit United Railway in an effort to meet the heavily increased demand for service. In spite of these efforts, however, the service falls short of adequately filling the demands. According to Mr. Wallace, at the present time the city system needs at least 100 additional cars.

He says that approximately 150 of the cars now operating are so worn out and obsolete that their operation represents a current liability in the form of excessive maintenance and upkeep costs. These cars should be scrapped immediately and replaced. Furthermore, the department will need an additional 150 street cars or large buses to meet the future demands of next fall and take care of the rapid population and territorial growth of the year.

Mr. Wallace says that in considering the motor coach problems it is apparent that the city system will need 75 additional large buses to handle present business satisfactorily and on a conservative estimate will require 50 more buses to establish additional routes in certain sections of the city which are urgently in need of transportation facilities.

In consequence he has recommended that the city advertise for prices and terms on the following equipment: 300 new street cars, with six months option on 150 additional cars; 150 new large double-deck buses, with six months option on additional buses.

Mr. Wallace says:

> As soon as we get these bids we will be able to determine what kind of terms we can get on the purchase of this equipment, and after obtaining the terms we can then definitely decide on the amount of equipment to purchase at this time.
>
> From various conferences that we have had with bus manufacturers and car manufacturers we have been led to believe that we will be able to procure equipment on terms that will permit of our paying for all of this equipment either out of the earnings from the equipment or out of the saving that we can make in the cost of operating new, light, modern cars in place of our present heavy and obsolete units.

The board has approved the request made by Mr. Wallace and the Department of Street Railways advertised on Feb. 24 for bids for the equipment mentioned by the railway manager in his letter. The awarding of the contracts is of course subject to approval by the City Council.

Brill Report Misquoted

In the digest of the report of the J. G. Brill Company published in the ELECTRIC RAILWAY JOURNAL for Feb. 13, page 307, the item of cost of operation was misstated due to the transposition of the figure of $560,938. The paragraph in which this figure appeared as contained in the report and as it should have been presented in the JOURNAL read:

> After deducting from earnings all cost of operations, including maintenance and repairs and depreciation for the year amounting to $560,938 and after setting aside out of earnings reserve for federal income taxes, not yet due, of $82,791, the result of the operations of all the plants of your company shows a net profit for the year of $571,269.

Ohmer Company Is Active

With its factories working day and night in an effort to keep the total of unfilled orders to a minimum, the Ohmer Fare Register Company, Dayton, Ohio, reports the volume of sales for the month of January to be considerably greater than any previous month in its history. More employees are engaged at the present time than has been the case since the close of the war. As compared with this time last year, there is an increase of 30 per cent in the number of men employed.

January was also the biggest month for export business in the history of the company, it was reported. Many large orders were received from Australia, New Zealand, South and Central America, England and Canada. The new types of ticket-printing fare registers for electric and steam railroad companies and motor bus lines, which were recently announced, are attracting attention from transportation officials throughout the world, and are being manufactured in increasingly largely numbers. It is anticipated that 1926 will prove a record year for the Ohmer Company.

Prize for Industrial Advertising Urged by Harvard Award

Recommendation for the establishment of an award for the best advertising campaign of industrial products was made on Feb. 22 by the jury of awards of the Harvard Advertising Awards, founded by Edward W. Bok. At the same time the names of the winners of awards already established in 1925 were announced by Wallace B. Donham, dean of the Harvard Business School. The annual award consists of cash prizes totaling $11,000 and a gold medal. The latter was awarded to Ernest E. Calkins, president of Calkins & Holden, Inc., New York advertising agency, for distinguished personal service to advertising.

Cash awards cover various phases of the advertising field, such as the national campaign most excellent in planning and execution; the most excellent local campaign of a manufacturer; research and development of an index of effective buying power for consumers by counties in the United States; distinguished individual advertisements, etc. It is significant that the jury of awards felt it advisable to recommend an additional award to stimulate excellence in industrial advertising.

The adoption of this recommendation would naturally mean a reapportionment of awards in existence at the present time.

Pennsylvania Orders Electric Passenger Locomotives

Contracts on all the motive machinery, controls and other electrical equipment for six large electric passenger locomotives and two double-cab switching locomotives have been awarded by the Pennsylvania Railroad to the Westinghouse Electric & Manufacturing Company. This equipment will be shipped to the Juniata shops of the Pennsylvania Railroad at Altoona, where the entire group of eight locomotives is to be built.

The six passenger locomotives, which have a continuous rating of 3,730 hp. each, and compare as regards both tractive effort and speed with the greatest steam locomotives in existence, will be put into operation in the New York division hauling heavy passenger trains between the Pennsylvania Terminal, in New York City, and Manhattan Transfer. These locomotives are in addition to two others of a similar type placed in service at Manhattan Transfer in 1924.

Design of the new equipment was handled by the engineering staff of the motive power department, Pennsylvania Railroad, under the personal direction of its chief, J. T. Wallis. The passenger units have a 2—8—2 wheel arrangement with a so-called "steeple" type cab construction. Motors are arranged two per jack shaft, and are mounted outside, and at either end, of

the driving wheelbase. Each jack shaft serves two pairs of drivers, the latter of which are 80 in. in diameter, or approximately 1 ft. higher than the average man. The connection between the motors and the jack shaft is by means of pinions and flexible gears. The gear ratio of the locomotives will permit a sustained speed of 70 m.p.h. When delivered and ready for service each locomotive will weigh approximately 400,000 lb., with a total length of 68 ft.

The two electric switching locomotives are of the so-called double-cab type for general yard work, of which quite a number already have been designed and ordered.

Purchase of Enormous Copper Smelter Announced

Hyman-Michaels Company, Chicago, Ill., announces the purchase through the United Commercial Company, San Francisco, of one of the largest copper smelters in the world. The purchase covers the Mammoth, Keystone and Kennett properties of the United States Smelting, Refining & Mining Company, located at Kennett, Cal. In addition to the plants, the purchase covers all personal properties, including a considerable amount of trackage and railroad equipment.

Pressed Steel Car Company Merges with Subsidiary

Stockholders of the Pressed Steel Car Company have approved the plan recently submitted by directors whereby a merger with Western Steel Car & Foundry, a subsidiary, will be effected and the company recapitalized. The name Pressed Steel Car will be continued. When the plan is consummated Pressed Steel Car Company will have an authorized capital of $16,200,000, par value, cumulative 7 per cent preferred and $46,300,000, par value, common stock, with outstanding issues of $15,000,000 preferred and $12,500,000 common.

Rolling Stock

Memphis Street Railway, Memphis, Tenn., has placed an order with the St. Louis Car Company, St. Louis, Mo., for 32 single-end cars, 46 ft. long.

Roanoke Railway & Electric Company, Roanoke, Va., an American Electric Power Company property, has ordered from the J. G. Brill Company six 28-ft. closed motor cars equipped with Brill 77-E trucks.

Tampa Electric Company, Tampa, Fla., has included in its 1926 budget the purchase of 25 double-truck cars. This item of the expansion program alone represents an expenditure in excess of $300,000.

Worcester Consolidated Street Railway, Worcester, Mass., needs 77 new cars, according to a recent survey made there, to bring the rolling stock equipment up to present-day requirements. The proposal now made is for the use of light-weight one-man, two-man cars. Reference is made elsewhere in this issue to the survey under which this fact and others with respect to service and equipment in Worcester were brought out.

Chileña de Electricidad, Santiago, Chile, has ordered from the Brill Company 30 28-ft. 3-in. closed car bodies to be equipped with Brill 177-E trucks.

Georgia Railway & Power Company, Atlanta, Ga., ordered in January of this year ten new one-man cars for its interurban line. The specifications of these cars follow:

Builder of car body	Cincinnati Car Company
Type of car	Single-end, double-truck interurban safety car for two-car train service
Seating capacity	51
Weights:	
Car body	18,000 lb.
Trucks	9,880 lb.
Equipment	8,365 lb.
Total	36,245 lb.
Bolster centers, length	26 ft. 3 in.
Length over all	45 ft. 6 in.
Truck wheelbase	5 ft. 4 in.
Width over all	8 ft. 4 in.
Height, rail to trolley base	11 ft. 8 in.
Body	All steel
Interior trim	Light mahogany
Headlining	Agasote
Roof	Arch
Air brakes	Safety Car Devices
Armature bearings	Sleeve General Electric
Axles	Brill Company Cambria hammered steel
Bumpers	Pressed steel
Car signal system	Faraday
Car trimmings	Bronze oxidized, Dayton
Center and side bearings	Brill, center bearings; Stucki, side bearings
Compressors	Western Traction Brake Company DII-16
Control	General Electric PC 5-K2
Couplers	Tomlinson, Form 10, car, air and electric
Curtain fixtures	Curtain Supply No. 90, pinch fixture, Rex rollers
Curtain material	Pantasote, grain Morocco, color No. 86
Destination signs	Keystone JRR and ILR
Door-operating mechanism	National Pneumatic
Energy-saving device	Economy meter
Fenders	H-B wheelguards
Gears and pinions	General Electric A-1
Hand brakes	Peacock staffless
Heater equipment	Unsettled
Headlights	Ohio Brass SDII roof type
Journal boxes	Brill
Lightning arresters	General Electric Aluminum A-11
Motors	Four GE-265-A, inside hung
Registers	Ohmer
Sanders	Ohio Brass, Form 2
Sash fixtures	Dayton wedge type
Seats	Hale & Kilburn 900A bucket type
Seating material	Genuine gray leather
Slack adjuster	American automatic
Springs	Brill Company
Step treads	Aluminum, Cincinnati Car
Trolley retrievers	Knutson 5-B
Trolley base	Ohio Brass, Form 4
Trolley wheels	Nuttall 6 in. diameter
Trucks	Brill 177-E-1
Ventilators	Nichols-Lintern Company type C
Wheels	26 in. steel E-26-S
Special devices	Signal lights; push-button control of doors, variable load brake, compensating fixture dome lights

Metal, Coal and Material Prices

Metals—New York	Feb. 23, 1926
Copper, electrolytic, cents per lb	14.25
Copper, wire base, cents per lb	16.00
Lead, cents per lb	9.10
Zinc, cents per lb	8.07
Tin, Straits, cents per lb	64.75
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$4.875
Somerset mine run, Boston, net tons	2.10
Pittsburgh mine run, Pittsburgh, net tons	2.05
Franklin, Ill., screenings, Chicago, net tons	1.575
Central, Ill., screenings, Chicago, net tons	1.125
Kansas screenings, Kansas City, net tons	2.425
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft	$6.25
Weatherproof wire base, N.Y., cents per lb.	17.75
Cement, Chicago, net prices, without bags	2.10
Linseed oil (5-bbl. lots), N.Y., cents per lb.	11.60
White lead in oil (100-lb. keg), N. Y., cents per lb	15.50
Turpentine (bbl. lots), N. Y., per gal	$0.98

Trade Notes

Kelly, Cooke & Company, Philadelphia, Pa., have announced a change in location for their headquarters. Formerly located at 424 Chestnut Street, they have now taken offices in the Insurance Company of North America Building, the Parkway at Sixteenth Street.

Leon L. Wolf, president of the Leon L. Wolf Waterproof Fabric Company, Cincinnati, Ohio, has announced the appointment of Edwin Besuden to be sales promotion manager. Mr. Besuden formerly was connected with the Jewett Motor Car Company. He is well known among electric railway men. He will spend most of his time in the field, further stimulating the widening market for Wolf Kemi-suede, the new waterproof material for upholstery purposes in the automotive and electric railway fields.

Farley Osgood, for many years prominently identified with the electric light and power industry, has established consulting engineering offices in the National Bank of Commerce Building, New York. He will engage more particularly in the design, construction, operation and interconnection of public utilities. Mr. Osgood has been especially active in the affairs of the American Institute of Electrical Engineers and was signally honored with the presidency in 1924-1925. He is widely known as a remarkably able engineer.

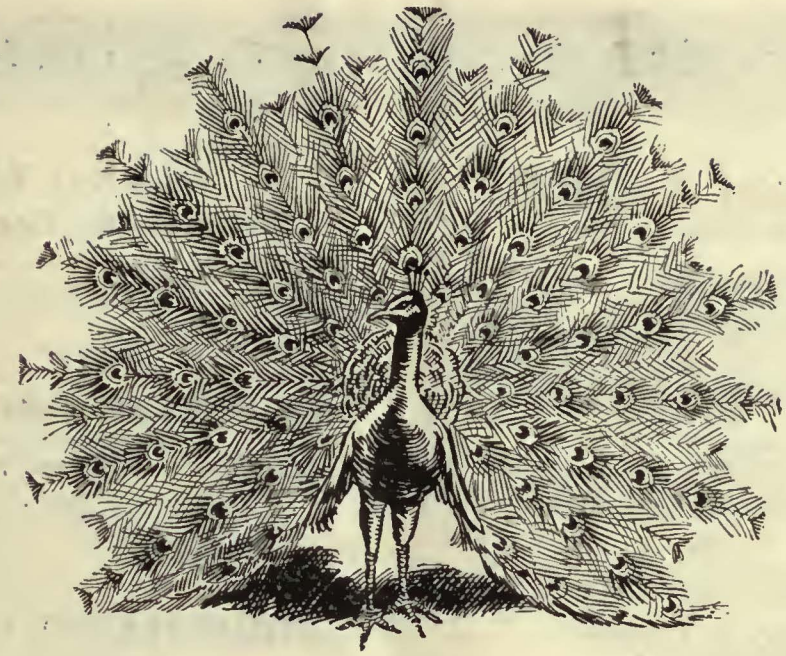
Reo Motor Car Company, Lansing, Mich., states that, exclusive of administrative expenses, a fleet of six Reo 21-passenger six-cylinder model W buses has been operated in South Bend, Ind., at a cost of only 8¾ cents per bus-mile by the Chicago, South Bend & Northern Indiana Railway. Information as to operating costs was obtained from a statement recently made by George R. Green, general superintendent of the railroad. The fleet has been in operation since February, 1925.

New Advertising Literature

Electric Controller & Manufacturing Company, Cleveland, Ohio, has issued a leaflet which illustrates various applications for E, C & M separator magnets. Installation methods are also treated. Copies will gladly be supplied on request.

Metallo Gasket Company, New Brunswick, N. J., has issued catalog No. 26, entitled "Metallo Gaskets." In this are described various types of gaskets for use in pipe joints, air pumps, boilers, hand hose, and wherever else this equipment may be required. Gaskets for high and low pressure work and for ordinary and extreme conditions are available.

Korfund Company, Inc., New York, N. Y., has issued a bulletin entitled "How to Isolate Machine Vibrations." This points out the disadvantages of attempting to operate machinery without adequate protection from size and vibration, and states that Korfund plates of coarse natural cork are admirably adapted to meet these problems.



The Peacock Staffless

Solving the safety problem on modern, light-weight cars—

An important part of the modernization program calls for increased safety on the new cars that the industry is now discussing. The solution to this safety feature can be readily found in Peacock Staffless Brakes.

Their 144-inch chain winding capacity provides tremendous braking power regardless of the worn condition of brake shoes or the looseness of brake rigging.

Minimum floor space required, simplicity of operation and low installation and maintenance costs are further reasons for the use of Peacock Staffless Brakes on all your cars.

Ask for further proof of Peacock performance in the form of actual facts and figures.

National Brake Co., Inc.

890 Ellicott Sq., Buffalo, N. Y.

Canadian Representative

Lyman Tube & Supply Company, Limited, Montreal, Canada

PEACOCK

Staffless Brakes

Bankers and Engineers

Leading the field~

For the first day or so the field in a six-day race keeps well bunched together. But the gruelling contest quickly weeds out the weaker members, for Old Man Wear-an-Tear sets a terrific pace.

The result by the end of the third and fourth days is no longer in doubt. The Boyerized Boy, showing no signs of fatigue, leads the pack by many laps. Even the veteran Wear-an-Tear is badly outdistanced.

To quote a famous sporting writer—"The Boyerized Boy wins in a breeze. He is easily three to four times better than any of the others."

That's the kind of enviable reputation being hung up by all Boyerized Parts.

Try them on your hardest jobs.

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

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.

FORD CHAIN HOISTS

TRIBLOC
¼ to 2 tons.

TRIBLOC
5 to 10 tons.

Screw Hoist
½ to 10 tons.

Differential Hoist
¼ to 3 tons.

Enable your mechanics to speed up repairs

Transfer the costly drudgery of load lifting to sturdy Ford Chain Hoists. Keep your mechanics at the job they are paid to do.

When large public utilities and railroads choose these hoists for their work, it is a choice based on confidence —established by proved records of performance. It is visible recognition of the merit possessed by Ford Chain Hoists.

There are many types of Ford Hoists. The best known and most widely used is the TRIBLOC. This type is a spur geared chain hoist, 80% efficient, and the strongest and most compact chain hoist made. It is made in all sizes from ¼ ton to 20 tons, and equipped with Roller Bearing Trolleys when required for applications like that shown above.

The Screw Geared Hoist is frequently preferred for portable use because it is lighter in weight than the TRIBLOC. A bronze gear and steel worm operating in an oil-tight housing provide a smooth working and powerful hoisting arrangement that has a long life. This hoist is made in sizes from ½ ton to 10 tons.

The Differential Hoist is best suited for occasional lifting of light loads. It is made in sizes from ¼ ton to 3 tons.

There are other types of Ford Hoists we should like to tell you about, both standard and special. Many are described in our catalog which is sent on request. Just ask for Catalog 7-B, or if you have special conditions, we shall be glad to make recommendations.

FORD CHAIN BLOCK COMPANY
2nd and Diamond Sts. Philadelphia, Pa.

We also manufacture "THE MOTORBLOC" an electrically driven portable chain hoist

That 5th Important Element in Bus Operating Costs

—*How the low first cost and long life of the Studebaker Bus Chassis reduces it*

THERE are four primary factors of operating cost in bus transportation: (1) gasoline, (2) oil, (3) tires, (4) repairs.

But there is a fifth—often disregarded, but unavoidable and therefore important. This is depreciation cost—a factor which varies according to the amount of first cost and the mileage a bus delivers.

This factor has been most carefully considered in the designing and building of the Studebaker Bus Chassis. Tremendous mileage is built-in to render unexcelled service.

Every Studebaker Bus Chassis is capable of delivering a minimum of 150,000 miles of dependable, low-cost service. This is proved by numerous instances in which Studebaker Bus Chassis have delivered upwards of 200,000 miles of service and are still profitable operating units.

Since no other bus chassis can excel the Studebaker Bus Chassis in length of service, it is certain the *depreciation cost of a Studebaker chassis per year is less.* For it equals any other bus chassis in strength. Yet it costs 50% less than the average bus.

Compare, for instance, the Studebaker 19-passenger cross seat sedan costing $4900 with the average large truck-type unit costing $10,500. (Seating capacity has no bearing in this comparison.)

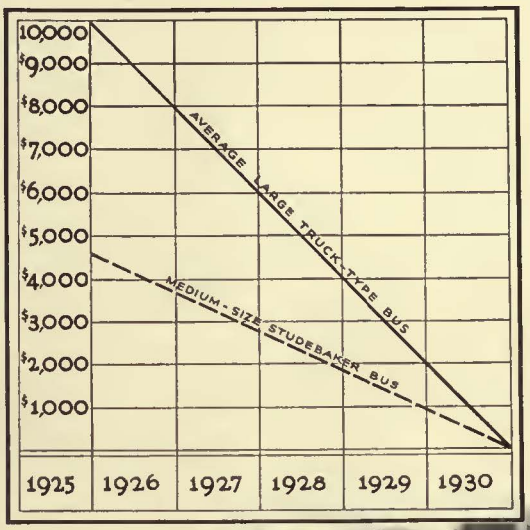
—first cost
—depreciation cost
—maintenance cost
—operating cost

Lower

The expensive truck-type chassis is no sturdier, nor is it capable of giving longer service.

For depreciation, let us allow 20% on both chassis—(a conservative figure, for many fleet operators allow up to 33⅓%).

With the Studebaker Bus this means $980 per year depreciation cost which is just as much a part of operating cost as gas, oil, tires, etc.



Depreciation cost figures at 20%

With the large, truck-type bus, the depreciation cost is $2,100 per year.

Again let us say each of the busses averages 50,000 miles per year.

This means a depreciation cost on the Studebaker Bus, amounting to only .0196 per mile.

On the large truck-type chassis, the depreciation cost is .042 per mile.

There is thus no question that the Studebaker Bus Chassis is much lower in depreciation cost than the average bus chassis. As a result, it insures a larger margin of profits during the five years over which depreciation costs are usually figured. This explains why operators all over the United States are buying the Studebaker chassis in preference to large truck-type bus chassis.

STUDEBAKER BUS CHASSIS

Ashland, O., Operator reports 108,500 miles—$14.04 for Repairs

Speaking of his Studebaker Bus, purchased in 1924, W. L. Newcomer, Ashland, Ohio, comments as follows:

"Running between Ashland and Wellington, I have now driven this bus 108,500 miles. The only parts which have been replaced on account of wear are a set of piston rings, $6.72, one-half of an axle shaft, $6.00, and a distributor base plate, $1.32. The original wrist pins and bushings are still in the motor. I have had the valves ground four times. The brakes have been relined twice. I have never missed a trip or been held up a minute from any fault of the car."

"I Have Made More Money with Studebaker Equipment"

—Writes H. A. Chase, Montana Operator

H. A. Chase, who operates three Studebaker busses between Missoula, Polson and Hamilton, Mont., writes:

"My Studebaker busses are averaging 156 miles per day. I get from 14,000 to 16,000 miles to the set of tires; from 13 to 15 miles per gallon of gas; 1200 miles per gallon of oil; 22,000 miles on a set of brake lining.

"Routes are through the Rocky Mountains, one of our hills being 7½ miles long and another 3½ miles long. But we seldom have to shift into intermediate gear. There is always power to spare in the Studebaker.

"Regardless of weather or road conditions, my busses have never left the depot late and always pull in on time, due to the kind of equipment Studebaker sells and the service I get from your local dealer, who is always on the job, day or night.

"My busses are overloaded practically all the time. Passengers are always commenting on the comfort and dependability.

"I have made more money in the last eight months with my new Studebaker equipment than I have in the last three years. There is money in the bus business, if you purchase Studebakers."

THE 15-Passenger Sedan-type Bus, illustrated below, is mounted on a specially designed Studebaker chassis of 158-inch wheelbase.

Engine is the most powerful of any bus chassis of its size in the world, according to the rating of the Society of Automotive Engineers.

Extra safety factors include: staunch frame braced by eight stout cross-members; large rear axle shaft; oversize propeller shaft; sturdy, resilient springs; special disc bus wheels.

Body is 167 inches long by 76 inches wide. Finish is rich, durable lacquer. Three doors on the right side provide convenient entrance and exit for passengers. Seat cushions and backs of seats are upholstered in genuine leather. Six ventilators, adjustable windows, dome lights, roller window shades and an exhaust heating system. Baggage rack under the third tier of seats; additional luggage accommodation under seats and on the roof.

Equipment includes: stop signal system; illuminated destination sign box; automatic windshield cleaner; rear-view mirror; front and rear bumpers; motometer; extra wheel, tire and tube with carrier mounted on left front fender; 8-day clock and gasoline gauge, plus the usual instruments; lights controlled by steering wheel switch.

Write for full details of this 15-Passenger Studebaker Bus. Mail the coupon below.

The Studebaker 15-Passenger Sedan-Type Bus

$4035 f. o. b. factory

Including extra wheel with tire and tube

NOW FREE:

Mail coupon at right and obtain free a copy of our unique booklet, "Profitable Bus Operation." It contains facts and figures of vital interest to every bus owner.

THE STUDEBAKER CORPORATION OF AMERICA,
Dept. B South Bend, Ind.
Send me free "Profitable Bus Operation" without obligation.

Name .....

Address .....

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

How many busses have you at present? .....

Check below the Studebaker Bus about which you desire information.

Type: Sedan ..... Parlor Car ..... Street-Car Type .....

Capacity: ..... Passengers.

Five Body Designs
12 to 21 Passengers
$3785 to $5575

12-Pass. (including driver) cross-seat Sedan-Type $3785.00
15-Pass. (including driver) cross-seat Sedan-Type $4035.00
19-Pass. (including driver) cross-seat Sedan Type $4900.00
20-Pass. (including driver) Parlor-Car De Luxe * ... $5575.00
21-Pass. Pay-As-You-Enter Street-Car Type * $5025.00

Prices f. o. b. factory, covering body and chassis, complete

* Includes dual rear wheels

CAR LOAD OR TRAIN LOAD

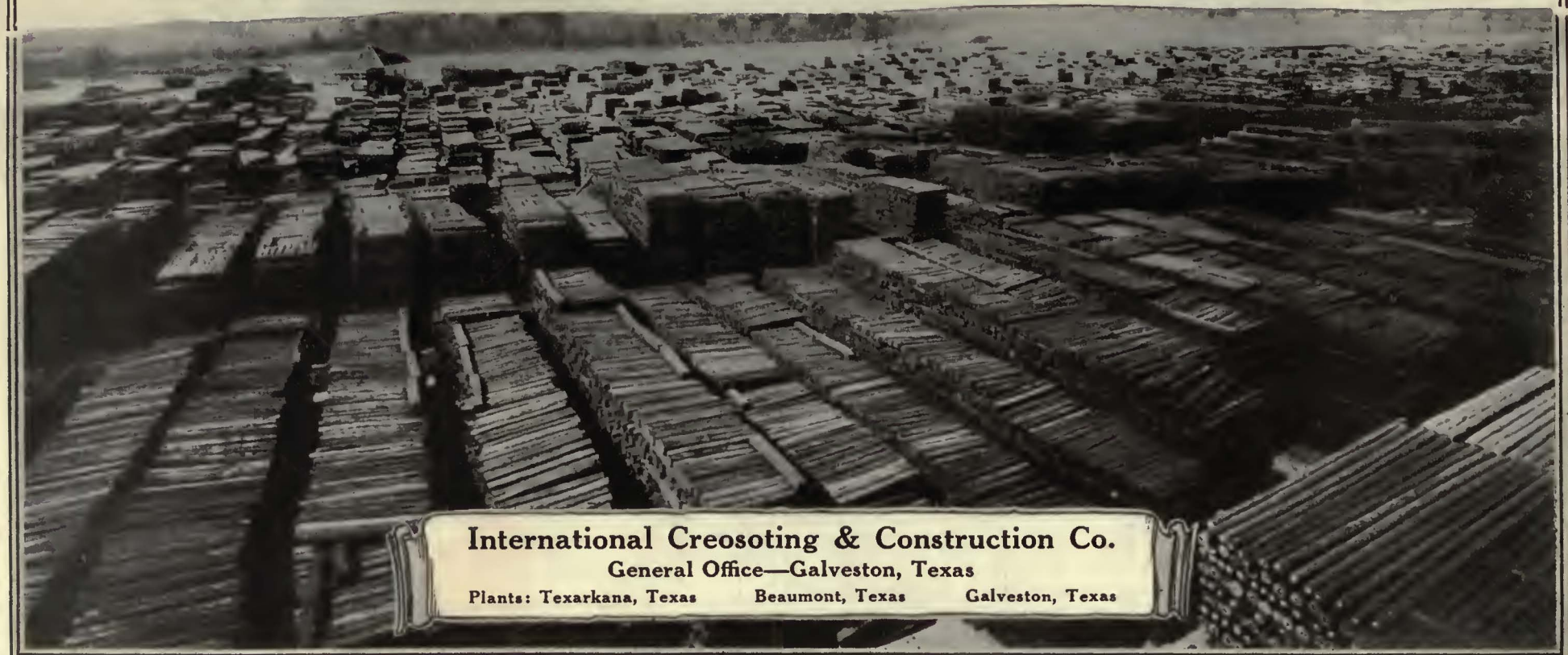
Quality Ties of the Exact Grade You Specify

Ready for Shipment NOW

International now has a large stock of standard A. R. E. A. specification ties to render a "ship today service" of Quality Ties in car loads or train loads.

Such service insures the right kind of ties at the right place at the right time, at a considerable saving per tie.

Just phone, wire, or write your requirements. Even a check inspection is not absolutely necessary—for no more exacting enforcement of specifications is known in the tie industry than that practiced at *International* Plants.



International Creosoting & Construction Co.

General Office—Galveston, Texas

Plants: Texarkana, Texas Beaumont, Texas Galveston, Texas

"With RAIL maintenance

Al. A. Oldfield, Engineer of Maintenance of Way, Wisconsin Power & Light Co., Fond du Lac, Wis. Mr. Oldfield is numbered among the best known railway engineers in the country.

FILLER *costs will be decreased"*

"Two years ago, in a paper read before the Wisconsin Utilities Association in Milwaukee," says Alf A. Oldfield, a leading street railway engineer, "I made the statement that it seemed likely that we would have to avoid the use of concrete in city track zones. But since that time we have made great strides in the development of resilient track, and consequently my idea does not hold.

"About the time that we changed from flexible types of pavement to concrete, we also began the use of ties of steel construction.

"Finally the welded joint and mechanical tie were developed. We used a mechanical tie having asphaltic filler, which provides the necessary resiliency. While this was a great advancement, we found it desirable to keep the rail from having direct contact with the concrete between ties. And for this purpose we have adopted Carey Elastite Rail Filler. Our decision was reached after a six months' test on two stretches of track, one with and one without rail filler.

"Personally, I am convinced that concrete pavement in city track zones with rail filler will be found much more satisfactory, and that maintenance costs will be considerably decreased."

* * * * * * *

Carey Elastite Rail Filler is a mastic compound of asphalt and fiber. It comes in ready-formed slabs shaped to fit any type of rail. A tap with a mallet puts the strip into place. It forms a resilient cushion for the rail, which absorbs traffic impact and reduces noise. Unaffected by moisture or changes in temperature. The very small amount it adds to construction costs is insignificant compared with the saving in maintenance costs which results. Write for full details.

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

A view of the track system of the Wisconsin Power & Light Co. at Sheboygan, Wis. This shows the type of track construction together with the use of Carey Elastite Rail Filler which was being set in place when the photograph was taken.

Carey Elastite

REG. U.S. PAT. OFF.

TRADE MARK REG'D. U.S. PATENT OFFICE

SYSTEM OF
TRACK INSULATION

CONSIDER what a tremendous saving in rolling-stock upkeep and track and foundation maintenance that represents (the shock- and vibration-absorbing features makes it a sure thing), and try to estimate the value of the good-will that has been built up by the relative silence of traffic operated over all that Dayton Tie track. Then consider how this saving is going to continue piling up in the years to come, throughout the long maintenance-free life of Dayton Tie tracks.

Others—many others—have considered this and are profiting by it to an increasing extent every year.

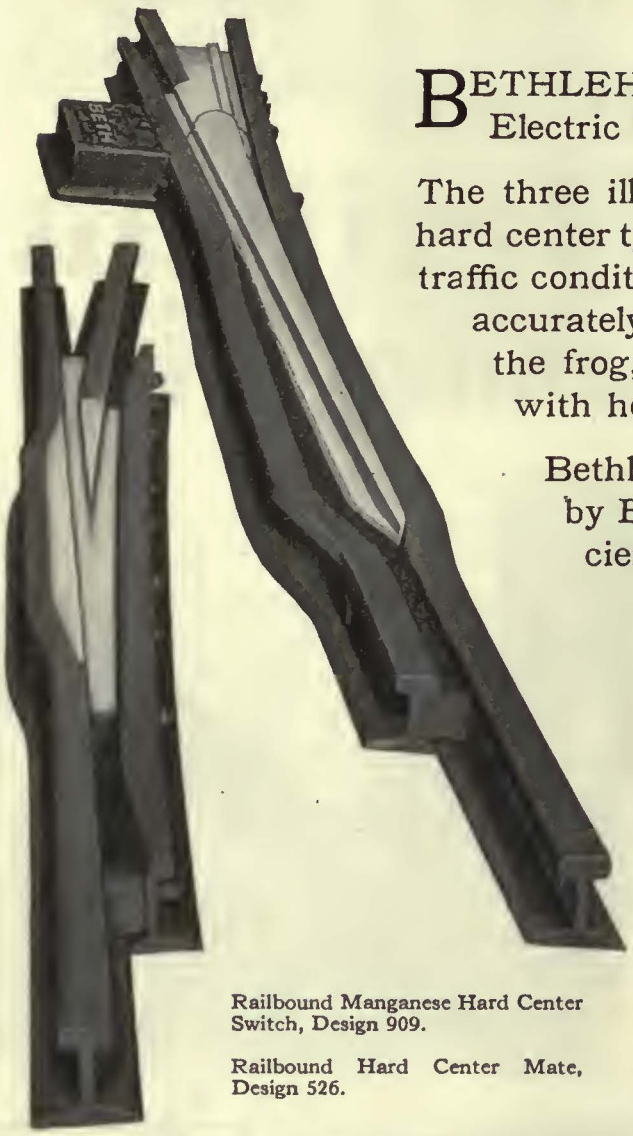
Except for good-will (you can figure that at whatever you wish) the actual figures are available on case after case, in cities of every character. Every detail is yours for the asking.

DAY
RESILI

The Dayton Mechanical
DAYTON,

Bethlehem Track Specialties

Railbound Manganese Hard Center Frog, Design 951.



Railbound Manganese Hard Center Switch, Design 909.

Railbound Hard Center Mate, Design 526.

BETHLEHEM manufactures a complete line of Electric Railway track specialties.

The three illustrated products are of the railbound hard center type, and are made to withstand extreme traffic conditions. The manganese steel centers are accurately ground to fit the rail. The parts of the frog, switch and mate are bolted together with heat-treated Mayari chrome-nickel bolts.

Bethlehem track specialties are widely used by Electric Railways because of their efficiency, economy and durability.

BETHLEHEM PRODUCTS *for* ELECTRIC RAILWAYS

Tee and Girder Rails; Machine Fitted Joints; Splice Bars; Hard Center Frogs; Hard Center Mates; Rolled Alloy Steel Crossings; Abbott and Center Rib Base Plates; Rolled Steel Wheels and Forged Axles; Tie Rods; Bolts; Tie Plates and Pole Line Material.

Descriptive Literature Sent on Request

BETHLEHEM STEEL COMPANY, *General Offices:* BETHLEHEM, PA.

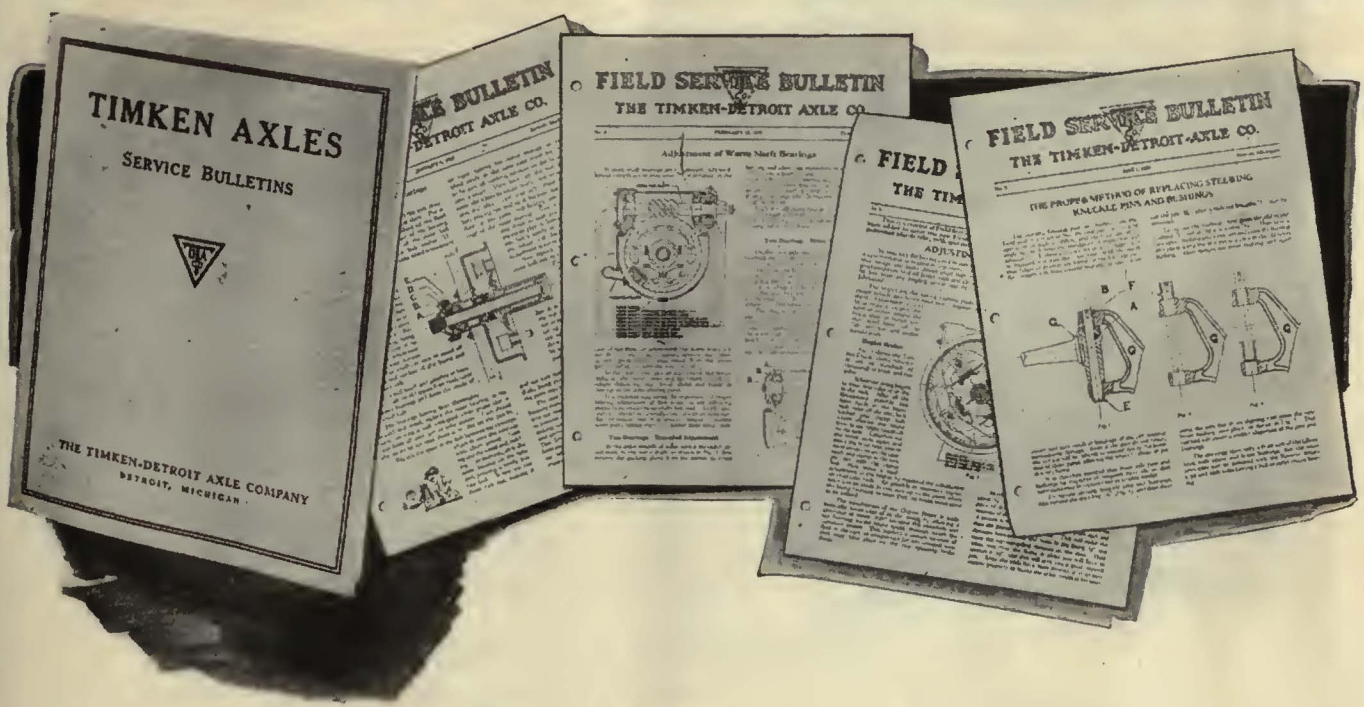
District Offices:

New York, Buffalo, Boston, Cleveland, Philadelphia, Detroit, Cincinnati, Baltimore, Chicago, Washington, St. Louis, San Francisco, Atlanta, Los Angeles, Pittsburgh, Seattle

Bethlehem Steel Export Corporation, 25 Broadway, New York City, Sole Exporter of our Commercial Products

BETHLEHEM

TIMKEN



Service Bulletins Available

If you own or service vehicles equipped with Timken Axles you should have these bulletins on file for ready reference. They are in an attractive loose-leaf binder and cover the following subjects: (1) Inspection Chart for Front and Rear Axles. (2) Care and Adjustment of Front Wheel Bearings. (3) Adjustment of Rear Wheel Bearings—Full Floating Type. (4) Adjustment of Rear Wheel Bearings—Fixed Hub Type. (5) Adjustment of Thrust Bearings on Steering Knuckle Pins. (6) Adjustment of Worm Shaft Bearings. (7) Adjustment of Differential Bearings and Worm Gearing. (8) Adjusting and Relining Brakes. (9) Replacing Steering Knuckle Pins and Bushings. (10) Lubrication.

Let us know how many copies you can use

THE TIMKEN-DETROIT AXLE CO., DETROIT, MICH.

AXLES

2098 consists mostly of 99.8% pure Gilsonite, fluxed with other bitumens. The natural oils of the materials used volatilize only at temperatures produced by artificial heat and the flexibility, or life, of the coating may be depended upon to endure for a longer period than that attained by mixtures of oil, gum and pigment.

It Protects

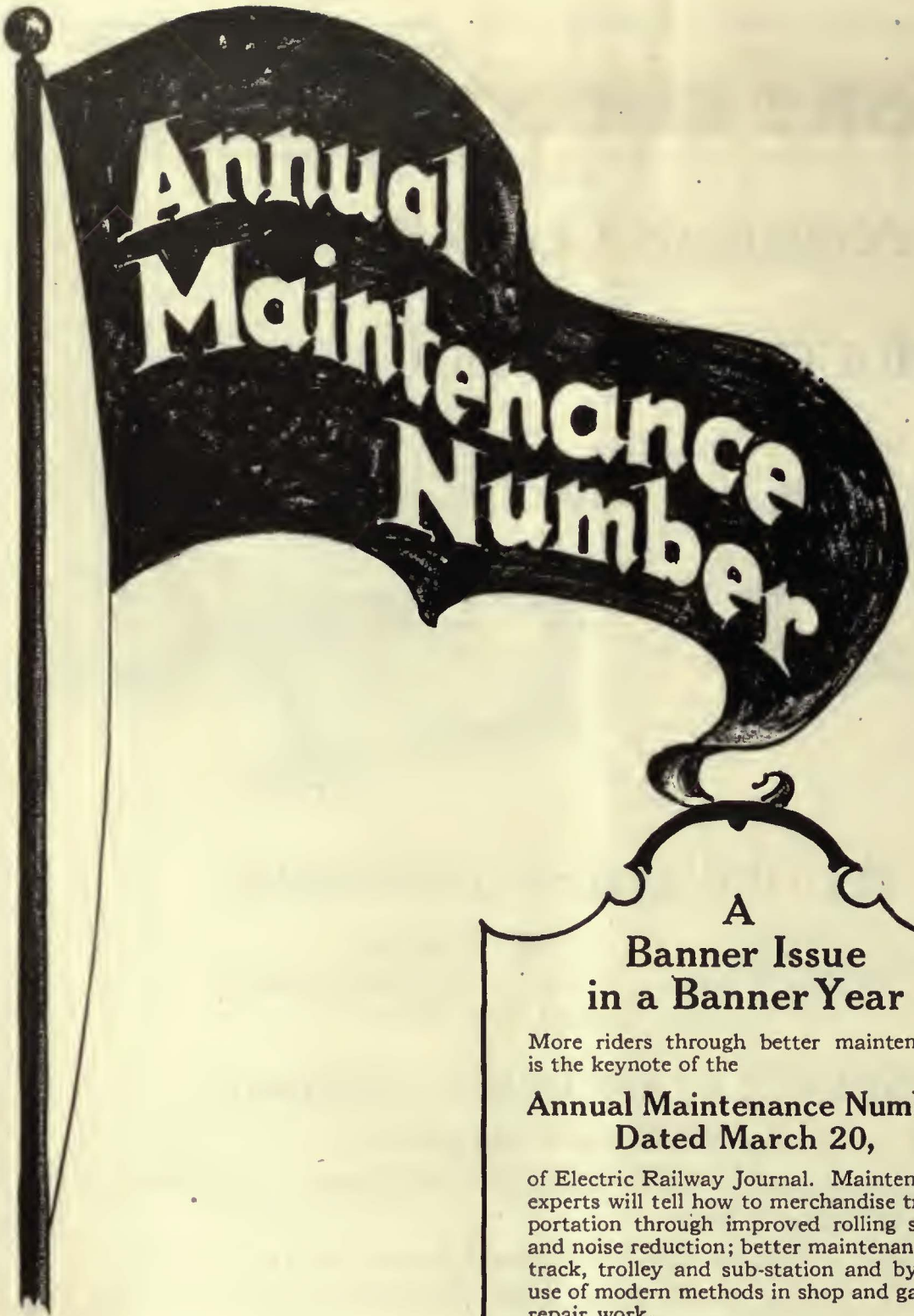
metal and wood against the deteriorating effects of moisture, acid and alkali.

Adopted by 18 out of every 21 concerns that made tests during 1925 - for switch boxes, storage battery boxes, barrels, tanks, car trucks auto running gear, copper wire, castings, etc., etc.,

Its low cost is not indicative of its quality. Judge it by performance - send for sample.

MITCHELL-RAND MFG. CO.

14 VESEY STREET
NEW YORK, N. Y.



A Banner Issue in a Banner Year

More riders through better maintenance is the keynote of the

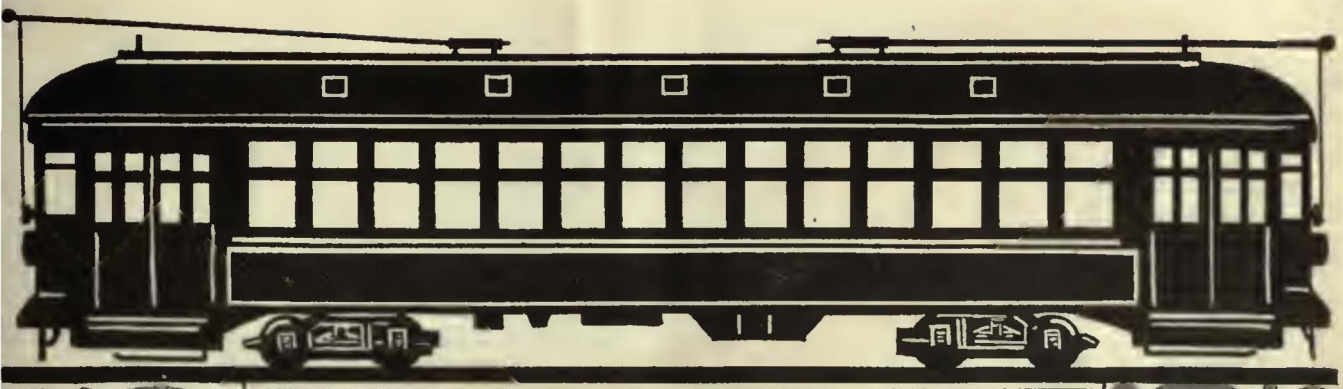
Annual Maintenance Number Dated March 20,

of Electric Railway Journal. Maintenance experts will tell how to merchandise transportation through improved rolling stock and noise reduction; better maintenance of track, trolley and sub-station and by the use of modern methods in shop and garage repair work.

Plan to capitalize your opportunity through strong and effective advertising space in this banner issue.

First forms close March 10. Send your reservations now.

Electric Railway Journal



Service represents one of the reasons why electric railways in steadily increasing numbers are using Gary Wrought Steel Wheels. Central plant location assures prompt delivery after shipment. Long association with railroad requirements guarantees intelligent and painstaking handling of orders.

Of themselves, these considerations would be insufficient, perhaps, to be of deciding influence. Added, however, to the manner in which the quality of Gary Steel Wheels is guarded from ore mine to finished product, they help to explain the favor that Gary Wheels enjoy.

Illinois Steel Company

General Offices: 208 So. La Salle St.
Chicago, Illinois

GARY

WROUGHT STEEL WHEELS

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 $2.00.

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.

ERJ

POSITIONS WANTED

AS supervisor of welding, grinding and bonding. Nine years' experience both as traveling demonstrator, and in supervising joint and surface welding, grinding, bonding, shop-welding and apparatus repairs on both city and interurban properties. Can guarantee to get highest results in economy and performance. Location immaterial. Available about April 15. PW-883, Electric Railway Journal, Tenth Ave. at 36th St., New York.

ENGINEER, 24 years' experience in electric railway rolling stock maintenance and transportation supervision, open for position. PW-879, Electric Railway Journal, Tenth Ave. at 36th St., New York.

SUPERINTENDENT of transportation, shop, track and overhead on large property operating both city and interurban rail and coach service, desires change for personal reasons. Connected now with the same company that trained me. Correspondence invited. PW-885, Electric Railway Journal, 883 Mission St., San Francisco, California.

BOOKS AND PERIODICALS

For Sale

25 years' unbound copies Electric Railway Journal, $50. B&P-880, Electric Railway Journal, 7 So. Dearborn St., Chicago, Ill.

WANTED

Hydraulic Pinion Puller

1—Second-hand. State size, number of jaws and price of complete outfit.

NORTHEAST OKLAHOMA RAILROAD CO.
Miami, Okla.

FOR SALE

30 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.

TO HELP YOU

LOCATE COMPETENT MEN

"Searchlight" Advertising

G-3

Rails WeBuy and Sell entire equipment of Electric Railways, including Rails, Cars, Wiring, Conduits, Etc.

Get Our Bids or Ask for Prices

Hyman-Michaels Company

Peoples Gas Bldg., Chicago
New York St. Louis Pittsburgh
San Francisco Dallas (76)

Master's Sale of Interurban Properties

STATE OF ILLINOIS } ss.:
Champaign County }

IN THE CIRCUIT COURT THEREOF,
In Chancery, January Term A. D. 1926.

JOHN H. THORNBURN, Trustee, Complainant,
vs.
KANKAKEE & URBANA TRACTION COMPANY, a corporation, *et al.*

No. 7546
FORECLOSURE.

Public notice is hereby given that in pursuance of a decree of Foreclosure made and entered in the above entitled cause on the 30th day of January, A. D. 1926, by said Court, I, Harry B. Boyer, Master in Chancery of said Court, will at the hour of **10:00 o'clock in the forenoon, on Saturday, the 27th day of March, A. D. 1926**, at the North Door of the Court House in Urbana, Champaign County, Illinois, sell at public vendue to the highest and best bidder the following described property and premises mentioned in said Decree; viz.,—

All of the property of the Kankakee & Urbana Traction Company of whatsoever kind or nature, whether real, personal or mixed, tangible or intangible, including the Right of Way of said Company from the City of Urbana, Illinois, to the City of Paxton, Illinois, and including all trackage, poles, wires and also all stations, and sub-stations of said Company and including all machinery, apparatus, equipment and instruments and all rolling stock and also all machinery, tools, apparatus or equipment of the trackage and rolling stock and all other property of every kind and nature, including all rights, franchises, leases, licenses, good will, credits and effects of the said Defendant, the Kankakee & Urbana Traction Company,—or so much thereof as will satisfy said Decree.

Said sale to be made subject to all taxes and assessments legally levied and assessed on said property.

TERMS AND CONDITIONS OF SALE:—Cash in hand on day of sale. Sale absolute on confirmation of Court and payment of purchase price, subject to all taxes and assessments aforesaid.

Dated this 20th day of February, A. D. 1926.

HARRY B. BOYER,
Master in Chancery, Champaign, Ill.

Clark & Noel, Solicitors for Complainant, Urbana, Ill.
Williamson & Winkelmann, and W. E. Gilmore, Solicitors for certain defendants, Urbana, Ill.

"Opportunity" Advertising:

Think "*SEARCHLIGHT*" First!

G-02

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J. W. GERKE

"Railway Equipment"

303 Fifth Avenue,
New York City

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.

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

Appraisals
Amer. Appraisal Co.

Armature Shop Tools
Elec. Service Supplies Co

Asphalt Paint
Amer. Asphalt Paint Co.

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.
Carnegie Steel Co.
Illinois Steel Co.
Johnson & Co., J. R.
Westinghouse E. & M. Co.

Axles, Carbon Vanadium
Johnson, J. R.

Axles, Car Wheel
Bethlehem Steel Co.

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

Axles, Steel
Carnegie Steel Co.
Johnson, J. R.

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

Babbit Metal
More Jones Brass & Metal Co.

Badges and Buttons
Elec. Service Supplies Co.

Bearings and Bearing Metals
Bemis Car Truck Co.
Brill Co., J. G., The
General Electric Co.
More Jones Brass & Metal Co.
Westinghouse E. & M. Co.

Bearings, Center and Roller Side
Stucki Co., A.

Bells and Gongs
Brill Co., The J. G.
Consolidated Car Heat. Co.
Elec. Service Supplies Co.

Bodies, Bus
Auto Body Co.
Cummings Car & Coach Co.
Graham Bros.

Body Material, Haskelite and Plymetl
Haskelite Mfg. Corp.

Boilers
Babcock & Wilcox Co.

Bolts & Nuts Track
Illinois Steel Co.

Bond Testers
American Steel & Wire Co.

Bonding Apparatus
Amer. Steel & Wire Co.
Electric Railway Improvement Co.
Elec. Service Supplies Co.
Ohio Brass Co.
Railway Track-work Co.
Una Welding & Bonding Co.

Bonds, Rail
Amer. Steel & Wire Co.
Electric Railway Improvement Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Railway Track-work Co.
Una Welding & Bonding Co.
Westinghouse E. & M. Co.

Brackets and Cross Arms (See also Poles, Ties, Posts, Etc.)
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
Hubbard & Co.
Ohio Brass Co

Brake Adjusters
Brill Co., The J. G.
National Ry. Appliance Co.
Westinghouse Tr. Br. Co.

Brake Shoes
American Brake Shoe & Fdry. Co.
Bemis Car Truck Co.
Brill Co., The J. G.

Brakes, Brake Systems and Brake Parts
Bemis Car Truck Co.
Brill Co., The J. G.
General Electric Co.
National Brake Co.
Safety Car Devices Co.
Westinghouse Tr. Br. Co.

Brushes, Carbon
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
Westinghouse E. & M. Co

Bulkheads
Haskelite Mfg. Corp.

Bus Seats
Bender Body Co.
Hale-Kilburn Co.
S. Karpen & Bros.

Buses, Motor
Brill Co., The J. G
Cummings Car & Coach Co.
Garford Motor Truck Co.
Graham Brothers
International Motor Co.
Mack Trucks, Inc.
Studebaker Corp.
Yellow Coach Co.

Bushings, Case Hardened and Manganese
Bemis Car Truck Co.
Brill Co., The J. G.

Cables. (See Wires and Cables)

Cambric Tapes, Yellow and Black Varnish
Irvington Varnish & Ins. Co.

Carbon Brushes (See Brushes, Carbon)

Cars, Dump
Brill Co., J. G., The
Differential Steel Car Co.

Car Lighting Fixtures
Elec. Service Supplies Co.

Car Panel Safety Switches
Consolidated Car Heat. Co.
Westinghouse E. & M. Co.

Car Wheels, Rolled Steel
Bethlehem Steel Co.

Cars, Passenger, Freight, Express, etc.
Amer. Car Co.
Brill Co., The J. G.
Cummings Car & Coach Co.
Kuhlman Car Co., G. C.
National Ry. Appliance Co.
Wason Mfg. Co.

Cars, Gas, Rail
Brill Co., J. G., The

Cars, Second Hand
Electric Equipment Co.
Transit Equipment Co.

Cars, Self-Propelled
Brill Co., J. G., The
General Electric Co.

Castings, Brass Composition or Copper
More-Jones Brass & Metal Co.

Castings, Gray Iron and Steel
American Brake Shoe & Fdry. Co.
Bemis Car Truck Co.
Wm. Wharton, Jr. & Co.

Castings, Malleable and Brass
American Brake Shoe & Fdry. Co.
Bemis Car Truck Co.
Horne & Ebling Corp.

Catchers and Retrievers, Trolley
Driver-Harris Co.
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. Co.

Change Carriers
Cleveland Fare Box Co.
Electric Service Supplies Co.

Circuit-Breakers
General Electric Co.
Westinghouse E. & M. Co.

Clamps and Connectors for Wires and Cables
Elec. Ry. Equipment Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Cleaners and Scrapers Track (See also Snow-Plows, Sweepers and Brooms)
Brill Co., The J. G.
Root Spring Scraper Co.

Clusters and Sockets
General Electric Co.

Coal and Ash Handling (See Conveying and Hoisting Machinery)

Coil Banding and Winding Machines
Elec. Service Supplies Co.

Coils, Armature and Field
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.
Johnson Fare Box Co.

Coin Sorting Machines
Cleveland Fare Box Co.

Coin Wrappers
Cleveland Fare Box Co.

Commutator Slotters
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Commutator Truing Devices
General Electric Co.

Commutators or Parts
Cameron Elec'l Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

Compounds (Insulating and Splicing)
Johns-Manville, Inc.

Compressors, Air
General Electric Co.
Westinghouse Tr. Br. Co.

Concrete Flooring Surface
Irving Iron Works

Condensor Papers
Irvington Varnish & Ins. Co.

Condensers
General Electric Co.
Westinghouse E. & M. Co.

Connectors, Solderless
Westinghouse E. & M. Co.

Connectors, Trailer Car
Consolidated Car Heat. Co.
Elec. Service Supplies Co.
Ohio Brass Co.

Controllers or Parts
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.

Copper Wire
Anaconda Copper Mining Co.

Copper Wire Instruments, Measuring, Testing and Recording
American Steel & Wire Co.

Cord, Bell, Trolley, Register
Brill Co., The J. G.
Elec. Service Supplies Co.
Roebling's Sons Co., John A.
Samson Cordage Works
Silver Lake Co.

Cord Connectors and Couplers
Elec. Service Supplies Co.
Samson Cordage Works
Wood Co., Chas. N.

Couplers, Car
Brill Co., The J. G.
Ohio Brass Co.
Westinghouse Tr. Br. Co.

Cross Arms (See Brackets)

Crossing Foundations
International Steel Tie Co.

Crossing, Frog & Switch
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.

Crossing, Manganese
Bethlehem Steel Co.
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.

Crossings
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.

Crossing, Track (See Track, Special Work)

Crossings, Trolley
Ohio Brass Co.
Westinghouse E. & M. Co.

Curtains & Curtain Fixtures
Brill Co., The J. G.
Morton Mfg. Co.
Pantasote Co., Inc.

Dealer's Machinery & Second Hand Equipment
Elec. Equipment Co.
Gerke, J. W.
Hyman-Michaels

Derailing Devices (See also Track Work)

Derailing Switches
Ramapo Ajax Corp.

Destination Signs
Elec. Service Supplies Co.

Detective Service
Wish-Service, P. Edward

Door Operating Devices
Brill Co., The J. G.
Consolidated Car Heat. Co.
General Electric Co.
Nat'l Pneumatic Co., Inc.
Safety Car Devices Co.
St. Louis Car Co

Doors & Door Fixtures
Brill Co., The J. G.
Consolidated Car Heat. Co.
Hale-Kilburn Co.
General Electric Co.
Morton Mfg. Co.

Doors, Folding Vestibule
Nat'l Pneumatic Co., Inc.
Safety Car Devices Co.

Drills, Track
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Ohio Brass Co.

Dryers, Sand
Elec. Service Supplies Co.

Ears
Electric Service Supplies Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Electrical Wires and Cables
Amer. Electrical Works
Amer. Steel & Wire Co.

Electric Grinders
Railway Track-work Co.
Western Electric Co.

Electrodes, Carbon
Railway Track-work Co.
Una Welding & Bonding Co.

Electrodes, Steel
Railway Track-work Co.
Una Welding & Bonding Co.

Enamel
Lucas & Co., John

Engineers, Consulting, Contracting and Operating
Allison & Co., J. S.
Archbold-Brady Co.
Beeler, John A.
Bibbins, Rowland J.
Buchanan & Layng Corp.
Bureau of Commercial Economics, Inc.
Day & Zimmermann, Inc.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Kelker & DeLeuw
Kelly Cooke & Co.
McClellan & Junkersfeld
Railway Audit & Inspection Co.
Richey, Albert S.
Sanderson & Porter
Stevens & Wood
Stone & Webster
White Eng. Corp., The J. G.

Engines, Gas, Oil or Steam
Westinghouse E. & M. Co.

Exterior Side Panels
Haskelite Mfg. Corp.

Fare Boxes
Cleveland Fare Box Co.
Johnson Fare Box Co.
Perey Mfg. Co.
Nat'l Ry. Appliance Co.

Fare Registers
Electric 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.
Consolidated Car Fender Co.
Root Spring Scraper Co.

Fibre and Fibre Tubing
Westinghouse E. & M. Co.

Field Coils (See Coils)

Flangeway Guards, Steel
W. S. Godwin Co., Inc.

Floodlights
Elec. Service Supplies Co.

Floor, Sub
Haskelite Mfg. Corp.

Floors
Haskelite Mfg. Corp.

Forgings
Brill Co., J. G., The

Frogs & Crossings, Tee Rail
Bethlehem Steel Co.
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.

Frogs, Track (See Track Work)

Frogs, Trolley
Electric Service Supplies Co
Ohio Brass Co.
Westinghouse E. & M. Co.

Funnell Castings
Wm. Wharton, Jr. & Co., Inc.

Fuses and Fuse Boxes
Consolidated Car Heat. Co.
General Electric Co.
Westinghouse E. & M. Co

Fuses, Refillable
General Electric Co.

Gaskets
Westinghouse Tr. Br. Co.

Gas Producers
Westinghouse E. & M. Co

Gas-Electric Cars
General Elec. Co.
Westinghouse E. & M. Co

Gates, Car
Brill Co., The J. G.

Gear Blanks
Bethlehem Steel Co.
Brill Co., J. G., The

Gear Cases
Chillingworth Mfg. Co.
Westinghouse E. & M. Co

Gears and Pinions
Bemis Car Truck Co.
Bethlehem Steel Co.
Electric Service Supplies Co.
General Electric Co.
Nat'l Ry. Appliance Co.
Nuttall Co., R. D.
Tool Steel Gear & Pinion Co.

Generating Sets, Gas-Electric
General Electric Co.

Generators
General Electric Co.
Westinghouse E. & M Co

Girder Rails
Bethlehem Steel Co.
Lorain Steel Co.

Gong (See Bells and Gongs)

Greases (Sre Lubricants)

Grinders & Grinding Supplies
Metal & Thermit Corp.
Railway Track-work Co.

Grinders, Portable
Railway Track-work Co.

Grinders, Portable Electric
Railway Track-work Co.

Grinding Bricks and Wheels
Railway Track-work Co.

Guard Rail Clamps
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.

Guard Rails, Tee Rail & Manganese
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co

Guards, Trolley
Elec. Service Supplies Co
Ohio Brass Co.

Harps, Trolley
Elec. Service Supplies Co
More-Jones Brass & Metal Co.
Nuttall Co., R. D.
Star Brass Works

Headlights
Elec. Service Supplies Co
General Electric Co.
Ohio Brass Co.

Headlining
Haskelite Mfg. Corp.
Pantasote Co., Inc.

Heaters, Car (Electric)
Consolidated Car Heat. Co.
Gold Car Heat. & Ltg. Co
Nat'l Ry. Appliance Co.
Smith Heater Co., Peter

Heaters, Car, Hot Air and Water
Smith Heater Co., Peter

Helmets, Welding
Railway Track-work Co.
Una Welding & Bonding Co.

Hoists & Lifts
Ford Chain Block & Mfg. Co.

Instruments Measuring, Testing and Recording
General Electric Co.
Westinghouse E. & M. Co.

Insulating Cloth, Paper and Tape
General Electric Co.
Irvington Varnish & Ins. Co.
Mitchell-Rand Mfg. Co.
Okonite Co.
Okonite-Callender Cable Co.
Stand. Underground Cable Co.
U. S. Rubber Co.
Westinghouse E. & M. Co.

Insulating, Silk & Varnish
Irvington Varnish & Ins. Co.

Insulation (See also Paints)
Electric Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Irvington Varnish & Ins. Co.
Mitchell-Rand Mfg. Co.
Okonite Co.
Okonite-Callender Cable Co.
U. S. Rubber Co.
Westinghouse E. & M. Co.

Insulation Slots
Irvington Varnish & Ins. Co.

Insulators (See also Line Materials)
Elec. Ry. Equipment Co.
Elec. Service Supplies Co
General Electric Co.
Irvington Varnish & Ins. Co.
Ohio Brass Co.
Western Electric Co.
Westinghouse E. & M. Co.

Insulator Pins
Elec. Service Supplies Co.
Hubbard & Co.

Interior Side Linings
Haskelite Mfg. Corp.

Jacks (See also Cranes, Hoists and Lifts)
Buda Co.
Elec. Service Supplies Co.

Joints, Rail
(See Rail Joints)

Journal Boxes
Bemis Car Truck Co.
Brill Co., J. G.

Junction Boxes
Standard Underground Cable 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
Electric Service Supplies Co.
Nichols-Lintern Co.
Ohio Brass Co.

Lanterns, Classification
Nichols-Lintern Co.

Letter Boards
Haskelite Mfg. Corp.

Lightning Protection
Elec. Service Sup. 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 Sup. Co.
General Electric Co.
Hubbard & Co.
More-Jones Brass & Metal Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Locking Spring Boxes
Wm. Wharton, Jr. & Co., Inc.

Locomotives, Electric
Cummings Car & Coach Co.
General Electric Co.
St. Louis Car Co.
Westinghouse E. & M. Co.

Lubricating Engineers
Universal Lubricating Co.

Lubricants, Oil and Grease
Universal Lubricating Co.

Manganese Parts
Bemis Car Truck Co.

Manganese Steel Castings
Wm. Wharton, Jr. & Co., Inc.

Manganese Steel Guard Rails
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.

Manganese Steel, Special Track Work
Bethlehem Steel Co.
Wm. Wharton, Jr. & Co., Inc.

Manganese Steel Switches, Frogs & Crossings
Bethlehem Steel Co.
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.

Meters (See Instruments)

Motor Buses (See Buses, Motor)

Motors, Electric
General Electric Co.
Westinghouse E. & M. Co.

Motors and Generators, Set
Allis-Chalmers Mfg. Co.
General Electric Co.

Motormen's Seats
Brill Co., J. G.
Elec. Service Sup. Co.
Heywood-Wakefield Co.
Wood Co., Chas. N.

Nuts and Bolts
Bemis Car Truck Co.
Bethlehem Steel Co.
Hubbard & Co.

Oils (See Lubricants)

Omnibuses (See Buses, Motor)

Oxy-Acetylene (See Cutting Apparatus, Oxy-Acetylene)

Oxygen
International Oxygen Co.

Packing
U. S. Rubber Co.
Westinghouse E. & M. Co.

Paint
Amer. Asphalt Paint Co.

Paints and Varnishes (Insulating
Electric Service Supplies Co.
Irvington Varnish & Ins. Co.

Paints and Varnishes for Woodwork
National Ry. Appliance Co.

Panels, Outside, Inside
Haskelite Mfg. Corp.

Paving Guards, Steel
Consolidated Car Heat. Co.
W. S. Godwin Co., Inc.

Paving Material
American Brake Shoe & Fdry. Co.

Pickup, Trolley Wire
Elec. Service Supplies Co.
Ohio Brass Co.

Pinion Pullers
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 Fittings
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.

Pole Line Hardware
Bethlehem Steel Co.
Electric Service Supplies Co.
Ohio Brass Co.

Poles, Metal Street
Elec. Ry. Equipment Co.
Hubbard & Co.

Pole Reinforcing
Hubbard & Co.

Poles, Metal Street
Bates Expanded Steel Truss Co.

Poles & Ties Treated
Bell Lumber Co.
International Creosoting & Construction Co.

Poles, Ties, Posts, Piling & Lumber
Bell Lumber Co.
International Creosoting & Construction Co.
Naugle Pole & Tie Co.

Poles, Trolley
Bell Lumber Co.
Elec. Service Supplies Co.
Nuttall Co., R. D.

Poles, Tubular Steel
Elec. Ry. Equipment Co.

Portable Grinders
Buda Co.

Potheads
Okonite Co.
Okonite-Callender Cable Co., Inc.

Power Saving Devices
National Ry. Appliance Co.

Pressure Regulators
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Punches, Ticket
Wood Co., Chas. N.

Rail Braces & Fastenings
Ramapo Ajax Corp.

Rail Filler
Philip Carey Co.

Rail Grinders (See Grinders)

Rail Joints
Carnegie Steel Co.
Illinois Steel Co.
Rail Joint 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
Hyman-Michaels

Rails, Steel
Bethlehem Steel Co.
Carnegie Steel Co.
Illinois Steel Co.

Railway Paving Guards, Steel
Godwin Co., Inc., W. S.

Railway Safety Switches
Consolidated Car Heat. Co.
Westinghouse E. & M. Co.

Rattan
Brill Co., The J. G.
Cummings Car & Coach Co.
Elec. Service Supplies Co.
Hale-Kilburn Co.

Registers and Fittings
Brill Co., The J. G.
Elec. Service Supplies Co.
Ohmer Fare Register Co.
Rooke Automatic Register Co.

Reinforcement, Concrete
Amer. Steel & Wire 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
Elec. Service Sup. Co.

Resistances
Consolidated Car Heat. Co.

Resistance, Wire and Tube
American Steel & Wire Co.
General Electric Co.
Westinghouse E. & M. Co.

Retrievers, Trolley (See Catchers and Retrievers, Trolley)

Rheostats
General Electric Co.
Westinghouse E. & M. Co.

Roofing Asbestos (Car)
Johns-Manville, Inc.

Roofing, Car
Haskelite Mfg. Co.
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 Sup. Co.
Nichols-Lintern Co.
Ohio Brass Co.

Sash Fixtures, Car
Brill Co., The J. G.

Scrapers, Track (See Cleaners and Scrapers, Track)

Screw Drivers, Rubber Insulated
Elec. Service Sup. Co.

Seats, Bus
Brill Co., The J. G.
Hale-Kilburn Co.

Seats, Car (See also Rattan)
Brill Co. The J. G.
Hale-Kilburn Co.

Seating Materials
Brill Co., J. G.
Haskelite Mfg. Corp.
Pantasote Co., Inc.

Second Hand Equipment
Electric Equipment Co.
Gerke, J. W.
Hyman-Michaels

Shades, Vestibule
Brill Co., The J. G.

Shovels
Brill Co., The J. G.
Hubbard & Co.

Side Bearings (See Bearings, Center and Side)

Signals, Car Starting
Consolidated Car Heat. Co.
Elec. Service Sup. Co.
Nat'l Pneumatic Co., Inc.

Signals, Indicating
Nichols-Lintern Co.

Signal Systems, Highway Crossing
Nachod Signal Co., Inc.
Wood Co., Chas. N.
U. S. Electric Signal Co.

Signal Systems, Block
Elec. Service Sup. Co.
Nachod Signal Co., Inc.
U. S. Electric Signal Co.

Slack Adjusters (See Brake Adjusters)

Sleet Wheels and Cutters
Elec. Ry. Equipment Co.
Elec. Ry. Improvement Co.
Elec. Service Supplies Co.
More-Jones Brass & Metal Co.
Nuttall Co., R. D.

Smokestacks, Car
Nichols-Lintern Co.

Snow-Plows, Sweepers and Brooms
Brill Co., The J. G.
Consolidated Car Fender Co.
Cummings Car & Coach Co.
Root Spring Scraper Co.

Sockets & Receptacles
Johns-Manville, Inc.

Soldering and Brazing Apparatus (See Welding Processes and Apparatus)
Irvington Varnish & Ins. Co.

Special Adhesive Papers
Irvington Varnish & Ins. Co.

Special Trackwork
Bethlehem Steel Co.
Lorain Steel Co.
Wm. Wharton, Jr. & Co.

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
Amer. Steel & Wire Co.
Bemis Car & Truck Co.
Brill Co., The J. G.

Sprinklers, Track and Road
Brill Co., The J. G.
Cummings Car & Coach Co.

Steel and Steel Products
Carnegie Steel Co.
Illinois Steel Co.

Steps, Car
Brill Co., The J. G.
Morton Mfg. Co.

Stokers, Mechanical
Babcock & Wilcox Co.
Westinghouse E. & M. Co.

Storage Batteries (See Batteries, Storage)

Strain, Insulators
Electric Service Supplies Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Strand
American Steel & Wire Co.
Roebling's Sons Co., J. A.

Superheaters
Babcock & Wilcox Co.

Sweepers, Snow (See Snow Plows, Sweepers and Brooms)

Switches, Selector
Nichols-Lintern Co.

Switches, Tee Rail
Ramapo Ajax Corp.

Switches, Track (See Track Special Work)

Switches and Switchboards
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Tampers, Tie
Railway Track-work Co.

Tapes and Cloths (See Insulating Cloth, Paper and Tape)

Tee Rail Special Track Work
Bethlehem Steel Co.
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.

Telephones and Parts
Elec. Service Supplies Co.

Terminals, Cable
Std. Underground Cable Co.

Testing Instruments (See Instruments, Electrical Measuring, Testing, etc.)

Thermostats
Consolidated Car Heat. 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
Carnegie Steel Co.
Godwin Co., Inc., W. S.
International Steel Tie Co.

Ties, Wood Cross (See Poles, Ties, Posts, etc.)

Tires
U. S. Rubber Co.

Tongue Switches
Wm. Wharton, Jr. & Co., Inc.

Tools, Track & Miscellaneous
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Hubbard & Co.
Railway Track-work Co.

Tool Steel
Bethlehem Steel Co.

Torches, Acetylene (See Cutting Apparatus)

Towers and Transmission Structures
Archbold-Brady Co.
Westinghouse E. & M. Co.

Track Expansion Joints
Wm. Wharton, Jr. & Co., Inc.

Track Grinders
Metal & Thermit Corp.
Railway Track-work Co.

Track, Special Work
Barbour-Stockwell Co.
Bethlehem Steel Co.
Buda Co.
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co., Inc.

Trackless Trolley Cars
Brill Co., The J. G.

Transfer (See Tickets)

Transfer Issuing Machines
Ohmer Fare Register Co.

Transfer Tables
American Bridge Co.

Transformers
General Electric Co.
Westinghouse E. & M. Co.

Transportation Publication
Blake & Jackson's Electric Railway Transportation

Trends, Safety, Stair, Car Step
Irving Iron Works
Morton Mfg. Co.

Trolley Bases
General Electric Co.
More-Jones Brass & Metal Co.
Nuttall Co., R. D.
Ohio Brass Co.

Trolley Bases, Retrieving
Nuttall Co., R. D.
Ohio Brass Co.

Trolley Buses
Brill Co., The J. G.
General Electric Co.
Westinghouse E. & M. Co.

Trolley Material, Overhead
Elec. Service Supplies Co.
More-Jones Brass & Metal Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Trolley Wheel Bushings
More-Jones Brass & Metal Co.

Trolley Wheels & Harps
Electric Service Supplies Co.
More-Jones Brass & Metal Co.

Trolley Wheels (See Wheels, Trolley)

Trolley Wire
Amer. Electrical Works
Amer. Steel & Wire Co.
Anaconda Copper Min. Co.
Roebling's Sons Co., J. A.

Trolleys & Trolley Systems
Ford Chain Block & Mfg. Co.

Trucks, Car
Bemis Car & Truck Co.
Brill Co., The J. G.
Cummings Car & Coach Co.
Lightweight Noiseless Electric Street Car Co.

Trucks, Motor
Graham Bros.
International Motor Co.
Mack Trucks, Inc.
White Co.

Truss Planks
Haskelite Mfg. Corp.

Tubing, Yellow & Black Flexible Varnish
Irvington Varnish & Ins. Co.

Turbines, Steam
General Electric Co.
Westinghouse E. & M. Co.

Turnstiles
Elec. Service Supplies Co.
Perey Mfg. Co., Inc.

Valves
Ohio Brass Co.
Westinghouse Tr. Br. Co.

Varnished Papers & Silks
Irvington Varnish & Ins. Co.

Ventilators, Car
Brill Co., The J. G.
Nat'l Ry. Appliance Co.
Nichols-Lintern Co.
Railway Utility Co.
St. Louis Car Co.

Vestibule Linings
Haskelite Mfg. Corp.

Welded Rail Joints
Electric Railway Improvement Co.
Metal & Thermit Corp.
Ohio Brass Co.
Una Welding & Bonding Co.

Welders, Portable Electric
Electric Railway Improvement Co.
Ohio Brass Co.
Railway Track-work Co.
Una Welding & Bonding Co.
Westinghouse E. & M. Co.

Welders, Rail Joint
Railway Track-work Co.

Welding & Cutting Tools
International Oxygen Co.

Welding Processes and Apparatus
Electric Railway Improvement Co.
General Electric Co.
Metal & Thermit Corp.
Ohio Brass Co.
Railway Track-work Co.
Una Welding & Bonding Co.
Westinghouse E. & M. Co.

Welding Steel
Electric Railway Improvement Co.
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.

Wheel Guards (See Fenders and Wheel Guards)

Wheel Presses (See Machine Tools)

Wheels, Car, Cast Iron
Bemis Car Truck Co.
Griffin Wheel Co.

Wheels, Car, Steel & Steel Tire
Illinois Steel Co.

Wheels, Trolley
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 Air Brake Co.
Westinghouse E. & M. Co.

Wire Rope
American Steel & Wire Co.
Roebling's Sons Co., J. A.

Wires and Cables
Amer. Electrical Works
Amer. Steel & Wire Co.
Anaconda Copper Min. Co.
General Electric Co.
Kerite Insulated Wire & Cable Co.
Okonite Co.
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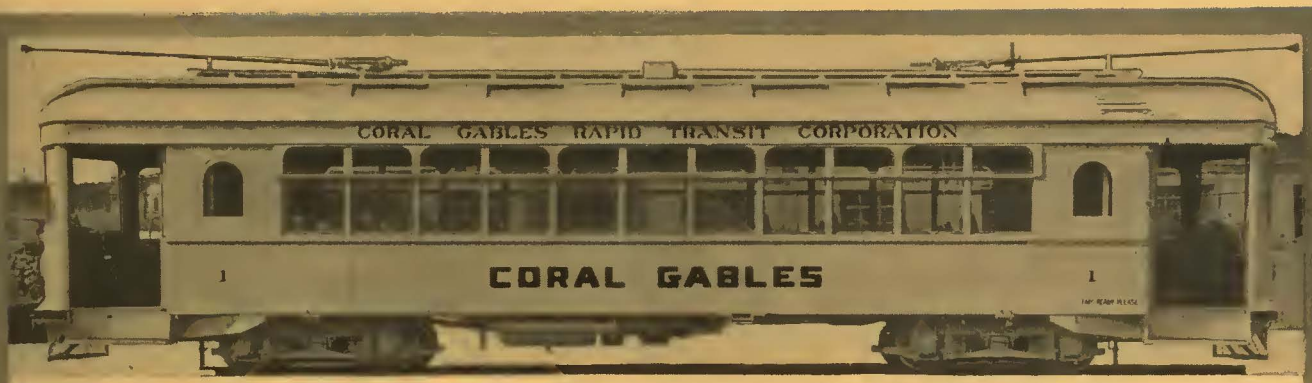
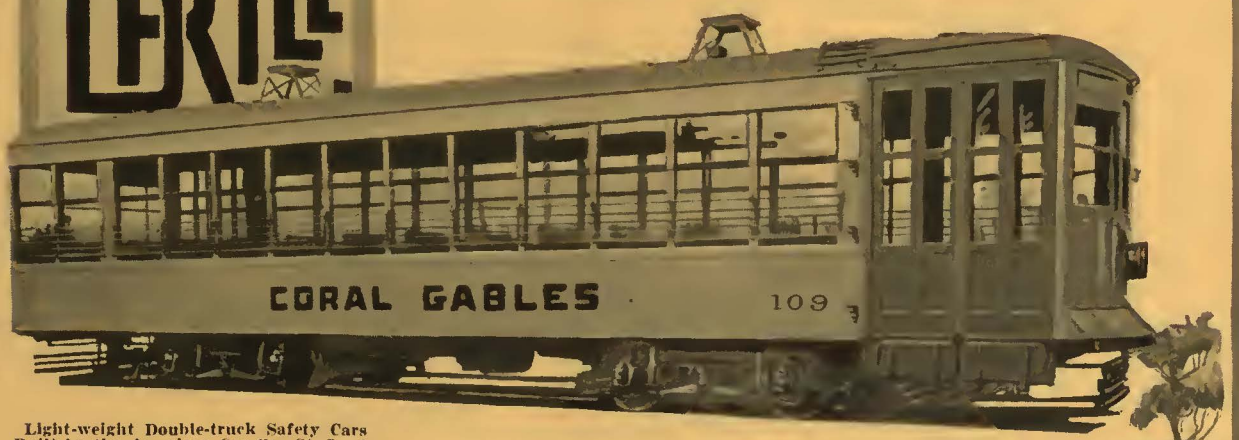


Brill "DeLuxe" Rapid Transit Type Car

MODERN CARS
Win in Coral Gables

Coral Gables quickly recognized the importance of modern electric railway car service to community development.

BRILL



Light-weight Double-truck Safety Cars
Built by the American Car Co., St. Louis

Birney Safety Cars
Built by Brill

Bus equipment that's familiar —it's electric

Railway mechanics and electrical equipment men prefer to care for gas-electric buses. They are familiar with the electrical equipment; they have a means of testing the engine—which is possible only with

Gas-Electric Drive

(for buses and trucks)

Consult the General Electric Company before you buy buses to be sure proper electrical equipment is applied. Best results are obtained only when service and grade conditions have been considered.

THE operation of buses naturally presents certain new problems to the railway operator. Therein lies a distinct advantage which the gas-electric bus offers to electric railways.

Gas-Electric Drive eliminates many of the difficulties of maintenance, which the ordinary gas bus may present. There is no clutch to care for. No gear experts are needed because there are no transmission gears. The "rear end" problem is gone, because there is no differential, rear wheels being driven by standard direct-current electric motors.

The familiar tests and usual methods of maintenance are applicable to Gas-Electric bus drive, because it consists simply of generator, motors and control.

Maintenance Advantages

Inspection and testing of engine are simplified, made systematic and conclusive.
Engine cannot be raced or stalled and average engine speed is lower—prolonging life of bearings, pistons, cams and all other moving parts.
Clutch, gears and differential—all subject to high maintenance—are eliminated.
Without the shock of gear changing, the life of engine, chassis and body is longer.
Uniform torque of electric drive means less tire wear.
Engine lubrication is materially less.

Operating Advantages

Greater riding comfort—no vibration or jerks during starting, and smooth acceleration.

Increased safety—control entirely in foot pedal relieves operator's hands for steering—skidding is minimized by individual drive on rear wheels—engine cannot stall on dangerous crossings.

Higher schedule speeds—through more rapid acceleration and reduction of driver fatigue—affording lower costs and higher receipts.

GENERAL ELECTRIC