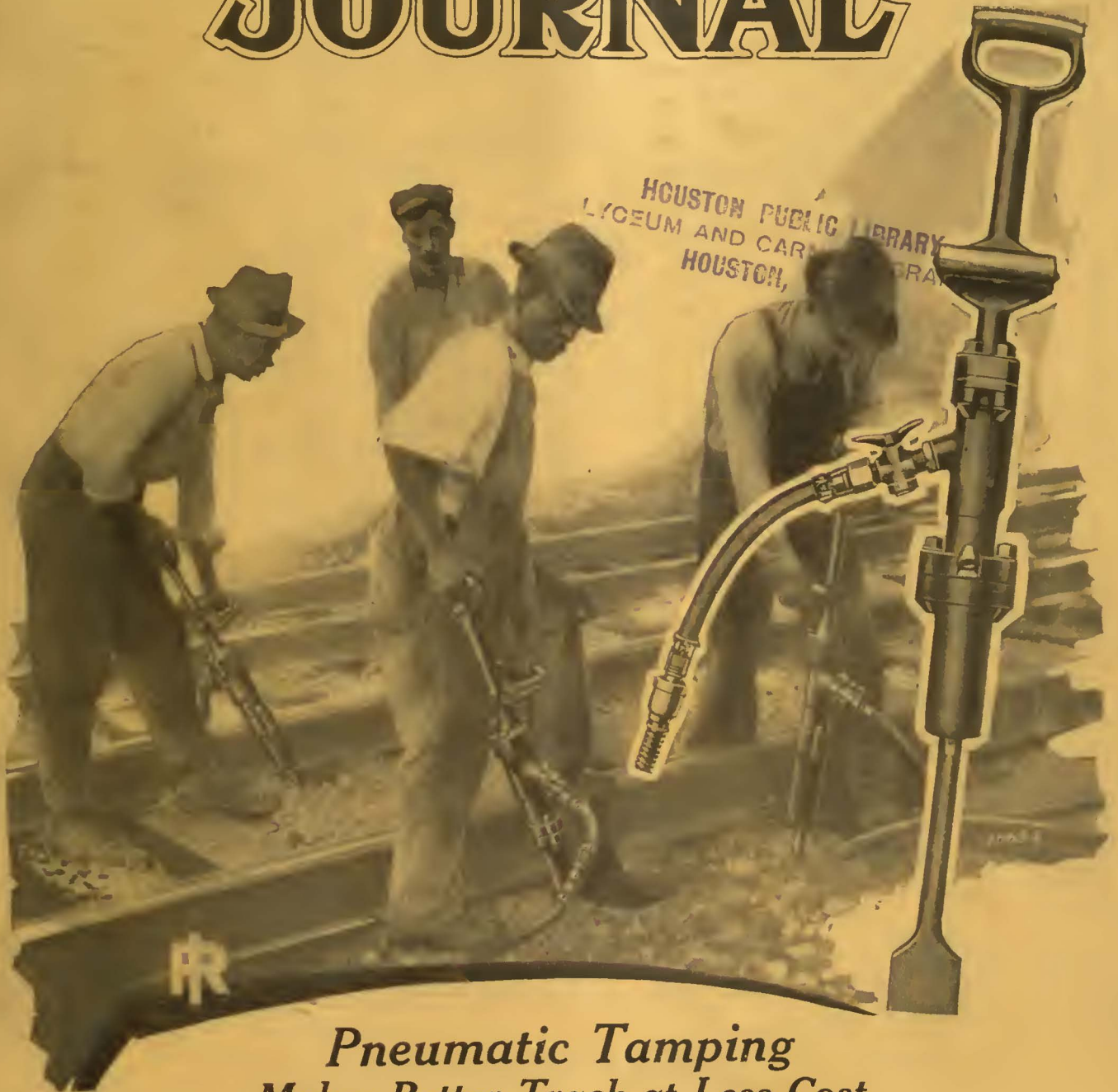


ELECTRIC RAILWAY JOURNAL



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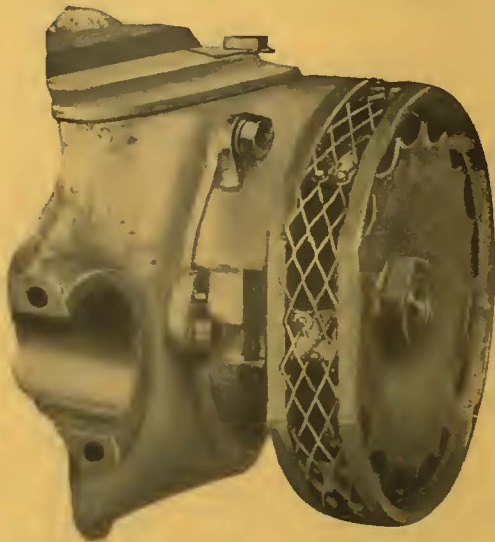
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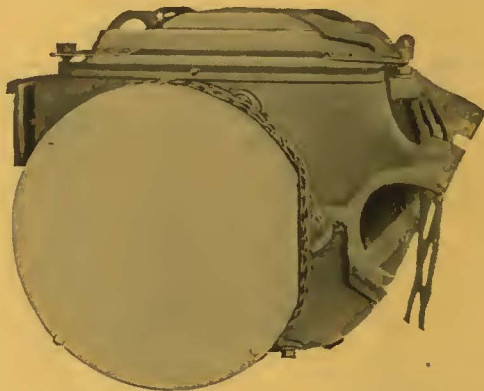
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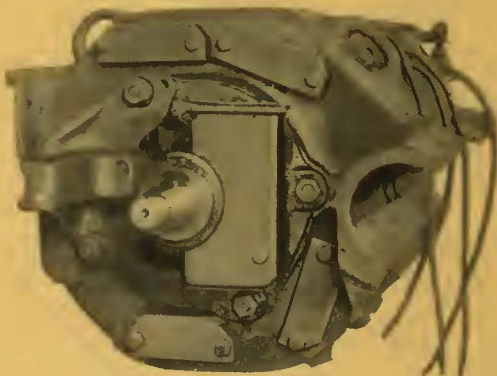
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follows the application of Westinghouse External Fans to your non-ventilated railway motors.

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An Impetus to Maintenance

NEXT week will be published the Annual Maintenance Number, which has come to be one of the outstanding contributions of the ELECTRIC RAILWAY JOURNAL to the industry. A feature of this year's number will be two surveys which will show, first, to what degree electric railway shops fall short of being modern plants, and, second, how modern machine tools can be used to cut shop costs.

These two articles will be quite enlightening. The first mentioned impresses one with the great need for improvement in the equipment of the car shops, as an important part of the industry's modernization program. The second gives definite examples of new uses of machine tools and the use of new types of machine tools in speeding up maintenance work and reducing labor charges.

Another feature will be a picture-story of the variety of material handling machines that can be employed to considerable advantage by electric railways in the several departments. There have been many new machines of this character introduced into railway work in the last year or two, and the pictures will tell the story.

Other articles will deal in an important and practicable way with line and track maintenance work. Extra copies will be printed to supply the usual extra demand for this

Annual Maintenance Number

NEXT WEEK

MARCH 22

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Mr. Hevenor's Experience

Mr. H. P. Hevenor, consulting engineer, New York, who has had an extensive consulting and contracting experience in connection with electric railway track wrote this for Electric Railway Journal :

“There is only one real method for properly removing corrugation and that is by means of what is known as the Reciprocating grinder which gives a true planing action on the top of the rail.

“Corrugation should be removed as soon as it can be visibly detected or identified, or before it has had an opportunity to loosen or harm the track assembly or the adjacent paving. It will absolutely destroy the track structure and the adjacent paving long before normal depreciation. I might also add that corrugated track is very hard on rolling stock, and the noise caused by corrugation is very annoying to passengers as well as the people living in the vicinity.

“Unquestionably, all metal removed from the top of the rail, in addition to that of normal wear, will have a tendency to decrease the life of the rail, but if this rail has corrugations on it, it will naturally add to the life of the rail to remove the corrugations.”

*Any corrugations on your property?
Enough Reciprocating Grinders?*

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“Reciprocating” Track Grinder



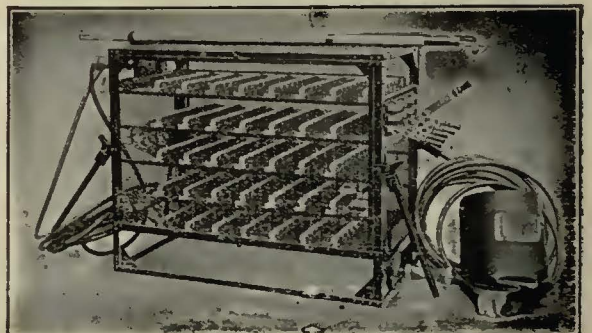
“Universal” Rotary Track Grinder



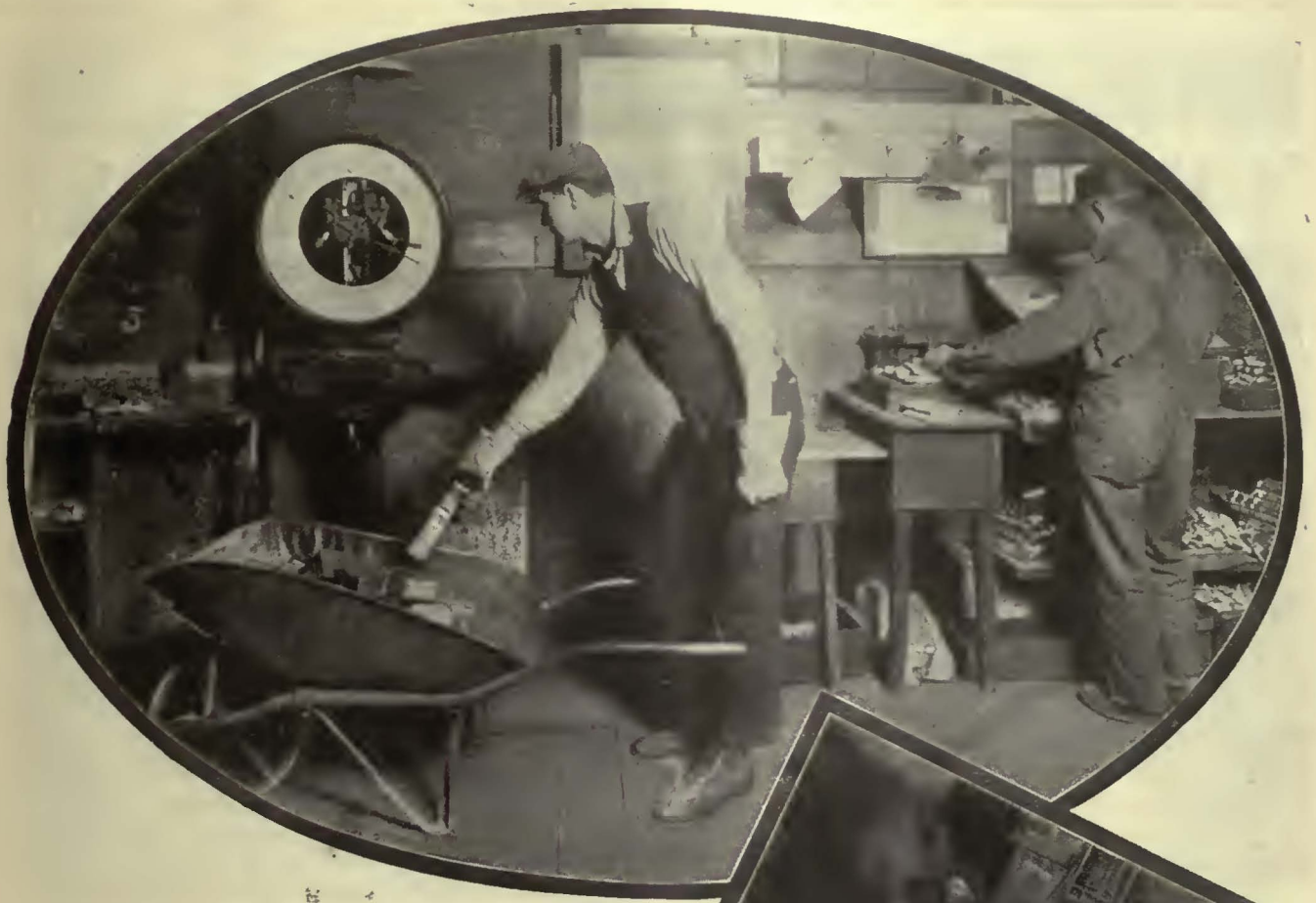
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“Atlas” Rail Grinder



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Accuracy is a by-word in the O-B Foundry because tried and proved results have shown what it means to users of O-B Bronze.

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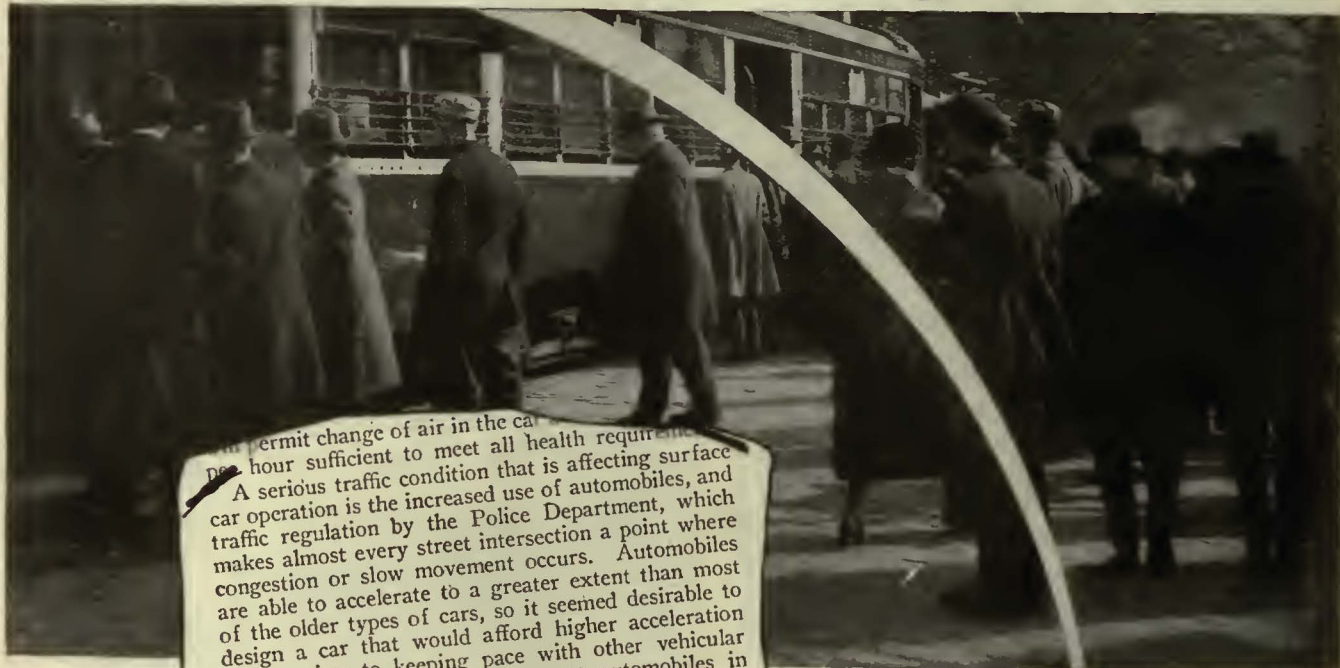
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Mansfield, Ohio, U.S.A.

TROLLEY MATERIAL—ELECTRIC RAILWAY CAR EQUIPMENT—RAIL BONDS—HIGH TENSION PORCELAIN INSULATORS—THIRD RAIL INSULATORS

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WESTINGHOUSE "VARIABLE LOAD" BRAKE



... permit change of air in the ca
 ... hour sufficient to meet all health require
 A serious traffic condition that is affecting surface
 car operation is the increased use of automobiles, and
 traffic regulation by the Police Department, which
 makes almost every street intersection a point where
 congestion or slow movement occurs. Automobiles
 are able to accelerate to a greater extent than most
 of the older types of cars, so it seemed desirable to
 design a car that would afford higher acceleration
 with a view to keeping pace with other vehicular
 traffic, and particularly to prevent automobiles in
 the rear from passing the car until the next stop was
 reached. To accomplish this, motors were provided
 to accelerate rapidly at the rate of two miles per
 hour per second.

To improve the braking efficiency, permitting more
 rapid deceleration, these cars are equipped with a
 variable load brake, so named because it provides
 a braking force, automatically regulated by the weight
 of the load in the car, thus ensuring a short, uni-
 form stopping distance regardless of whether the
 car is empty, partly loaded or loaded to capacity.
 A braking efficiency of one hundred per cent at
 all times is attained by this apparatus. The use of
 this type of brake reduces the average time con-
 sumed in stopping, and cuts down the running time
 between stops by allowing a longer peak speed be-
 fore deceleration begins, thus accomplishing a gen-
 eral speeding up of service. The brake rigging is
 so arranged that if a fracture should occur in any one
 rod or lever there would still remain sufficient pres-
 sure to stop the car.

The cars are equipped with all the modern safety
 devices, the most important of which is the so-called
 Dead Man's Hand.


Conditions
 Demanded it—
 We Supplied
 it.

The clipping reproduced here is from a recent magazine article dealing with the 200 new cars of the Brooklyn City Railroad. Many other progressive companies are adopting the Variable Load Brake to meet the same conditions as those described in this particular case.



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

WESTINGHOUSE TRACTION BRAKES



TRACK MUST WEAR
But
Must ALL of it
WEAR OUT?

In your 1924 paved track construction plan for wear on rail and paving and plan against "wear-out" of your foundations and ties.

Steel Twin Tie Track meets these requirements at an initial cost that is often far below the cost of usual designs. The large effective bearing of the Twin Tie plates provides a support on which rails may wear naturally while the effective bearing of the concrete foundation on the subgrade supports the paving. Then, at the end of a long life of the wearing parts, the renewal does not affect the foundation at all.

The complete details are at your disposal in our proposal folder which will include delivered prices on Twin Ties.

The International Steel Tie Co.
Cleveland, Ohio

SteelTwinTieTrack

Western
Red Cedar Poles

N
P
C
O

Northern
White Cedar Poles



They're off with a splash



On the Way



In the boom ready to be cribbed

A Giant Flume Carries the Poles to Puget Sound

Close to the summit of a mountain, seven miles from Puget Sound, stand several hundred thousand of the finest Western Red Cedar trees that grow.

To get these poles to Puget Sound it was necessary to build a great flume down the mountain side and divert water from a mountain stream to carry them down the flume to the Sound, where they are gathered into cribs and towed to the pole-handling yards.

National Pole Company operate at more than forty woods points, maintain four treating plants and nine concentrating and distributing yards. That's why this organization is making possible a delivery service to pole buyers that is unapproachable by any other company in the cedar pole business.

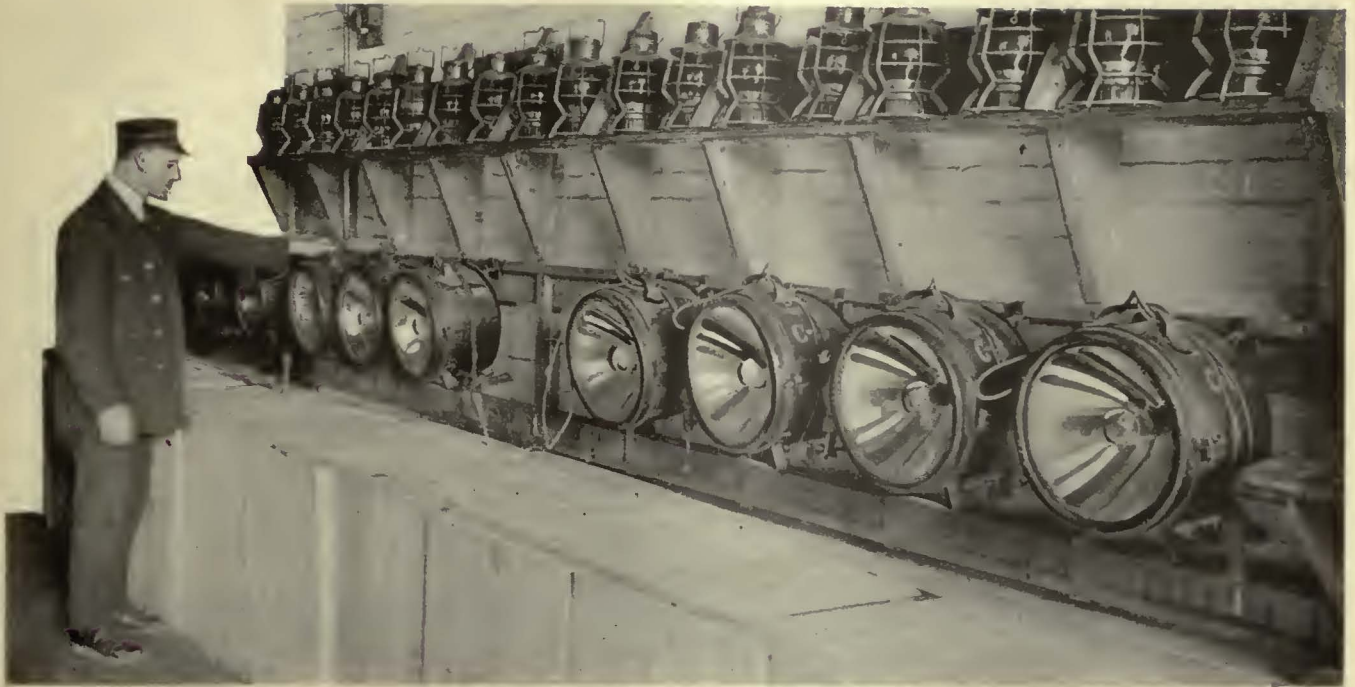
NATIONAL POLE COMPANY

Escanaba, Michigan

Western Electric Company

Incorporated

Offices in 47 principal cities.



Ready for the night runs

G GOLDEN GLOW **W**

Headlights

MANY companies use "Golden Glows" exclusively! Their golden, penetrating beam of light, free from dangerous glare and dazzling effect, renders them especially valuable in electric railway operation. In such cases, *safety* must be always the prime consideration. And the "Golden Glow" principle is the last word in safety.

Another important consideration—the Golden Glow reflector will not scratch, tarnish or corrode. It is a permanent reflector and easy to keep clean.

Golden Glow Headlights are made in various styles and sizes.

Consult Catalog No. 7



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We believe that the uniform and fair enforcement of these specifications by all producers and railroad companies is a move in the right direction, not only to stabilize the tie business and reduce costs but in addition, so that a tie operator can proceed with an orderly, uniform program of production of standard marketable ties prior to the receipt of orders, knowing that if he can not dispose of them to one road, they will be salable to others.

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Write for full particulars

International Creosoting & Construction Co.

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The door that watches itself

Study this photograph!

It shows the new National Pneumatic Automatic Door in actual operation on a Chicago one-man, two-man car.

The passenger has just alighted, and the door can be seen closing without so much as a touch from the motorman or conductor.

At the next stop it will open in the same way—automatically—just as soon as the car has stopped, and a passenger steps on the countersunk treadle in the floor.

Chicago's one-man, two-man, National Pneumatic equipped, *automatic door cars* are one example of progress in improvement and efficiency.

Investigate!

NATIONAL PNEUMATIC AUTOMATIC DOORS

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Bates Poles on the United Traction Company Lines at Albany, N. Y.

Bates Poles are pictured at a crossing on the United Traction Company lines, out of Albany, N. Y. The permanency of Bates Pole construction has been one of the reasons for the increased preference shown them by engineers of utility companies.

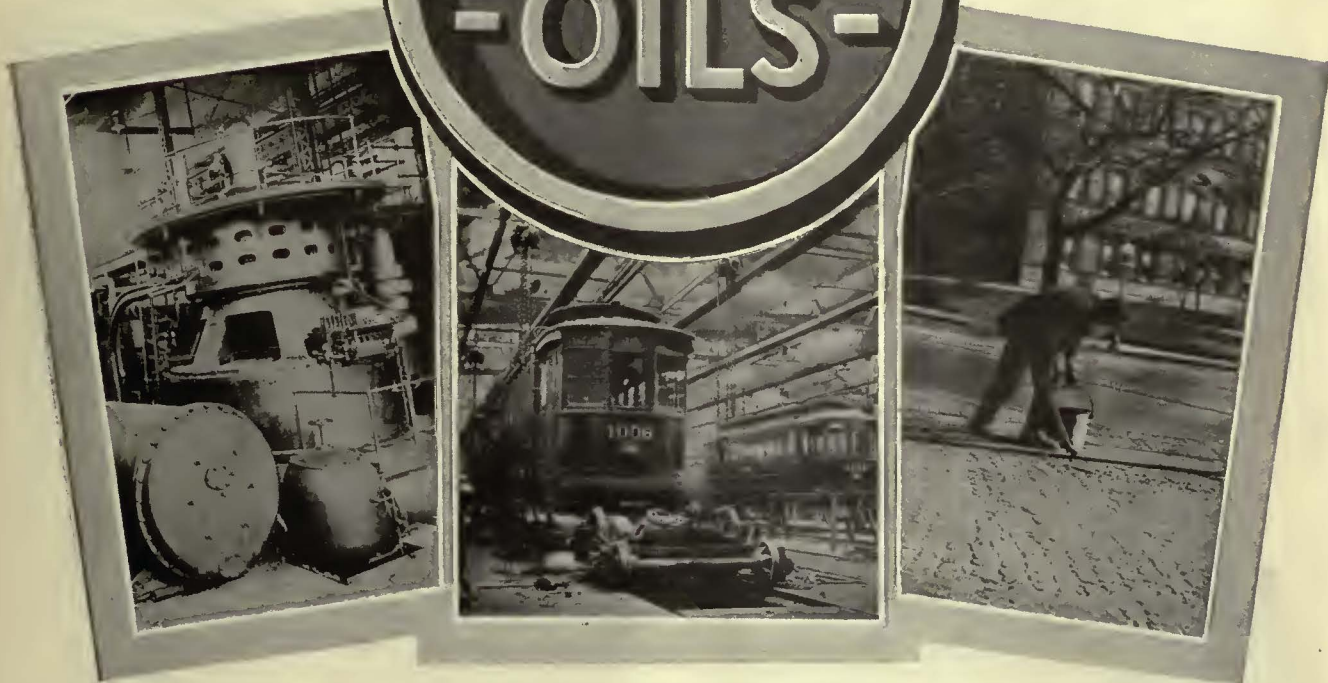
Bates Poles outline the bond issues that buy them!

Get a Bates Pole quotation on *your* current pole requirements for comparison and consideration.

Bates **E**xpanded **S**teel **T**russ **C**o.
Illinois Merchants Bank Bldg.
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BATES ONE PIECE EXPANDED STEEL POLES



Power Dept.—Rolling Stock Dept.—Track Dept.

Galena Service centralizes responsibility for lubrication economies

Galena Service does more than supply oil and grease for every railway requirement. It co-ordinates, simplifies and creates economies throughout the whole lubrication problem.

Galena Service affords expert supervision over the supply and use of lubricants from one end of the road to the other.

A Galena contract places responsibility for results on us.

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- Power House Engine Oil
- Power House Valve Oil
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- Track Oil
- Gas Engine Oil
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- Anti-Friction Triple Valve Oil
- Air Brake Compound
- Gear Greases
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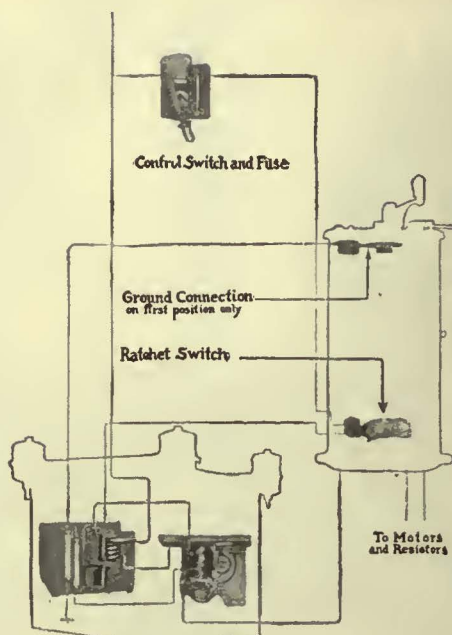
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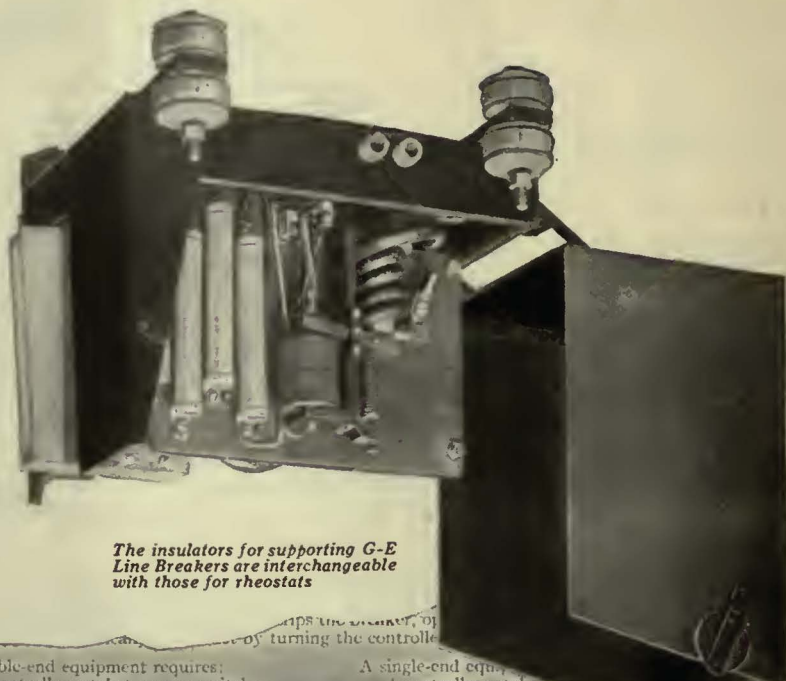
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Line Breaker under the Car Consists of Overload Relay and Contactor with powerful magnetic Blowout



The insulators for supporting G-E Line Breakers are interchangeable with those for rheostats

A double-end equipment requires:
 2 controller ratchet or cam switches
 1 line breaker,
 2 MS-46-H switches, Cat. No. 194945
 2 fuses, 10-amp., Cat. No. 34995 for control switch,
 250 feet 19/25 B.&S. cable.

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 1 line breaker,
 1 MS-46-H switch, Cat. No. 194945
 1 fuse, 10-amp., Cat. No. 34995 for control switch,
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Type and Form	Max. H.P. at 600 Volts	Control Equipment Generally Used with	Net Wt. in Lb. Each	Remarks
A	300	K-6, -8, -10, -11, -12, -27, -28, -35, -36, -40, -63	116	Single breaker
	465	K-64, L-4	200	Two breakers (main contacts in parallel)
	30	K-14	200	Two breakers (main contacts in series)
	450	K-14	250	Two breakers (main contacts in series)

a page from your G-E Catalog



Don't Purchase Supplies at Random

General Electric Company
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Controller Protection

G-E Line Breakers on thousands of cars are keeping controller maintenance costs down to a minimum.

The Line Breaker is for use with drum controllers. It reduces arcing and consequent wear on the controller fingers and segments. It has proved of great benefit also in protecting motors from improper acceleration. Since it is installed under the car it removes the arcing nuisance from the platform.

Another desirable feature of the Line Breaker is that it permits the interlocking of doors through the control circuit.

The operation of Line Breaker Equipment is explained in detail in your G-E Railway Supply Catalog. See page 178.

GENERAL ELECTRIC

New York, March 15, 1924

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Company, Inc.

HENRY W. BLAKE and HARRY L. BROWN, *Editors*

Volume 63
Number 11

Running the Same Old Cars in the Same Old Way

ABOUT the only thing which benefits by being the same today as it was many years ago is some relic of a bygone generation. When a railway man boasts that "We go along in the same old way we have always gone—nothing much that is new or different," it places his company in a class with other antiques. The strange part of it is that some railway executives seem proud to be following such a policy.

It goes without saying that this attitude of pride in being old fashioned is not characteristic of the electric railway industry as a whole. But it is unfortunate that there should be even a few who take that position, because it furnishes ammunition to the critics of the electric railway who decry its usefulness and prophesy its speedy demise.

What a different point of view is that of the president of a railway which recently commenced bus operation. He was asked why the company was planning this move. "Well," he said, "it's something new; that's what the people want. It shows we are doing something besides running the same old cars in the same old way."

Criticism of the railway which sticks firmly to its established customs and makes no changes or improvements is perfectly fair because it is nearly always a question of disinclination to do otherwise rather than inability. That this is so is shown by the fact that it is boasted of, not regretted.

The executive with foresight and courage will find a way to do something new, regardless of the financial condition of the company, and usually such improvements will pay for themselves many times over.

Contracting for Labor on Annual Output Basis

PERHAPS the most interesting idea to Americans in the review of operations of the combined transit system of Paris on page 415 is the plan of handling the time of platform men on the basis of annual instead of daily or weekly output. The limitations set upon the Paris management because of the legal regulations concerning eight-hour days, forty-eight-hour weeks and twenty-one-day vacations certainly called for ingenuity and mutual good feeling if the undertaking was to be operated without an excessive number of extra men. The plan of contracting for a total annual output goes a long way toward settling this problem in a time when the employment situation made it difficult to employ extras in any event.

In essence, the plan means that a man agrees to work more hours per week in the heavy traffic months, or on the heavy traffic days; and in exchange therefor he enjoys a shorter working period at other times. The natural tendency resulting from this practice is to give the experienced man the opportunity to earn extra money when there is extra work to be done, and, on the

other hand, to permit the management to economize in labor expense during periods when it would not pay to have the men average a legal day's work.

It may be worth some thought to see whether this Paris plan could be put in practice here. It certainly is not fair to have to keep regular runs going full time on the duller days simply to give the men their guaranteed pay and then, at other times, to have to employ extras with minimum wage guarantee and maximum accident liability. The annual output plan has the advantage of averaging out many inequalities and of proving profitable to both parties.

Make Your Headways Sell Your Service

"EVERY hour on the hour. Your watch is your time-table" is the well-known slogan by which some interurban railways seek to popularize their service. There is an idea in this that street railways might use, too. Of course, an hourly headway is likely to occur only in interurban service, but the same general principle applies with equal force to any other headway except one so short that the public does not have to keep in mind the leaving times of cars.

When the service is infrequent, it should be so operated that railway patrons or the man on the street can easily remember the schedule. For instance, if cars leave a central terminal on a ten-minute headway it is desirable that they should leave at ten, twenty, thirty minutes, etc., past the hour. At other points the leaving times can be remembered quite readily as the cars will leave, say, three minutes later, at thirteen, twenty-three, thirty-three, etc., or some corresponding combination. Freak headways of any sort are undesirable. One car every twenty-eight minutes is not appreciably more convenient from the standpoint of frequency than one car every half hour, and it certainly is much worse from the standpoint of ease in remembering the schedule. A combination headway with a three-minute interval between cars and then a seven-minute interval may pass for a five-minute average headway in the time-table department, but it will not be so considered by the general public.

Undoubtedly great economies in electric railway operation have been accomplished by the scientific scheduling of cars. Careful study by competent men is required to prepare time-tables so that cars will not pull out too early, stay out too long, waste time in excessive layovers, or bunch in the central district. The time and money employed to make accurate traffic checks are well spent.

But after the mathematical analysis of traffic demands has been made, the matter should not be dropped there. The psychological effect on the public

of a change in the headway should be very carefully considered. For example, if a fifteen-minute headway were found slightly shorter than required by traffic demand, the interval should not be lengthened to, say, seventeen minutes. Of course, it sounds absurd to say that any railway would do such a thing as that, even though a car could be saved by the change. The JOURNAL is, however, familiar with a number of systems where just such headways are maintained, and the time-table men feel that they have made excellent schedules. In such a case as that cited, if the headway could be increased to twenty minutes it would accomplish still more saving and make a schedule the public could understand. Every unnecessary car-mile should be cut out of the schedule, of course, but there always must be a certain leeway. Since the idea of the railway is to sell service, economizing should not be done at too great a sacrifice of public convenience. The public needs to be encouraged in every possible way to ride on the railway, and an easily remembered time-table is a factor of no small importance.

Local Citizens in the Directorate an Asset for Syndicate Properties

ABSENTEE management of utilities, particularly of street railways, has long been known to have very distinct disadvantages from the standpoint of public relations. The administrative advantages of syndicate management, which are of course the reason for it, can easily be demonstrated. With the form of organization so often adopted, where the local manager has little authority and has to obtain orders from headquarters even for inconsequential acts, his position is difficult. When a serious local controversy arises some of the local people seem to take delight in attacking the company, because they feel, perhaps, that they are fighting "Wall Street"—because there is no local personality that stands out as representing the company.

Several means have been used successfully by holding companies to overcome this tendency. One of them is to place on the board of directors local men who have the confidence of the public and whose business experience qualifies them to serve. Another plan goes even further, in selecting for the president of the company a local man. The manager, of course, should be a man who, although he may come from outside and be chosen for his ability in operation, will become a part and parcel of the community.

But such things are not always done, even at this advanced stage of the art of maintaining good public relations, desirable as they are. Recently, in an instance where the company needed all the favor it could muster with the local people, the question arose at once, "Who are your local directors?"

The company had none. There was no local banker or merchant or manufacturer, whose standing in the community and whose knowledge of the company's affairs enabled him to speak authoritatively and show the justice of the company's position. There was no local man identified with the management, or who had interests in the company, that would be hurt by unfriendly or unwarranted treatment. The situation, already bad, was made that much harder to handle, and the result was perhaps less favorable than it might otherwise have been. It served to impress on observers again the desirability, in fact the necessity, of having local representation in the councils of the company.

The Habit of Preserving Junk

SOME railway men, it seems, cannot bring themselves to junk old cars as long as there is a dollar of value left in them. When the need for some change is realized, instead of buying new cars, they scheme up some way to rearrange the body, or put two bodies together, and then after a nice paint and varnish job, run the product out on the street as "modern" equipment. And what have they done?

They have increased the original investment in the car by perhaps 100 per cent, considering the price of the car twenty years ago. They have saddled upon themselves the continuance of the high energy and maintenance costs. They have continued the slow acceleration and slow running speed, items which are most costly in the light of present-day wages. They are depriving themselves of the merchandising value of the higher speed and easier riding which would have been effected by the purchase of new cars. And finally, they still have old cars—improved to be sure, but still old.

What may seem at first thought to be an economy, often is a very dear procedure. To spend 20 per cent to 30 per cent of the cost of new cars to rebuild the old ones may cause a company to lose savings which would make a substantial addition to its net, not to try to evaluate the attraction of new cars to riders.

Definite examples of this fallacy have been cited in these columns heretofore. Two more cases, which, incidentally, are from the studies of one who would not profit by the purchase of new equipment, are cited here.

A certain street railway company, had it junked its equipment and bought all new cars, instead of rebuilding, would have saved enough on the two items of power and maintenance alone to have paid for the new cars in five years and thereafter earned 20 per cent on the cost of the new cars. Still this company has not only been rebuilding its old junk, but it has bought a number of cars "unloaded" by some other company and spent a sizable amount in fitting them up.

A certain rapid transit company is planning to spend a large sum in rebuilding old wooden cars for a different manner of operation, while if it were to spend a larger amount for new cars and junk the old ones, the procedure would be twice as profitable to the company, measured in net results.

There are of course exceptions where it may actually be profitable to rebuild old cars. But generally speaking the order of the day is new cars, for it is part of the industry's program of modernization. Furthermore, it is very questionable whether any steps should be taken to perpetuate the operation of wooden cars, in view of the lightness with which steel cars can be built and their greater freedom from serious accidents.

Truth Must Dominate Publicity

THERE is just a little evidence, only recently manifested, that the instrumentality of publicity may be used to put something over that would not bear up under close scrutiny. The industry should jealously watch and guard against any such work, for it will later react to undo much of the good will that has been built. We must not permit anything but honest purpose to be the underlying motive for any of our publicity matter. And we cannot afford to let any unscrupulous person endanger the accepted sincerity of our publicity efforts in general.

Carhouse for 100 Cars at Louisville

New Structure, Which Replaces Carhouse Burned Last Year, Is of Reinforced Concrete with Full Sprinkler Equipment—Through Tracks Facilitate Car Movement—A Novel Type of Double Skeleton Pits and Facilities for Car Washing Are Features

By F. H. Miller

Vice-President in Charge of Engineering, Louisville Railway



Louisville Carhouse from the Corner of Fourth and Avery Streets. A Reinforced Concrete Roof Is Placed Over the Entire Carhouse, but End Doors Are Not Provided

THE Fourth Street carhouse of the Louisville Railway, which recently was put in commission, represents the best thought of the company in the design of a modern fireproof structure for housing approximately 100 cars. Facilities are provided for inspection, car washing and light repair work.

The fire which destroyed a portion of the old carhouse occurred Jan. 15, 1923, and burned thirty-four cars of various types, including twenty-four passenger cars. The fire wall between the brick portion of the old carhouse and frame sheds, combined with a favorable direction of the wind, prevented the spread of the fire, so that no cars were lost other than those housed in the brick portion.

Four days after the fire the fire loss had been adjusted by the insurance company, the burned carhouse had been cleared of rubbish, temporary trolley wires had been erected and a temporary roof had been built over the office, so that the carhouse foreman was back in his old location and the carhouse in use. Deciding at once to rebuild, plans were prepared for the construction of a modern reinforced concrete, sprinkled carhouse, with a separate office and recreation building, the latter being placed on a separate lot owned by the company on the opposite side of Fourth Street. A contract was let for the building March 24, 1923, and the entire construction was finished in October, the office building being opened by a dance given by the Co-operative Welfare Association of the company on the night of Nov. 1.

The south end of the carhouse with its track con-

nections was finished first and that portion placed in use while the north half was being constructed. To take care of the additional car storage required, temporary outdoor tracks were provided on company property several blocks from the carhouse site.

TRACK LAYOUT IS FLEXIBLE

The new track layout is very flexible, as indicated in the larger line drawing. The loop around the office building is used as a terminus for a short line of cars. Cars can enter the house from either direction and, as each track goes completely through, can leave without being reversed. It is also possible to wye cars at either end of the carhouse. This arrangement is of particular advantage when hauling trailers, as is the practice in Louisville.

Due to the narrowness of the street and the special track layout, the ends of the building are set back 45 ft. 9½ in. from the property line. This gives ample clearance within the house.

The construction is reinforced concrete throughout, except the walls, which are of brick. No doors have been placed at either end of the carhouse, but provision has been made for installing gates in case they are deemed necessary. This has been provided for by inserting steel angle supports for hinges in the vertical concrete columns. Some saving was made by utilizing the east wall of the old brick carhouse in the construction.

A row of small rooms and bins has been built along the entire west wall of the carhouse. These provide a shop office, a room for the motor inspectors, wash-

Some Views of the Louisville Carhouse and Headquarters Building

No. 1. The office building is directly across the street from the carhouse.

No. 2. The double pit has a concrete walkway in the center between tracks, with open space beneath.

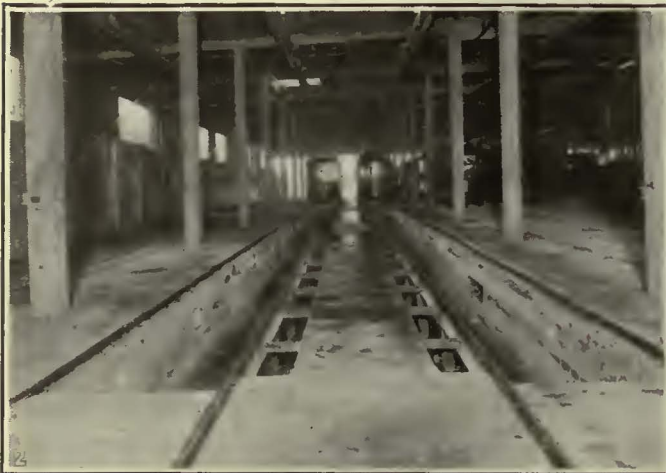
No. 3. The sprinkler system is directly beneath the roof and the trolleys are carried in wooden troughs.

No. 4. The foreman's office is light and cheerful.

No. 5. The reporting room for the platform men.

No. 6. Pool tables are provided in the recreation room for trainmen.

No. 7. The second floor provides a basketball court and assembly room.



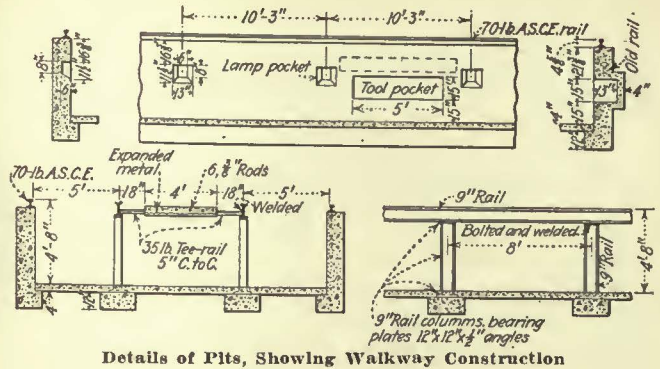
rooms and toilets for men employees and women car washers, also for storage of various kinds. Space is given for drying and storing sand, coke and salt. Steel sash are used in the windows.

The roof is of reinforced concrete construction, supported on reinforced concrete pillars spaced between the tracks. The roof is covered with 4-ply Trinidad Lake asphalt felt. A number of skylights in the roof provide light and ventilation.

Fire protection for the entire building is obtained by the dry-pipe sprinkler system. There are 1,486 sprinkler heads spaced beneath the roof, instead of at car height. This places them out of danger of being struck by trolley poles. Sprinkler heads are not provided in the pits.

The arrangements within the carhouse are shown in the larger line drawing. There is one pit of ordinary type, 150 ft. long, on track 8. Two double pits of novel construction are under tracks 2 and 3 and 10 and 11. These pits, shown in the accompanying illustrations, are arranged in such a manner as to give a free space on one side of each of the two adjoining tracks. This is accomplished by supporting the track rails on vertical columns made of old 9-in. girder rails. Cross members of 35-lb. T-rail tie the adjacent track rails together and form the beams for a reinforced concrete walkway midway between the two tracks of the pair. The steel members are bolted and welded top and bottom. The pits are 4 ft. 8 in. deep from the top of the track rails, which leaves a free space beneath the concrete walkway of approximately 3 ft. 10 in.

In addition to lamp pockets along the walls of the pits, a novel feature is the inclusion of tool pockets,



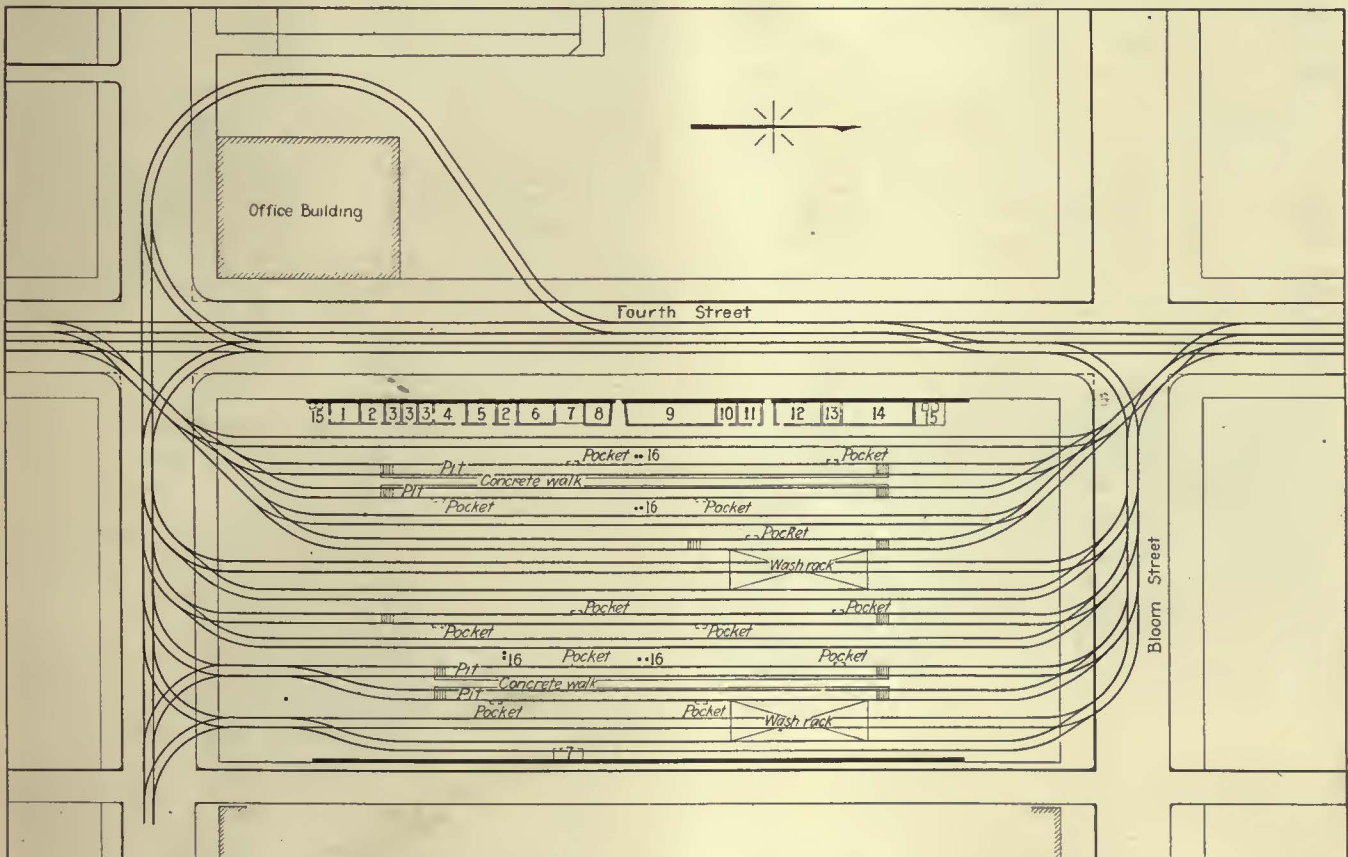
Details of Pits, Showing Walkway Construction

providing places where the workman may leave his tools out of the dirt and moisture of the pit bottom. There are four of these pockets, two on each side of a double pit, the nearest one being approximately 20 ft. from the steps at the end. The lamp pockets are spaced 10 ft. 2 in., giving ample lighting at all points beneath the cars.

The floor of the carhouse is paved with 1½ in. of Tarmac placed on old macadam ballast which had previously been thoroughly tamped and rolled. Relaying rails are placed on creosoted ties for the trackwork inside the carhouse. Inside drainage is provided by frequent cesspools connected to 8-in. wrought iron drain pipes which connect with the city sewers.

The carhouse is piped for both hot and cold water, and a number of taps for each are provided at convenient points.

A car washing system is being installed at two locations within the carhouse. With this arrangement,



Floor Plan of New Louisville Carhouse

- | | | | |
|--------------------------|-------------------------------------|-------------|----------------------------|
| 1—Office. | 5—For men car washers. | 8—Kindling. | 12—Motor inspector's room. |
| 2—Storage. | 6—Salt. | 9—Sand. | 13—Coal. |
| 3—Toilets. | 7—Pit and sprinkler system control. | 10—Rags. | 14—Coke. |
| 4—For women car washers. | | 11—Oil. | 15—Sand and coke. |

cars will be washed by being passed between several vertical streams of flowing water. This system is similar to that used successfully in Detroit and Toronto.

Wooden trolley troughs are used throughout the carhouse, being suspended from the concrete roof by means of $\frac{3}{4}$ -in. rods. Lighting within the carhouse is from the 600-volt d.c. trolley circuit, while the office building across the street is lighted from the local electric light company's service.

The office building, which is directly across Fourth Street from the carhouse, at the corner of Avery Street, has the foreman's office on the first floor. A large waiting and recreation room is provided for the platform men. As shown in the illustrations, this room contains ample facilities for writing reports, and is provided with time-table racks, bulletin boards, etc. There are also two pool tables, a locker room with individual steel lockers for each employee, a shower bath room with extra lockers for the basketball teams and a washroom. The second story is devoted to recreation purposes and has a large floor which is used for games and as a gymnasium. The basketball floor is 40 ft. x 80 ft. with a clear height of 25 ft. This floor is used weekly by the company basketball team, which plays in an industrial league. The employees also hold dances there monthly.

The basement, which goes under only a portion of the building, provides space for a heating plant and coal storage.

Snow Scrapers on Heavy Freight Car

BECAUSE of lack of business due to auto truck competition, the electric express department of the Union Street Railway, New Bedford, Mass., was forced to discontinue operation some time ago. This left the company with several express cars on its hands and no apparent use for them. As they were of heavy tonnage the company decided to try the experiment of equipping them with special snow-fighting apparatus. This was done in different ways on different cars, but the general plan was to place diagonal scrapers on the front and rear ends and wing attachments at the middle of the sides. A typical example of such a freight car equipped



One of Several Express Cars Rebuilt by the Union Street Railway for Use as Snow Plows

for snow-fighting work is shown in the accompanying illustration. These cars have proved extremely effective.

Close supervision over the operation of snow plows during a storm is accomplished by means of a large map showing all the routes of the railway. Yellow headed pins numbered to correspond with the numbers of the snow plows are placed on this map to indicate the position of the different units. The operators of

plows are required to telephone in to the office of the superintendent of transportation whenever they reach a telephone station. The approximate location of every such unit at any particular moment is shown by the pins on the map.

Long Wing Clears Roadway of Snow

AFTER a snowstorm, in order to clear a vehicular roadway alongside of its track and thus provide a place for the operation of automobiles, the Boston & Worcester Street Railway, Framingham, Mass., has equipped a heavy flat car with two extremely long wings. There is a wing on each side of the car ar-



When the Snow Wing on This Car Is Swung Outward to the Maximum a Roadway of 22 Ft. Can Be Cleared

ranged to swing outward to the right from the front end of the car, regardless of the direction in which it is going. The wings are hinged and may be swung outward at varying angles according to the width of the roadway to be cleared of snow. When not in use they are swung in close to the side of the car and hooked up.

Each wing is built of $\frac{5}{8}$ -in. steel sheeting reinforced in back by two 75-lb. rails. Two A-frames, the vertices of which rest in sockets in the side of the car and the legs of which rest against the wings, are used to brace it in its outward position. Frames of different sizes are available so that the position of the wing may be adjusted. Timber is used for these frames, the dimensions depending upon the length and the strain which they have to carry. The wing is 33 ft. long and has a maximum sweep of 22 ft. A minimum space of 4 ft. can be obtained by using the shortest frame.

Because it is of such heavy construction this long wing is difficult to handle. The procedure when it is desired to swing it out into position is first to raise it slightly by means of a block and fall from the supports on which it normally rests. It is then pushed out by hand far enough to clear the supports and dropped down to the ground. The car is backed up and the wing swings out by itself. The two A-frames are then placed in their proper position, after which the wing is tightened up by means of ropes and pulleys.

It is thought by the railway that this car saved its comparatively small cost of construction during the first snowstorm. The clearing of a vehicular roadway alongside of the track has made it possible to keep the automobiles and motor trucks off the railway right-of-way and has prevented many tieups. Public relations also have been improved. It is the practice to clear all streets where the railway operates with this apparatus, the snow being pushed back all the way to the curb. No particular attention is paid to sidewalks, hydrants, etc., in the operation of the car, the clearing of such locations being done later by hand.

Would Speed Up Cars and Stop Jitneys

In Houston, Tex., Shortening of Indirect Railway Routes, the Elimination of Unnecessary Stops and Changes in Car Design to Speed Up Service Are Recommended as the Result of Consultant's Investigation—Jitneys Unnecessary and Elimination Will Materially Aid Railway

ELIMINATION of jitneys on the part of the city, and rerouting, rescheduling and general conservation of time, combined with the use of all practicable operating economies on the part of the Houston Electric Company, are recommended in two reports by John A. Beeler, New York, made for the city. He maintains that the jitney should be limited to fields where it will assist in building up the community rather than to be allowed to operate where it tends to destroy a service which it is economically unfitted to supplant. While showing the city the wisdom of eliminating this unfair competition, the report points out that the solution of present difficulties lies largely within the power of the railway. It must revamp its slow, halting service, eliminate unnecessary stops and delays, and reduce the waste in all factors involving the time element.

As a result of this survey an agreement has been accepted by the city and by the company, as told in *ELECTRIC RAILWAY JOURNAL* of Jan. 26, 1924, which will eliminate the jitneys after April 1. The railway will undertake extensive improvements costing approximately \$1,500,000 during the next three years.

The engineer's report shows that the number of revenue rides per capita per annum per mile of track formerly ran between 3.36 and 3.91, averaging 3.58 prior to 1914. In 1915 when the jitneys began to operate in numbers this factor dropped to 2.13. Since then the riding habit has been unsteady. It rose to 2.78 in 1918, but afterward it fell off steadily until 1922, when it was down to 2.08, or 40 per cent below the pre-war rate. There has been a similar trend in the total number of revenue passengers carried. Had the general traffic trend continued after 1914 as it was from 1903 to 1914, the number of passengers would now be 45,000,000 instead of 31,000,000. The jitney in 1923 was carrying 8,700,000 passengers, bringing up the total to nearly 40,000,000. The fare increase to 7 cents undoubtedly had its effect on the riding habit, but the slow speed of cars is thought to be also to blame.

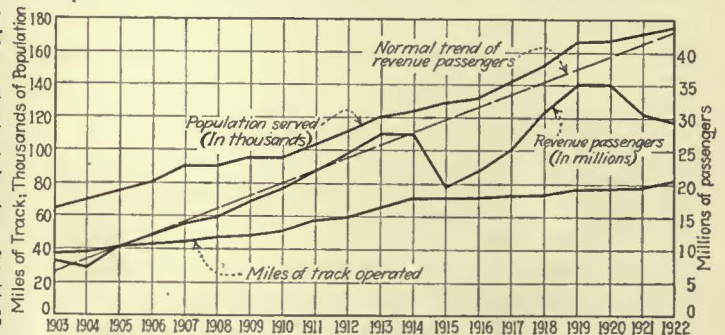
Factors that are contributing to slow speed in Houston are slow loading and unloading due to narrow single doors, waiting at turnouts, too many stopping places, and a large number of positive stops, the report states. The failure on the part of the management and the men to realize the value of the time element in transportation is everywhere in evidence. The value of a second seems to be completely ignored. These valuable time units are being squandered all day long on practically all lines. One of the reasons why the jitney has made such inroads into the railway business is because it saves time.

The operating revenues for Houston are uniformly lower than elsewhere except as measured in earnings per mile of track. The reason for this item being higher is apparently the large amount of single track. This would indicate the need of more double-track lines for two-way operation, enabling the company to make better schedule speed.

At present there are nineteen routes in operation.

Four of these are shuttle lines. Six are routes operating through the business district from one section of the city to another. The through routing is a prominent feature. Favorable conditions for through routes require balanced loading in the two sections and direct-routing. Some of the present lines do not entirely meet these requirements, and suggestions are made in the report for rerouting to overcome this difficulty.

A number of lines operate in one direction only on certain streets, service in the other direction being supplied on a parallel street several blocks away. On one single-track belt line the patrons from some districts ride a considerable distance out of their way on inbound trips. Test rides show that approximately 73 per cent



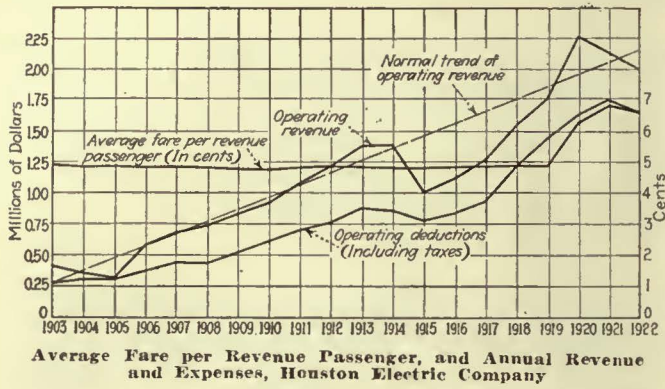
Population Served, Track Operated, and Revenue Passengers of the Houston Electric Company, 1903 to 1922. Passenger Curve Shows Effect of Jitneys, Beginning in 1915.

of the total passengers ride through the terminal on their way to the business district. These people are carried on an average of 1.19 miles out of their way at a loss of eight minutes time.

A routing which will provide an extension of service into some well-settled districts, and give two-way service in some sections now served in only one direction by the present belt or loop lines, would be an improvement over the existing arrangement. The principal changes suggested to accomplish this end are the combination of two shuttle lines with their connecting trunk lines, and the double tracking of certain streets to permit operation in both directions.

The discontinuance and removal of 2.32 miles of track is recommended. This is to be replaced by 3.66 miles of new track consisting of connections for more direct routing, and double tracking for some of the existing single-track lines. The track which is to be removed includes single track which must be taken up for the laying of double track. As much of this track is rapidly approaching a condition when it will have to be rebuilt, the entire expense can hardly be attributed to rerouting alone. The extent of the accrued depreciation would be a renewal. It is considered that it would be advisable to charge the value of all the track that is discontinued to the renewal and retirement fund instead of new capital account.

The running time of a street car is of vital importance to the quality of service. The faster the schedules are, consistent with their being maintained, the



better the service for the car rider and the community in general. Cars are averaging 9 m.p.h., while the jitneys are making 14 m.p.h. Every practicable thing should be done to minimize the delays and speed up the service. The running time on most of the lines in Houston is too slow. Some have a long layover, much of which is killed along the route to the disgust of the patron.

Cars are operated at present on a "stop-at-every-block" policy. The number of passenger stopping places under the arrangement is about sixteen to the mile. In Houston an average of 6.28 stops per mile are made during the middle of the day, and 6.83 per mile during the rush hour.

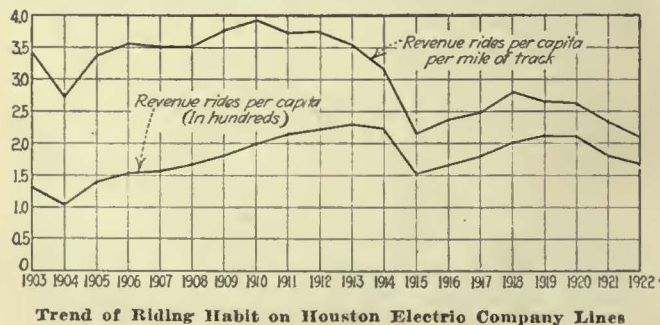
The report states that a complete revision of stopping places is hardly justified, but that readjustment is needed in some sections where the spacing is altogether too close. Care should be taken to have the stops located in the most advantageous places. A stop should not be made on a single track if there is a possibility of one on double track serving approximately the same location. By this means cars moving in the opposite direction would not be delayed.

At certain points positive stops serve a useful purpose. It is common practice, however, to have positive stops ordered for various reasons which have little or nothing to do with safety, and sometimes they are enforced long after the disappearance of conditions for which they were installed. Houston has an excessive number of positive stops.

Boulevards are important arteries of passenger travel, but the number of persons in automobiles accommodated by requiring every street car to stop before crossing is small compared with the number of car patrons discommoded by the practice.

Positive stops are made at street car intersections by cars approaching on all lines. This is unnecessary as the more important lines can be given the preference and the other lines required to observe the stop. Such a procedure would speed up considerably more than half the cars, with no reduction in safety.

At all street intersections in the business district



positive stops are required. This applies even when the signal lights show "clear." While it is true that a car is usually obliged to stop at each of these intersections to load or unload passengers, this does not entirely justify the practice, because it is the occasional time gained when having the right-of-way that enables the cars to keep on schedule.

Double berthing should be employed at all important stops in the congested districts and at the heavier outside loading points. This is not now practiced, although when two or three cars are standing at the same stopping place they all load and unload simultaneously. However, when the first car pulls out the second car frequently goes forward and stops again for additional passengers. When the second car moves ahead after taking on and discharging passengers it should proceed without stopping a second time.

Every one-man safety car in Houston is provided with a single door at the front end. Only one line of passengers can load or unload at a time. It is not uncommon during the rush hour to see a car stand ninety seconds or longer at a single stop. In the business district where the congestion is greatest and where there is the greatest necessity of keeping cars in motion, the most time is taken up in the interchange of passengers. Every possible means should be used to reduce the length of stop. Test rides indicate that the average length of passenger stop is slightly more than eleven seconds. With a car making six stops per mile it means that with every second reduction in the average length of stop, the speed can be increased one-eighth of a mile per hour.

All of the large double-truck Birney cars should be remodeled so as to provide separate entrance and exit facilities at the front end, and a single entrance or exit at the rear. With such an arrangement and with the use of street collectors, loading and unloading in many instances would be accomplished in a third of the time that it takes at present.

At the more congested corners, young, energetic men should be stationed to sell tickets, collect fares, and assist passengers. With the larger cars remodeled and equipped with doors at both ends, these street collectors can let passengers in the rear door in the case of the safety car, or in the front door on the two-man car.

One source of delay to street cars and vehicles alike is angle parking in the congested district. In many places this forces moving vehicles on the car tracks and interferes seriously with the movement of all traffic. The parked cars backing out into the street are a source of great danger. For safety and speed in transportation, angle parking should be discontinued on all streets on which there are car movements. Of course, parking opposite a car stop should be prohibited throughout the city.

The effect of the proposed changes in routing and headways will reduce the number of cars needed.

NUMBER OF CARS		
	Present	Proposed
A. M. rush period.....	158	147
Non-rush period.....	90	83
P. M. rush period.....	174	152
Night.....	73	68

The proposed schedules result in a total saving of seven base and twenty-two rush-hour cars, and the proportion of one-man cars is greatly increased. About 27 per cent of the cars are now operated with two men. Careful investigation indicates that one-man operation can be extended further, thus increasing the efficiency.

With a single exception, all lines should operate one-man cars regularly.

A summary of the car-hours and car-miles present and proposed follows:

	Car-Miles		Car-Hours	
	Present	Proposed	Present	Proposed
Two-man cars.....	3,984	1,300	464	155
One-man cars (single-truck).....	8,709	8,587	1,030	935
One-man cars (double-truck).....	5,349	7,720	540	762
All cars.....	18,042	17,607	2,034	1,852

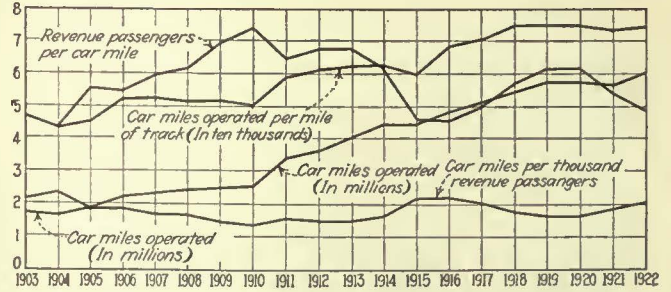
This is a saving in car-hours required of 182 daily, and 309 car-hours now operated with two-man cars will be replaced by one-man cars. There will be a reduction of 435 car-miles daily because of the better distribution of service. There will be an actual extension and increase of needed service. The waste mileage will be eliminated, several of the routes will be shortened, two-way service will be provided in a number of places where there is only one-way operation at present, and the rush-hour cars will be better distributed to meet the demands under the proposed plan.

More than 33 per cent of the revenue passengers carried by the Houston Electric Company make use of the free transfer privilege. Such a proportion is unusually large for a system with so many through lines, and one with practically every line entering the business district. Many people do not hesitate to use transfers improperly obtained or that have expired. The railway is thought to be largely to blame for the abuse of the transfer privilege because of the laxity of the system employed. It is recommended that a new type transfer be adopted and that the issuance and acceptance of transfers be carefully inspected.

FINANCIAL ASPECTS OF RECOMMENDATIONS

The consultant states in his report that in order to bring the plant up to the highest degree of operating efficiency needed, some \$163,000 will have to be spent for trackwork, and fifteen modern double-truck one-man cars purchased at a cost of about \$12,000 each or a total of \$180,000. This means a total immediate expenditure of \$343,000.

As all of the new cars are replacing old equipment unfitted for present operation, their entire cost should be paid out of the renewals and retirements reserve. The cost represented by the track that is retired by the new trackwork should be charged to the renewals and retirements reserve. This amounts to \$93,000,



Service Rendered by Houston Electric Company. Total Car-Miles Operated, Car-Miles per Mile of Track and per Thousand Revenue Passengers, and Revenue Passengers per Car-Mile

leaving about \$70,000 which should be charged to capital. At 7 per cent this will increase the annual interest charges \$4,900.

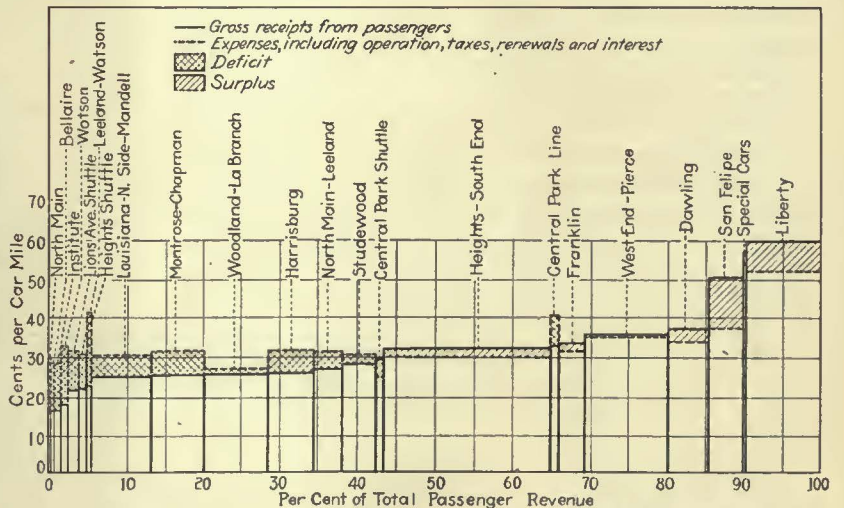
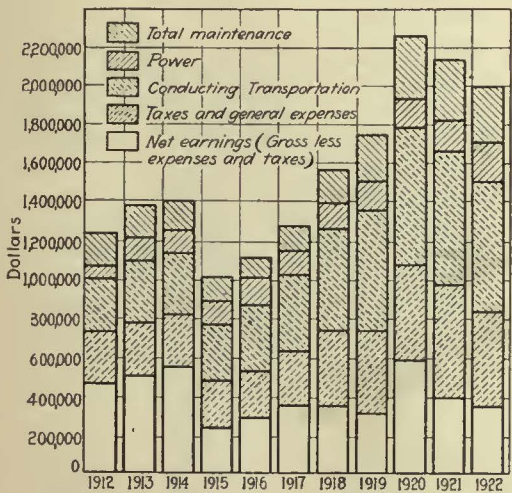
In order to determine the reduction in operating expense due to the fewer car-hours required, an estimate was prepared of the cost per car-hour. With the changes as proposed effective, the total annual reduction in expenses that should accrue are as follows:

309 car-hours daily changed from two-man to one-man operation, 309 x \$0.741, equals \$229 daily; or yearly, \$229 x 365.....	\$83,500
95 one-man single-truck car-hours saved daily, 95 x \$1.277, equals \$121 daily, or yearly, \$121 x 365.....	44,300
Equivalent of eighty-seven one-man double-truck car-hours saved daily, 87 x \$1.598, equals \$139 daily, or yearly, \$139 x 365.....	50,700
Increased revenue by improved transfer system.....	65,000
Total savings.....	\$243,500

Complete accounts for 1923 beyond the five months ending May 31 are not available at this time, but judging from last year's accounts, these five months may be taken as representative of what may be expected for the entire year of 1923. The total revenue will be about \$2,042,000, an increase of \$40,000 over last year; but operating deductions, including taxes, will increase from \$1,659,000 to \$1,683,000, leaving net earnings of \$359,000. After interest and amortization charges of about \$232,000 are paid off, a surplus of \$127,000 will remain for renewals and dividends on the capital stock.

The statement below shows these figures in comparison with the estimated results with the proposed plan in operation for the year.

	Present Operations	Under Proposed Plan
Operating revenue.....	\$2,042,000	\$2,107,000
Operating expense.....	\$1,538,000	\$1,360,000
Taxes.....	145,000	145,000
Operating deductions.....	\$1,683,000	\$1,505,000
Net earnings.....	\$359,000	\$602,000



Left—Distribution of Revenue Since 1912. Right—Receipts and Expenses per Car-Mile by Routes. This Gives a Complete Picture of the Difficult Situation Confronting the Houston Electric Company in the Face of jitney Competition

It is also pointed out that without jitney competition, the gross revenue of the railway for 1923 would probably be about \$2,250,000 instead of \$2,042,000.

HOW THE JITNEY AFFECTS THE SITUATION

Jitney competition began in 1914. Its effect on the railway revenue can be seen by the drop in revenue during the later years. At the present time the city is served by a dual transportation system comprising nineteen electric car lines and eight jitney lines. The jitney lines all operate between near-by residential sections and the business district and in nearly every instance along or parallel to the railway lines. The type of jitney employed is the ordinary Ford touring car.

The investment actually represented in the make-up of the two systems is assumed by the engineer to be as follows, that for the jitney, with garage and shop facilities, being estimated at \$1,000 for each vehicle in service:

INVESTMENT COMPARISON IN RAILWAY AND JITNEY		
	Railway	Jitney
Investment represented.....	\$6,000,000	\$150,000
Investment per capita served.....	33.52	.83
Investment per dollar of annual revenue.....	3.00	.29
Investment per thousand revenue passengers.....	193.00	17.23
Investment per thousand seat-miles operated annually.....	23.00	5.86

The following comparative figures give a good idea of the annual volume of business handled under present conditions:

PASSENGERS CARRIED			
	Railway	Jitney	Total
Revenue.....	31,000,000	8,710,000	39,710,000
Transfer.....	11,450,000		11,450,000
Total (including free).....	42,800,000	8,710,000	51,510,000

Of the 39,710,000 revenue passengers, the jitney carries 8,710,000, or 22 per cent. Out of the grand total of 51,510,000 passengers, which includes transfer and free passengers, the jitney carries but 17 per cent, while it receives passenger revenues of \$522,600, or 21 per cent of the combined revenues. The service conditions may be briefly summarized as follows:

COMPARATIVE SERVICE CONDITIONS, RAILWAY AND JITNEY		
	Railway	Jitney
Active cars in daily service.....	174	150
Car-miles run annually.....	6,525,000	6,421,000
Car-hours per annum.....	719,800	454,913
Average passenger seats per car.....	40	4
Seat-miles in millions per annum.....	261	26
Average speed, miles per hour.....	9.1	14.1
Miles per day per car.....	103	117
Miles per annum per car.....	37,550	42,800
Seat-miles per revenue passenger.....	8	3

While the total mileage is about equally divided between jitney and railway, the latter with greater seating capacity is transporting five times as many passengers as the jitney, and is giving 261,000,000 seat-miles as against 26,000,000 for the jitney. The number of seat-miles furnished per each revenue passenger, namely, eight and three, respectively, shows that the railway is furnishing 166 per cent more transportation service than the jitneys. This is partially due to the longer haul on the railway line and partially to the greater seating capacity of the railway cars. The speed of the jitney, viz., 14.1 m.p.h., is its greatest advantage to the patron, being 55 per cent faster than the railway, resulting in an average saving of about four and one-half minutes per trip. Some idea as to the relative operating features of the two methods of transportation may be gained from the following:

OPERATING FEATURES COMPARED		
	Railway	Jitney
Revenue per car-mile, in cents.....	30.7	8.0
Revenue per car-hour, in cents.....	278	115
Total passengers per car-mile.....	6.58	1.36
Total passengers per man-hour.....	60	19
Man-hours required per thousand seat-miles.....	2.7	17.7

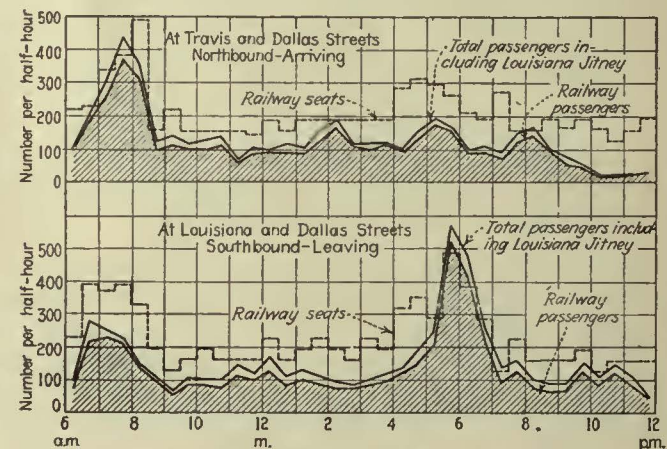
The jitney, operating in uniformly well populated districts, on a short haul basis, and making better speed, is earning \$1.15 per car-hour, or nearly 40 per cent as much as the railway, while the earnings on a car-mile basis are 8 cents, or slightly less than one-fourth that of the railway. The fact that the jitney requires 17.7 man-hours to render a thousand seat-miles as against 2.7 for the railway, or 550 per cent more, shows huge waste of man-power by this method.

Although on some routes the jitneys run on an average of one minute apart during the rush hours, the individual is not always benefited. Often all available seats are occupied and prospective passengers are kept waiting. This type of vehicle provides only four regular seats but loads of nine or more passengers are not uncommon. The extra passengers sit upon or lean against the doors.

Passenger fares, length of trip and rides, and rates are compared below:

LENGTH OF RIDE AND RATE OF FARE		
	Railway	Jitney
Cash fare, in cents.....	7.00	6.00
Ticket rate, in cents.....	6.25	6.00
Average receipts per revenue passenger, cents.....	6.45	6.00
Average length of one-way car trip, in miles.....	5.37	2.62
Average rate of fare per trip mile, in cents.....	1.20	2.30
Average length of ride per revenue passenger in miles.....	2.83	1.96
Average rate of fare per mile of passenger ride in cents.....	2.28	3.06

Although the cash fare on the jitney is 1 cent less than on the railway, the actual rate per mile of passenger ride is greater on the jitney. The jitney rate of



A Comparison of Railway and Jitney Seats Provided, and the Loading of Each

This is for a competitive railway and jitney line and is typical of the study made for each line. The graph shows that the railway provides enough seats to accommodate both jitney and railway passengers at nearly all hours of the day.

3.06 cents per mile, applied to the railway passenger on the basis of his present average length of ride, would cause him to pay 8.67 cents. On the other hand, were the railway rate of 2.28 cents per revenue passenger-mile applied to the jitney passenger, a charge of 4.47 cents would result. The jitney rate is thus seen to be 34 per cent higher than the railway rate when the average distance actually traveled by the revenue passenger is taken into consideration.

In conclusion the report states that jitney operation has no place in mass transportation or where congestion is acute. Jitney routes should not parallel or run along railway routes where the service furnished is adequate. Where unnecessary duplication of transit facilities or service is maintained an economical rate of fare cannot be maintained for long. To continue such a practice indefinitely will involve the community in an unnecessary and wasteful expense that must eventually be paid for by the users in some form or another.



Railway Buses and Cars Operate Side by Side on Broadway, Providence

"Four-Track" Operation in Providence

Co-ordinated Service, with Buses Carrying the Local Passengers and Cars Running Express, Has Enabled the United Electric Railways to Reduce by Five Minutes the Running Time to Olneyville Square—Joint Operation Necessitates New Methods of Snow Removal

BY THE unusual expedient of inaugurating bus service parallel to and on the same street with its regular car service, the United Electric Railways, Providence, R. I., has increased its net income and gained much public good will. For several years there was a persistent demand from the residents of suburban communities, particularly in the district beyond Olneyville, for more rapid transportation. At that time the company was operating both local service in the city and through service to the outlying communities via Broadway. The complaint was that the many stops made to care for the short-haul passengers were a source of serious delay to the through passengers. Complaint was made also that on an inbound car the local passengers had no chance whatever of securing seats, because they were all occupied by the through passengers boarding at points beyond Olneyville, before the car reached the city limits.

One way that was suggested to remedy this was to build passing tracks alongside the existing double tracks to permit the operation of express cars which could then get ahead of the locals. It was felt by the company, however, that such a solution of the problem would involve considerable expense and would present serious operating difficulties. Instead of installing passing tracks,

therefore, the railway decided to carry the local passengers by bus and operate all electric cars express to Olneyville Square. A summary of the proposed plan was given in *ELECTRIC RAILWAY JOURNAL* for Feb. 17, 1923.

A combination of two favorable circumstances made it possible to do this successfully. In the first place, the width of the street was sufficient to permit bus operation alongside the track without interfering in any way with the rail operation. In the second place, there is only one heavy traffic street crossing Broadway, so that the express cars can operate reasonably close to their scheduled speed and are not frequently delayed by traffic at intersections. The result has been to reduce the running time between the center of Providence and Olneyville Square, about $1\frac{1}{2}$ miles, from fifteen minutes to ten minutes, and also to provide vehicles which have empty seats available for the short riders.

Bus operation was commenced in May, 1923, and the number of motor buses in service has been augmented from time to time as the traffic has increased. Mack, Republic and White buses seating twenty-five passengers are used. The present schedule calls for $280\frac{1}{2}$ round trips per day, each half-trip requiring approximately eleven minutes. The headway and the number of buses in operation at various hours are shown in the following table:



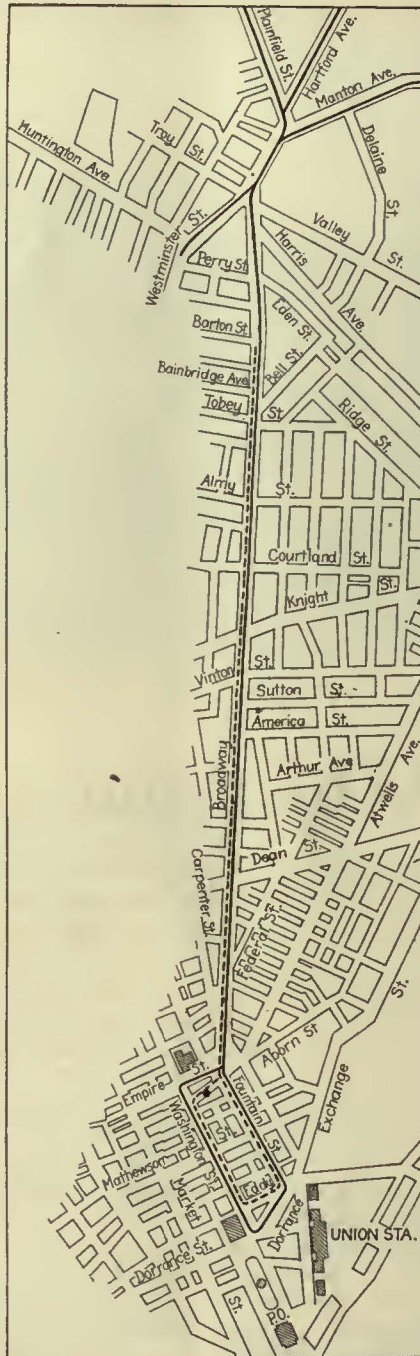
Twin Yellow Bands on the Trolley Poles Mark Bus Stations

	A.M. Rush	All-Day Base	Noon Rush	P.M. Rush
Buses	8	5	6	10
Headway	3	5	4	2½

The former headway with street cars alone was never as short as the present two-and-one-half-minute schedule and was somewhat irregular, because the cars of the several through lines and the short line cars did not divide the intervals evenly. There are 7,013 scheduled seats on the buses both ways each day, and the number of passengers averages 5,500. The outbound bus terminal is about 1,000 ft. short of Olneyville Square, to prevent the crowding of the local buses by passengers to whom the express service is available. The latter people take the cars from Olneyville Square to Providence rather than walk the 1,000 ft. to the bus terminal and the entire bus carrying capacity is therefore available for the short-haul riders. The express cars run between Olneyville Square and Exchange Place, stopping inbound for passengers to alight but not to board, and outbound to pick up but not to discharge.

In the morning the first inbound trip of the buses starts at 5:40 and the last trip at night leaves the center of the city at 1 a.m. The railway express service is operated during the same hours. Between 5:40 a.m. and 11:40 p.m. there is a starter at the inbound terminal. Two men, each working a nine-hour shift, regulate the bus service. They are solely bus men, however, and have no responsibility whatever for railway operation.

The bus stations are closely spaced, averaging only about 300 ft. apart. They are marked by twin yellow bands on the trolley poles, in contrast to the ordinary white band used to designate a car stop. In spite of the frequent stops, however, the buses' average speed for the section along Broadway is slightly over 10 m.p.h.



Solid Line Shows Express Car Route Between Exchange Place and Olneyville Square, Providence. The Local Bus Route Is Shown Dotted

Cars average about 16 m.p.h. through this territory. The company feels that it is undesirable to operate buses at too high a speed, and hence no attempt has been made to shorten their running time. As a result, 995,848 persons were carried by buses on this route during 224 days of 1923 without injury to a single passenger. The bus-miles per accident have been nearly double the average car-miles per accident.

A 6-cent fare is charged on the buses. Nine metal tickets are sold for fifty cents, the same as on the cars. Payment is made by inserting the ticket in a Rooke register, or when cash fares are paid a nickel is inserted and a penny handed to the operator. Each operator must turn in as many pennies as there are nickels rung up on his register. Transfers good on car lines other than those operating on the same street are issued by the bus for 2 cents. Fare collection is pay-enter inbound and pay-leave outbound.

PARALLEL OPERATION BRINGS PROBLEM IN SNOW REMOVAL

An interesting phase of the situation created by the operation of buses and cars on the same street concerns snow removal. It was originally felt by the railway that the best plan would be to pile up the snow on the left of the vehicular roadway and on the right of the trolley track, thus making one large pile between the two lanes. There were two reasons for following this procedure. In the first place it enabled the buses to draw up close to the curb and in the second place it was thought that it would be possible to clear a wider roadway.

In practice it was found that the plan worked out nicely until the ridge of snow began to thaw and water run across the pavement to the curb. In this way the vehicular roadway



Railway Sweepers Pile the Snow Beside the Tracks and the Buses Push It Back to the Curbs

became covered with water and when the temperature fell considerably at night the water froze and made a slippery coating on the pavement.

Another disadvantage of piling the snow in the middle of the street was the necessity of opening aisles for electric car passengers to board and alight. The advantages, on the other hand, were the complete clearing of the gutters, which permitted the buses to draw up to the curb; the clearing of lanes to the sewer catch basins, permitting rapid drainage, and, most important of all, the segregation of traffic so that motor vehicles were forced to keep off of the car tracks.

What finally proved to be the greatest disadvantage of all was that the truck drivers turned into the piles in order to pass parked automobiles and spread the snow all over the vehicular roadway. This necessitated abandoning the plan altogether and pushing all the snow over to the curb. Had sufficient space been available for trucks to turn out without cutting into the central piles, the other disadvantages would not have been sufficient to cause the change. In spite of the fact



Slump Test Determines Proper Moisture for Concrete

Although It Has Not Yet Been Widely Adopted by Electric Railways, This Has Been Found to Be a Satisfactory Method of Regulating the Consistency

THERE is wide variation among different railways in the amount of water used in mixing concrete for track construction work. In general, the tendency seems to be to use a rather wet mixture. It is claimed that the loss of strength due to the pressure of excess water is compensated by the greater ease of working a wet mixture into place. Regardless of how wet it is desired to have the concrete, it is ordinarily desired to have it uniform for jobs of the same kind.

Because of variation in the moisture content of the material constituting the aggregate, however, the exact amount of water that will be required for a given



At Left—For Hand-Finished Paving Such as This a Greater Slump Is Permissible. At Right—A Moderately Dry Mixture of 1:2½:5 Concrete on Harrisburg, Pa., Track

that the United Electric Railways has abandoned the central piling scheme on Broadway, Providence, the company feels that this plan is theoretically a sound one. If Broadway were slightly wider than its present width of 50 ft. from curb to curb, it is thought that the central piling would have been entirely successful.

Financially, bus operation has been very satisfactory. The withdrawal of local cars from Broadway saves the railway considerable money. Against this economy the cost of bus operation to supply the local service is less than similar rail operation would be. As a matter of fact, more passengers are now being carried by cars and buses than were formerly carried by the cars alone.

Large Shop for Brooklyn

PLANS are being prepared for large repair shops for the Brooklyn Manhattan Transit Company. They will be located between the Sea Beach right of way on the west, Shell Road on the east, Avenue X on the north and Coney Island Creek on the south. This tract comprises about 60 acres, and the city has already taken title to it for the purpose of the erection of these shops. It is said that the total investment, after their completion, will be in the neighborhood of \$10,000,000 and that they will be the largest electric railway repair shops in the country.

concrete mixture and a given consistency cannot be specified in advance. There may be already so much water in the aggregate that the amount of mixing water necessary is considerably reduced. Fine sand or small pebbles will usually require a greater quantity of water than coarse sand or large pebbles. The quantity of mixing water recommended by the Portland Cement Association is given in an accompanying table.

Water is mixed in concrete for two purposes, namely, to hydrate the cement and to produce a convenient

APPROXIMATE QUANTITY OF MIXING WATER REQUIRED FOR CONCRETE

Cement	Mix Volume of Aggregate After Mixing	Approximate Mix as Usually Expressed		Water Required (Gallons per Sack of Cement)		
		Cement	Fine Aggregate	Coarse	Minimum	Maximum
1	3	1	1½	2½	5	5½
1	4	1	1½	3	5½	6
1	4½	1	2	3	5½	6½
1	5	1	2	4	6	6½
1	6½	1	2½	5	7½	7½
1	7½	1	3	6	8½	8½

consistency. From the point of view of strength it is desirable to use as little water as possible. On the other hand, it is difficult to work a stiff mixture into the crevices around the ties and rails where concrete is used for track foundations.

A good way to regulate the consistency is by means of the slump test. By this means the amount of mixing water used in the concrete can be carefully con-



The Settlement of the Concrete Is an Accurate Indication of Its Consistency

trolled. A sheet metal form, shaped like the frustum of a cone, 4 in. in diameter at the top, 8 in. at the bottom and 12 in. high, is the principal item of equipment for this test. A pointed metal rod $\frac{3}{8}$ in. in diameter and 21 in. long is also needed.

To carry out the slump test this form is filled with the concrete to be tested. It is placed in layers about 4 in. deep and worked around with the metal rod. The specifications of the American Society for Testing Materials state that in order to secure uniform results each layer should be rodded exactly thirty times. The form is then immediately removed and the settlement of the concrete is measured.

A mixture having a slump of only $\frac{1}{2}$ in. to 1 in. contains about the right amount of water for maximum strength, but is rather thick for practical purposes. For most work a slump of 2 in. would not be too much. For hand-finished paving as much as 4 in. is permissible.

Batches should be tested from time to time and the quantity of water increased or decreased according to the amount of slump. If this is done the strength of the concrete can be controlled.



This Wet Mixture Is Used by the Northern Texas Traction Company Preparatory to Laying a Brick Pavement

Supplying Coal for Car Heaters

BY P. V. C. SEE

Superintendent of Equipment,
Northern Ohio Traction & Light Company, Akron, Ohio

TAKING care of the hard coal heaters in 175 cars by the method described below has cut the force handling the fires from ten men to six men and resulted in a far more satisfactory firing service. On the lines of the Northern Ohio Traction & Light Company handling heater coal has been quite a problem. Since the ground is uneven and the car storage space limited, the wheeling of the coal in wheelbarrows through the long lines of cars and then shoveling it into buckets that had to be carried into the cars took considerable time and labor. This method was unsatisfactory, and sometimes the bins on the cars were not filled up.

After a study was made at the company's Kenmore shop it was noted that in bringing the cars into the carhouse they all passed around a loop and then backed into the carhouse. Advantage was taken of this and a coal storage bin was constructed at the leaving point on the loop. This coal bin was built with chutes that could be opened so that the coal would run out into the buckets. A weighted cut-off door was installed on each chute, so that the coal handler could fill the buckets as rapidly as he could handle them without having to do any shoveling.

As each car comes in for the night, the handler has ready six or seven full buckets of coal, which he passes



Coal-Handling Equipment for Supplying Car Heaters

to the crew, who dump them into the car coal box, completely filling it up. He is able to fill the cars as fast as they come around the loop, holding them scarcely a minute, so that when the cars are all in they are all completely coaled and there is no necessity for wheeling or handling during the night.

To accomplish this an electric portable coal handler was purchased, costing in the neighborhood of \$600. This greatly facilitated the unloading of the hopper bottom coal cars. The device will unload a 100,000-lb. capacity coal car in two hours. The bottom of this portable conveyor is pushed under the bottom of the car and the pockets dumped. The conveyor then lifts the coal up and throws it about 10 ft. from the car, so that very little shoveling is needed. The same conveyor is then used to pick the coal from the ground and put it into the top of the coal bin.

Since this system has been installed, even with a reduced number of men, there have been no complaints of fires not being in good shape. The car coal box is loaded and the stove is clear of ashes in the morning and ready for starting a new fire.

Economic Problems of Car, Bus and Boat Transport in Paris*

The Management Corporation of This State-Owned System Earns Slightly More than Government Bonds of the Day—Important Improvement Is the Truckless Car—Consolidation Improves Car-Use Efficiency—Contracts Are on Annual Output Basis to Reduce Extra List While Holding to Principle of Forty-Eight-Hour Week

THE Aug. 5, 1922, issue of the ELECTRIC RAILWAY JOURNAL carried a detailed description of the state purchase and consolidation of the surface transit facilities of Greater Paris, which had been leased to a private management company while the property remains under state regulation and ownership. The agreement became effective on March 4, 1921. The following account shows how this unusual combination of state ownership and private management with bonus provisions has worked out during its first two years.

PRE-WAR AND MOBILIZATION DAYS

In the period of 1910-1914 operating conditions were so favorable that the trolleys were able to make a fair return on distance fares of 10 and 15 centimes (then 2 cents and 3 cents) second-class and 15 and 20 centimes (then 3 and 4 cents) first-class. The motor buses, following improvements in engines and tires, became profitable about the year 1914. There was every expectation that all would continue smoothly under the agreements made by the private companies of that time with the city of Paris.

Then came the war. The entire motor-bus fleet was requisitioned at once by the government in accordance with plans made in 1913. For mass transportation this left the trolleys and boats, except the Metropolitan and North-South subways. At this time the surface transport of Greater Paris comprised ten private companies and one city undertaking as follows:

General Omnibus Company
Paris and Department of the Seine Tramways
General Parisian Tramways
East Paris Tramways
Nogentais Railway
Left Shore (Rive Gauche) Tramways
Bois de Boulogne Railway
Paris-Arpajon Railway
West Paris Tramways
General Paris Steamboat Company
Belleville Funicular Railway (city-owned)

All of these concerns continued operation, although handicapped by labor shortage and scarcity of materials.

COSTS ROSE MUCH SOONER THAN FARES

The war brought an immediate increase in the cost of operation, but it was not until Feb. 8, 1919, that the fares were raised to 20 and 30 centimes first-class and 15 and 20 centimes second-class. Although the density of traffic increased from 6.24 to 9.12 passengers per car-kilometer over the period 1913-1918, the increase in expenses was much greater. For the majority of workers, wages in 1920 were triple those of 1913.

Since expenses continued to go up instead of down,

the year 1920 showed a deficit like all of its war predecessors. Earnings per car-kilometer were 2.18 francs, but cost of service was 2.91 francs. In April, 1920, fares were raised again, making the second-class rates 25 and 35 centimes and the first-class rates, 35 and 50 centimes.

On granting the first increase in fare, the Department of the Seine and the city of Paris made a provisional agreement with the railways that was to hold until Dec. 31, 1920, pending the working out of a permanent plan. Under this agreement the operators were to be allowed a 4 per cent return, and accordingly, a special war deficiency account was set up in the hope that costs would soon go down enough to permit this return to be made out of operating surplus.

THE STATE PURCHASE OF THE RAILWAYS

As private capital did not care to continue in a losing venture, it was necessary for the state to take over the properties and operate them or lease them to a private organization. The latter method was chosen, with personnel drawn largely from the General Omnibus Company, which was the leading organization and which operated both buses and cars. Six companies were in the agreement by Jan. 1, 1921; the boat company by August, 1921, and the Boulogne and Arpajon railways by Jan. 1, 1922. The remaining private company, namely, Western Paris Tramways, continued to operate independently.

Under the plan the operation is conducted for the account of the department, which retains control of fares and service. In consequence all the receipts belong to the department and all expenses are charged against it, and it bears the responsibility for a surplus or a deficit.

For that reason the operating accounts of the property are carried in a "General Management Account" kept by the company and divided into three parts, as follows:

1. Financial accounts (fixed charges, including interest, amortization, etc.).
2. Operating accounts (all receipts and expenditures of operation, direct or indirect).
3. Remuneration for the company.

The remuneration of the operating company is made up of the following elements:

1. A return of 6 per cent on the new capital of 60,000,000 francs.
2. A management premium on all receipts, direct or indirect, except interest on funds invested, of 0.75 per cent on receipts up to 250,000,000 francs and of 1 per cent on anything in excess of that amount.

3. An efficiency premium based on the formula $E = 0.04 (R - 0.65 D)$, in which R represents total receipts from operation and D the cost of service, which includes all fixed charges such as interest and amortization of

*This article is based largely, but not entirely, upon a paper by A. Mariage, general manager of the Paris car-bus-boat combine, read before the Société des Ingénieurs Civils de France, Feb. 9, 1923, and reprinted in the November, 1923, issue of *L'Industrie des Tramways, Chemins de Fer et Transports Publiques Automobiles*.

the purchase sum, war loans (deficiency account) and rehabilitation costs.

Out of this compensation, the company pays its board of directors and some forty-five heads and sub-heads of departments in addition to their salaries. The officials also receive a pro rata share of the economy bonus.

In practice the "operating premium" works out to only 24,000 francs for every 1,000,000 francs addition to the receipts. Furthermore, the department shares in any profits that remain after 8 per cent is paid to the stockholders up to the point where it would be possible for the department to acquire 75 per cent of the surplus.

At pre-war prices, the value of the combined undertakings was 400,000,000 francs. The working capital of 60,000,000 francs supplied, according to the agreement, by the Société des Transports en Commun de la Région Parisienne merely served to care for supplies, pay of personnel and advances to equipment makers. It was not sufficient for general rehabilitation and basic betterments. The allowed return of 6 per cent plus both operating and efficiency premiums was not a sufficient incentive to private capital, as government loans were then paying a better return. For this reason, the Department of the Seine itself made two bond issues at higher rates of interest in order that the company might carry out the improvement program. Thus the ELECTRIC RAILWAY JOURNAL for Feb. 11, 1922, noted that the Department of the Seine had offered a twenty-year, 7 per cent external gold loan for \$25,000,000 in the United States coincident with a similar issue for \$12,500,000 through British bankers. These bonds were offered at 90½ per cent of par. The actual rate of return of 7.78 per cent on these issues almost equals that earned by the company in 1922.

WHAT THE CONSOLIDATION NOW COMPRISES

The society now operates all surface and water transport facilities in Greater Paris exclusive of the Western Paris Tramways and the city-owned Belleville Funicular Railway. The outstanding data, which show its extent, are given in the table in this column.

At this time, power was supplied from three inter-

PARIS SURFACE TRANSPORT, LAND AND WATER ROUTES AND LENGTHS

	Total Equivalent (Single Track)	
	Kilometers	Miles
130 surface car routes.....	970	601.4
53 motor-bus routes.....	335	207.7
4 railways on right-of-way.....	265	164.3
1 steamship line.....	23	14.5
183 routes.....	1593	987.9

ROLLING AND FLOATING STOCK

Motor cars.....	1,779
Trail cars.....	869
Motor buses*.....	1,100
Steam locomotives.....	38
Freight and service cars.....	380
Steamboats (400-passenger capacity).....	49

*By October 1923, there were reported 1,369 four-wheel buses seating twenty-three to thirty-eight with last capacity standard; fifty-one six-wheel, forty-eight-seat buses and six trackless trolley buses.

SHOPS, POWER DISTRIBUTION, OFFICES, ETC.

50 inspection centers, area.....	479,500 sq. meters
5 maintenance plants, area.....	73,200 sq. meters
1 headquarters, area.....	2,400 sq. meters
32 substations, rated capacity.....	62,000 kw.
1 fuel depot, area.....	12,260 sq. meters
Total tank capacity (underground storage).....	1,200,000 liters

TRANSPORTATION STATISTICS, 1922

Vehicle-kilometers for the year.....	135,595,979
Average daily vehicle-kilometers.....	371,500
Passengers carried.....	917,723,323
Passengers carried daily (average).....	2,514,310
Receipts for the year, francs.....	305,801,227
Average daily receipts, francs.....	840,551

connected stations at Vitry, Saint Denis and Billancourt. Eventually, power will be supplied primarily from a central station at Gennevilliers, leaving the present stations for standbys.

As early as 1910, the chief predecessor company operated two-car trains double-end by means of control equipment on the trailer. This arrangement eliminates the necessity of coupling at terminals. Fears with regard to operation around curves and with the trailer at the front of the train have proved groundless.

Although the tramcars that have been standard from about 1913 onward were fitted with light-weight, commutating pole motors and other improvements that made them unusually light in comparison with earlier designs, the management took another step forward in 1921 with its forty-nine-seat "Type L" trackless car (see ELECTRIC RAILWAY JOURNAL, Dec. 2, 1922), in which the principle of separate truck and body has been abandoned in favor of automobile methods of combining chassis and motor. There are two 45-hp. motors per car, bevel-gear drive and band brakes. Empty, this car weighs 11.5 metric tons compared with the 14 metric tons of its predecessor, "Type G," of equal capacity. The weight per seat is 519 lb. against 610 lb. in the earlier type. The new cars have less unsprung weight, less track upkeep, less first cost and 20 per cent reduction in energy consumption. They are to replace existing cars as the latter wear out, or as additional cars are needed.

As regards motor buses, the four-wheelers have been standardized with thirty-eight seats instead of thirty-one or thirty-five. The six-wheel bus (see *Bus Transportation*, May, 1923, and January, 1924) seating forty-eight and intended for operation over the wider streets and boulevards had already been ordered to the number of fifty early in 1922, but the latest news indicates that it is too awkward for wider application because downtown Paris has too many narrow streets.

Without committing itself to the general desirability of using the "national" fuel, industrial alcohol, in preference to gasoline, the management has made tests which prove that so far as propulsion is concerned, alcohol is satisfactory. The company has a department of studies and technical control for research in fuels, carburetors, process of manufacture, drive, etc.

FINANCIAL RESULTS IN 1921 AND 1922

In the year 1920 the Paris General Omnibus Company alone had an operating deficit of 37,000,000 francs; and the grand total loss of the companies now in the consolidation was 70,000,000 francs. In 1921, however, the loss was cut to 21,000,000 francs despite the fact that wages alone were increased by 27,500,000 francs. In 1922, receipts and operating expenses were almost even, the operating deficit being only 689,447 francs. As shown in more detail in the ELECTRIC RAILWAY JOURNAL for Oct. 27, 1923, the outstanding figures for the year 1922 were these:

	Francs
Total revenue.....	303,581,980
Operating expenses.....	304,271,426
Operating deficit.....	689,447
Charges payable by Department of Seine on sinking fund, war fund guarantees, new capital, etc.....	42,600,188
Remuneration to company.....	9,191,355
Add operating deficit.....	689,447
Deficit in true cost of service.....	52,480,970

Of the item "remuneration to company," 3,600,000 francs were merely the 6 per cent return on the 60,000,-

000 francs of new (operating fund) capital; 2,425,158 francs was the management premium and 3,166,177 francs the economy bonus. Therefore, aside from the less than current rate of return on capital, the company received only 5,591,335 francs on a turnover of 303,581,980 or about 1.8 per cent. Its dividend to stockholders came to 8.5 per cent, but as noted previously this is not very attractive when the department's own bonds issued to non-working investors yield 7.78 per cent.

One of the factors that helped to reduce the deficit was the more intensive use of equipment. In 1920, the motor cars were active only 65 per cent of the possible time; 77 per cent in 1921 and 80 per cent in 1922. Trailer effectiveness also rose from 42 per cent in 1920 to 85 per cent in 1922. As a result, the tramways in 1921 carried 5.1 per cent more passengers than in 1920, and because of higher fares earned 16.3 per cent more revenue. In 1922 the tramway receipts were 6.4 per cent higher than in 1921.

RELATIONS OF CAR AND BUS IN GREATER PARIS

In 1921, the cars of the combine ran 85,115,000 km. The buses ran 35,220,000 km., or almost 30 per cent of the total. In 1922, the cars ran 91,817,000 km. and the buses 43,210,000 km., or 32 per cent of the total. In the first six months of 1923, the buses alone ran approximately 24,296,000 km. In 1922, the cars brought 63 per cent and the buses 35 per cent of the revenue. The remaining 2 per cent was almost equally divided between the steam railways and the boats.

In considering these figures, one must bear in mind that in a large portion of inner Paris there is a surface monopoly of the buses; that the underground rapid transit lines are really short-haul distributors of traffic within Paris itself; and that the chief long-haul electric business, paradoxically as it may seem, is done by the suburban tramways.

Perhaps no true comparison of tramway and motor-bus costs is possible under circumstances involving such radical changes in financing, prices and operation. However, the available detail accounts for the year 1921 show that the operating cost per kilometer of cars tending to average forty-nine seats was 2.18 francs, while buses ranging from thirty-one to thirty-eight seats cost 2.47 francs. The fuel costs of both classes of vehicles dropped in 1922, as both coal and gasoline show a decline of about 30 per cent in unit costs.

The receipts per car rider in 1921 averaged 0.33 franc and the density per car-kilometer 7.06 passengers. The corresponding bus figures were 0.36 franc and 6.67 passengers. The tramway receipts for 1921 show an average of 2.12 francs against expenses of 2.18 francs. The bus receipts show 2.54 francs against expenses of 2.47 francs.

While the six-wheel forty-eight-seat bus has been found advantageous from the standpoint of capacity, it is heavier per seat than the other buses. The latest tendency is in the opposite direction of smaller, more mobile units of twenty-three-seat capacity.

Inasmuch as the platform cost is the outstanding factor, although the wages paid are beyond the control of the management, every possible way of saving time to increase revenue-miles per hour must be utilized. One innovation that seems small in itself but which has proved of value from a time and good-will standpoint relates to the police investigation of accidents, such as collisions.

Formerly a good deal of time and ill-will was involved

every time a policeman had to secure from the motor-man his name, run number and other facts which would locate him promptly should he be needed later. Today, each operator carries a card already prepared for quick turn-in to M. le Gendarme! There is no opportunity for argument or embarrassment.

Another step is the Commercial Department (Direction de l'Exploitation Commerciale), whose job it is to make most effective use of the vehicle-kilometers manufactured. The management does not hold that the simple figure of "passengers per kilometer" is a true index of the best use or the proper use of the service. Thus in pre-war days the density averaged seven passengers per kilometer (11.2 passengers per car-mile). During the war with congested conditions this density exceeded nine passengers per kilometer (14.4 passengers per car-kilometer). It is not a high figure due to overcrowding at peaks that indicates efficiency, but a high figure that comes from a good load factor throughout the operating day. Hence the desirability of studying ways and means that will give service in the way most encouraging to off-peak travel and yet cause minimum dissipation of a product which must be either consumed or lost the instant it is produced.

USING THE PLATFORM MAN'S TIME EFFECTIVELY

Besides refraining from charging fares that would discourage traffic, no matter how justifiable in theory, the management has given exceptional attention to efficient use of its personnel within these legal limitations:

The average working week must not exceed forty-eight hours, with one day off in seven.

Platform time is on the basis of an eight-hour day.

The working day must not exceed nine and one-half hours (straight run).

The elapsed-time working day must not exceed thirteen and one-half hours (swings).

Meal times are counted as part of these over-all periods.

Sunday layoffs shall be fairly equal to average weekday layoffs.

Twenty-one days vacation is given in each year with pay, and vacations are to be taken between March 1 and Nov. 1.

Within these limitations, it appears that the management is entitled to a total of 2,360 hours per man in ordinary years and 2,368 hours in leap years. Out of this total it is necessary to build runs that will require as few extras as possible on Sunday, which is the biggest traffic day in Paris (markets are open Sunday mornings, for example) and during the vacation season, which happens also to average more traffic per month than the interval Nov. 1-Feb. 28.

By agreement with the union, the men accept a longer average working day during the vacation season; and likewise they accept a longer period on Sunday than on the other days of the week. Between March 1 and Oct. 31, the average working day is eight and one-fourth hours; while in the non-vacation period, the average is only seven and one-half hours. To take care of the Sunday peaks, the men accept an average week of forty-nine and one-half hours during the vacation season, and in exchange they work only a forty-five-hour week the remainder of the year.

General Manager Mariage states that this novel division of labor time has given a high degree of suppleness to meet variations in traffic. He compliments the union for its understanding of the problems involved.

As for the undertaking as a whole, while naturally desirable to make it pay for itself, he believes the Department of the Seine ought not hesitate to finance further improvements so long as it appears that the general good of the public is served thereby.

Snow Loader Is a Great Labor Saver

One Truck Filled Every Two Minutes Was Average Maintained Over a Period of Hours by Springfield Street Railway During Recent Storm

IN SPRINGFIELD, MASS., there is a mutual agreement between the city and the Springfield Street Railway that instead of removing the snow from between the rails and 18 in. outside of the tracks all over the city, the railway shall remove all of the snow from an equivalent area and for the full width of the street. As a result the snow removal work of the railway is



This Snow Loader and Four Men Clear the Streets More Rapidly than Would a Much Larger Force Working with Shovels

confined to one end of the city, and its force is concentrated, instead of the men being scattered around.

During a snowstorm the railway's plows and sweepers pile the snow in windrows clear of the tracks. When the storm has stopped motor trucks equipped with plows push these windrows back to the gutter. Following the motor truck plow, a Barber-Greene snow loader is put in operation. An attempt is made to keep the snow piles thus pushed back just clear of the gutter, as it has been found that by piling the snow in this manner it is possible to operate the snow loader so that the machine does not rub against the curbstone.

The dump trucks are lined up a considerable distance behind the snow loader facing backward. They back

as the loader moves along, but keep sufficiently far away not to interfere with it or with the truck that is being loaded. The city assigns a policeman to keep vehicular traffic out of the way. As soon as a load is received the belt conveyor of the machine is stopped, the truck starts for the dump and another truck backs into place. The machine is then started again and the next truck is loaded.

The streets from which the railway has agreed to remove the snow vary from 50 ft. to 70 ft. in width. To haul the snow from the street to the nearest dump 5-ton trucks are employed. In the downtown district snow is dumped through manholes of the new Memorial Bridge over the Connecticut River.

The organization for operating the snow loader consists of two men who precede with shovels and throw any loose snow into the general pile, two men who shovel snow into the hopper of the snow loader, one man who operates the machine, and as many motor trucks and drivers as are needed to keep the loader continuously at work. This apparatus has been able to keep seventeen 5-ton trucks busy continuously and have some spare time. A single 5-ton truck can be loaded in about forty-five seconds. Over a period of six hours an average of one truck has been filled every two minutes. During a recent storm one snow loader and four men in Springfield covered one side of a street a mile long in approximately four hours. The Springfield Street Railway has found the apparatus to be very efficient, and it has saved the company considerable money.

Open Cars Converted Into Snow Sweepers

All Equipment Except the Brake Cylinder Has Been Placed Inside—Removable End Panels Facilitate Replacement of Broom Motors—Steel Strips Reinforce the Rattan in the Brooms

EFFICIENT snow-fighting units have been constructed by the Worcester Consolidated Street Railway from obsolete open cars. Eleven sweepers have been built in this way at Worcester and nine more have been built for the Springfield Street Railway. These machines have proved very satisfactory for snow fight-



The Absence of Chains and Countershafts Makes the Interior of This Home-Made Snow Sweeper Convenient and Roomy



The Canvas Screen Is Fastened to a Metal Frame at the Top so that It Can Be Thrown Back When Desired

ing and are considered by the railway to be superior to other types previously used. A double-truck snow sweeper is thought to excel a single-truck unit because it can clean up deeper and heavier snow at greater speed. Moreover, the expense involved in this reconstruction was small.

The body of the sweeper is that of an old fifteen-bench open car which had been shortened 5 ft. at each end. The original trucks were used and on them are mounted G.E. type 67 motors. The broom axles are supported by extensions to the underframe of the car. A heavy tie rod runs from this framework up to the letterboard on each side, along the entire length of the body and down to the frame at the other end. These braces have turnbuckle attachments at the ends, by means of which any drooping of the noses can be prevented.

Each broom is driven independently by a G.E. type 67 motor. Gear drives manufactured by the Russell Car & Snow Plow Company are used. The absence of chain, countershaft, clutches, etc., in the middle of the car gives it a roomy appearance and facilitates the work of the crew.

An interesting feature of the body construction is that the diagonal ends of panels are removable. This permits the broom motors to be taken out quickly and easily. In case of trouble on the road with the broom



Converted Open Cars Make Efficient Snow Sweepers at Worcester

motor, the sweeper can be pulled into the carhouse and the motor replaced in about half an hour.

A canvas curtain somewhat different from that ordinarily employed on snow sweepers is used to limit the throw. This curtain is attached to a metal frame the weight of which holds it down in spite of the force of the snow thrown by the rapidly revolving brooms. The frame is hinged at the top, however, so that the curtain may be lifted up at night when there is no vehicular traffic on the street and when it is desired to throw the snow as high and wide as possible.

An extra set of brooms is kept on hand for every sweeper so that in case of a storm of long duration worn brooms can be replaced and the sweeper quickly returned to service. In order better to cut ice and sleet as well as to prolong their useful life, the broom-heads have ribbon steel interspersed with the rattan.

All equipment and wiring excepting only the brake cylinder has been placed inside the body. When the sweepers are run into the shop, a steam hose can therefore be applied to all the underparts to melt off the snow and ice quickly. This greatly facilitates the inspection work. No equipment is removed from the sweeper during the summer. Although such apparatus as controllers, motors, air compressors and the like are the same as those used on other cars, the railway considers it more economical to leave the equipment permanently on the sweepers. They are then instantly available whenever needed for service.

Bus Development by the Boston Elevated

The Company Now Has Thirty-three Buses, Which Are Used Largely in Supplementary Service at the Outer Terminals of Rapid Transit Lines

THE first bus line operated by the Boston Elevated Railway began service between Allston and Watertown, Mass., in February, 1922. Since then the company has gradually added buses until it now has thirty-three. These consist of one Republic-Knight, twelve Mack and twenty White buses. All are of the one-man twenty-five-passenger type.

All of these buses do a feeder service in the suburban districts, and operate as an integral part of the Boston Elevated system. That is to say, the same fare is charged as if the service was given by surface cars, and transfers are given between buses and cars, just as they would be if trolley cars only were used. In several of these cases, the buses take the place of trolley lines, when, because of the need of track reconstruction, or for some other financial reason, the company thought it undesirable to continue the rail service. A typical case of this kind, although on a more extensive scale than usual, was in Malden and was described in an article in the ELECTRIC RAILWAY JOURNAL for Oct. 6, 1923, by Edward Dana.

STATISTICS OF SERVICE

For the service in January, 1924, the last month for which figures are available, the company had thirty-three buses, of which twenty-three were required for regular operation and ten were used as spares, or

BOSTON ELEVATED RAILWAY MOTOR BUS OPERATION— MONTH OF JANUARY, 1924

Number of Buses in Regular Service — Thirty-three		Per Revenue Mile (Cents)
Round trips.....	14,998	
Revenue-miles.....	57,093	
Non-revenue-miles.....	3,721	
Total miles.....	60,814	
Bus-hours allowed time.....	7,692	
Bus-hours running time.....	5,172	
Total revenue passengers.....	312,577	
Operating Expenses:		
Maintenance of Equipment		
Painting and varnishing.....	\$6.75	
Repairs to bodies.....	544.34	
Repairs to chassis.....	1,914.22	
Tire renewals.....	743.95	
Repairs to engines.....	1,138.54	
Repairs to storage batteries.....	375.05	
Total Ac. 30.....	\$4,722.85	
Ac. 40 depreciation (a).....	3,207.52	
Total maintenance including depreciation.....	\$7,930.37	13.89
Total maintenance including depreciation per total miles operated.....	13.04 cents	
Power:		
Ac. 53 Gals. of gasoline.....	15,392	
Cost of gasoline.....	\$1,647.98	2.89
Total miles operated per gallon.....	3.95	
Transportation:		
Ac. 63 Superintendence and instruction.....	\$342.61	0.60
64 Wages of operators.....	8,056.09	14.11
67 Lubricants.....	66.99	0.12
67 Miscellaneous supplies for buses.....	105.25	0.18
70 Garage employees.....	619.08	1.08
71 Garage expenses (heating, lighting, etc.).....	548.90	0.96
71 Garage expenses, rentals.....	529.17	0.93
Total transportation.....	\$10,268.09	17.98
Total operating expenses.....	\$19,846.44	34.76
Investment in buses, 6 per cent.....	1,056.67	
Investment Allston garage 6 per cent on one-half of investment.....	75.00	
Taxes, 2 per cent.....	377.22	
License fees.....	30.00	
Total interest and taxes.....	\$1,538.89	2.70
Total cost of service (b).....	\$21,385.33	37.46

(a) Depreciation of buses carried on a five-year basis, with allowance of 10 per cent salvage.

(b) No charges included for general and miscellaneous expenses.

during peak loads. The management of the Boston Elevated Railway considers that in a number of respects the conditions under which the buses operate are unfavorable for a good showing. In the first place all of them, under the fare system of the company, carry passengers for 5 cents if no transfer is required, and most of them are on light traffic lines. Under such conditions inefficient schedules are inevitable. In the second place the lines are quite scattered so that housing and maintenance cannot be carried on under the most desirable conditions. This situation is improving, however, as the company has built or leased some garages and has a program of garage construction under way. In the third place, operation and drivers are new. This has meant the breaking in of nearly all drivers, who naturally are not as expert in this work as they will become by more experience. It should be said on the other side, however, that the care and operation of automotive equipment are not new matters on the Boston Elevated. The company has had for some years

the work required, during the month, but the total given of 13.89 cents per revenue mile operated by the buses does not vary greatly from the other monthly figures during 1923. Depreciation is charged each month on the basis of an assumed life of five years for the bus and a salvage value at the end of that time of 10 per cent, based on its purchase price.

Under "Conducting Transportation" the operators' wages are based on a payment of 78 cents per hour. This is also the rate paid on the surface cars under the last arbitration decision and is made up of a base rate of 70 cents plus a premium of 8 cents for one-man cars or buses.

Under Fixed Charges, the items are self-explanatory, the interest being based on the annual rate of 6 per cent on the purchase price of the buses and the taxes on 2 per cent of the purchase price of the buses and garage investment.

Gasoline is purchased partly at the wholesale rates, where the company has storage accommodations and partly at the retail rate. The latter during January in Boston averaged about 19 cents.

The receipts of these buses during January were slightly less than the total cost of service as given in the accompanying statement. In other words, the buses at present do not pay operating expenses, including depreciation and fixed charges, but this was not expected under the conditions under which they operate.

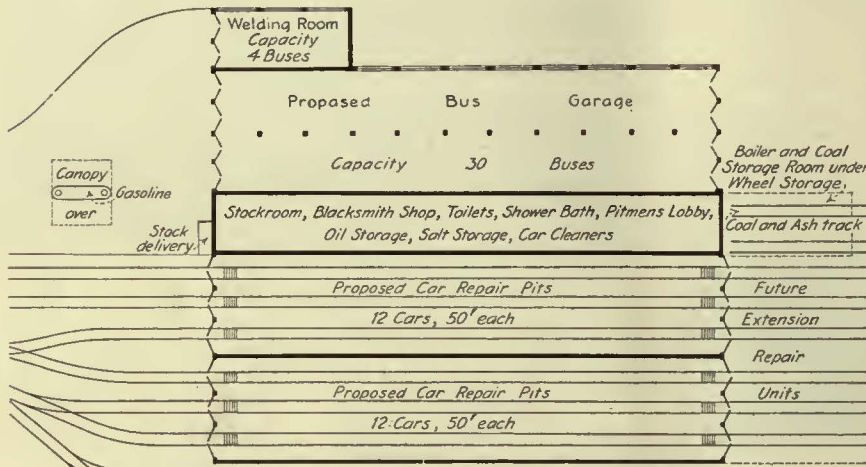
NEW GARAGES UNDER CONTEMPLATION

The principal garages of the company at present are one at Allston, one at Hyde Park, and one at Riverside Avenue, Medford. The latter was built originally for a commercial garage but leased by the company

until it can construct proper garage facilities. To take the place of the latter the company contemplates the construction of a garage to hold thirty buses at Medford, adjoining its Salem Street carhouse. Between the carhouse and the garage will be a long, narrow building to accommodate the stockroom, blacksmith shop, toilets, pitman's lobby, oil storage, storage, accommodations for the car cleaners, etc. The accompanying diagram shows the general arrangement. No special lobby for the bus operators is contemplated, because they will share the lobby now on this area used by the car platform men.

On the opposite side from the storeroom is a welding room with capacity for four buses, where carbon in the cylinders can be burned out, etc. The building construction itself is of brick with mill construction roof and steel columns. The floor is concrete and there are no pits, but a trestle will be built on which buses can be run for underneath inspection. The end doors are 12 ft. wide and 14 ft. high, this height admitting a tower car. Gasoline storage is provided outside under a canopy. There is a driveway at each end so that buses can enter from the front or rear of the garage.

While this particular garage has been designed so that, if necessary, it can be used as a carhouse, it is the policy of the company when laying out or rehabilitating division depots at yards to make provision for the possible future care of buses, as well as cars.



At its Medford Depot Headquarters, the Boston Elevated Railway Proposes to Add a Thirty-Bus Garage, Adjoining the Carhouse

a good sized equipment of motor tower wagons, emergency trucks, inspectors' automobiles, tractors, etc., numbering at the present time about 120. For this reason it has necessarily had to provide for the repair of this equipment, so that the maintenance of the Boston Elevated's fleet of buses has not been in inexperienced hands.

Since the establishment of its first bus line in February, 1922, the company has carefully maintained operating figures, both statistical, as to the runs of individual buses, and financial.

The mileage statistics for January, 1924, showed that ten of the buses during the month ran more than 2,000 miles, as follows: 2,835, 2,830, 2,744, 2,550, 2,504, 2,480, 2,280, 2,253, 2,110 and 2,074. The table on page 419 shows general operating statistics and operating expenses of the company's motor bus service for January, 1924, though in this statement no charge is included for "General and Miscellaneous Expenses."

FINANCIAL STATISTICS EXPLAINED

In this statement it should be said that the number of 10-cent fares, mentioned under Operating Statistics, means the number of passengers requesting transfers, usually to continue the trip downtown on a rapid transit line.

The monthly charges on maintenance and depreciation of equipment of course vary greatly, according to

Association News & Discussions

Bus Accounting Discussed at Fort Wayne

Operating Costs Compared with Those for Electric Railways—Officers Also Elected at Annual Meeting of the Central Electric Railway Accountants

BUS accounting was the main topic discussed at the two-day meeting of the Central Electric Railway Accountants' Association, held at Fort Wayne, Ind., on Feb. 29 and March 1. At the session on March 1 L. J. Wertzler, assistant auditor Chicago, North Shore & Milwaukee Railroad, presented an extended paper on this topic, treating not only accounting for buses but methods of establishing rates and other allied matters. This paper was published in abstract in last week's issue of the ELECTRIC RAILWAY JOURNAL. An abstract of a prepared discussion on this topic, presented by F. E. Belleville, auditor Louisville Railway, is published in this week's issue.

In the following discussion J. S. Bleecker, formerly general manager Indiana, Columbus & Eastern Traction Company, and now with Day & Zimmermann, spoke about the operation of buses by the I. C. & E. and also the bus operation in general. The point emphasized by Mr. Bleecker was that the traveling public is demanding this class of transportation, which in a measure is new business not at the present time enjoyed by the electric railways. To secure this new business and at the same time protect the electric railways from unfavorable competition, the electric railway should engage in the operation of buses. Mr. Bleecker declared that maintenance cost would necessarily be lower on buses operated by a railway company than on those of outside concerns and that bus operation could be used in place of electric cars which are now being operated at a loss.

Another point discussed at the meeting was that of transporting passengers on tickets which would be valid either on a bus operated by the railway company or upon the railway cars, according to the wishes of the passenger. This point was developed further as to the feasibility of transporting the passenger on the bus and checking baggage on the railway car, which would possibly be desirable in cases where severe competition exists.

W. L. Wilt, special representative Pennsylvania Railroad, Chicago, Ill., gave a very interesting talk on the railroad situation in general, covering the subject of valuation, basis of rate making and the effect of the recapture clause of Section 15A of the interstate commerce act. Mr. Wilt presented some interesting statistics compiled by the Pennsylvania Railroad as to the disposition of revenue received from freight, passenger, mail and express business, also the distribution of the

"bread dollar" comparing the transportation revenue to that of the various features entering into the cost and profits of this commodity.

ASSOCIATION BUSINESS AND ELECTION OF OFFICERS

In accord with the rules of the association, the discussion on the afternoon of Feb. 29 covered differences in accounting methods as between different roads, and resulted in several properties agreeing to conform more generally to the working rules indorsed by the association.

The committee reports rendered on March 1 indicate progress, but no definite recommendations were made.

The following officers were elected for the coming year:

President, L. W. Van Bibber, auditor Indiana, Columbus & Eastern Traction Company, Springfield, Ohio.

First vice-president, J. P. Longon, auditor Cincinnati & Dayton Traction Company, Dayton, Ohio.

Second vice-president, Tudor W. Jones, auditor Union Traction Company of Indiana, Anderson, Ind.

Secretary-treasurer, L. E. Earlywine, Traction Terminal Building, Indianapolis, Ind.

Executive committee: C. E. Baker, auditor Lima-Toledo Railroad Company, Lima, Ohio; V. R. Shick, auditor Fort Wayne & Northwestern Railway, Kendallville, Ind.; C. A. Dugle, auditor Indianapolis & Cincinnati Traction Company, Rushville, Ind.; H. F. McColgin, auditor passenger receipts Interstate Public Service Company, Indianapolis.

It was decided to hold the next meeting at Cleveland on Aug. 15-16.

Bus Operation Is Benefiting Louisville*

De Luxe Service at a 10-Cent Fare Is Given in Motor Coaches—Also Elected at Annual Meeting of the Central Electric Deficit Is Growing Smaller

BY F. E. BELLEVILLE
Auditor Louisville Railway

IN LOUISVILLE we are getting away from the use of the word "bus" as applied to the kind of service generally furnished by a responsible transportation company, such as a street railway. We are attempting to dignify the de luxe service rendered by us by calling it "coach service" and in all cases referring to the passenger equipment as "motor coaches." Our motor coach operations are not carried on by the Louisville Railway, but by a subsidiary company, Kentucky Carriers, Inc., whose operations are entirely in the charge of officials of the Louisville Railway.

It has been said that most railway companies engage in the operation of motor coaches primarily to keep the other fellow out. This is not exactly the case in our city, nor do we believe it to be generally true in other cities. As we all know the present operating companies already have the organizations necessary to engage in this new arm of transportation, and it is but logical that they should engage in this field to secure unified transportation service.

In Louisville the question of installation of motor coach service had been discussed for some time, quite generally by people residing in sections

of the city not directly served by street cars, and also by the operating officials of the railway and the conclusion was reached that eventually a profitable business could be built up. A survey of the city was made, and as a result the company commenced operations on June 24, 1923, with six coaches, operating over one route. In July, 1923, six additional coaches were added and another route was opened. Later one of these routes was discontinued and a service was inaugurated in another section of the city in the hopes that a more productive territory could be reached.

We do not regard coach service as exactly parallel to street railway service. Every community has many private automobile owners who use their machines extensively between their homes and the office, store or shop, because they desire some means of transportation better than is afforded by street car service. The increasing difficulties in finding suitable parking space in the downtown business districts, together with cost of operation, we believe, are gradually discouraging the use of automobiles by private owners, and it is this class of people whom we hope to reach by the use of motor coaches.

The results of operation for the first six months, while showing an operating loss, are not entirely discouraging, as the operating deficit has been considerably decreased during the latter months. While this is partly due to a

*Abstract of discussion presented at the meeting of the Central Electric Railway Accountants' Association, Fort Wayne, Ind., March 1, 1924, of the paper on "Bus Operation and Accounting," by L. J. Wertzler, published in the ELECTRIC RAILWAY JOURNAL for March 8, page 387.

lower selling price of gasoline, it is also partly due to a gradual increase in earnings per coach-mile. Passenger revenues averaged about 12½ cents per coach-mile during the summer months of 1923, while during the last three months the average will run about 15½ cents per coach-mile. In some cities this increase in revenue might be attributable to adverse weather conditions, but in Louisville we have had a comparatively mild and open winter, as is usually the case, and, we believe this increase to be a natural growth in the business which will continue.

Our operating expenses and taxes for the first six months of operation averaged 19.21 cents per coach-mile operated. Included in operating expenses are depreciation charges on passenger equipment at the rate of 25 per cent per annum, and accruals to reserve for tire repairs and renewals at the rate of 1¾ cents per coach-mile. The cost per coach-mile stated above (19.21 cents) does not include interest on investment.

The rate of fare charged since the inauguration of the service is 10 cents per passenger. Transfers are not given from one coach route to another, nor are they interchanged between coaches and street railway cars. No free passengers are carried. All coaches are one-man coaches, seating twenty-five passengers and are equipped with Johnson registering fare boxes.

The operating trip sheet in use is similar to the one used by the North Shore Company, and shows: date, run number, coach number, leaving and starting points, etc., speedometer readings, fare-box readings, number of passengers carried and amount of revenue. Daily reports are made to the proper department heads and officials, showing passenger earnings, coach-miles operated, earnings per coach-mile, and timetable cost.

The classification of accounts which we are using is based on the Interstate Commerce Commission's classification for electric railways and is similar to that adopted by the American Electric Railway Association at Atlantic City in October, 1923.

Oklahoma Association Meets

NEARLY 600 representatives of the four branches of the public utility industry gathered for the sixth annual convention of the Oklahoma Utility Association in Oklahoma City, beginning March 11 and continuing three days. Some twenty speakers were on the program.

The interference of motor bus lines with the legitimate operation of railways was discussed by John Shartel, president Oklahoma Railway Company, and A. S. Johnson of the M. K. & T. R.R. Both pointed out that bus lines are not compelled to stand on the same basis as other transportation. The railroads are allowed to earn only 5½ per cent on their investment and are required to pay heavy taxes, while bus lines make use of the highways paid for by the people, without having to help adequately to support the highways.

Mr. Shartel characterized the growing use of the private automobile as

"a social stampede that would stop no one knows where." He said that of 26,000 automobile owners in Oklahoma City 3,000 paid income tax last year.

Mayor O. A. Cargill of Oklahoma City, who studied law while a street car motorman and a traffic policeman in Oklahoma City, welcomed the convention. He declared that municipal ownership of utilities does not offer the same degree of incentive for effort on the part of those responsible for its administration as comes with private ownership.

At the banquet Wednesday night Governor M. E. Trapp was the guest of honor and was told that the business world now has confidence in the capacity and integrity of the state government in Oklahoma.

Clarence E. Rentchler, a lineman of the Oklahoma Gas & Electric Company, was awarded an Insull medal for saving the life of a fellow lineman.

Special Trackwork

THE sectional committee of the American Engineering Standards Committee on specifications for special trackwork materials and design of 7-in. plain girder rails held its fourth meeting at A.E.R.A. headquarters, New York, on Feb. 28. Those present were V. Angerer, chairman; C. A. Alden, E. B. Entwisle, H. H. George, R. E. Hess (representing Messrs. Young and Kenney), F. Newman, E. P. Roundey, E. M. T. Ryder and J. B. Strong.

For sub-committee No. 1 Mr. George reported that he had submitted its report to the committee on way matters

of the A.E.R.E.A.

In the absence of Chairman R. C. Cram of sub-committee No. 2 Mr. Roundey read the report, covering proposed specifications for standard section rails, girder groove, plain girder and girder guard rails. This report developed considerable discussion, particularly as to the matter of adoption of certain specifications in which a number of changes of minor importance were being considered.

Mr. Hess read the report of sub-committee No. 3 for Mr. Young, submitting manufacturers' standard specifications for rolled manganese steel rails, specifications for manganese steel in castings for trackwork, specifications for general steel castings, specifications for hard steel castings for trackwork, specifications for gray iron castings for parts other than bodies of track castings and also for bodies of track castings, specifications for malleable castings. He also read a letter from Enrique Touceda, consulting engineer of the American Malleable Castings Association, pointing out the objections to specifying two grades of malleable castings. It was decided to recommend one grade only, that standard with the American Society for Testing Materials.

Some discussion also ensued on the various specifications, a number of suggested minor changes being considered. It was decided to obtain tentative agreement on such changes before submitting them to the different associations interested.

The next meeting of the committee will be held at New York on April 23.

American Association News

Power Transmission and Distribution

A TWO-DAY meeting of the power transmission and distribution committee of the American Electric Railway Engineering Association was held March 10 and 11, in the offices of the Chicago Rapid Transit Company. The first day was devoted to sub-committee meetings, reports of subcommittees being presented at the general session.

The subcommittee on concrete poles presented a tentative specification for the construction of concrete poles. The subcommittee proposes to have Prof. D. D. Ewing check a portion of the existing specification in section D S 3c of the Engineering Manual, which is to be revised, to determine if it conforms with present day practice.

Considerable information is being collected by the subcommittee on dimensions of approach gears, with a view toward standardization.

Consideration was given to the subject of current collectors with the result that the entire committee instructed a subcommittee on the subject to co-ordinate with that on car equipment.

Another subject discussed at some length was the matter of a trolley support in storage yards. This was provoked by the recent proposed rules on fire protection tentatively set up by

another committee of the Engineering Association. It was felt that a set of rules should be adopted with which a majority of the companies will comply. These same rules to comply with the American Fire Protective Association code. It was suggested that a subcommittee be formed to crystallize the power transmission and distribution committee's ideas on this subject.

Progress reports were presented by the various subcommittees.

During the meeting, H. A. Johnson, president of the Engineering Association congratulated the committee on its attendance, and explained the effort being made on the part of that association to co-ordinate the work of the various committees.

The following members were present: Chas. H. Jones, chairman; J. Walter Allen, Robert L. Allen, S. M. Day, T. H. Drew, Leslie E. Delf, D. D. Ewing, Charles Gilman, H. W. Griffin, C. L. Hancock, C. J. Hixson, A. Hughes, Jr., John Leisenring, F. McVittie, H. S. Murphy, Carl P. Nachod, J. F. Neild, H. A. Pharo, W. J. Quinn, W. Schaake, A. Schlesinger and F. J. White. D. L. Smith, D. H. Huttleston, D. A. Tomlinson, W. L. McDaniels, Sam Johnson, John Stephenson, Cæsar Antoniono, G. I. Wright, H. A. Johnson, L. W. Birch, Charles Gordon and M. B. Knox were present as guests.

Maintenance of Equipment

Simple Snow Scraper Used at Holyoke

THE city of Holyoke, Mass., has frequent heavy snow storms during the winter. An ample number of snow sweepers and plows enables the Holyoke Street Railway to keep its lines open during most severe storms. In order to obviate the necessity of using the sweepers



The Scraper Successfully Handles Light Snow and Saves the Use of Plows and Sweepers

for light snow storms, however, the company has equipped its cars with home-made scrapers of the type show in the accompanying illustration. They consist of a metal piece bent to the circumference of a large circle and slightly greater in length than the width of the track. This is mounted on a simple framework which is hinged at the front end and may be raised or lowered by means of a lever located on the platform alongside the motorman.

Maintaining Aluminum Cell Lightning Arresters

THE Northern Indiana Power Company, Kokomo, Ind., has thirty-five General Electric direct-current aluminum lightning arresters in service on its cars. These are of the standard two-cell type and are installed outside, either under the car or on the roof.

The company's practice in maintaining these arresters is to remove them from the cars at the beginning of winter. The electrolyte and oil are thrown away, the jars and plates are washed thoroughly and the arresters are then stored in a dry, warm place. When they are again returned to service in the

spring, new electrolyte and oil are used. During the summer months the arresters are inspected once a month and the fuses are inspected after each lightning storm. This work is done by the pit men. Excellent results have been obtained from this method, and within a year's time the company has used but two new cells and one set of plates for replacement on thirty-five arresters. No failures have occurred due to lightning while in service during this period.

Air Hoist Used on Work Car

AN UNUSUAL type of derrick car has been constructed by the United Electric Railways, Providence. Between the motorman's cabs at the two ends of an ordinary flat car a horizontal beam has been placed about 7 ft. above the floor. The two trolley poles are attached to the upper side of this beam. From the under side of the beam is suspended an ordinary air hoist, such as is used for handling materials in repair shops. This has been laid flat along the underside of beam and from the end of the hoist a chain with a hook runs over a series of pulleys and to a rotating derrick arm. The arrangement is shown in the accompanying illustration. The hoist is attached to the air system of the car and by the operation of a valve the power of the pneumatic hoist is used for lifting objects at the end of the derrick boom.



A Compressed Air Hoist Suspended from the Center Beam Does the Lifting Work of This Derrick Car

Fender Dipping Tank Does Painting Cheaply

THE steel fenders used by the Union Street Railway, New Bedford, are painted very cheaply by a dipping process. A tank of comparatively small capacity has been built slightly larger than the fender. This



Dipping Tank for Fenders

is filled two-thirds full of water and one-third of paint on top of the water. The fender is lowered by means of an arrangement of light pulleys and ropes down through the paint into the water and then lifted out again and allowed to drip. The apparatus used in this process is shown in the accompanying illustration.

Handy Die Stock Rack

DIE stocks of various sizes are common tools about electric railway shops and it is convenient to keep these together with an arrangement for easy selection. A rack for die stocks which has been found particularly convenient is shown in the accompanying illustration. It is in use in the shop of the Philadelphia & Western Railway, Norristown, Pa.

The front pieces of the rack which support the stocks are made of 1½-in. angles and the distance between these decreases as the height from the floor increases in order to provide for different lengths of the stock handles. Slots are cut in one of the flanges of the angles to receive and support the stocks. These are sloped slightly so that there is no danger of the stocks rolling out when once they are placed in position. The back supports for the rack are of 1-in. angles and the framework is strengthened and supported by the use of flat straps. A front strap 1½ in. wide and end straps 1¼ in. wide are used. The rack is 67 in. high, 29 in. wide at the base and 23 in. deep. The width at the top is 12 in. Pro-



Die Stocks Are Kept Convenient to the Work In This Rack

vision is made for holding thirteen stocks.

In order to provide a storage space for the dies, a shelf is included in the rack. This is 12 in. x 22 in. and is made of sheet iron. This shelf is 23 in. from the floor.

of framing operation required. It is made in four sizes, the No. 1 size being adapted to lumber up to 2-in. thickness, the No. 2 to lumber up to 4-in. thickness, the No. 3 for lumber up to 6-in. thickness and the No. 4 is built to order for work on timbers of any dimensions. The No. 2 size is particularly adapted for the class of work necessary in repairing car bodies in electric railway shops. Used with different attachments, it is a router, a bench joiner, a gainer, a boring and counter sinking machine or a saw for cutting off or ripping lumber. Emery and buffing wheels can also be used as well as saws. The chassis is mounted on roller bearings and the center swivel post on ball bearings. The weights are adjustable so as to allow the operator to "tune" the machine to suit himself. The sawing head is adjustable to cut at any angle up to and including 55 deg., making it a convenient tool for various repair operations. Accompanying illustrations show this machine with a mortising attachment and also with a joiner attachment in use in the shops of the United Railways & Electric Company, Baltimore, Md.

New Equipment Available

Making Woodworking Repairs on the Job

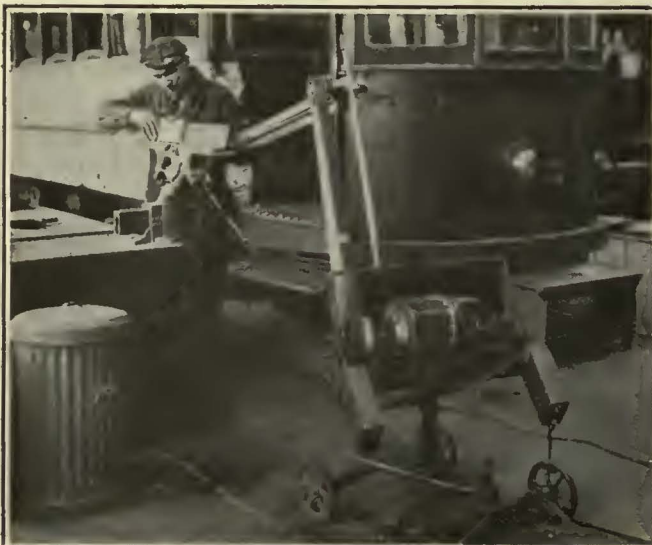
REPAIRS to electric railway cars usually entail a large amount of hand work. In order to meet this condition the P. L. Billingsley Company is marketing the Flexway wood-

working machine. The work done by one of these machines comprises boring, ripping, cutting off, ploughing, splining, etc.

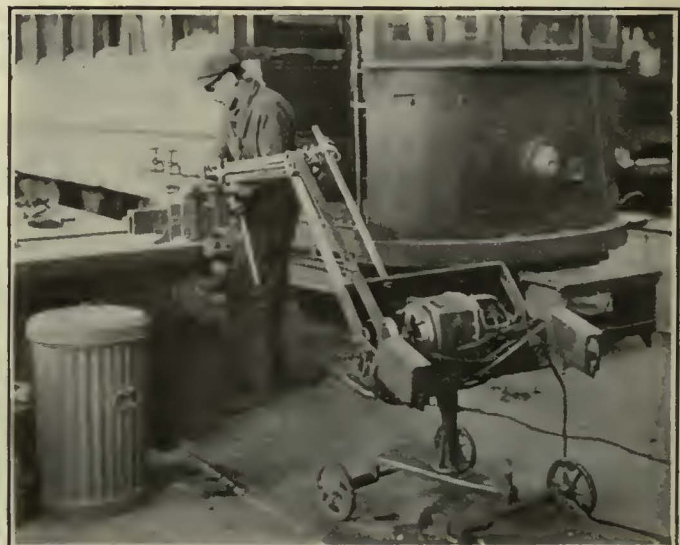
The machine combines many of the features of the mill and is portable, well balanced and flexible so that it can be taken to the job for any class

Combination Tractor and Rail Truck

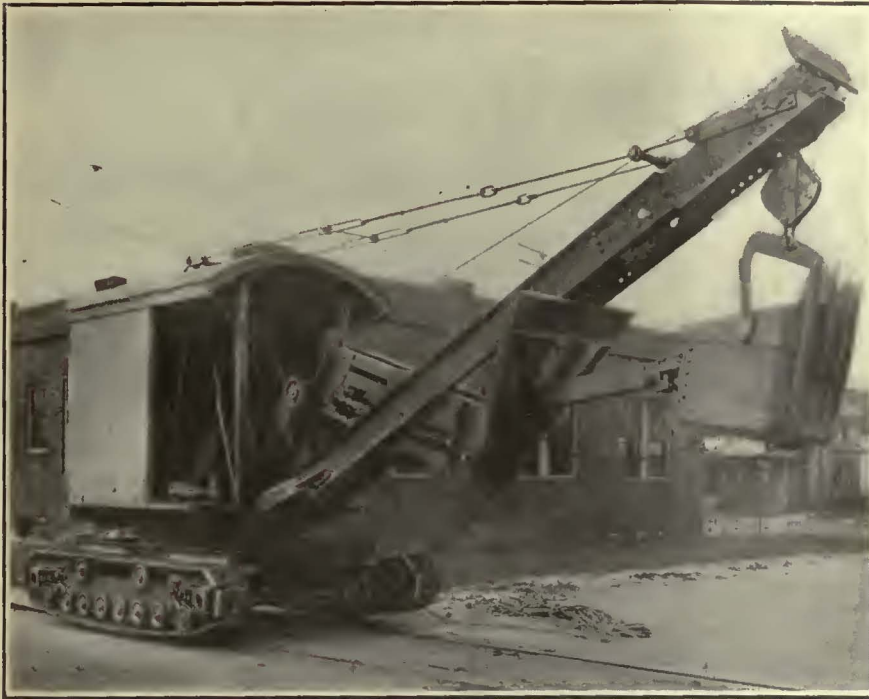
IN ORDER to provide a mobile unit that can be operated either on the rails or off, the Differential Steel Car Company, Findlay, Ohio, has developed a combination car-wheel truck and tractor. A machine that can operate on rails is of great advantage in getting to the job, as with the tractor treads alone movement over long distance is slow and



Woodworking Machine with Joiner Attachment



Shaping a Piece with Mortising Attachment



New Propelling Unit for Electric Shovel or Other Field Machine Is Equipped for Tractor Operation or to Run on Rails

costly. When once on the job tractor mounting is most convenient.

The equipment on the upper part of the car body can be anything desired, and the operating part can be fitted to concrete mixers, power shovels or other equipment. When applied to a shovel continuous digging is made possible and the time of shifting the shovel is reduced. The shovel can also advance while digging, which is a further advantage. The tractor mounting eliminates the need for mats used to support the shovel, and no blocking is required to maintain its position while digging as is required with wheel mounting.

The change in arrangements from the position of running on the tractor treads to the car-wheel operation, or vice versa, is effected by removing four nuts and filler blocks and replacing them so as to raise or lower the car wheels and bring them into contact with the rails, or raise them above the bottom of the tractor treads.

With the car running on rails, the change is made to the tractor treads by running the car wheels on wedge blocks, so as to raise the whole machine. By removing the four filler blocks above the axle, the tractor treads come down to their lowest position. Then by replacing the filler blocks beneath the axle, the equipment is ready to travel on the tractor treads. To make the reverse change, it is only necessary to reverse this operation.

The equipment is steered when traveling on the tractor treads by means of clutches of the multiple-tooth type, and either tread may be locked while the other is driven. The width varies according to the type of shovel, and whether the journal bearings are located inside or outside the wheels. The extreme width is from 7 ft. 7 in. to 8 ft. 8 in.

Improved Journal Truing and Axle Lathe

A COMBINATION journal truing and axle lathe has been developed by the Consolidated Machine Tool Corporation of America, Rochester, N. Y. This lathe is provided with two carriages, so that a pair of journals with wheels mounted may be turned at one time. The machine has a headstock of the opening type located in the center of the machine, and the bed has gaps for swinging wheels up to 45 in. diameter. When used as a jour-

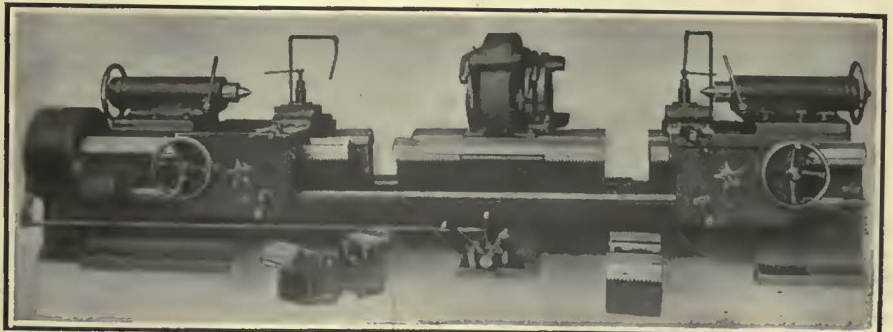
nal truing lathe, the two carriages turn the journals with the wheels mounted, thereby obviating the necessity of forcing the wheels off the axle and pressing them on again. This naturally results in a considerable saving of time.

The large driving gear is made in two halves with a coarse pitch and wide face teeth. It rotates in two large bronze bearings, of which there is one on either side of the center. The pinion meshing with this gear runs in oil and is mounted on a heavy shaft located in the center of the bed and is driven from the speed change gears located in the left hand end of the bed.

The gaps in the bed of the lathe are machined and finished filler blocks are furnished, which when inserted in the gaps give the carriage full travel between the driving head and the end of the machine, so that regular axle turning, when the wheel and gear seats and journal fits are to be machined, can be handled with economy. With the filler blocks inserted, the carriages have a full bearing on the bed at all times.

This lathe has a 27-in. swing over the bed so that it will accommodate a gear of the ordinary size used by electric railways mounted on the axle. Should the gear run a little larger than this dimension, it is possible to take care of this by raising the tailstock, center driving head, and tool rest a sufficient distance to swing the larger diameter gear over the bed.

Some of the users of this type of lathe are obtaining an average production of two sets of axles per hour with four journals. This production of course greatly exceeds what could be obtained if wheels were pressed off the axles and the journals turned on an axle lathe or a standard engine lathe, and the wheels then pressed on the axle again with a wheel press. Also the pressing off of the wheels destroys the tight fit to a certain extent.



Journal Truing Lathe with Machined Gaps for Wheels

The News of the Industry

Mayor Hylan Makes His Annual Plea: "Leave It to Me"

Mayor Hylan of New York on March 12 appeared at a joint hearing before the Senate and Assembly committees on public service and demanded that the Legislature enact his home rule transportation and public utilities bills, including one which would give legal sanction to the city for going into the bus business.

He assailed the Republican bill, which would give to New York an absolutely free hand in transit on the only condition that municipal operations be made self-sustaining. He characterized this as a measure presented to help the "traction ring."

On the other hand the Mayor made a special plea for his bus bill and renewed his pledge that with the legislation he demanded enacted he would bring about decided improvements in the New York City transit situation within sixty days after such facilities existed.

The delegation which came to speak against the bill was headed by William McCarroll, former Public Service Commissioner. Other opposition was presented by representatives of the chambers of commerce, Citizens' Union and New York Electric Railway Association.

Staten Island Electrification Advocated

Plans for the electrification of the Staten Island Rapid Transit Railway as outlined briefly in the *ELECTRIC RAILWAY JOURNAL* for Feb. 9, 1924, page 228, received the unanimous approval of twenty Staten Island civic organizations at a hearing before the New York Public Service Commission, March 11. Chairman William A. Prendergast of the commission, who presided, announced that the report of that body on the railway's plan will be issued within the next two weeks.

Appointment of Daniel L. Turner Recommended at Pittsburgh

The special committee appointed by the City Council of Pittsburgh to formulate a plan of procedure as to the construction of a subway and other related questions submitted its final report to the councilmanic public works committee on March 4. The committee recommends the appointment of Daniel L. Turner, New York City, to serve as consulting engineer in charge of studies relating to traffic and transportation in Pittsburgh.

As to the appointment of an advisory commission to serve under Mr. Turner, the committee recommended that this commission be composed of five members, each one of whom shall

represent one or more organizations in the city. The committee also suggests that the necessary funds and forces to enable Mr. Turner to carry on the work assigned to him can be provided for by Council after Mr. Turner has had an opportunity to form an opinion as to his requirements.

\$110,000,000 for Subways

New York Commission Indicates It Is Ready to Advertise Bids for New Construction

Steps were taken on March 11 by the New York Transit Commission to bring about the speedy beginning of the construction of the Brooklyn crosstown and Washington Heights subways. On that day the Transit Commission formally notified the Board of Estimate that it was ready to proceed with such construction and requested that the board appropriate \$110,000,000, the estimated cost, either directly or by reserving that amount out of the city's borrowing margin.

Both bodies have approved the routes of both subways, except for one section in Brooklyn, for which the commission has presented alternative routes in Fulton Street and Lafayette Avenue and has expressed its willingness to accept either route the board may select.

The commission's letter to the board was signed by George McAneny, chairman. It announces that the commission is ready to advertise at once for bids on the first section of the Brooklyn crosstown subway, and will be ready to advertise for bids on many other sections in June and July. In view of agreement with the board's

MAIN BROOKLYN CROSSTOWN LINE		
	Length in Feet	Estimated Cost
Construction.....		\$22,600,000
Station finish.....		1,400,000
Trackwork.....		620,000
Total.....	28,620	\$24,620,000
THE FULTON STREET LINE		
Construction.....		\$3,600,000
Station finish.....		350,000
Trackwork.....		200,000
Total.....	10,550	\$9,150,000
THE LAFAYETTE AVENUE ALTERNATIVE		
Construction.....		\$6,350,000
Station finish.....		250,000
Trackwork.....		175,000
Total.....	9,300	\$6,775,000
WEST SIDE LINE—NORTH OF 59TH ST.		
Construction.....		\$42,200,000
Station finish.....		1,000,000
Trackwork.....		1,000,000
Total.....	33,865	\$44,200,000
WEST SIDE LINE EXTENSIONS, SOUTH		
Construction.....		\$10,000,000
Station finish.....		480,000
Trackwork.....		340,000
Total.....	10,900	\$10,820,000
Grand total.....	93,235	\$95,565,000

transit committee on every point that had been in dispute between the board and the commission, the members of the commission expressed the view that there was no reason why the board should not begin to "say it with shovels" this spring, and that there was an excellent prospect of going on with the rest of the commission's program for the construction of new subways.

The length and estimated cost of construction of the new routes are given in the accompanying table.

Long-Term Trackless Franchise at Rochester

The Common Council of Rochester, N. Y., on March 11 approved the franchise for the operation of the crosstown trackless trolley line for a period of twenty-five years. This line is operated by the Rochester Railways Coordinated Bus Lines, Inc., a subsidiary of the New York State Railways. The franchise includes transfer privileges to all city bus and trolley lines.

The trackless line was started on Nov. 1, 1923, and has won popular approval. It connects the large industrial and residential sections on either side of the Genesee River, via the Driving Park Avenue bridge.

Recommendations for Rapid Transit in Detroit

Col. Sidney D. Waldon, chairman of the Detroit Rapid Transit Commission, commented recently on the situation there. He said that the rapid transit studies there indicate that the comprehensive system for Detroit ultimately will include occupancy of the so-called Dix-High-Waterloo thoroughfare or a similar combination of streets in about the same locality. The recommendation is made that the thoroughfare be condemned and widened to 106 ft. or 120 ft. to permit the construction of a four-track rapid transit line beneath the right-of-way. The fact that there must be crosstown lines to relieve congestion at the center of the city is emphasized by Major John P. Hallihan, transit engineer in charge of the rapid transit studies for the city, in a supplementary report to acting Mayor Martin.

The following recommendations are summarized from Major Hallihan's report:

1. There should be a crosstown avenue in about the location of the proposed Dix-High-Waterloo route.
2. Sections of the Dix-High-Waterloo route offer certain advantages in connection with outside thoroughfares that make those sections of much greater importance today than when the route was originally laid out.
3. Any main crosstown thoroughfare now or hereafter adopted should be, first of all, continuous; should avoid all offsets, sharp turns and bad alignments; should directly cross and not occupy other thoroughfares, and should have a minimum width of 106 ft., and preferably 120 feet.

4. The width of 80 ft. now considered for Dix-High-Waterloo is insufficient along certain sections, notably the one from Michigan eastward across Woodward to Gratiot Avenue, and should be increased to 106 ft. or preferably, 120 ft.

\$600 in Prizes for Ideas on Sound Public Relations

Six hundred dollars in prizes is being offered by *Forbes Magazine* for articles on "How Sound Public Relations Between Public Utilities and Communities Can Best Be Developed and Maintained." For the best articles the following cash prizes will be awarded: First prize, \$300; second prize, \$200; third prize, \$100. By "best" article *Forbes* does not mean the best from the standpoint of literary excellence, but the best in the reasons and ideas presented on the subject. Ideas should be based on present and past experience. The contest closes on May 1. The awards will be announced by the magazine in the issue of May 24. The manuscripts will be passed upon by B. C. Forbes and two other judges representing the National Electric Light Association.

City Councils of Virginia Still Have Jurisdiction

The third attempt to remove the bus and general transportation business from the jurisdiction of city councils in Virginia has failed. In other words, the General Assembly has adjourned without acting on a bill giving the courts of record the right to reverse decisions of city councils in matters pertaining to competition in transportation on city streets.

The bill was so drawn as to give the court the right to cancel any franchise or other agreement if the court found that a city council had granted a new transportation concern the right to operate in competition with an old one in territory where the facilities offered by the senior line were adequate.

The measure was introduced late in the session. It took the place of two other bills somewhat similar in substance which were defeated. The third bill appeared at one time to be likely to pass, having been favorably reported.

Georgia Railway Can't Meet Wage Demands, Says Arkwright

Final arguments in the hearing for higher wages for employees of the Georgia Railway & Power Company, Atlanta, Ga., were presented to the board of arbitration in its last public meeting at the Fulton County Court House on March 6. Edward McMorrow, a member of the executive board of the Amalgamated Association, made the closing plea for the workers.

Preston S. Arkwright was the principal witness for the company. He stated that the company was not able to meet the new demands as it had been when the war labor board adjusted the Atlanta wage scale in 1918, and that any increase in wages must fall directly upon the public which uses the cars. He asserted that financially the company was not in a position even to consider the merits of the appeal for more wages.

Kansas Courts to Be Permitted to Interpret Law Prohibiting Strikes

The provision of the Kansas Industrial Relations Court act which prohibited strikes by coal miners must stand or fall on the decision of the Kansas courts. This the Supreme Court held on March 10 in the case of August Dorchy. The decision of the lower court was reversed.

Justice Brandeis, delivering the opinion, said the Supreme Court could, if it desired, pass upon the validity of the section in question, but that it would rather leave that point to the State courts, and would accept their decision. He declared that the lower courts should not have passed upon the question.

The case arose out of the soft coal strike. The union officials convicted of calling a strike contended that a state could not arbitrarily declare any particular industry to be an essential one.

It will be recalled that in the famous Wolff Packing Company case the United States Supreme Court passed upon the constitutionality of certain parts of the Kansas Industrial Court act, but it does not appear that the State court passed upon the question whether Section 19 (the one under attack), being an ultimate part of the system of compulsory arbitration held to be invalid, falls with it. Justice Brandeis says that in order that the State courts may pass upon this question, its judgment in this case, which was rendered before our decision in the Wolff Packing Company case, should be vacated.

To accomplish that end the judgment of the State Supreme Court was reversed. It was explained that this reversal was largely a technical proceeding, however, designed merely to permit the Kansas Supreme Court again to pass on Section 19, taking into consideration this time the principles laid down by the United States Supreme Court in the Wolff case.

Fellowship in Transportation Offered at Yale

The Graduate School of Yale University announces that the Strathcona Memorial Fellowship in Transportation, of \$1,000, is offered annually for advanced work in transportation, with special reference to the construction, equipment and operation of railroads, the problems connected with the efficient transportation of passengers and freight and the financial and legislative questions involved. The holder of the fellowship must be a man who has obtained his first degree from an institution of high standing. In making the award, preference is given in accordance with the will of Lord Strathcona to such persons or to sons of, such persons as have been, for at least two years, connected in some manner with the railways of the Northwest.

Applications for this fellowship should be addressed to the dean of the graduate school of Yale University, New Haven, Conn., before May 1, on blanks which may be obtained from the dean, and should be accompanied by a statement of the applicant's education and practical experience, a statement of the particular field of interest to the

applicant and his reasons and purposes for desiring the fellowship, letters of recommendation and reprints of articles or publications by the applicant.

Kewanee Public Utilities Service Company Incorporated

The Kewanee Public Utilities Service Company, Kewanee, Ill., has been incorporated with the idea in mind of operating the Kewanee & Galva Electric Railway, the Kewanee Street Railway and the gas and electric plants in Kewanee. B. F. Lyons of Beloit, Wis., is president of the corporation. Mr. Lyons has already submitted a proposition to the City Council of Kewanee to take over the utilities mentioned. Reference to his plan for reclaiming the railway was made in the *ELECTRIC RAILWAY JOURNAL*, issue of March 1.

Wage Request of Capital Traction Employees Denied

Trainmen and bus operators of the Capital Traction Company, Washington, D. C., have been denied a wage increase from 56 cents to 70 cents an hour. All other employees were refused the 25 per cent advance sought. Arbitration is the next step. The present agreement has two more years to run, but provision is made whereby the schedule may be considered at the end of each year. When the agreement now in existence was signed last March it gave motormen and conductors 50 cents an hour for the first year, 52 cents an hour for the second year, 54 cents for the third year and 56 cents thereafter.

John H. Cookman, secretary of the Amalgamated union, in making known the application for an increase cited the increase in the cost of living since the last wage advance. In announcing the rejection of the petition by the company, George E. Hamilton, president, said that he did not believe any increase in wages was justified under present conditions and that conferences to discuss such increase would achieve no useful purpose.

Wages Advanced Two and One-Half Cents in Augusta

A compromise wage scale granting the trainmen of the Augusta-Aiken Railway & Electric Corporation, Augusta, Ga., an increase of 2½ cents an hour was agreed to recently by the board of arbitrators. The men had asked for a 5-cent advance. The new scale is effective as of Jan. 1, 1924.

According to the new agreement trainmen operating one-man cars, who received a voluntary increase of 5 cents an hour when placed in charge of the new cars, will now receive 52½ cents an hour instead of 45 cents. The company, it was stated, voluntarily increased its trainmen who were placed in charge of the new cars, for it was realized that the operation of the one-man cars would call for more strenuous labor. The scale was consequently increased from 45 to 50 cents an hour. The operators of the old cars requiring both motorman and conductor were retained on the 45-cent scale.

Plan Joint Station of "L" and Pennsylvania Railroad

Plans for connecting the New York division of the Pennsylvania Railroad with the Frankford Elevated Railway at Harrowgate were discussed recently by Pennsylvania Railroad officials and representatives of business organizations in the northeast section of Philadelphia. The business men outlined a plan to replace the present Frankford Junction station with a new structure at Kensington Avenue, thereby virtually linking the Pennsylvania's New York passenger traffic with the Frankford Elevated Railway. Vice-president C. S. Krick of the Pennsylvania Railroad said this would be expensive and difficult to do. A more practicable plan, he explained, would be to have the proposed new station at or near Erie Avenue, and to connect it with the Frankford "L" by a sidewalk for passengers.

"Co-ordinated Transportation" in New Jersey Explained

How the street cars and the buses can be hitched together to give a co-ordinated transportation service is told by the Public Service Railway, Newark, N. J., in a pamphlet called "Street Cars and Buses." The pamphlet is being mailed direct to the patrons of the railway. On a separate card attached to the pamphlet the company solicits the customer's support if the plan seems favorable to him. The patrons are urged to read the pamphlet carefully so that they will know how the company proposes to operate both agencies of transportation in co-operation, what the benefits will be to the public and the present evils that will be eliminated. The company says that "co-ordinated transportation buses would not use the public street for a garage, and would maintain schedule and headways that would relieve, instead of increase, congestion." The pamphlet illustrates the lesson of the inconvenience and congestion caused by competition and contrasts by means of pictures the difference when co-ordinated service is established.

Opponents of Elevated Construction Win in New York

An agreement has been reached by the New York Transit Commission and the Brooklyn-Manhattan Transit Corporation which will end the long dispute regarding the Fourteenth Street-Eastern District rapid transit line and the elevating of the tracks in the Bushwick section of Brooklyn. Instead of having that portion of the line east of Montrose Avenue elevated the line will be continued as a subway, thereby conforming with the request of Brooklyn citizens. The Transit Commission on March 11 approved the modification of the plans and has submitted them to the Board of Estimate and Apportionment.

The Board of Estimate, in approving the route some time ago, voted against an elevated structure from Montrose

Avenue to the present elevated structure at East New York, but the subway officials, claiming to be held by the terms of contract No. 4, refused to accept a subway in lieu of the elevated line specified in the contract.

The first portion of the new line, from Fourteenth Street and Sixth Avenue to Montrose Avenue in Brooklyn, is expected to be ready for operation during the summer.

Paving Relief Measure Defeated

So far as the passing of new bills is concerned the session of the New Jersey Legislature is at an end. In the discussion during the closing hours the Thompson bill was defeated in the House. The intent of this measure was to permit municipalities to relieve the electric railways of all or any part of the cost of paving and keeping in repair pavements between street railway tracks and within 18 in. on either side. Three bills were passed that had been introduced by Senator Smith allowing the Board of Public Utility Commissioners to specify the date on which orders should become effective and increasing and clarifying the power of the board to order a resumption of service discontinued through suspensions.

\$491,000 Spent in Des Moines—Facts Advertised Widely

The Des Moines City Railway completed during 1923 a remarkable program of construction and betterment. In its entirety the year's program contemplated an expenditure of \$665,470. This was all accomplished with the exception of the failure to complete the Crocker Street line and the non-arrival of the new car bodies which had been counted upon during the late months of the year. This brought the actual expenditures in new capital down to \$491,090.

With its idea of placing all available information before the car-riding public the company has recently been using half-page advertisements to tell just what the expenditures for construction and equipment covered.

In the advertisements the figures were given in detail. Recapitulated by departments they were as follows:

Total way and structures.....	\$343,978
Equipment.....	238,550
Power.....	82,942
Grand total.....	665,470
Deduct	
Uncompleted work Crocker line.....	\$78,430
New car bodies not received.....	95,950
	\$174,380
Net expenditure of new capital.....	\$491,090

The new car bodies are expected soon. They will be mounted on the trucks and will be put in service as rapidly as possible.

While this major construction program was under way 30,000,000 passengers were carried. Another important work of the year was the quiet, consistent campaign in the interest of customer ownership. This resulted in

the addition of more than 400 stockholders. The offering consisted of an issue of \$750,000 of 7 per cent preferred stock. A special effort was made to attract small investors.

Louisville Motorman Shot by Automobile Bandits

Dan Criswell, as he was affectionately known to all of the boys on the Chestnut Street line of the Louisville Railway and to many others, was shot and fatally injured by automobile bandits at Madison and Forty-second Streets at 1:30 o'clock Saturday morning, Feb. 23.

Two men boarded Dan's car at the end of the line for the return trip into town. Before Dan had time to start the car one of the men commanded him to wait for the third man. At the same time, the second man told him to stick his hands up, and before Dan had time to turn, shot him through the back. Although suffering from a bullet through the body, just below the heart, Dan started his car after the bandits and fired twice through the car window, the hold-up men returning the fire, which punctured several car windows. Dan fell exhausted after pursuing the men half a block. He was discovered by two automobile drivers and the crew of a westbound car, and they removed him to SS. Mary and Elizabeth Hospital. At 11 o'clock that night Dan passed away. He leaves a widow and five children.

To increase the probability of capture of the assailants the company has offered a reward of \$1,000.

In addition to the above reward, C. T. Wingate, conductor at Twenty-fifth and Market carhouse, recently elected a director of the company to represent the employees on the board, together with some of his co-workers, are circulating a subscription list with the intent of offering a separate additional award.

Bus and Subway Bills Introduced in Philadelphia

Ordinances were introduced in the City Council at Philadelphia, Pa., on March 6 appropriating \$44,213,647 for the Broad Street subway. At the same session Councilman Apt introduced a new bus franchise bill, which would require the Rural Transit Company, a subsidiary of the Philadelphia Rapid Transit Company, to pay the city annually 5 per cent of its gross receipts, after July, 1927. Both these ordinances were referred to the Council's committee on transportation. The Broad Street subway ordinances were sent to the Council by Mayor Kendrick with a communication of Director Ehlers of the Department of City Transit and a brief message from the Mayor, requesting favorable consideration for these ordinances.

Another measure introduced authorized the transit department to contract for what is known as Step No. 1 in the transit plans. This includes the Broad Street subway, with its connecting line running on Ridge Avenue.

Michigan Company Hopes to Use Truck as Feeder

F. W. Brown, general superintendent of the Michigan Railroad, has outlined a program which is expected to save the railway considerable money, enable trucking firms to give up long hauls and give the manufacturer, farm producer and other shippers quicker and more economical service.

Mr. Brown now is negotiating with a trucking firm in Detroit doing long distance hauling to eliminate these long trips, which often extend more than 100 miles into the state, and confine the activity of the motor trucks to the towns and cities and to concentrated rural districts.

Under the plan the truck firm would pick up the goods at one end, load them into the cars of the Michigan Railroad and after the interurban had made the haul, say, between Detroit and Grand Rapids, the truck representatives in Grand Rapids would enter the car and distribute the goods.

The Michigan Railroad's part in the shipment would consist merely in sealing the car when the truck firm had loaded it and in delivering that car on the interurban siding at the point of destination. Since all goods under the plan are to be carried in carload lots a shipment of miscellaneous freight would be billed as one item to the truck company instead of in forty or fifty items as is now the case. Instead of having to notify the recipients of freight in each case, the railroad would simply have to notify the truck company that the car had arrived and the company would do the rest, since it is to operate locally in every center from which the Michigan Railroad now ships freight. Among other things this plan would allow the railroad to pursue its natural function, eliminate the bugbear of long hauls for the truck company and lead to more freight business for the railroad. It would be particularly advantageous in the winter when snows often prohibit efficient trucking on the roads. Thus where a truck going from Grand Rapids to Detroit might in winter require several days for the trip the railroad could take a loaded car to Detroit during a single night and the truck feeder could make deliveries the following day, giving twenty-four-hour freight service over a distance of more than 150 miles.

Rerouting and Extensions in Toledo Partly Approved

The Council committee on railroads and telegraphs at Toledo, Ohio, has approved a large part of the general Community Traction Company rerouting and extension plan submitted a week ago by Street Railway Commissioner W. E. Cann. Decision was delayed on the establishment of the double-deck bus line on Collingwood and Madison Avenues, the abandonment of part of the Michigan line, the rerouting of Long Belt and Nebraska-Lagrange lines.

Extensions of the Bancroft line to Ottawa Park, East Broadway line through the New York Central subway, the Cherry line to Fitch, the laying of double track in Summit Street exten-

sion and the establishment of the trackless trolley crosstown line were all approved.

The final draft of the plan will be submitted to Council only after a very thorough discussion and attempt to line up all sides to put through the constructive features of the plan.

Quartet Helps Railway Relations

The Inspectors' Quartet of the Louisville Railway recently put on an evening program at the radio broadcasting station, WHAS, of the Louisville *Courier Journal*. The company received 186 letters and telegrams complimenting the quartet. These singing trainmen are the ones who contributed to the banquet entertainment at the Midyear Dinner of the American Electric Railway Association at St. Louis. They have three or four engagements a week in Louisville and it is believed they have unquestionably helped to create a better spirit toward the railway on the part of the local public.

Radio Party on Twenty-fifth Anniversary

The United Railways & Electric Company, Baltimore, Md., celebrated its twenty-fifth anniversary on March 4 by giving a radio birthday party. The United took charge for the evening of Station WEAR of the Baltimore *News* and presented a program entirely by its officers and employees, even the announcing being done by a company man.

It was a most diversified program, including brief talks by President C. D. Emmons and other company personages, band, chorus and solo numbers. That it was enjoyed was testified to by the large number of letters and postcards received by the company from patrons who listened in and who wrote commending the company for its enterprise as well as for a delightful evening's entertainment.

News Notes

Another Urge to Ride in Non-Rush Hours.—Another city is joining the ranks calling attention to shoppers and pleasure seekers to return home in the evening before the usual rush hour crowds. A recent New Orleans editorial writer states that it is impossible to arrange arbitrarily the closing of business hours, but it is possible for women shoppers and pleasure seekers in general, to use the cars in off-rush periods. The editorial suggests to the theater managers one way out of the difficulty by earlier matinees. Instead of their starting at 2:30 as is usual, the writer suggests a 2 o'clock performance, so that the theater patrons might be permitted to reach home before the evening rush hour begins.

Railway Official Subject of Article.—An appreciation of James P. Barnes, president of the Louisville Railway, is contributed by E. F. Kelley to the January number of the *Tech Engineering News*. Mr. Kelley recounts an inter-

esting narrative on an outstanding figure in the electric railway field "through secretary's eyes." This number also includes articles on "Putting Radio to Work" and the "Hydro-Electric Power Plants of California," and treats of other subjects of interest to the engineers.

Working Toward Saving Line.—Efforts are being made to prevent the abandonment of the Meadville-Linesville Line of the Northwestern Electric Service Company of Erie, Pa. To this end a special committee has been appointed representing local civic bodies, it having been announced previously that the line was not a paying venture, that to put it back in proper condition would cost thousands of dollars and that service was likely to be abandoned at any time.

Company Won't Pay for Paving.—Clark V. Wood, president of the Springfield Street Railway, Springfield, Mass., has informed the town of Palmer that the company will not conform to terms calling for the cementing of Main Street in Three Rivers Village, for which \$15,000 was appropriated by the town. The company is called upon to pay for the cement between the rails and for 18 in. on either side. Rather than do this, Mr. Wood says the company will discontinue the line running to Three Rivers.

New Interurban Under Consideration.—John H. Carpenter of Florence, Ala., and associates are securing options on right-of-way for an interurban railway from Florence, Ala., to Nashville, Tenn., by way of Mount Pleasant and Franklin, Tenn. The standard gage railroad operated with gasoline from Mount Pleasant to Franklin, Tenn., is owned by John H. Carpenter and the Howard estate. This track will be used as a part of the proposed new interurban line. The line would serve the Wilson Dam district and the Muscle Shoals territory.

\$114,505 in Pensions.—During the year 1923 there was paid to employees on the pension list of the Boston Elevated Railways, Boston, Mass., \$114,505. Fifty-seven men were added to the list and thirty were taken from the list by death. There are 243 men on the pension roll at the present time.

Seek Wage Advance.—The employees of the Lehigh Valley Transit Company, Easton, Pa., have asked for an increase in pay from 6 cents to 8 cents an hour and changes in working conditions. The three-year men are now being paid 55 cents an hour.

A Real Achievement in Service.—A record of 4,500 years of service is the boast of the Portland Railway, Light & Power Company, Portland, Ore. Inspired with one idea, namely, service to the public, 187 employees of this company have stuck to their cars for a period of twenty years or more of continuous service. Recently these men, members of the Twenty-Year Club, celebrated their loyalty at a dinner at the Chamber of Commerce. Though known as the Twenty-Year Club, some of the men have given forty years of their best efforts to accommodating the company's patrons and co-operating with their company.

Financial and Corporate

Good Showing by Eastern Massachusetts

Gross Revenue Up \$100,000—All Fixed Charges and Preferred Dividends Covered

Net income of the Eastern Massachusetts Street Railway, Boston, for the year ended Dec. 31, 1923, after all charges, was \$878,583, a decrease of \$181,259 over 1922.

According to the annual report presented to the stockholders on March 3 gross receipts from car fares in 1923 were \$10,006,150, an increase of \$16,422 over similar receipts of the previous year. On Sept. 1, however, the Hyde Park division was taken over by the Boston Elevated with a decrease during the last four months of the year of approximately \$17,000 in gross receipts.

COMPARATIVE INCOME OF EASTERN MASSACHUSETTS STREET RAILWAY

Statement of Public Trustees for Years Ended Dec. 31

	1923	1922
Passenger revenue.....	\$10,006,153	\$9,989,728
Auto bus revenue.....	76,389	16,359
Freight and other revenue	46,033	40,107
Rentals, advertising, etc....	233,741	252,892
Interest and other income..	350,389	413,578
Total revenue.....	\$10,712,705	\$10,712,663
Expenses:		
Way and structures.....	\$1,811,202	\$1,879,506
Equipment.....	1,395,813	1,245,256
Power.....	1,219,869	1,082,151
Car operation.....	2,461,327	2,337,343
Injuries and damages.....	365,093	356,701
Insurance.....	84,810	162,588
Law expense.....	15,757	13,546
Rent of tracks.....	68,521	77,258
General wages and expenses	246,322	247,127
Pensions and group insurance	77,404	33,696
Stationery and printing....	41,423	41,984
Stores and garage expenses..	104,814	212,777
Miscellaneous expense.....	51,430	54,673
Auto bus expense.....	116,729	13,484
Total operating expenses	\$8,060,514	\$7,758,090
Total operating expenses and taxes	\$8,436,019	\$8,154,914
Gross income.....	2,276,686	2,557,749
Interest and rentals.....	1,398,152	1,497,956
Net income.....	\$878,583	\$1,059,792

Operating expenses include charges for depreciation amounting to \$848,214 in 1923 and \$848,753 in 1922. During the year \$509,119 of the reserve was applied to reconstruction and amortization.

Although at the end of June there was an increase over the corresponding period of 1922 of more than \$317,000, this gain was almost entirely wiped out by the end of 1923. In no month since June did the passenger revenues of the present year equal those of the corresponding months of 1922. Industrial depression in the shoe and textile centers, increased use of privately owned automobiles and unseasonable weather conditions during the summer and fall all contributed to this result. During the year there have been no material changes in the rates of fares. The average fare is 6.9 cents.

There was a substantial increase in auto bus revenue due to the installation of a larger number of buses. Interest and other income declined more than \$63,000, due to the application of large portions of reserve funds and the conse-

quent disposal of securities. Other revenue items did not show material changes from the previous year. Total revenues from all sources for 1923 exceeded those of 1922 by \$42.39.

There was an increase of \$302,423 in total operating expenses in 1923. Higher wages, an advance in price of fuel oil used for power and extension of auto bus operation account for the major portion. An increase of nearly \$44,000 in pensions and group insurance is due to the fact that group insurance for the productive force was in effect during only the last two months of 1922. Way and structures, insurance, and stores and garage expenses show material savings. The item of taxes shows a reduction of about \$21,000 due to decrease in net income. A substantial reduction was made in fixed charges.

The comparative expense in track and line was \$1,510,182 in 1923 and \$1,602,198 in 1922.

Trackwork representing \$301,547 was considered to offset depreciation to that amount and additional work costing \$190,406 was charged to the "rehabilitation" account. The unexpected balance of the "rehabilitation" fund is \$270,548.

Fifty new double-truck passenger cars were ordered in 1923 for delivery in October, but only a few of these were actually received in time to be put in service during the year. They will all be in operation early in 1924. These new cars cost approximately \$612,000.

It is expected that by Aug. 1 all routes included in the signal improvement program will be fully equipped. The estimated cost is \$200,000.

By an award of a board of arbitration wages of all productive employees, numbering about 2,100, were increased 3½ cents an hour, effective from May 1, 1923, to May 1, 1924. This award increases payrolls about \$200,000 per annum.

This company is now regularly operating thirty-one buses which serve in a large degree as feeders to the railway lines. Bus equipment investment for the year was \$148,502. This auxiliary service is supplied principally in

sparsely settled sections where there are no heavy peak loads such as street railway cars can better handle. Receipts on bus lines naturally are relatively small, and operation for the year shows a loss of about \$40,000. The trustees say that even if this feeder system should continue to result in financial loss, providing the loss is not too great to be absorbed by the earnings of the railway district in which the buses are operated, the good will of the public will be adequate compensation.

The dividends started in 1922 on the first preferred and sinking fund stocks were continued in 1923 by the payment of 3 per cent on Feb. 1 and Aug. 1 on these issues. In addition a 6 per cent dividend was paid on preferred B stock on Feb. 1 and 3 per cent on the same stock on Aug. 15. The adjustment stock received 5 per cent in two installments of 2½ per cent each, paid May 15 and Dec. 1. Total dividend payments for the year were \$959,852. The trustees also declared dividends of 3 per cent each on the first preferred and preferred B stocks, payable Feb. 1 and Feb. 15, 1924, respectively.

During the year funded obligations of the company to the amount of \$1,000,000 were retired and canceled as follows:

Serial bonds due Jan. 1, 1923.....	\$300,000
Serial bonds due Feb. 1, 1923.....	90,000
Lowell, Lawrence & Haverhill bonds due June 1, 1923.....	479,000
Bay State equipment trust notes due Aug. 1, 1923.....	131,000

The company elected not to exercise its option to extend \$689,000 of Brockton Street Railway bonds due Oct. 1, 1924, and provision will be made to pay them at maturity.

During the year the city of Boston took by eminent domain that portion of the company known as the Hyde Park Division and leased it to the Boston Elevated Railway for operation. The company was awarded \$310,000 for this property, and it secured about \$15,000 additional from salvage for power house machinery. This taking resulted in an investment loss to the company of \$326,980.

Dividends and Surplus Up on New York State Railways

A comparative statement of the earnings and expenses of the New York State Railways, Rochester, for the years ended Dec. 31, 1923, and 1922, follows:

SUMMARY OF OPERATIONS OF NEW YORK STATE RAILWAYS

	1923	1922
Railway operating revenues.....	\$10,800,517	\$10,500,220
Railway operating expenses (including depreciation).....	7,708,178	7,687
Net revenue railway operations.....	\$3,092,339	\$2,813,203
Net revenue auxiliary operations.....	2,482	1,544
Net operating revenue.....	\$3,094,821	\$2,814,747
Taxes assignable to railway operations.....	797,122	705,382
Operating income.....	\$2,297,699	\$2,109,365
Non-operating income.....	76,869	97,421
Gross income.....	\$2,374,568	\$2,206,786
Deductions from gross income.....	1,451,177	1,435,517
Net income.....	\$923,391	\$771,269
Sinking fund appropriations.....	34,129	34,740
Dividends preferred stock.....	(5%) 193,125	(5%) 193,125
Earned on common stock.....	(3.49%) \$696,136	(2.72%) 543,403
Dividends common stock.....	(21%) 448,762	(13%) 299,175
Surplus.....	\$247,374	\$244,228

North Shore's Best Year

\$686,864 Net Income Reported for 1923 by Chicago-Milwaukee Line—An Increase of 32.61 per Cent

The year 1923 was the most successful in the history of the Chicago, North Shore & Milwaukee Railroad. Operating revenues increased \$937,320, or 18.71 per-cent over the year 1922, while the increase in the net income was \$168,935, or 32.61 per cent. Gross revenues from freight and merchandise despatch business increased \$294,661, or 39.88 per cent.

Participation shareholders met on Feb. 27, 1923, and by unanimous vote adopted the plan previously announced for the financial reorganization of the company. A new corporation was formed under the name of the Chicago, North Shore & Milwaukee Railroad, with an authorized capital stock distributed as follows:

Prior lien 7 per cent cumulative stock...	\$10,000,000
Preferred 6 per cent non-cumulative stock	5,000,000
Common stock.....	5,000,000

All of the preferred and common stock, together with \$2,684,208 of five-year, non-interest bearing promissory notes, were delivered to the participation shareholders in exchange for their shares in the proportion provided for in the trust agreement under which the participation shares were issued.

A quarterly dividend of 1½ per cent on the preferred stock was paid Oct. 25

COMPARATIVE INCOME ACCOUNT OF NORTH SHORE LINE, INCLUDING OPERATION OF CHICAGO & MILWAUKEE ELECTRIC RAILWAY

	1923	1922
Operating revenue:		
Passenger and special car revenue.....	\$4,836,531	\$4,214,151
Freight and express revenue.....	1,033,479	738,817
Miscellaneous revenue.....	75,261	54,983
Total.....	\$5,945,271	\$5,007,951
Operating expenses:		
Way and structures.....	538,588	429,280
Equipment.....	405,220	342,850
Power.....	529,480	483,317
Conducting transportation.....	1,878,229	1,533,246
Traffic.....	179,504	154,794
General and miscellaneous.....	933,399	834,104
Total.....	\$4,464,420	\$3,777,592
Net revenue—railway operation.....	\$1,480,851	1,230,359
Net auxiliary operating revenue.....	11,444	8,731
Net revenue from operation.....	\$1,492,295	\$1,239,090
Taxes assignable to railway operation.....	279,448	248,937
Operating income.....	\$1,212,847	990,153
Non-operating income.....	26,625	14,560
Gross income.....	1,239,472	1,004,713
Fixed charges.....	552,608	486,784
Net income.....	\$686,864	\$517,929

to stockholders of record Oct. 10. Quarterly dividends on the prior lien and preferred stocks were declared payable Jan. 2 to stockholders of record Dec. 17.

Under authority of the Illinois Commerce Commission and the Wisconsin Railroad Commission, the company issued \$1,500,000 of the new prior lien 7 per cent cumulative stock, partially to reimburse the treasury of the company for capital expenditures made in 1923. The stock is being sold at the par value of \$100 a share.

More than two-thirds of this stock has been sold to employees and cus-

tomers of the company, residents of the territory tributary to the road.

During the year additional equipment was acquired costing \$649,000. This was financed through an equipment trust amounting to \$557,000, the balance of the purchase price being paid by the company.

To provide funds for additions and betterments \$1,000,000 of 6½ per cent three-year secured sinking fund notes were sold. First mortgage bonds to the amount of \$902,000 were issued and deposited as part of the security for the notes above mentioned.

Equipment notes amounting to \$142,000 were paid during the year and

COMPARATIVE INCOME STATEMENT OF NORTH SHORE LINE, CONTRASTING YEARS 1916 AND 1923

	1916	1923
Operating revenue.....	\$1,157,191	\$5,945,272
Operating expenses.....	714,887	4,464,421
Net revenue—railway operation.....	442,304	1,480,851
Net auxiliary operating revenue.....		11,444
Net revenue from operation.....	442,304	1,492,295
Taxes assignable to railway operation.....	66,038	279,448
Operating income.....	376,266	1,212,847
Non-operating income.....	6,208	26,626
Gross income.....	382,474	1,239,473
Fixed charges.....	237,996	552,608
Net income.....	144,478	686,865

\$110,900 secured sinking fund notes were retired.

It will be recalled that the North Shore Line has the distinction of being the first winner of the Coffin medal, thus adding materially to the value of the award.

Attention is directed in the report to the additions made during the year to the rolling stock equipment.

The record for safe operation was maintained during the year.

Relations between the company and its employees and customers are very satisfactory. The management says there is evidence that the feeling of good will toward the company in the various communities it serves increases year by year.

Offer Made for Ohio Interurban

An offer of \$172,500 is understood to have been made in behalf of the Northern Ohio Traction & Light Company for the property of the Cleveland, Alliance & Mahoning Valley Railroad, now in receivership. It had not been intended to announce the offer until after the deal was closed, but the news became public following a meeting of bondholders, at which the offer was announced and a statement made to the bondholders indicating the amount of money it would be necessary for them to furnish in order to continue operation. Bonds to the amount of \$1,116,000 are outstanding against the property, and the bondholders are said to be opposed to advancing any new money.

On March 14 confirmation was secured in New York of the statement that the Common Pleas Court of Cleveland had confirmed the purchase of the road by the Northern Ohio Electric Corporation, acting for the Northern Ohio Traction & Light Company. The price was \$172,500.

The Cleveland, Alliance & Mahoning Valley Railroad, 45 miles long, runs through Alliance, Ravenna and Warren.

Toledo & Western Sold

Willys-Overland Company and Wabash Buy Line Extending from Toledo to Pioneer

Announcement of the sale of the Toledo & Western Railroad to the Willys-Overland Automobile Company and the Wabash Railroad was made at Toledo recently. As a result the Toledo & Western Railway has been incorporated with a capital of \$500,000. John N. Willys is president; J. F. Taussig, president of the Wabash Railroad, executive vice-president; A. B. Qualy, secretary, and J. H. Gerkens, treasurer. The latter officers are both executives at the Willys-Overland plant in Toledo. The new company will spend about \$1,000,000 for improvements to the property and in new connections.

The property sold consists of a line from Toledo west to Pioneer, Ohio, and a branch north to Adrian, Mich. The road, in the shape of a "Y," intersects the Wabash railroad at Adrian and at Franklin, a junction point near Alvordton, Ohio. The Willys-Overland company will operate the line largely in the interests of improving its freight-handling facilities. At the present time all its shipments have to be made over the New York Central system. The new Wabash connection will provide another outlet through which shipments can be made on a fast line to the Eastern markets.

More than 300 acres of land were purchased in Toledo to provide a new freight right-of-way into the local plant. Willys also owned an old spur of the Detroit, Toledo & Ironton. This will serve for part of the freight route, which will be only about 2 miles in length from the plant to the Toledo Terminal Railroad and Toledo & Western junction point. The new freight line will open up a big territory for new industries and provide transportation facilities from the automobile plant into a new residence district not supplied with electric traction service at present.

The road has been operated by the Henry L. Doherty interests for thirteen years, the last two under receivership. The receivers have until April 5 to wind up their affairs. It was purchased some months ago by Frank Coates, on behalf of the Doherty interests, for \$600,000 at special master's sale. Since the purchase the electric power distributing facilities have been separated from the railroad and grouped under the Toledo Suburban Electric Company, a newly incorporated company. The Toledo & Western property has been operated at only a very slight loss in the last few years.

Merger Bill Appears Again in Washington

The District Commissioners at Washington have sent to Congress for introduction a revised bill designed to bring about a merger of the two local railways and the Potomac Electric Power Company.

The bill considered by the last session of Congress calls for the collection of a certain percentage of any moneys earned by the company in excess of a

fair return on valuation. The revised measure changes this to a direct tax of 20 per cent on the operating income without regard to valuation.

The bill relieves the company of paying the salaries of crossing policemen, which amounts to \$38,000 a year for the Capital Traction Company and \$60,000 for the Washington Railway & Electric Company.

The new bill requires the companies to continue to pay the cost of paving between tracks.

Plan Announced for Readjusting Financial Structure of New Jersey Corporation

Thomas N. McCarter, president of the Public Service Corporation of New Jersey, announced on March 14 a plan for the readjustment of the corporation's financial structure as affecting certain securities and intercompany relations. The plan has already gone before the Board of Public Utility Commissioners. The purpose behind it is to permit the company to meet the requirements of service to the public, to strengthen and improve the position of security holders and to provide an adequate means of procuring new capital for necessary extension and development.

Consummation of the plan will not disturb the relationship which the corporation now bears to its subsidiary companies or to the public; nor will it affect the holders of securities of the underlying electric, gas and railway properties, except to improve their position by facilitating the development of these properties. It will make possible the financing by the corporation itself of the capital requirements of the railway properties until the credit of the railway is re-established, while the electric and gas activities will be placed in position to finance themselves independently.

In general terms the plan provides for a series of financial operations designed to remove the present mortgage restrictions which cramp the capital expansion of the underlying companies and it will at the same time increase the borrowing capacity of the parent corporation.

The details of the plan regarding changes in the outstanding securities, announced briefly, are largely of interest to the holders of the securities of the Public Service Corporation, to whom they are addressed. It does appear of general interest to note that among other things the plan contemplates the consolidation of Public Service Electric Company, Public Service Gas Company, United Electric Company of New Jersey and several smaller companies, practically all of whose stocks are now owned by the Public Service Corporation, into a new company to be known as the Public Service Electric & Gas Company, all of whose common stock will be owned by the Public Service Corporation. Further announcement will be made by the company to the security holders when the precise details of the plan are finally settled. It will be recalled that Mr. McCarter recently announced that the capital requirements of the company this year would be \$34,000,000.

\$3,000,000 of Boston Elevated Bonds Offered

Harris, Forbes & Company, New York, N. Y., as members of a syndicate are offering for subscription \$3,000,000 of Boston Elevated Railway 6 per cent ten-year gold bonds. The bonds are dated June 1, 1923, and are due June 1, 1933. They are in coupon form in denomination of \$1,000 each. The issuance of the bonds has been approved by the Department of Public Utilities of Massachusetts. Of the proceeds of the issue \$700,000 will be used to reimburse the company for money used to pay at maturity on Jan. 1, 1923, a like amount of West End Street Railway debenture 4½ per cent bonds. The balance will be used to provide for extensions to the company's power station in South Boston, for new shops in Everett and for the George Street storehouses in Somerville. The offering price is 103 and interest, yielding 5.60 per cent.

Missouri, Oklahoma and Ohio Properties Merged

Formal action in organizing the Missouri Power & Light Company, was taken at Mexico, Mo., on Feb. 28, when the directors and all common and preferred stockholders of the Missouri Utilities Company voted to change the name of the company and form the new organization.

In the formation of the new company the electric, railway, gas and bridge properties at Jefferson City, properties of the North Missouri Light & Power Company, from Hannibal down the river, and properties of the North American Light & Power Company in Oklahoma and Ohio, including the Cahokia Gas & Oil Company, a corporation of Illinois, were taken over, in addition to the properties of the Missouri Utilities Company in Missouri.

The North American Light & Power Company owns all of the common stock of the Missouri Power & Light Company and common stock of the Illinois Traction Company, which controls the Illinois Power & Light Corporation.

Many improvements are contemplated in the properties, particularly additions and extensions to the generating plant and transmission lines.

Approval of Purchase of New York Interurban Sought

The Venango Public Service Corporation, a Pennsylvania company, operating railway lines in northwestern Pennsylvania through ownership of the Northwestern Electric Service Company, has applied to the New York Public Service Commission for authority to acquire and purchase such amounts of the capital stock of the Warren & Jamestown Street Railway as have been or may hereafter be tendered to it and all the stock of the Carroll Electric Light & Power Company.

The Warren & Jamestown Street Railway operates a 22-mile electric railway, 9 miles of which is in New York State. It is controlled by the same interests that administer the affairs of the Warren Street Railway. The stock

of that company, as noted recently in the *ELECTRIC RAILWAY JOURNAL*, is in process of transfer to the Penn Public Service Corporation.

Auction Sales in New York.—At the public auction rooms of A. H. Muller & Sons this week there were sold \$26,000 Second Avenue Railroad 6 per cent receiver's certificates, 39 per cent.

Seattle Falls Down Again in January.—Operating revenues of the Seattle Municipal Railway in January were \$8,351 and the operating expenses \$8,520, leaving an operating deficit of \$169. This was increased to \$3,554 by the inclusion of other charges.

Bond Issue Authorized.—Permission has been granted by the Georgia Public Service Commission to the Gainesville Railway to issue \$100,000 in bonds and \$15,000 in additional stock, following the recent purchase by it of the railway properties at that city. The company purchased the property from the Georgia Railway & Power Company, Atlanta.

Partial Abandonment Authorized.—Abandonment of a portion of electric railway from a point near the intersection of Standard Avenue and Scofield Street, Richmond, has been authorized by the California Railroad Commission on the application of trustees of the San Francisco-Oakland Terminal Railways.

Wants to Consolidate and Issue Bonds.—The United Railways & Electric Company, Baltimore, Md., has applied to the Public Service Commission for permission to consolidate its suburban lines under the name of the Maryland Electric Railways. Approval is also asked of the issue of \$4,000,000 mortgage bonds, already sold, under a \$25,000,000 mortgage on the properties of the consolidated company.

Line Officially Abandoned.—Daniel P. Abercrombie, receiver for the Connecticut Valley Street Railway, announces the line has officially stopped operating. Efforts are being made to induce the court to permit a private sale of the Greenfield & Turners Falls division, which was to be disposed of by public auction.

Permission Sought to Abandon Camden Line.—The Board of Public Utility Commissioners of New Jersey expects to hear on March 17 an application of the Public Service Railway for permission to abandon the Fairview extension from Broadway and Warren Street, Gloucester, to Collings Avenue and Mount Ephriam Avenue, Camden. The petition sets forth that the revenue from the extension is approximately \$11 a day or \$4,000 a year, while the overhead cost is approximately \$20,950, exclusive of superintendence, depreciation, general and miscellaneous taxes, fixed charges and return on capital.

Payment of Dividend on "L" Authorized.—The directors of the Interborough Rapid Transit Company, New York, have ordered the payment on April 1 of a quarterly dividend of \$1 a share on the stock of the Manhattan Elevated Railway. The payment due on this issue in December was omitted because the Interborough system showed a deficit in the quarter ended Sept. 30.

Traffic and Transportation

Seven-Cent Fare in Clayton Temporarily

The United Railways, St. Louis, Mo., has put into effect temporarily a 7-cent fare between points in St. Louis and the courthouse square in Clayton, Mo., with the proviso that it is applicable only to rides on a single transfer between the Kirkwood-Ferguson and Olive-University lines. The Missouri Public Service Commission recently, acting on a complaint lodged by residents of Clayton, ordered the company to equalize the rate of fare from Clayton to St. Louis with that charged between the Maplewood, Mo., loop and St. Louis. A 7-cent fare was charged on the latter trip, while from the Clayton courthouse to points in St. Louis the charge was 14 cents. The United Railways has applied for a new hearing on the question and has announced that in the meantime Clayton will have the 7-cent rate with the restrictions named.

Col. Albert T. Perkins, general manager for the United Railways, stated that if it was necessary to maintain the same rate between Maplewood and St. Louis as between Clayton and St. Louis the company would be forced to raise the Maplewood rate. The company could not profitably maintain a 7-cent rate from the courthouse in Clayton to all points in St. Louis with the same transfer privileges as on the St. Louis lines.

Passholders at Terre Haute Are Steady Customers

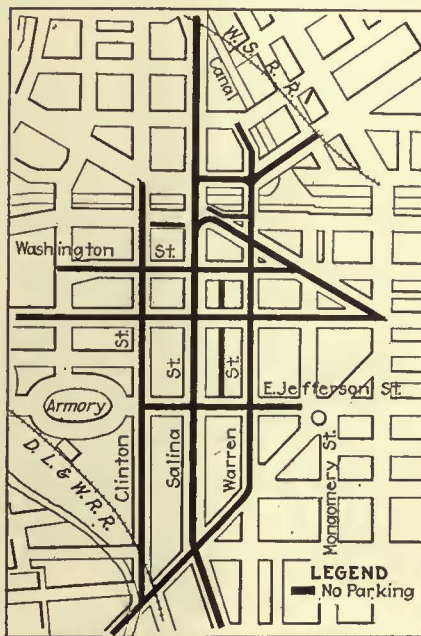
Statistics show the user of the pass on the Terre Haute city lines of the Terre Haute, Indianapolis & Eastern Traction Company to be the company's steadiest customer. The pass has been in use in Terre Haute since May 1, 1922. Since then Terre Haute has had its industrial ups and downs because of its dependence on the amount of activity in the surrounding coal mines. During the latter months of 1923 a high percentage of mine idleness was reflected in lower earnings on the electric railway. This gave the opportunity to see how differently the cash and pass riders are affected. The cash fare is 5 cents, while the pass sells at the high price of twenty fares. Hence the pass appeals only to frequent riders and those who like to use the cars for mere convenience.

A comparison of the sixteen weeks ended Dec. 30, 1923, with the corresponding period of 1922 shows that while the cash fares suffered a decline of 4.47 per cent, pass revenue dropped only 1.68 per cent. Moreover, the average gross rides per pass also showed a decline, indicating that because of lesser prosperity the passholder took fewer off-peak rides than before. In the 1923 period the holder of the pass averaged only 31.5 gross rides compared with 34.7 in the 1922 period, a decline of 9.3 per cent. The number

of actual net, or origin-to-destination, rides in each case was about 20 per cent less, inasmuch as pass riders are always counted as revenue riders whether on a through or a transfer ride. While the pass revenue declined only 1.68 per cent, the total gross rides on passes declined by 10.68 per cent.

Opinion Divided Over Non-Parking Regulation in Syracuse

Syracuse is another city which has vigorously taken up the parking evil. Jurisdiction in this matter rests with the municipal commissioner of public safety and on Jan. 1, 1924, on the recommendation of the Safety Council, which is a branch of the Chamber of Commerce, he put in force a non-parking regulation covering a number of the important streets in the downtown district. The streets thus



District in Which Parking Is Prohibited in Syracuse

covered are shown by the accompanying map and the regulation is defended on the grounds of safety and the necessity for providing clear streets for the operation of the fire department. Parking is prohibited on the streets shown from 8 a.m. to 6:30 p.m., and under the ruling of the corporation counsel a parking car is one which is not loading or unloading.

Vehicle and street car movement on the streets is much more free than before the regulation was adopted, but the opinion of the downtown merchants and business houses is divided on the effect of the regulation on business. The Syracuse Journal of Feb. 16 contains the results of a poll of eighty-five leading business houses. Of these fifty-one favor a thirty-minute parking

regulation, seventeen favor some sort of parking regulation, five are for no parking, twelve refused to be quoted on the parking limit. In regard to the effect on business forty-eight said their business was being injured by the present regulations, sixteen said their business was not affected and the others were not sure.

Bus Operation Over Unserved Streets Suggested

Peter Witt, who was recently called to Trenton, N. J., to make a survey of trolley and bus operation, has recommended that bus franchises granted to the Central Transportation Company, a subsidiary of the Trenton & Mercer County Traction Corporation, should provide for the operation of the machines over thoroughfares now unserved by trolley cars; that there should be transfer privileges from trolley to bus and that no revenue from the Trenton car riders should be used to make up deficits on the bus lines. Mr. Witt also recommended that bus franchises which are granted to bus companies other than the Central Transportation Company should be only short term grants and other companies should be denied the right to compete with the present system of transportation.

Bus Fares Advanced in Spartanburg

Increased bus fares in the city of Spartanburg and an application to the commission for an increase in railway fares on the suburban lines are the outstanding developments in the continued controversy between the South Carolina Gas & Electric Company and the city of Spartanburg. Since the decision of the South Carolina Supreme Court ordering the company to resume its railway service, the company has decided to appeal to the United States Supreme Court. This action is now pending. As the attorneys have three months from the date of the order to file the appeal, the action will be consummated on or before April 14. Meanwhile the company is continuing the operation of four buses in the city proper and two street cars on the suburban lines.

The bus fares on the South Carolina Gas & Electric Company's lines went up from 5 to 10 cents on Feb. 25, following the decision of the Railroad Commission to refuse to consider a petition filed by the company asking for the authorization of an increase in rates. Ticket books for school children and adults are sold at special rates. The commission refused the petition on the ground that the litigation between the city of Spartanburg and the company was pending in the federal courts, and on the further grounds that in a recent decision the Supreme Court of South Carolina had held that the Railroad Commission had not the authority to approve the substitution of buses for trolley cars on its lines.

George B. Tripp, president of the company, said that the company could not be expected to continue the bus operations unless the income received

from fares equaled at least actual operating expenses, even if the income was not large enough to pay for any depreciation, or provide for a reasonable return on the investment.

A hearing will take place on March 27 on the petition of the company for an increase in fares on its suburban lines. The increase will include a 10-cent fare from the city limits to Glendale and vice versa, in the first zone; a 10-cent fare from Glendale to Clifton and vice versa, in the second zone. School children in actual attendance at school will be allowed to purchase commutation tickets in books of sixteen for \$1, and in books of four tickets for 25 cents. Adult passengers will be allowed to purchase tickets in books of twelve for \$1 or three tickets for 25 cents. These tickets will be accepted as fare in each zone.

Special Limited Service in Ohio

Business on the Red Egg Lines—the Columbus, Newark & Zanesville Electric Railway and the Indiana, Columbus & Eastern Traction Company—is on the upward trend. In the past month and a half eight new fast trains have been placed in service.

Two fast trains, the Capital City Flier and the Gem City Flier, make the run between Dayton and Columbus, a distance of about 100 miles, in two hours and twenty minutes, with only one stop at Springfield, Ohio. Special equipment is used on these limiteds, such as large and heavy cars, making for safety and comfort, particular consideration having been given to the route over which they operate and the high-speed schedule. These trains make connections at Dayton for Indianapolis, Ind.

Following the success of the Capital City and the Gem City Fliers, the Indiana, Columbus & Eastern added two more high-speed trains between Columbus and Dayton. Operating in connection with the Dayton & Western and the Terre Haute, Indianapolis & Eastern, this added service provides through transportation from Columbus to Indianapolis. These trains are known as the Hoosier Special and the Buckeye Special.

After the addition of the first two fliers on the Indiana, Columbus & Eastern came the announcement of four new fast trains on the Columbus, Zanesville & Newark Electric Railway. That company has selected the Indian names of the Shawnee, the Muskigum, the Wyandotte and the Miami for these trains as the country through which this line is laid abounds in rich Indian lore. Only two stops are made by these cars between Columbus and Zanesville, namely, at Newark and Hebron. The trip is made in two hours.

Arthur V. Bland, director of the public relations department of the Red Egg Lines, says that the addition of these eight new trains is only the forerunner of a better and more complete service for the near future. Another change just announced is the moving of the freight departments of these roads to the Interurban Terminal Building at Columbus, Ohio.

Illinois Road Wants Bus Grant Between Aurora and Elgin

An application for authority to operate motor vehicles for passenger and freight service between Aurora and Elgin has been filed with the Illinois Commerce Commission at Springfield by the Aurora, Elgin & Fox River Electric Company, which now operates an electric interurban line between the two cities. The proposed line, it is announced, would follow a route along both the east and west river roads and would in no way interfere with the service of the electric railroad.

At the present time there is no railroad operating all the way between Aurora and Elgin on the one side of the river. There is a direct automobile road on each side. Some residents in outlying districts have difficulty in getting to the interurban stations when they want to go to Aurora or Elgin. With the buses in operation they could ride in them to either of the cities, or to intermediate points. By operating motor vehicles the company would be adding to the present service by providing transportation for those whose homes are a long distance from the electric line.

Six-Cent Fare Measure Extended

The Council of Richmond, Va., has just extended the 6-cent fare ordinance. This measure allows the Virginia Railway & Power Company to charge a 6-cent fare, although franchise requirements fix the fare at 5 cents. The extension is for a period of six months, effective on April 12, when the present 6-cent ordinance is due to expire.

Politics, long the interfering factor in an agreement between the company and the city on the new blanket franchise asked by the company, will probably delay action on this vital measure for at least three months longer. The franchise is before the committee on streets of the Council. The election takes place in the spring, however, and action is being put off so that the franchise issue shall not become involved in the fate of local politicians.

Connecticut Fares Remain Unchanged Temporarily

As a result of the hearing before the Public Utilities Commission on March 11 fares on the lines of the Connecticut Company will remain unchanged until April 14 to permit the counsels for the protesting cities to study the mass of evidence submitted by the Connecticut Company. At the hearing George D. Watrous, chief counsel for the company, argued that there was no reason for treating the Bridgeport division or the city of Bridgeport differently from other cities; that the results of operation neither demanded nor warranted it. Rather was uniformity sought.

The hearing was called to consider petitions from the cities of New Haven, Hartford, Waterbury, Meriden, Stamford and New Britain, which were seeking a reduction of the 83-cent ticket charge put into effect on Feb. 10. The cash fare is 10 cents.

Permits for Parallel Operation Approved.—The Board of Public Utility Commissioners of New Jersey has granted an application of the Public Service Transportation Company, a subsidiary of the Public Service Corporation, operating the Public Service Railway, for municipal permits to operate four buses between the Pennsylvania Railroad ferries and Forty-fourth Street and Westfield Avenue, Camden. The route parallels in the same streets tracks of the Public Service Railway over the entire distance.

Planning a Clubhouse in Seattle.—Plans are being furthered for the erection of a \$100,000 clubhouse for the use of Seattle Municipal Railway trainmen and their families. A recent mass meeting was held to stimulate interest in the campaign to raise funds for this purpose.

Eight Cents Cash Rate.—According to a recent ruling of the Oklahoma State Corporation Commission, the Muskogee Electric Traction Company, Muskogee, Okla., will charge 8 cents for cash fares with two tickets for 15 cents. The order also allows fourteen tickets for \$1 and fixes the fares for school children at 4 cents each where twenty-five tickets are purchased at a time.

Applies for Bus Right.—The Jefferson Traction Company, Punxsutawney, Pa., has applied to the Public Service Commission for permission to replace its railway service between Punxsutawney and Big Run with bus service. If the petition is granted the work of removing the car tracks will be started in about two months.

Operates to Beach.—The San Diego Electric Railway, San Diego, Cal., made a trial trip over its new short line to the beaches on Feb. 22. A two-car electric made a fast trip from the heart of the city to Pacific Beach, a distance of 12 miles. The trip was made exactly four months after construction was begun. The company promises service to Mission Beach by May 1 and to La Jolla by July 1.

Commission's Operating Recommendations Accepted.—At the annual meeting of the Union Traction Company of Indiana President Brady reported on the recommendations made by the Public Service Commission as a result of its investigation of the Alfont collision on Feb. 2. The directors instructed the officers of the company to notify the commission that the company would comply with the recommendations of the commission, subject to minor modifications, in the interest of good and safe practice. The recommendations referred to relate to rules and practices in the operation of interurban trains and block signals.

Five-Cent Fare for Trial Period.—The Danville Traction & Power Company, Danville, Va., will go back to the 5-cent fare on April 6 for a ten-day trial period, during which time a careful check of the patronage will be made. If the increase in patronage justifies it, the 5-cent fare will continue, otherwise it will be withdrawn and the present 7-cent fare resumed. Should the fare experiment fail the traction officials will ask permission to use one-man cars.

Personal Items

Auto Maker Heads Electric Line in Ohio

Mr. Willys Has Been Made President of the Toledo & Western Railroad, Recently Acquired

John N. Willys, president of the Willys-Overland Company, has been elected president of the Toledo & Western Railroad, an electric road which the Willys-Overland interests and the Wabash Railroad have acquired. This is the entrance marked of another motor manufacturer into the field of railroading. Mr. Ford in his purchase got a right-of-way and two streaks of rust, which he is engaged in converting into a real railroad and in electrifying. Mr. Willys, on the other hand, gets a

urer and general manager. Under Mr. Willys' guidance the Willys-Overland Company rose to a prominent place in the automotive industry, which position it has held continuously.

Mr. Willys was born in 1873 in Canandaigua, N. Y. He was doing well in his studies and working in a law office when his father died and he had to give up his college dreams. Bicycles were beginning to make their appearance and he saw in them a profitable outlet for his ingenuity as a salesman. He bought a sample bicycle and was duly authorized as a local agent for the manufacturers, and at eighteen he had organized a sales company. Gradually he worked into the wholesale distribution of bicycles and at the age of twenty-seven did a business of \$500,000 a year. Then came the automobile and his entrance into that field.



J. N. Willys

fully equipped electric railroad fairly up to date in its appointments and capable of being turned immediately to his use.

To the automobile world the career of Mr. Willys is well known. To most men in the electric railway field, however, John N. Willys is probably nothing more than a name linked inseparably with a make of automobile. Mr. Willys entered the automobile industry as a selling agent in Elmira, N. Y. In the dark days of December, 1907, he became uneasy about the non-delivery of Overland cars for which he had booked 500 orders. He went to Indianapolis and there was coolly told by the manager, "We are going into the hands of the receiver tomorrow morning." He then decided to save the company by a money-raising campaign which was a success, and within eight years John N. Willys, savior of the Overland company, was offered \$80,000,000 for his share of the company.

In January, 1908, the reorganization was accomplished and Mr. Willys became president the following year. The institution was moved from Indianapolis to Toledo and Mr. Willys became its active head, carrying, in addition to the title of president, that of treas-

Howard R. Whitney Appointed Vice-President

Howard R. Whitney, Springfield, Mass., was appointed vice-president in charge of operations of the Worcester Consolidated and the Springfield Street Railway, effective March 1. This represents an advance from the office of assistant to the president. Mr. Whitney has been connected with these companies nearly ten years.

Mr. Whitney entered the employ of the Worcester and Springfield companies on Dec. 1, 1914, as engineer of maintenance of way, in charge of tracks and bridges, and a year later extended the scope of his duties to the charge of structures as well, thereby gaining a thorough knowledge of the entire physical properties of the two systems. He was appointed special assistant to the president in December, 1917, and early in 1919 was given the title of assistant. His latest promotion comes as a recognition of his ability in conserving the properties and promoting general efficiency on the systems. He was graduated from Tufts College in 1905 in civil engineering, and was first employed in construction of bridges and maintenance of track for the Missouri Pacific Railroad. Later he became construction engineer for the Central Vermont Railroad's subsidiary, the Southern New England Railroad, with headquarters in Woonsocket, while the projected extension from Palmer, Mass., to Providence, R. I., was being built. After that he was employed in the Boston & Maine's maintenance of way department, and then for one year by a Nashua, N. H., contracting firm.

A. B. Coryell has been appointed general superintendent and purchasing agent of the Windsor, Essex & Lake Shore Rapid Railway, Kingsville, Ont., effective April 1. Mr. Coryell was formerly general superintendent of the Muskogee Electric Traction and the Shawnee & Tecumseh Traction Company in Oklahoma.

F. A. Healy Interurban Pioneer

Accounting Official Helped to Bring Together Properties in Ohio Recently Segregated

F. A. Healy, secretary-treasurer of the Ohio Electric Railway, Springfield, Ohio, and subsidiary systems since the organization of the holding company in 1907, was largely instrumental in developing the property until it became one of the most extensive interurban systems in the Middle West, with more than 500 miles of track covering Ohio and extending into Indiana.

With the segregation of the Ohio Electric System properties in 1921, Mr. Healy again became secretary-treasurer of the Indiana, Columbus & Eastern and leased lines and for a few months following the retirement of J. H. McClure as active receiver he took over the work of the general manager in addition to his other duties.

In point of service Mr. Healy is one



F. A. Healy

of the veterans of the interurban business. He entered the field in the Middle West when development was still in its infancy and assisted in extending the trackage of the Ohio Electric system to all parts of the State.

He was born in 1861 at Moline, Ill., and at the age of nineteen entered the offices of the Atchison, Topeka & Santa Fé Railroad. He was consecutively office boy and clerk and assistant chief clerk in the auditor's office. In 1888 he became chief clerk in the auditor's office of the Southern California Railway with headquarters at Los Angeles. In 1893 he became auditor and general freight and passenger agent of the Santa Fé, Prescott & Phoenix Railway with headquarters at Prescott, Ariz.

He then became an expert accountant and served successively as general auditor for the South Carolina & Georgia Railroad, Augusta Southern Railway, Ohio River & Charleston Railroad and auditor for the receiver of the Lake Champlain & Ogdensburg Railroad. He was engaged as an expert accountant on properties controlled by Charles Parsons, then president of the above companies, and from December, 1899, to December, 1906, he was auditor of the Atlanta & West Point Railroad

and the Western Railway of Alabama with headquarters at Atlanta, Ga.

In 1906 he assumed the position which he now holds, taking part, during his eighteen years in office, in the development of the Ohio Electric Railway property to a high peak as a unit and also witnessing the segregation of the properties and their operation as separate entities under the changing economic conditions of the present day.

Obituary

Alfred H. Smith

Alfred H. Smith, president of the New York Central Lines and one of the best known railroad men in the United States, was killed on March 8 when he was thrown from his horse in Central Park. Mr. Smith met his death in pulling up suddenly to avoid running into a woman, mounted on a horse, who had ridden across his path.

Mr. Smith was indirectly interested in electric railway affairs through the participation by his company in the joint ownership with the Delaware & Hudson Company of the Schenectady Railway and the ownership by the New York Central of a controlling interest in the New York State Railways, also the ownership by the New York Central of the New York & Harlem Railroad, operating a surface line in New York City. In fact, Mr. Smith was president of the New York & Harlem and a director of each of the others.

Alfred H. Smith was everywhere beloved. He had risen from the ranks, but he came into prominence as an executive after the *entrepreneur* stage in railroading had passed and so he found the task ahead of him one very largely of administration. How well he succeeded as an administrator and executive is shown by the position of the New York Central today both as a money earner and as a public institution. Evidence of his broadminded and liberal attitude toward labor was furnished on many occasions; notably at the recent inquiry by the State of New York into the causes and conduct of the strike on the lines of the Schenectady Railway. The extent of the appreciation of Mr. Smith's unusual ability in circles outside of the railroad world is strikingly instanced by the expressions of deep regret at his untimely death contained in the numerous editorials appearing in the daily press all over the country.

T. W. Passailaigue

Theodore W. Passailaigue, vice-president of the Charleston Consolidated Railway & Lighting Company, Charleston, S. C., died recently, in his sixty-third year. His career with Charleston railways dates back to 1876, when he began service with the Enterprise Railway, a horse car line, at the age of fifteen. He entered service as an office boy, and from this position he was steadily advanced until he was promoted to succeed the late Alfred Ravenel as president of the company.

When the Enterprise Railway was

absorbed by the Consolidated Company's interests, which instituted the first electric railway system in Charleston, Mr. Passailaigue was made general superintendent of the system. He was elected vice-president of the Charleston Consolidated Railway, Gas & Electric Company in 1917 and vice-president of the Charleston Consolidated Railway & Lighting Company in 1922, the latter being the operating company.

Mr. Passailaigue had been a member of the American Electric Railway Association since 1884 and was a regular attendant at the annual meetings. He was a member of the city board of school commissioners for twenty years.

John M. Roach

John M. Roach, a member of the board of operation of the Chicago Surface Lines, first vice-president of the Chicago Railways and formerly president of that company, died on March 7 at Fort Myers, Fla. Mr. Roach was long one of the outstanding figures of the electric railway industry. He was



J. M. Roach

president of the American Electric Railway Association in 1899 and 1900, and at the convention of the association in Chicago in 1922 he was one of the seven former heads of the association introduced at the session on Oct. 4 given over to the reunion of the past-presidents.

Mr. Roach had an unusual capacity for work and organization. His knowledge of men was, perhaps, his strongest characteristic, and while he had been out of active management of the electric railways in Chicago for the last ten years, he was still loved by thousands of the men who served under him and who are still with the properties there.

He saw the introduction of the cable system in Chicago in 1882 and the trolley system beginning in 1890. It was during his administration that the Chicago properties were rehabilitated beginning in 1908. The record of reconstruction work there completed in three years is said to have been unequalled in traction history.

Mr. Roach began his career in Chicago as a conductor. That was in 1872 in the employ of the North Chicago Street Railway. Because he understood the basic things—his job, his

fellow employees, and the human beings who reluctantly handed him their fares—there was promotion to assistant superintendent, superintendent, vice-president and general manager of the West Chicago Street Railway, vice-president and general manager of the system embraced in the Union Traction Company, and president of the three other Chicago companies, then president of the Chicago Railways for six years. In 1914 he concluded to retire from active participation in the management of the Chicago properties. At that time he became a director of the Chicago Surface Lines, but continued as vice-president and director of the Chicago Railways. His fiftieth anniversary of Chicago railway service occurred in 1922. In honor of that event Mr. Roach was the guest of honor at a dinner in December, 1922. Directors of the several companies, heads of departments and old-time friends made up the party of sixty who took part in the testimonial.

Mr. Roach was born in Lowell, Ohio, in 1852. At the age of eighteen, he was attracted by the story of gold discoveries in Montana and went with a party of young men from his home in Belvidere, Ill., on the long western trip on horseback. Visions of wealth vanished after an attempt at mining, and the young man then tried his hand at ranching and newspaper work. In October, 1872, he went to Chicago and was at once attracted by the possibilities of advancement in street railway work. He had a letter of introduction which would have secured a position in the office of the general manager of the company, but he expressed preference for employment as a conductor "so he could learn the business from the car up." How well he succeeded the record of his achievements testifies.

E. E. McCall

Edward E. McCall, former Supreme Court Justice, ex-Public Service Commission chairman and at one time Democratic candidate for Mayor of New York, died on March 12. Mr. McCall was fifty-nine years old.

To Mr. McCall in his office as chairman of the Public Service Commission fell the duty of bringing to a consummation the plans of the then city and state authorities for a far-spreading development of New York City's transit system and the signing of the actual contracts that made this development possible. To his part in this work Judge McCall brought his wide experience in public life, the judicial training of the bench and a personal ability and efficiency far from the usual order.

The appointment of Mr. McCall to the commission met with much adverse comment. He signed the contracts, but was almost constantly under fire from his political opponents and finally was removed from office by Governor Whitman, a Republican.

On March 12 the commission said:

To him is due the profoundly grateful acknowledgment of the people of the city of New York for all that he accomplished in their name and in their interest, for the unvarying rectitude of his conduct in office, for the signal administrative ability he brought to bear upon the affairs of the commission he headed and for his consistent devotion to the high duties that were given him.

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

American Brake Shoe Business Diversified

Good Year for Brake Shoe & Foundry Company—Less Than One-Quarter of Its Sales Were of Brake Shoes

The annual report of President Joseph B. Terbell of the American Brake Shoe & Foundry Company to stockholders, dated March 1, 1924, shows the extent to which this company has expanded in various lines since its organization in 1901. At that time it was almost exclusively a manufacturer of brakeshoes for steam and electric railways. Now the sales of brake shoes amount to less than one-quarter of the combined sales of the entire company.

NATIONAL CAR WHEEL TAKEN OVER

The company as now organized includes the American Malleable Company, Dominion Brake Shoe Company, Ltd., Southern Foundry & Machine Company and Southern Wheel Company, and it also owns more than a 75 per cent interest in American Manganese Steel Company, American Brake Shoe & Foundry Company of California, American Forge Company and Ramapo Ajax Corporation. It has also just completed negotiations for the purchase of the entire outstanding capital stock of the National Car Wheel Company, with plants at Pittsburgh, Pa.; Cleveland, Ohio; Rochester, N. Y., and Sayre, Pa.

It will be seen from this statement that the company has engaged extensively in the manufacture of forgings and of malleable, steel and manganese steel castings. While some of this product is for steam and electric railways, such as brake heads and journal boxes in the malleable castings, special track work and track fixtures in the manganese and steel castings, and for miscellaneous uses in forgings, a very large part goes to other industries, particularly automobile and mining. During the war at its Erie plant the company did a large amount of shell manufacture for the United States and British governments, as well as the manufacture of some cannon, but these works were turned over to the government at the end of the war.

FORTY-ONE INDUSTRIAL PLANTS

The American Brake Shoe & Foundry Company now has forty-one industrial plants in different parts of the country, exclusive of three plants in Canada, which manufacture material for the company. The purpose of having a large number is to reduce delivery freight charges. During 1923 new plants for the manufacture of brake-shoes were opened at Portsmouth, Va., and Houston, Tex., and the erection of

an additional brakeshoe plant is under way at Kansas City.

The net earnings of the company for 1923, after depreciation and a reserve for federal taxes have been deducted, amount to \$2,727,097, equivalent, after payment of 7 per cent dividends on the preferred stock, to \$13.22 per share on the common stock. The dividend paid on the common stock was \$5 a share and the company carried over the surplus for the year, \$1,267,206. The annual report just issued is the most extensive ever made public by the company.

Registers for Every Requirement

Ohmer Fare Register Company Has Acquired Business of American Taximeter Company

The Ohmer Fare Register Company, Dayton, Ohio, has acquired the business of the American Taximeter Company, New York City. As a result the manufacture of the recording devices for which these two long-established companies are noted is to be concentrated at the plant of the Ohmer Fare Register Company at Dayton. Additional machinery and equipment will be installed. With the consolidation also of the sales and service forces of the two companies, the combined organization will be in a position to serve the transportation industry of American and foreign countries more efficiently than ever before.

OHMER COMPANY A PIONEER

The Ohmer Fare Register Company was organized in 1902 as the successor to the Ohmer Car Register Company and has widely distributed its fare registers for city and interurban railways and its receipt printing and issuing taximeter for taxicabs. John F. Ohmer, its founder, has been the guiding genius of the company in its twenty-two years of successful operation. He was the original inventor of the plurality fare indicating and recording fare register, has taken out more than 100 patents in his own name, and as a crowning achievement to his inventive career he conceived and constructed the Ohmer receipt printing and issuing taximeter. The Ohmer Fare Register Company now owns more than 300 patents covering its various products.

The American Taximeter Company was started in 1910 as a consolidation of the Jones Taximeter Company and the Franco-American Company. Francois Ducasse, its president, introduced in October, 1907, the first taximeters in this country when he imported French machines of the Popp make and installed them on the Darrecq taxicabs operated by the first motor cab com-

pany in this country, the New York Taxicab Company, and in which he was interested. Since that time Mr. Ducasse's company has built and distributed the Jones, Popp and Atco taximeters, superior instruments in the field of registering but non-printing taximeters, just as the Ohmer receipt issuing and printing taximeter is standard in its particular field.

The American Taximeter Company has also been a large manufacturer of the Dreadnaught Hub-O-Dometer, a mileage recording device that is installed on the hub of any vehicle, and the Dash-O-Dometer, an instrument devised to provide an accurate check on operating expenses of motor transports. This latter instrument will fill the needs of one branch of the commercial vehicle industry for which the Ohmer Truck Auditor is not intended. The manufacture and distribution of all of these devices formerly produced by the American Taximeter Company is being taken over by the Ohmer Fare Register Company. Thus the combined company will be in a position to fill every recording device need and requirement of the transportation industry.

Merger of Ball Bearing Makers Under Way

Plans for the proposed merger of the Marlin-Rockwell Corporation and the Gurney Ball Bearing Company are fast taking definite shape. The Marlin-Rockwell organization has called a special meeting of its stockholders for March 28, at which they will be requested to approve the terms under which it is proposed their corporation shall take over the Gurney Ball Bearing Company, Jamestown, N. Y.

For the property and other assets of the Gurney company, it is proposed that the Marlin-Rockwell shall issue \$2,722,800 in 7 per cent cumulative preferred stock and 133,554 shares of no par value common stock. Marlin-Rockwell at the same time will assume all debts and other liabilities of the smaller company. Marlin-Rockwell stockholders will be requested to authorize the issuance of the amount of preferred stock mentioned above and at the same time authorize an increase in the no par value common stock from 89,251 to 222,805 shares.

Metal, Coal and Material Prices

Metals—New York	March 11, 1924
Copper, electrolytic, cents per lb.	14.00
Copper wire base, cents per lb.	16.375
Lead, cents per lb.	9.00
Zinc, cents per lb.	6.86
Tin, Straits, cents per lb.	58.375
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	\$4.70
Somerset mine run, Boston, net tons	2.225
Pittsburgh mine run, Pittsburgh, net tons	2.125
Franklin, Ill., screenings, Chicago, net tons	1.825
Central, Ill., screenings, Chicago, net tons	1.625
Kansas screenings, Kansas City, net tons	2.25
Materiala	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	\$6.75
Weatherproof wire base, N. Y., cents per lb	18.00
Cement, Chicago net prices, without bags	\$2.20
Linseed oil (5-bbl. lots), N. Y., per gal.	\$0.96
White lead, in oil (100-lb. keg), N. Y., cents per lb., c/road lots	12.25
Turpentine, (bbl. lots), N. Y., per gal.	\$1.01

Newspaper Account of Braking Tests Misleading

Inquiries have been provoked by recent reports in the Schenectady *Gazette* and several other daily papers regarding braking tests being carried out there. The newspaper accounts grew out of a test by the General Electric Company in that city of a car using the motors as generators for retarding the car, the energy being taken up by resistors. The connections employed in this particular test were somewhat different from those used previously, but there was really no occasion for the wide publicity which the event received. For many years the General Electric Company has supplied electric braking controllers for street car service. Very few of these are in use in this country, however, as the air brake fulfills the requirements much better.

Rolling Stock

Des Moines City Railway, Des Moines, Iowa, has received the second batch of ten cars which were ordered last July. The specifications of the first ten were given in the *ELECTRIC RAILWAY JOURNAL*, issue of Dec. 29, 1923. The specifications of the second group follow:

Number of cars received.....	Ten
Name of road.....	Des Moines City Railway
Date order was placed.....	July 1, 1923
Date of delivery.....	Feb. 10, 1924
Builder of car body.....	McGuire Cummings
Type of car.....	Passenger-semi-motor
Seating capacity.....	Forty-eight
Weight {	
Car body.....	20,000 lb.
Trucks.....	10,000 lb.
Equipment.....	8,000 lb.
Total.....	38,000 lb.
Length over all.....	46 ft.
Truck wheelbase.....	5 ft. 6 in.
Width over all.....	8 ft. 3 in.
Height, rail to trolley base.....	11 ft. 6 in.
Body.....	Seml steel
Interior trim.....	Cherry
Headlining.....	Agasote
Roof.....	Arch
Air brakes.....	G. E. straight
Armature bearings.....	Sleeve
Axles.....	Standard Steel Works
Bumpers.....	Channel
Car signal system.....	Faraday
Car trimmings.....	Brass
Center and side bearings.....	Plain
Conduits and junction boxes.....	Duraduct
Control.....	G.E.K.-35
Couplers.....	Portable
Curtain fixtures.....	Curtain Supply Company
Curtain material.....	Pantasote
Designation signs.....	Hunter
Door-operating mechanism.....	National Pneumatic Company
Wheeguards.....	H.B.
Gears and pinions.....	G. E. grade M
Hand brakes.....	Peacock
Heater equipment.....	Consolidated
Headlights.....	Golden Glow
Journal bearings.....	Plain
Journal boxes.....	McGuire-Cummings
Lightning arresters.....	G. E.
Motors, type and number.....	4-G.E. 247-1
Paint.....	Enamel
Registers.....	International
Sanders.....	Des Moines Railway standard
Sash fixtures.....	Dayton Manufacturing Co.
Seats.....	Heywood-Wakefield
Seating material.....	Cane
Springs.....	Railway Springs Company
Step treads.....	Kass-Feralun
Trolley base.....	U. S. No. 13-E
Trolley wheels.....	More Jones
Trucks.....	McGuire-Cummings
Ventilators.....	Utility
Wheels.....	26-in. rolled steel

New York State Railways through its subsidiary, the Rochester Co-ordinated Bus Lines, plans the purchase of additional trolley buses.

Track and Line

Cleveland Railway, Cleveland, Ohio, plans a crosstown line on 117th Street, the boundary between Cleveland and Lakewood. The cost is estimated at \$100,000. The project waits on the approval of a bond issue.

Tennessee Electric Power Company, Nashville, Tenn., is carrying out a track improvement program in Chattanooga which calls for an expenditure of \$60,000 during the year. The work includes the installation of new crossings and new rails.

Pacific Electric Railway, Los Angeles, Cal., has ordered from the Union Switch & Signal Company the materials for equipping the double-track line between Dominguez and San Pedro, using color light signals. Forty-two Style "N" light signals, 105 single impedance bond layouts, 130 a.c. relays and 94 vertical rotary switch circuit controllers will be required, the field installation being performed by the railway company's signal construction forces.

Power Houses, Shops and Buildings

Gardner & Templeton Street Railway, Gardner, Mass., is planning improvements in the East Templeton power house.

Grand Rapids, Grand Haven & Muskegon Railway, Grand Rapids, Mich., recently installed an automatic substation at Walker Station. Its success has led to the installation of a second substation at the Coopersville station.

Public Service Corporation, Newark, N. J., recently purchased a portion of the plant of the Rogers Locomotive Works in Paterson. It is said that extension of the car storage facilities in Paterson of the Public Service Railway is expected.

Municipal Railway, San Francisco, Cal., has prepared plans and specifications for an addition to its present Seventeenth Street carhouse. This addition will give needed office and car storage space.

Trade Notes

Harper & Taylor, Inc., Philadelphia, Pa., will conduct a general engineering business paying particular attention to the design, construction and operation of hydro-electric projects. An announcement to this effect was made recently by John L. Harper, vice-president and chief engineer of the Niagara Falls Power Company, and H. Birchard Taylor, vice-president of the William Cramp & Sons Ship & Engine Building Company. An office is also located at Niagara Falls.

Cornell S. Hawley, president of the Consolidated Car Heating Company, has recently returned from a transcontinental trip, during which he visited Chicago, Denver, Salt Lake City, Vancouver, Portland, Tacoma, Seattle, San Francisco and Los Angeles.

New Advertising Literature

Warren Webster & Company, Camden, N. J., have issued "Webster from the Air," an unusually attractive pamphlet containing some exceptionally interesting aerial photographs of representative American cities using Webster systems of steam heating. The pamphlet says the Webster engineering service is prepared to offer suggestions from the experience of practical engineers leading to satisfactory operation of the steam plant from the moment of its installation.

Gold Car Heating & Lighting Company, Brooklyn, N. Y., is distributing a catalog and instruction book of heater equipment. Diagrams are given for thermostatic control of electric heaters and the latest types of electric heaters are described in considerable detail. Rules are also given for figuring the number of heaters required for different sized cars.

"Steinmetz and His Discoverer" is the title of a twenty-four-page booklet recently written by John T. Broderick, an early associate of Dr. Steinmetz in the General Electric Company. Mr. Broderick points to E. Wilbur Rice, Jr., as the discoverer of Steinmetz and their meeting in a Yonkers workshop thirty years ago is described. An outline of the growth of the electrical industry during the past twenty years follows as a prelude to Mr. Broderick's description of the influence of the two men on electrical progress.

Irving Iron Works, Long Island City, N. Y., has issued catalog 4-A 96, which describes the Irving subway.

W. S. Godwin & Company, Baltimore, Md., have just issued a twenty-page booklet descriptive of their continuous steel ties and Godwin paving guards. The economies and advantages of the Godwin construction for paved railways are fully treated. The material described is illustrated in a series of diagrams.

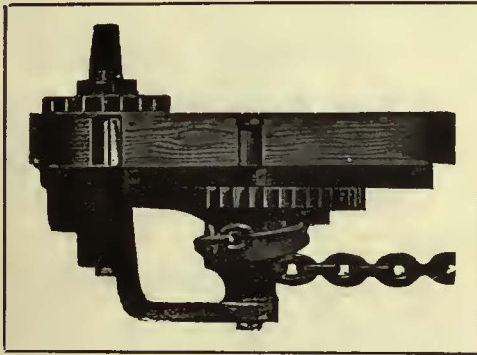
John C. Dolph Company, Newark, N. J., has issued a post-card pamphlet giving information on its insulating varnishes with a revised price list.

Knickerbocker Portland Cement Company, New York, N. Y., has issued a pamphlet on "Twenty-one reasons for our sales policy."

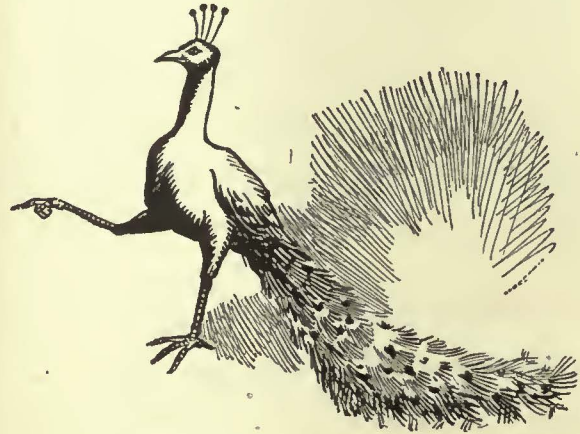
The Pittsburgh Testing Laboratory, Pittsburgh, Pa., has issued bulletin No. 33, on the subject of "Creosoted Materials." The pamphlet contains a brief account on wood conservation and wood preservation.

National Paving Brick Manufacturers' Association, Cleveland, Ohio, has issued a ninety-two-page booklet describing the construction of vitrified brick pavements. Some recommended specifications are included for drainage, grading, bases, bedding, laying brick and filler. The pamphlet also gives some miscellaneous uses of vitrified brick with specifications for private drives, sewers, bridges, railroad and architectural purposes.

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the heaviest car to a smooth swift stop*

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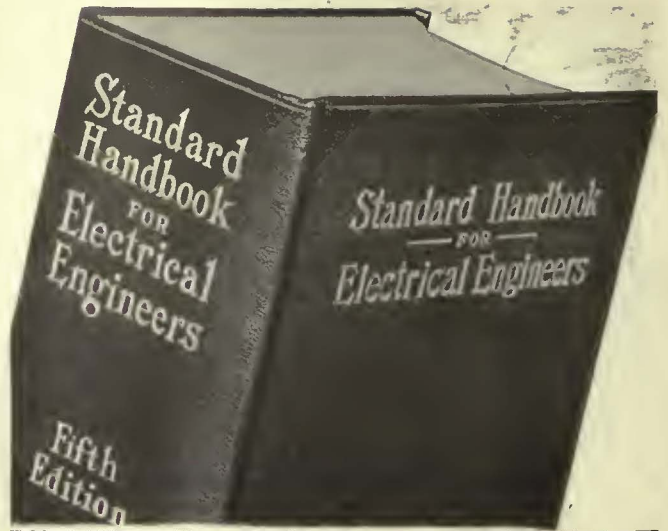
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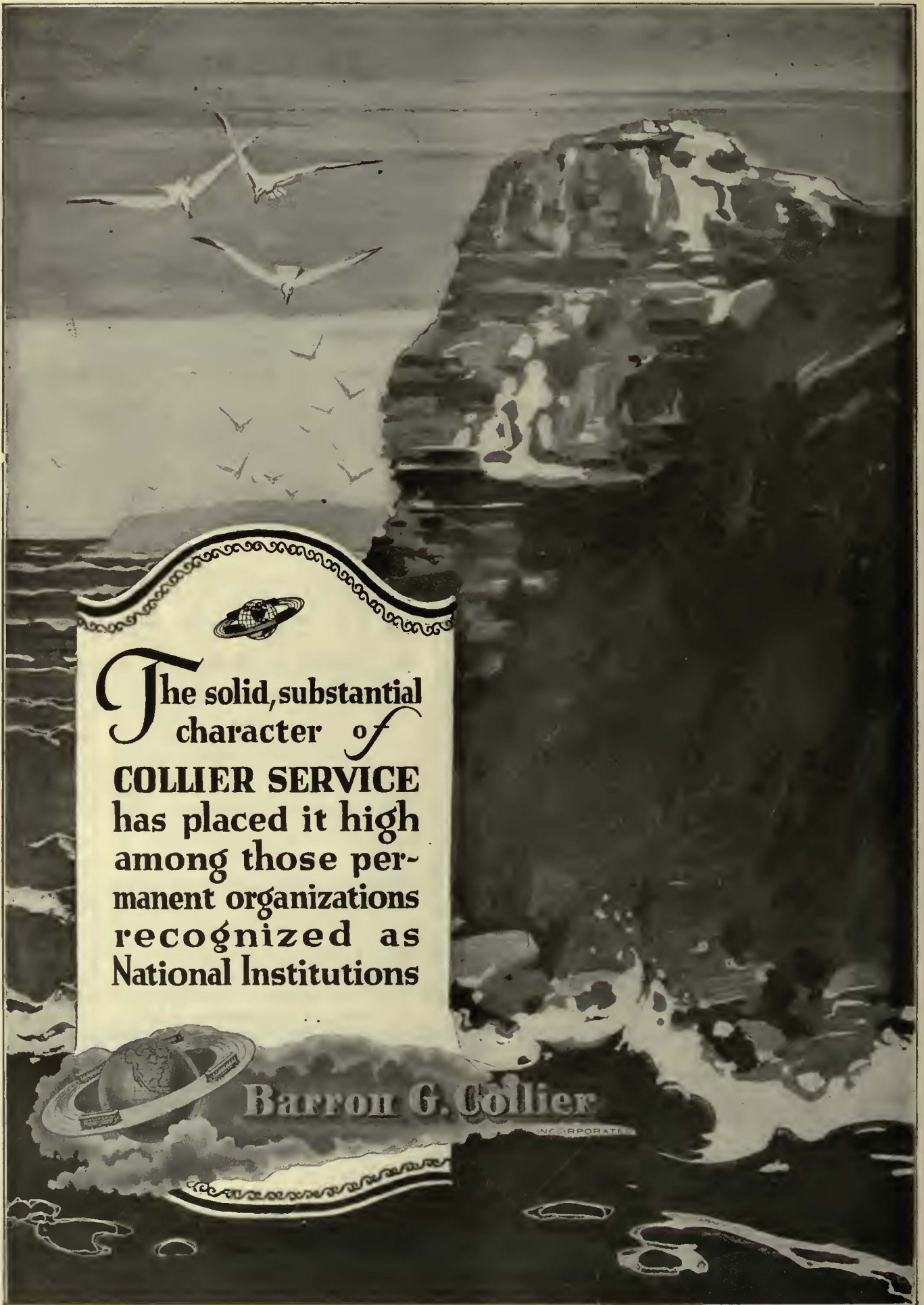
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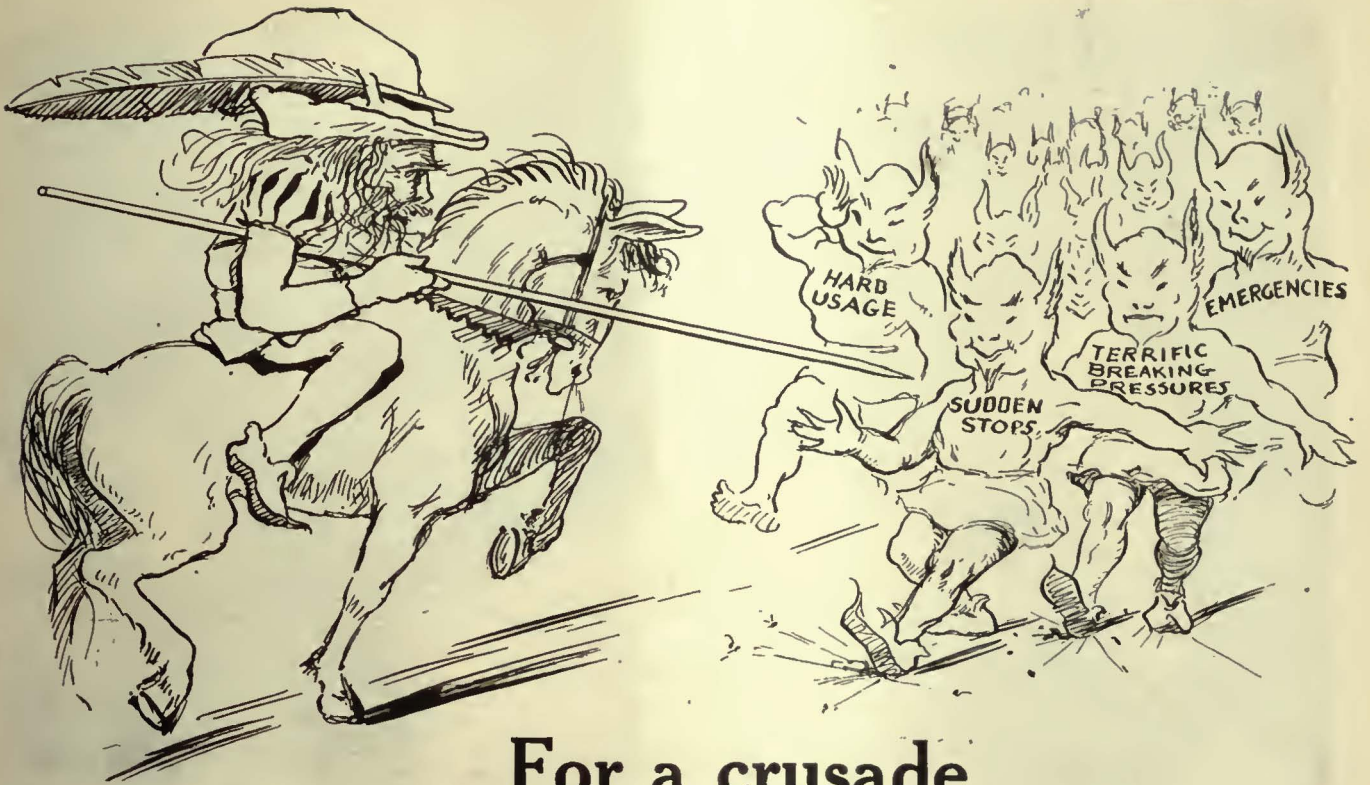
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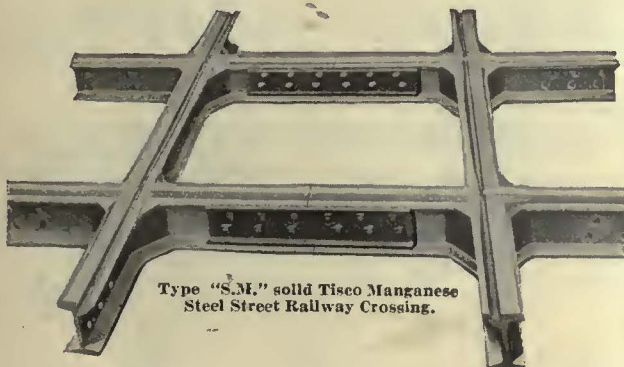
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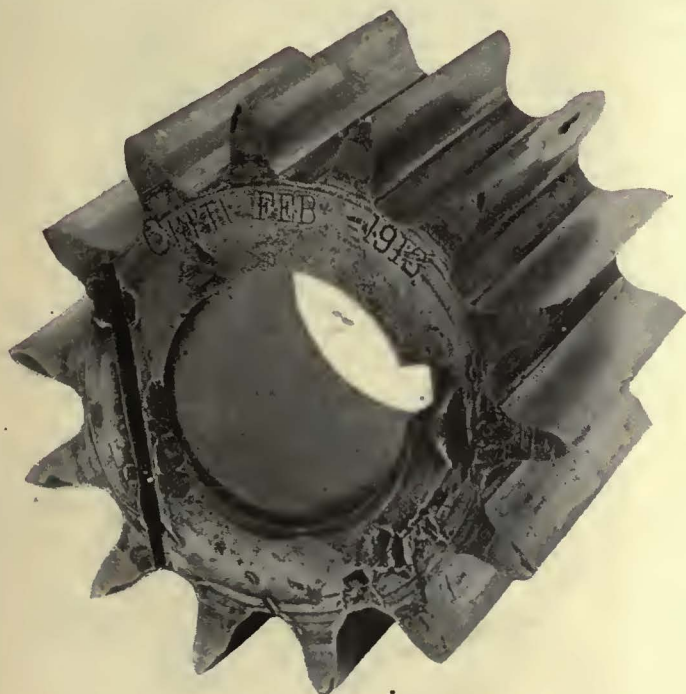
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Speed in construction and delivery is a feature of Baldwin Service.

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"Tool Steel"

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"We have several other pinions yet in service and in good condition which will probably give service almost equal to the one we have just taken out."

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4. To refuse to publish "puffs," free reading notices or paid "write-ups"; to keep his reading columns independent of advertising considerations, and to measure all news by this standard: "Is it real news?"
5. To decline any advertisement which has a tendency to mislead or which does not conform to business integrity.
6. To solicit subscriptions and advertising solely upon the merits of the publication.
7. To supply advertisers with full information regarding character and extent of circulation statements, subject to proper and authentic verification.
8. To co-operate with all organizations and individuals engaged in creative advertising work.
9. To avoid unfair competition.
10. To determine what is the highest and largest function of the field which he serves, and then to strive in every legitimate way to promote that function.

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The first of a new type gasoline-electric passenger car intended for use in railroad service has been sold to the Chicago Great Western Railroad and will be demonstrated some time in May or June. This car was developed by the co-operation of the General Electric Company with the St. Louis Car Company, the Electromotive Engineering Company of Cleveland and the Winton Engine Company. It will seat fifty-six persons, has 100 sq.ft. of baggage room, is arranged for double-end operation and will be capable of maximum speeds up to 60 m.p.h. The car will weigh complete, and "ready to roll," approximately 54,000 lb. It will have capacity sufficient to handle a 35-ton trail car behind it.

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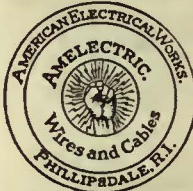
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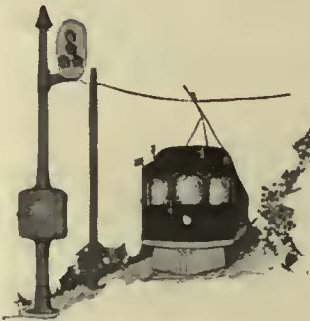
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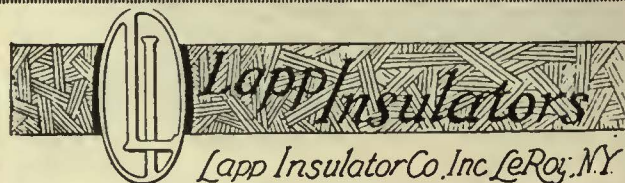


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**Lowest Cost Lightest Weight
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Special Work.

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is turned out with equal care in our shops. The orders we fill differ only in magnitude; small orders command our utmost care and skill just as do large orders. CAMERON quality applies to every coil or segment that we can make, as well as to every commutator we build. That's why so many electric railway men rely absolutely on our name.

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Gets Every Fare
PEREY TURNSTILES
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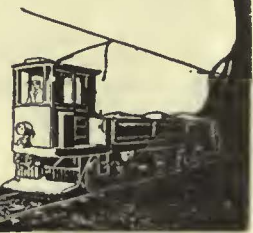
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They indicate and record the exact amount of each transaction. They place the sale of transportation on a strictly business basis.

We manufacture Indicating and Recording Fare Registers, Receipt Issuing Taximeters, and Fare Boxes.

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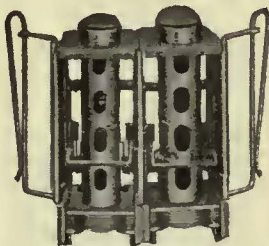
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Made in various types and sizes to meet the requirements of service on street and city system. Complete line of registers, counters and car fittings.

Exclusive selling agents for
HEEREN ENAMEL BADGES.

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Adjustable

The best changer on the market. Can be adjusted by the conductor to throw out a varying number of coins, necessary to meet changes in rates of fares.

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Each barrel a separate unit, permitting the conductor to interchange the barrels to suit his personal requirements, and to facilitate the addition of extra barrels.

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of pressed Steel for all Classes of Passenger Service. Ratitan for covering seats and for snow sweepers.

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Factory at Wakefield, Mass.

Offices at New York, Chicago, San Francisco



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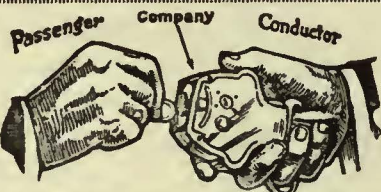
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Trade Mark Reg. U. S. Pat. Off.

Made of extra quality stock firmly braided and smoothly finished. Carefully inspected and guaranteed free from flaws. Samples and information gladly sent.

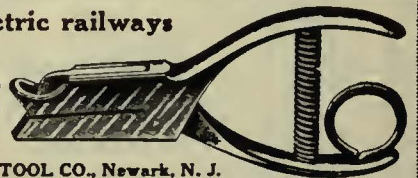
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B-V Punches

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For Every Class of Service

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E. F. J.

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SUPERINTENDENT of transportation wanted; must be good executive and disciplinarian and thoroughly familiar with handling city traffic. P-655, Electric Railway Journal, 10th Ave. at 36th St., New York.

WANTED: By a large special track work manufacturer in the East, a draftsman who has thorough knowledge of mathematics, particularly trigonometry and logarithms. P-658, Elec. Ry. Journal, Real Estate Trust Bldg., Phila., Pa.

POSITIONS WANTED

ARMATURE winder, 10 years' electrical experience, 7 years on railway motors, single, 30 years, willing to go anywhere. PW-652, Elec. Ry. Journal, Old Colony Bldg., Chicago, Ill.

AS CLAIM agent, or commerce attorney, age 38, married, Yale graduate in law, now employed, and have been for past five years, with short line, interstate road; specially qualified in Federal and State laws pertaining to railways in practice before the I. C. C. and State Commissions, as well as in the adjustment of claims. PW-661, Electric Railway Journal, 10th Ave. at 36th St., New York.

AS master mechanic or with chance for advancement; experienced low- and high-voltage d.c. equipment, passenger and freight, city and interurban; expert on motor and controller repairs. PW-656, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

AS supervisor of welding, bonding and grinding; four years' experience as travelling demonstrator of joint welding, shop welding, bonding, etc.; two years' experience in all-around welding on a small road; have practical knowledge of track construction and repair; can guarantee supervision resulting in more efficiency, economy and a broader field of operation for all apparatus. Available about May 15. PW-663, Electric Railway Journal, 10th Ave. at 36th St., New York.

POSITIONS WANTED

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WANTED: Position on small property where 21 years' experience in transportation, mechanical and safety departments could be used to advantage. Capable of filling supervisory position in these departments combined. PW-666, Elec. Ry. Journal, Old Colony Bldg., Chicago, Ill.

BARGAIN 13 Double End Equipments

General Electric MK
Multiple Control.

Transit Equipment Company

Cars—Motors
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BARGAIN PRICE EXCELLENT CONDITION ONE PORTABLE SUB-STATION

G. E. 250 kw. Now working on 33,000, 60 cy. line, 650 D.C., 1,200 r.p.m.

Photographs, price and further description on application.

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- 50—G. E. No. 80-A Motors.
- 50—Controllers, K-28-B; K-12.
- 35—B-2 Compressors.

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Philadelphia, Pa

FOR SALE

- 50—Johnson Fare Boxes type D-M-2—Two statements cash and tickets. Good operating condition.

GRAND RAPIDS RAILWAY CO.
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WANTED

- 6—One Man, Single Truck Safety Cars.

Double End Operation.

W-068, Electric Railway Journal
1570 Old Colony Bldg., Chicago, Ill.

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Draftsmen—Structural, Electrical and Architectural.....	2100—2500
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Think “SEARCHLIGHT” First!

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

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Ohio Brass Co.
Westinghouse E. & M. Co.
- Armature Shop Tools**
Elec. Service Supplies Co.
- Automatic Return Switch Stands**
Ramapo Ajax Corp.
- Automatic Safety Switch Stands**
Ramapo Ajax Corp.
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Bethlehem Steel Co.
Brill Co., The J. G.
Johnson & Co., J. R.
St. Louis Car Co.
- Axles, Steel**
Carnegie Steel Co.
- Habitat Metal**
Ajax Metal Co.
- Badges and Buttons**
Elec. Service Supplies Co.
Int. Register Co., The
- Bearings and Bearing Metal's**
Ajax Metal Co.
Bemis Car Truck Co.
General Electric Co.
Gilbert & Sons B. F. Co., A.
More-Jones Brass & Metal Co.
St. Louis Car Co.
Westinghouse E. & M. Co.
- Bearings, Center and Roller Side**
Baldwin Locomotive Works
Stucki Co., A.
- Bells and Gongs**
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Consolidated Car Heat'g Co.
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- Bollers**
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- Bonding Apparatus**
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Electric Railway Impt. Co.
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Ohio Brass Co.
Railway Track-work Co.
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Bates Expanded Steel Truss Co.
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Elec. Service Supplies Co.
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Westinghouse Tr. Br. Co.
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General Electric Co.
Jeandrun, W. J.
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Morganite Brush Co., Inc.
Westinghouse E. & M. Co.
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Ingersoll-Rand Co.
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- Buses, Motor**
Brill Co., The J. G.
St. Louis Car Co.
- Bus Seats**
Hale-Kilburn Co.
Heywood-Wakefield Co.
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Brill Co., The J. G.
St. Louis Car Co.
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- Cable Tapes, Yellow and Black Varnished**
Irvington Varnish & Ins. Co.
Mica Insulator Co.
- Carbon Brushes (See Brushes, Carbon)**
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Consolidated Car Heat'g Co.
Westinghouse E. & M. Co.
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Differential Steel Car Co.
St. Louis Car Co.
- Car Lighting Fixtures**
Elec. Service Supplies Co.
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- Car Wheels, Rolled Steel**
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- Castings, Gray Iron and Steel**
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- Coils, Choke and Kicking**
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.
- Coin Counting Machines**
Cleveland Fare Box Co.
- Intern'l Register 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.
Mica Insulator Co.
Westinghouse E. & M. Co.
- Compressors, Air**
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Tr. Br. Co.
- Compressors, Air Portable**
Ingersoll-Rand Co.
- Condensers**
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse E. & M. Co.
- Condenser Papers**
Irvington Varnish & Ins. Co.
- Connectors, Solderless**
Westinghouse E. & M. Co.
- Connectors, Trailer Car**
Consolidated Car Heat'g 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**
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.
- Conveying and Hoisting Machinery**
Columbia M. W. & M. I. Co.
- Copper Wire**
Anaconda Copper Mining Co.
- Cord, Bell, Trolley, Register**
Brill Co., The J. G.
Elec. Service Supplies Co.
Intern'l Register Co.
The Roebling's Sons Co., J. A.
St. Louis Car Co.
Samsom Cordage Works
Silver Lake Co.
- Cord Connectors and Couplers**
Elec. Service Supplies Co.
Samsom Cordage Works
Wood Co., Chas. N.
- Couplers, Car**
Brill Co., The J. G.
Ohio Brass Co.
St. Louis Car Co.
Westinghouse Tr. Br. Co.
- Cranes**
Allis-Chalmers Mfg. Co.
Universal Crane Co.
- Cranes, Gas or Electric**
Universal Crane Co.
- Cranes, Locomotive, Motor**
Truck & Turbine
Universal Crane Co.
- Cross Arms (See Brackets)**
- Crossing Foundations**
International Steel Tie Co.
- Crossings**
Ramapo Ajax Corp.
Crossing Signals (See Signals, Crossing)
- Crossing, Frog & Switch**
Ramapo Ajax Corp.
Wharton, Jr., & Co., Wm.
- Crossing Manganese**
Bethlehem Steel Co.
Ramapo Ajax Corp.
- Crossings, Track (See Track, Special Work)**
- Crossings, Trolley**
Anderson Mfg. Co., A. & J. M.
Ohio Brass Co.
- Curtains and Curtain Fixtures**
Brill Co., The J. G.
Elec. Service Supplies Co.
Morton Mfg. Co.
St. Louis Car Co.
- Dealer's Machinery**
Elec. Equipment Co.
Transit Equip. Co.
- Derailing Devices (See also Track Work)**
Wharton, Jr., & Co., Wm.
- Derailing Switches, Tee Rail**
Ramapo Ajax Corp.
- Detective Service**
Wish-Service, P. Edward
- Doors & Door Fixtures**
Hale-Kilburn Co.
St. Louis Car Co.
- Door Operating Devices**
Brill Co., The J. G.
Consolidated Car Heat'g Co.
General Electric Co.
Nat'l Pneumatic Co., Inc.
- Doors, Folding Vestibule**
Nat'l Pneumatic Co., Inc.
- Drills, Rock**
Ingersoll-Rand Co.
- Drills, Track**
Amer. Steel & Wire Co.
Elec. Service Sup. Co.
Ingersoll-Rand Co.
Ohio Brass Co.
- Dryers, Sand**
Elec. Service Supplies Co.
- Ears**
Anderson Mfg. Co., A. & J. M.
Ohio Brass Co.
- Electrical Wires and Cables**
Amer. Electrical Works
Roebling's Sons & Co., J. A.
- Electric Grinders**
Railway Track-work Co.
Rail Welding & Bonding Co.
- Electrodes, Carbon**
Railway Track-work Co.
- Electrodes, Steel**
Railway Track-work Co.
- Enamels**
Beckwith-Chandler Co.
- Engineers, Consulting, Consulting and Operating**
Allison & Co., J. S.
Archbold-Brady Co.
Arnold Co., The
Beeler, John A.
Bibbina, J. Rowland
Buchanan & Laying Corp.
Day & Zimmermann, Inc.
Drum & Co., A. L.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Kelly Cooke & Co.
Ong, Joe R.
Richey, Albert S.
Sanders & Porter
Stevens & Wood, Inc.
Stone & Webster
White Eog. Corp., The J. G.
Wortham, Edwin
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Ingersoll-Rand Co.
Westinghouse E. & M. Co.
- Fare Boxes**
Cleveland Fare Box Co.
Johnson Fare Box Co.
St. Louis Car Co.
Nat'l Ry. Appliance Co.
- Fences, Woven Wire and Fence Posts**
Amer. Steel & Wire Co.,
- Fenders and Wheel Guards**
Brill Co., The J. G.
Consolidated Car Fender Co.
Elec. Service Supplies Co.
St. Louis Car Co.
Star Brass Works
- Fibre and Fibre Tubing**
Westinghouse E. & M. Co.
- Field Coils (See Coils)**
- Flangeway Guards, Steel**
Godwin Co., Inc., W. S.
- Flaxinum Insulation**
Nat'l Ry. Appliance Co.
- Floodlights**
Elec. Service Supplies Co.
- Frogs & Crossings, Tee Rail**
Bethlehem Steel Co.
Ramapo Ajax Corp.
- Frogs, Track (See Track Work)**
- Frogs, Trolley**
Anderson Mfg. Co., A. & J. M.
Ohio Brass Co.
- Funnel Castings**
Wharton, Jr., Inc., & Co., Wm.
- Fuses and Fuse Boxes**
Consolidated Car Heat'g Co.
General Electric Co.
Westinghouse E. & M. Co.
- Fuses, Refillable**
General Electric Co.
- Gaskets**
Power Specialty Co.
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.
- Gear Cases**
Chillingworth Mfg. Co.
Elec. Service Supplies Co.
Westinghouse E. & M. Co.
- Gears and Pinions**
Bemis Car Truck Co.
Bethlehem Steel Co.
Elec. 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**
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.
- Girders Rails**
Bethlehem Steel Co.
Lorain Steel Co.
- Gong (See Bells and Gongs)**
- Graphite**
Morganite Brush Co., Inc.
- 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.
- Guard Rails, Tee Rail & Manganese**
Ramapo Ajax Corp.
- Guards, Cattle**
American Bridge Co.
- Guards, Trolley**
Elec. Service Sup. Co.
Ohio Brass Co.
- Hammers, Pneumatic**
Ingersoll-Rand Co.
- Harp, Trolley**
Anderson Mfg. Co., A. & J. M.
Elec. Service Supplies Co.
More-Jones Brass & Metal Co.
Nuttall Co., E. D.
Star Brass Works
Thornton Trolley Wheel Co.
- Headlights**
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
St. Louis Car Co.
- Heaters, Car (Electric)**
Consolidated Car Heat'g Co.
Gold Car Heat. & Light Co.
Nat'l Ry. Appliance Co., P.
Smith Heater Co., Peter
- Heaters, Car, Hot Air and Water**
Elec. Service Sup. Co.
Smith Heater Co., Peter
- Helmet's—Welding**
Railway Track-work Co.
- Hoists, Portable**
Ingersoll-Rand Co.
- Hydraulic Machinery**
Allis-Chalmers Mfg. Co.
- Indicating Signals**
Oskel Equipment 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.
Mitchel-Rand Mfg. Co.
Okonite Co.
Stand. Underground Cable Co.
Westinghouse E. & M. Co.
- Insulating Silk**
Irvington Varnish & Ins. Co.
- Insulating Varnishes**
Irvington Varnish & Ins. Co.
- Insulation (See also Paints)**
Anderson, M. Co., A. & J. M.
Electric Ry. Equipment Co.
Electric Service Sup. Co.
General Electric Co.
Irvington Varnish & Ins. Co.
Mica Insulator Co.
Mitchel-Rand Mfg. Co.
Okonite Co.
Westinghouse E. & M. Co.
- Insulation Slot**
Irvington Varnish & Ins. Co.
- Insulators (See also Line Material)**
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Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Irvington Varnish & Ins. Co.
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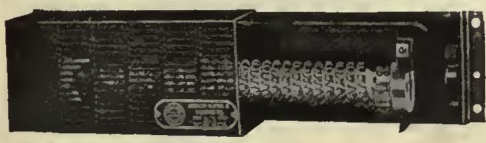
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(See also Headlights)
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Westinghouse E. & M. Co.
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- Lanterns, Classification
Nichols-Lintern Co.
- Lightning Protection
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Shaw, Henry M.
Westinghouse E. & M. Co.
- Line Material (See also
Brackets, Insulators,
Wires, etc.)
Anderson, M. Co., A. &
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Archbold-Brady Co.
Columbia M. W. & M. I. Co.
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Elec. Service Sup. Co.
Hubbard & Co.
More-Jones Brass & Metal
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Ohio Brass Co.
Westinghouse E. & M. Co.
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Baldwin Locomotive Wks.
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- Lubricants, Oil and Grease
Galena-Signal Oil Co.
Universal Lubricating Co.
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Amer. Insulating Mach. Co.
- Manganese Steel Castings
Wharton, Jr., & Co., Wm.
- Manganese Steel Guard Rails
Ramapo Ajax Corp.
- Manganese Steel Switches,
Frogs & Crossings
Bethlehem Steel Co.
Ramapo Ajax Corp.
- Manganese Steel, Special
Track Work
Bethlehem Steel Co.
Wharton, Jr., & Co., Wm.
eters (See Instruments)
- Mica
Mica Insulator Co.
Molding, Metal
Allis-Chalmers Mfg. Co.
- Motor Buses (See Buses,
Motor)
- Motors, Electric
Westinghouse E. & M. Co.
Motors and Generator Sets
General Electric Co.
- Motorists' Seats
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Brill Co., J. G.
Elec. Service Sup. Co.
Hale-Kilburn Co.
Heywood-Wakefield Co.
St. Louis Car Co.
Wood Co., Chas. N.
- Nuts and Bolts
Barbour-Stockwell Co.
Bethlehem Steel Co.
Bemis Car Truck Co.
Hubbard & Co.
- Oils (See Lubricants)
- Omnibuses (See Buses,
Motor)
- Oxy-Acetylene (See Cutting
Apparatus Oxy-Acetylene)
- Packings
Power Specialty Co.
- Paints and Varnishes
(Insulating)
Mica Insulator Co.
Mitchel-Rand Mfg. Co.
Paints & Varnishes (Pre-
servatives)
Beckwith-Chandler Co.
Paints and Varnishes for
Woodwork
Beckwith-Chandler Co.
National Ry. Appliance Co.
- Paving Guards, Steel
Godwin Co., Inc., W. S.
- Paving Material
Amer. Br. Shoe & Fdy. Co.
- Pickups, Trolley Wire
Elec. Service Supplies Co.
Ohio Brass Co.
- Pinion Pulleys
Elec. Service Supplies Co.
General Electric Co.
Wood Co., Chas. N.
- Pinions (See Gears)
- Pins, Case Hardened, Wood
and Iron
Bemis Car Truck Co.
Elec. Service Sup. Co.
Ohio Brass Co.
Westinghouse Tr. Brake Co.
- Pipe Fittings
Power Specialty Co.
Westinghouse Tr. Brake Co.
- Planers (See Machine Tools)
- Plates for Tee Rail Switches
Ramapo Ajax Corp.
- Pliers, Rubber Insulated
Elec. Service Sup. Co.
- Pneumatic Tools
Ingersoll-Rand Co.
- Pole Line Hardware
Bethlehem Steel Co.
Ohio Brass Co.
- Poles, Metal Street
Bates Expanded Steel Truss
Co.
Elec. Ry. Equipment Co.
Hubbard & Co.
- Pole Reinforcing
Hubbard & Co.
- Poles & Ties Treated
Baker Wood Preserving Co.
Bell Lumber Co.
International Creosoting &
Construction Co.
National Pole Co.
- Poles, Ties, Posts, Piling &
Lumber
Baker Wood Preserving Co.
Bell Lumber Co.
International Creosoting &
Construction Co.
National Pole Co.
- Poles, Trolley
Anderson Mfg. Co., A. &
J. M.
Elec. Service Supplies Co.
Nuttall Co., R. D.
- Poles, Tubular Steel
Elec. Ry. Equipment Co.
Elec. Service Sup. Co.
- Porcelain, Special High
Voltage
Lapp Insulator Co., Inc.
- Pothooks
Okonite Co.
- Power Saving Devices
National Ry. Appliance Co.
- Pressure Regulators
General Electric Co.
Westinghouse E. & M. Co.
- Pumps
Allis-Chalmers Mfg. Co.
Ingersoll-Rand Co.
- Pumps, Vacuum
Ingersoll-Rand Co.
- Punches, Ticket
Bonney-Vehstage Tool Co.
Intern'l Register Co., The
Wood Co., Chas. N.
- Rail Braces & Fastenings
Ramapo Ajax Corp.
- Rail Grinders (See Grinders)
- Rail Joints
Carnegie Steel Co.
Rail Joint Co., The
- Rail Joints—Welded
Lorain Steel Co.
Metal & Thermit Corp.
- Rails, Steel
Bethlehem Steel Co.
Carnegie Steel Co.
- Railway Paving Guards, Steel
Godwin Co., Inc., W. S.
- Railway Safety Switches
Consolidated Car Heat. Co.
Westinghouse E. & M. Co.
- Rail Welding
Metal & Thermit Corp.
Railway Track-work Co.
- Rattan
Brill Co., The J. G.
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Hale-Kilburn Co.
Heywood-Wakefield Co.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.
- Registers and Fittings
Brill Co., The J. G.
Elec. Service Supplies Co.
Intern'l Register Co., The
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
Elec. Service Sup. Co.
- Resistances
Consolidated Car Heat. Co.
- Resistance, Wire and Tube
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.
- Sanders, Track
Brill Co., The J. G.
Elec. Service Supplies Co.
Nichols-Lintern Co.
Ohio Brass Co.
St. Louis Car Co.
- Sash Fixtures, Car
Brill Co., The J. G.
St. Louis Car Co.
- Sash, Metal, Car Window
Hale-Kilburn Co.
- Scrapers, Track (See Clean-
ers and Scrapers, Track)
- Screw Drivers, Rubber
Insulated
Elec. 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.
Heywood-Wakefield Co.
St. Louis Car Co.
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Electric Equipment Co.
Transit Equip. Co.
- Shades, Vestibule
Brill Co., The J. G.
- Shovels
Allis-Chalmers Mfg. Co.
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.
Oskel Equipment Co.
- Signal Systems, Block
Elec. Service Sup. Co.
Nachod Signal Co., Inc
U. S. Elec. Signal Co.
Wood Co., Chas. N.
- Signal Systems, Highway
Crossing
Nachod Signal Co., Inc.
U. S. Elec. Signal Co.
- Slack Adjusters (See Brake
Adjusters)
- Sleet Wheels and Cutters
Anderson Mfg. Co., A. &
J. M.
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
More-Jones Brass & Metal
Co.
Nuttall Co., R. D.
- Smokestacks, Car
Nichols-Lintern Co.
- Snow Sweepers, Rattan
Heywood-Wakefield Co.
- Snow-Flows, Sweepers and
Brooms
Brill Co., The J. G.
Consolidated Car Fender Co.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.
- Soldering and Brazing Ap-
paratus (See Welding
Processes and Apparatus)
- Special Adhesive Papers
Irvington Varnish & Ins. Co.
- Special Trackwork
Bethlehem Steel Co.
Buda Company
Lorain Steel Co.
- Spikes
Amer. Steel & Wire Co.
- Splicing Compounds
Westinghouse E. & M. Co.
- Splicing Sleeves (See Clamp-
ing and Connectors)
- Springs, Car and Truck
Amer. Steel & Wire Co.
Bemis Car Truck Co.
Brill Co., The J. G.
St. Louis Car Co.
- Sprinklers, Track and Road
Brill Co., The J. G.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.
- Steel Castings
Wharton, Jr., & Co., Wm.
- Steel and Steel Products
Morton Mfg. Co.
- Steps, Car
Morton Mfg. Co.
- Stokers, Mechanical
Babcock & Wilcox Co.
Westinghouse E. & M. Co.
- Stop Signals
Oskel Equipment Co.
- Storage Batteries (See Bat-
teries, Storage)
- Strain, Insulators
Anderson Mfg. Co., A. &
J. M.
Ohio Brass Co.
- Strand
Roebling's Sons Co., J. A.
- Superheaters
Babcock & Wilcox Co.
Power Specialty Co.
- Sweepers, Snow (See Snow
Plows, Sweepers and
Brooms)
- Switch Stands & Fixtures
Ramapo Ajax Corp.
- Switches, Selector
Nichols-Lintern Co.
- Switches, Tee Rail
Ramapo Ajax Corp.
- Switches, Track (See Track
Special Work)
- Switches and Switchboards
Allis-Chalmers Mfg. Co.
Anderson Mfg. Co., A. &
J. M.
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.
- Tampers, Tie
Ingersoll-Rand Co.
Railway Track-work Co.
- Tapes and Cloths (See Insu-
lating Cloth, Paper and
Tape)
- Tee Rail Special Track Work
Bethlehem Steel Co.
Ramapo Ajax Corp.
- Telephones and Parts
Elec. Service Supplies Co.
- Terminals, Cable
Std. Underground Cable Co.
- Testing Instruments (See Ins-
truments, Electrical Meas-
uring, Testing, etc.)
- Thermostats
Consolidated Car Heat. Co.
Gold Car Heating & Light-
ing Co.
Railway Utility Co.
Smith Heater Co., Peter
- Ticket Choppers & Destroyers
Elec. Service Supplies Co.
- Ties, All Metal
Metal Safety R.R. Tie Co.
Ties and Tie Rods, Steel
Barbour-Stockwell Co.
Carnegie Steel Co.
International Steel Tie Co.
- Ties, Wood Cross (See Poles,
Ties, Posts, etc.)
- Tongue Switches
Wharton, Jr., & Co., Wm.
- Tool Steel
Bethlehem Steel Co.
- Tools, Track & Miscellaneous
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Hubbard & Co.
Railway Track-work Co.
- Torches, Acetylene (See Cut-
ting Apparatus)
- Towers and Transmission
Structures
Archbold-Brady Co.
Bates Expanded Steel Truss
Co.
Westinghouse E. & M. Co.
- Track Expansion Joints
Wharton, Jr., & Co., Inc.,
Wm.
- Track Grinders
Metal & Thermit Corp.
Railway Track-work Co.
- Rail Welding & Bonding Co.
- Trackless Trolley Cars
St. Louis Car Co.
- Track, Special Work
Barbour-Stockwell Co.
Bethlehem Steel Co.
New York Switch and
Crossing Co.
- Ramapo Ajax Corp.
Wharton, Jr., & Co.,
Inc., W.
- Transfer (See Tickets)
- Transformers
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.
- Treads, Safety, Stair, Car
Step
Morton Mfg. Co.
- Trolley Bases
Anderson Mfg. Co., A. J. &
J. M.
Elec. Service Supplies Co.
General Electric Co.
More-Jones Brass & Metal
Co.
Nuttall Co., R. D.
Ohio Brass Co.
- Trolley Bases, Retrieving
Anderson Mfg. Co., A. &
J. M.
- Elec. Service Supplies Co.
Nuttall Co., R. D.
Ohio Brass Co.
- Trolley Buses
Brill Co., The J. G.
General Electric Co.
Westinghouse E. & M. Co.
- Trolley Material
Bates Expanded Steel Truss
Anderson Mfg. Co., A. &
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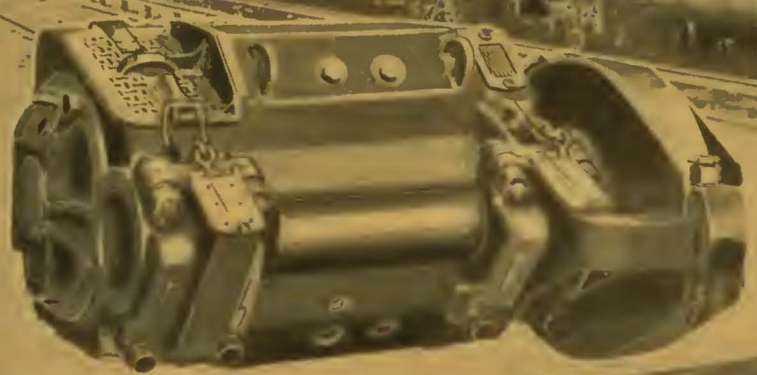
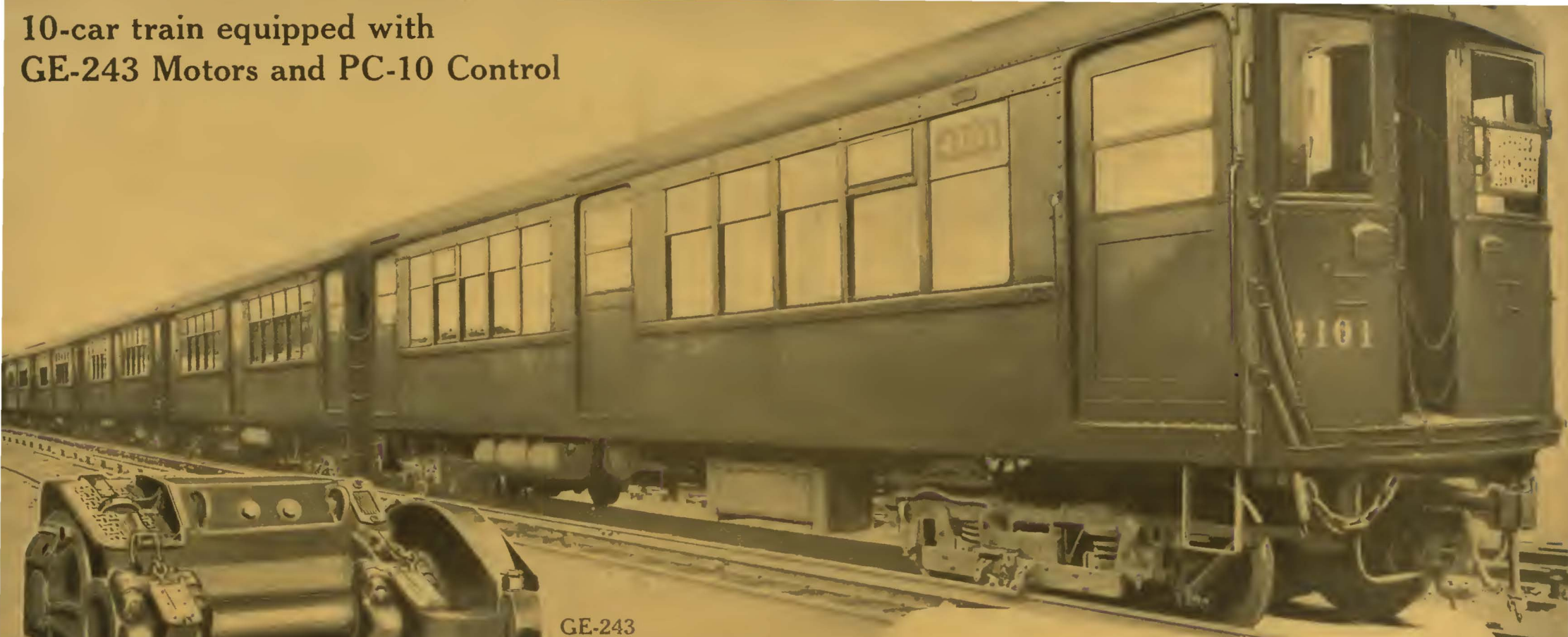
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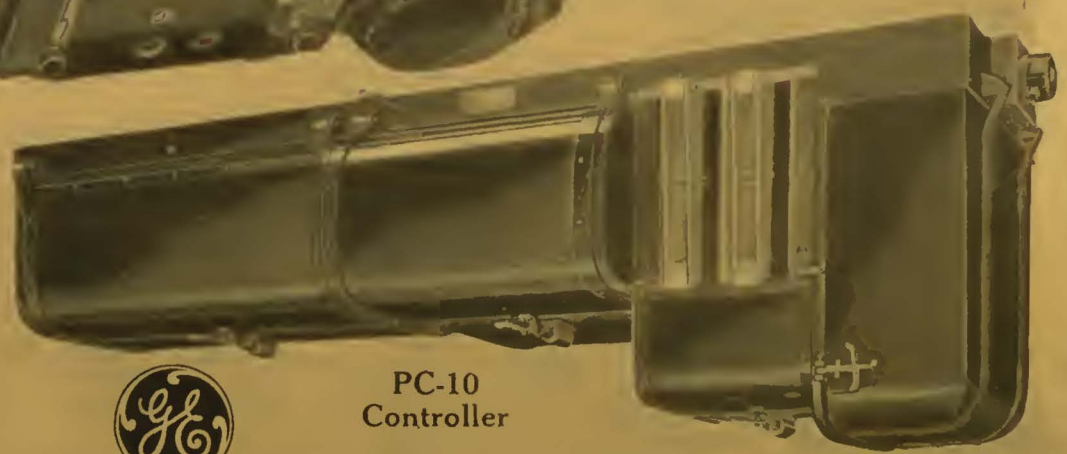
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