ELECTRIC RAILWAY JOURNAL

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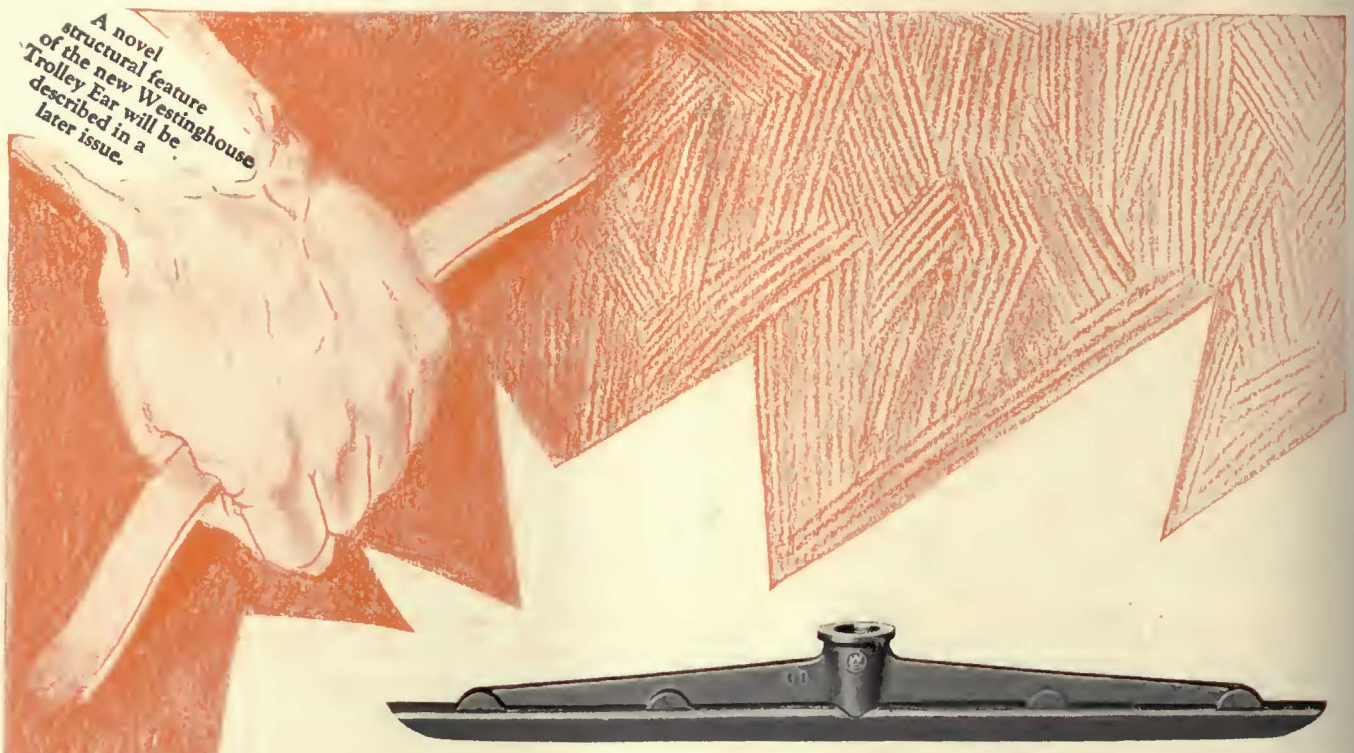

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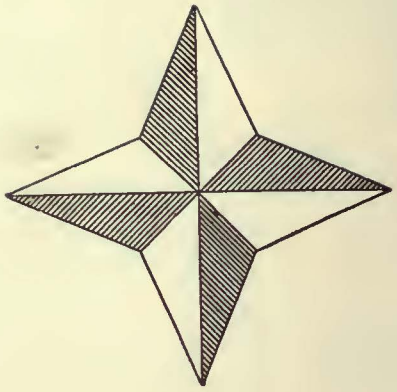

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How much comfort have you to sell?

Comfort is a tangible quantity in the competitive market for passenger fares. There is an obvious limit to which the effort to provide comfort may be carried. There is also a limit to the extent to which it may be neglected.

Few will be hardy enough to argue the point. May we present the standard which Cincinnati BALANCED LIGHTWEIGHT cars are maintaining on many successful systems? Then you will have a yard stick with which to measure the amount of comfort you have to meet the insistent public demand.

CINCINNATI CAR COMPANY
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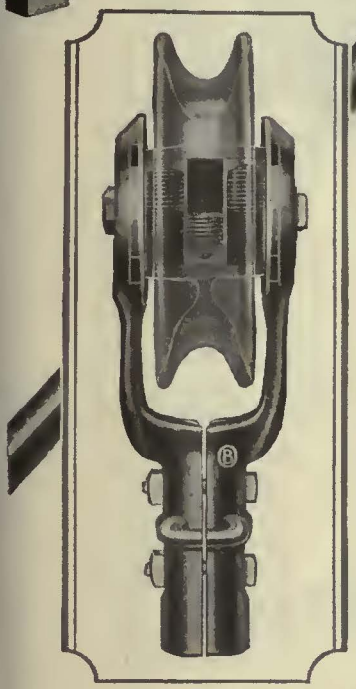
CINCINNATI BALANCED LIGHTWEIGHT CARS

The Four Features of Balanced Design are the Cardinal Points of today's demand

MAINTENANCE DOLLARS AND SENSE!

It is the many possible small saving, easily made, that help most to swell the "net". Let O-B Wheels and Harps contribute their share.



Phantow view showing fully automatic graphite lubricating plugs used in Improved O-B Trolley Wheel and Harp.

The O-B Trolley Wheel and Harp Make a Big Cut in Maintenance

A BIG portion of ordinary trolley wheel expense is maintenance—frequent oiling and periodical replacement of contact washers and springs.

Such maintenance is *all* eliminated with the O-B Trolley Wheel and Harp (Feist Patents). There is no oiling to pay for during the life of the wheel—for the permanent automatic lubrication of the graphite plugs makes this unnecessary.

Better conductivity is provided by the large, rigid axle, which, with its closely fitted bearing, minimizes overhead wear and prevents chattering.

O-B Wheels and Harps actually show a *definite saving* in purchases for replacement of $100 per million car miles and *cut maintenance costs* at least 36%. They will generally more than double the mileage of ordinary wheels.

A trial of O-B Wheels & Harps on your lines is a mighty good "Dollars and Sense" idea. Furnished in 5-in. and 6-in. sizes with either "U" or "V" groove.

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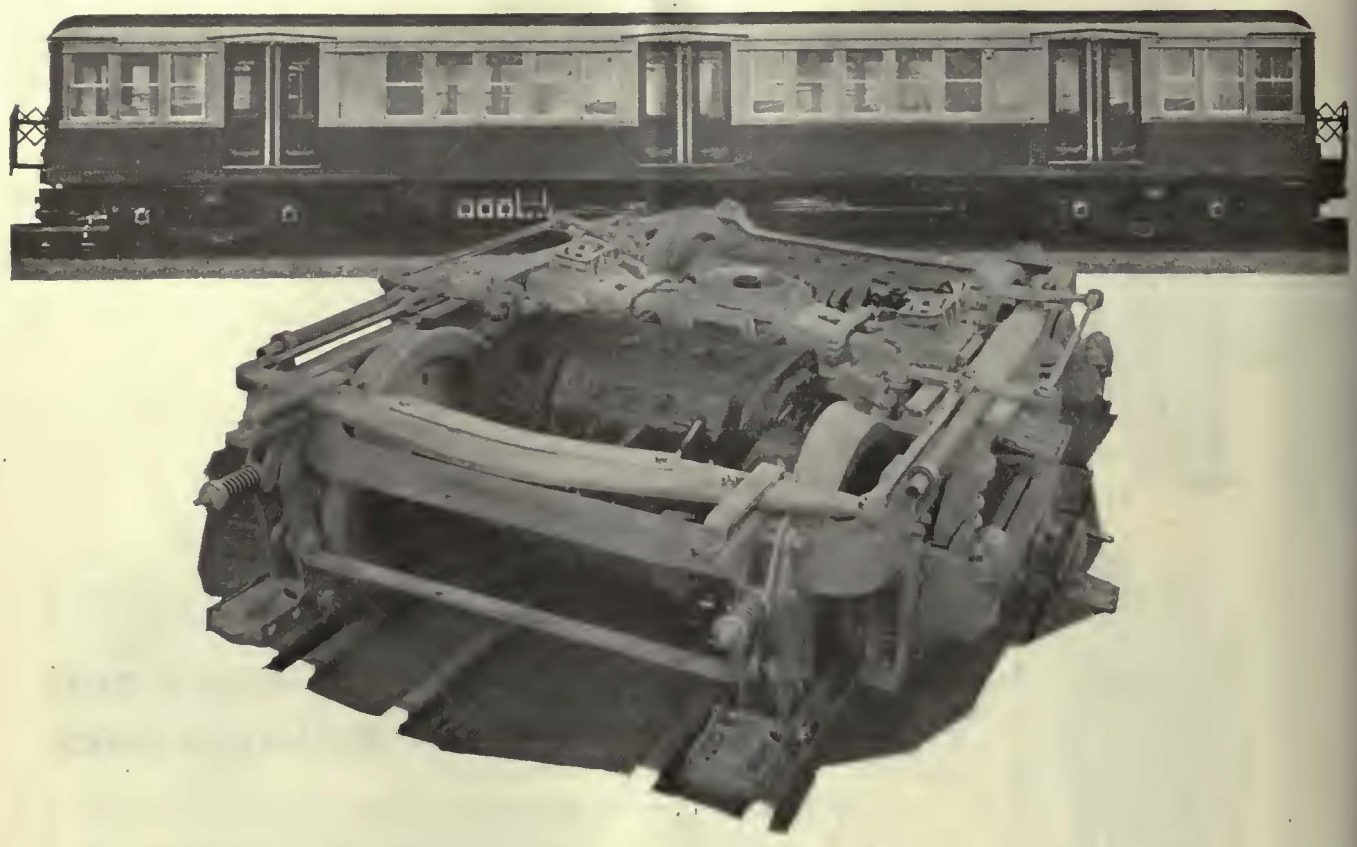


Clasp Brakes Speed Subway Operation

In no other service does railroad traffic density approach that of the subways.

Trains accelerate rapidly; they must decelerate the same way. To this end Clasp Brakes are a necessity.

With two brake shoes per wheel instead of one, the Clasp Brake produces the maximum retarding effect, with minimum wear and tear on truck and journal parts.

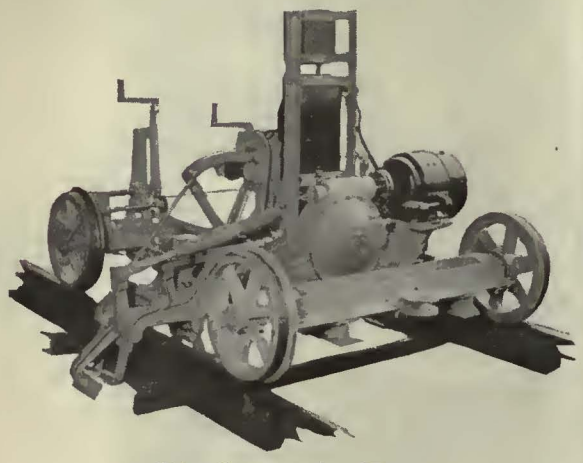
The Simplex Multiple Unit Clasp Brake affords smoother braking with less heating of brake shoes and reduces the number of "slid flat" wheels. It is an essential part of modern electric railway equipment.

AMERICAN STEEL FOUNDRIES

NEW YORK CHICAGO ST. LOUIS

Simplex Multiple Unit Clasp Brake for Motor Trucks

FIGURE IT THIS WAY—



The Compression Tamper

GANG LABOR COSTS so much per man per day. If John or Tony hasn't anything to do for an hour or so he sits around and consumes Honest Scrap, and your money.

When machines are used they're only drawing pay when the juice is turned on.

A compression tamping machine and a D-S-R track layer, combined, take the place of about eight men. Figuring an average labor rate of 50 cents an hour, a nine hour day, these two machines take the place of $36.00 worth of labor every day! That's just the *start* of the savings you get. Machines do the work *better* and *faster*.

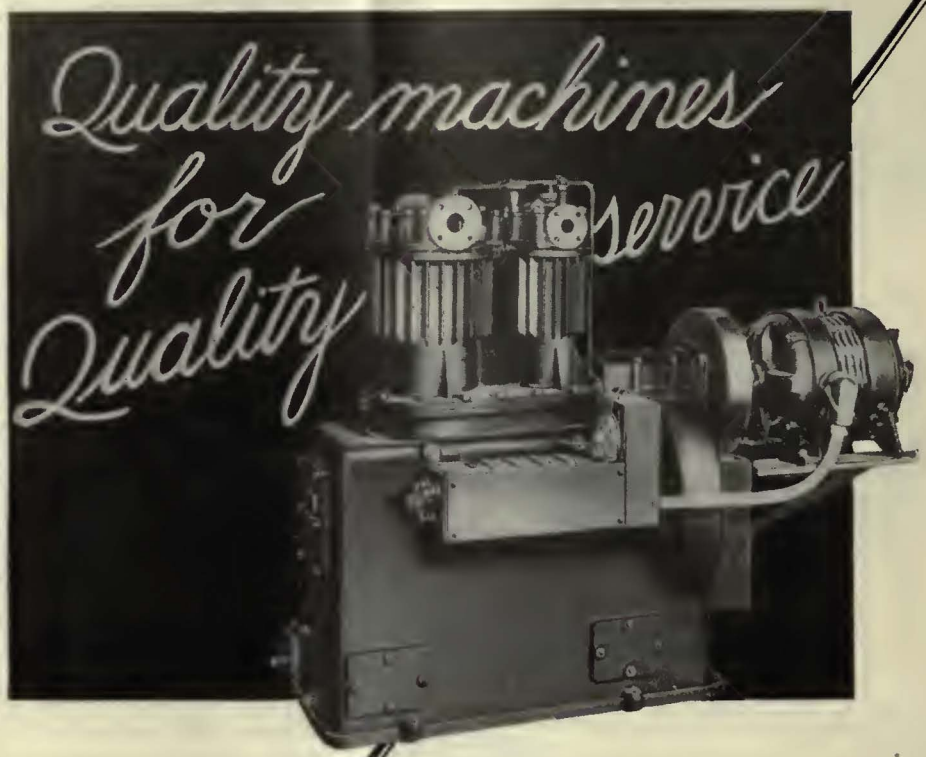
If you're building more than 100 yards of track—you need modern machinery. If you're building fifty feet, five thousand feet or more of track you need Steel Twin Ties.

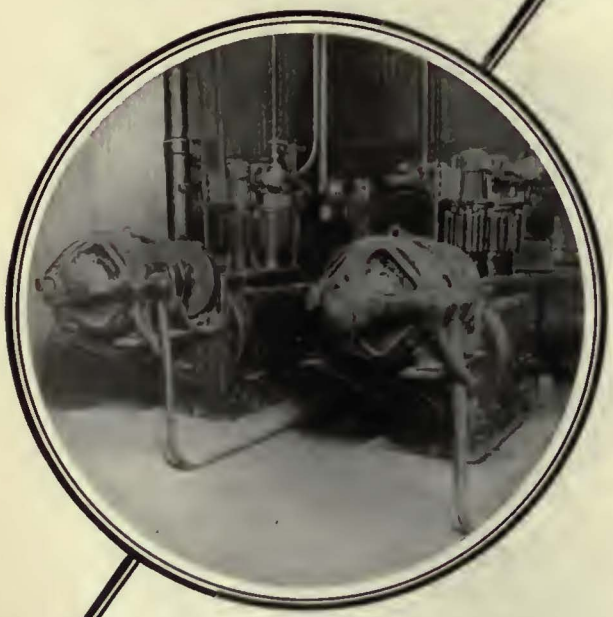
Steel Twin Ties, modern production machinery and Progress go hand in hand.

The D-S-R Track Layer

THE INTERNATIONAL STEEL TIE CO.
CLEVELAND, OHIO

STEEL TWIN TIE TRACK
THE BASE OF MODERNIZATION





A typical installation of Westinghouse National Compressors, type 2VC, in railway repair shop service.

9014

WESTINGHOUSE National Compressors embody the same careful design and precision in manufacture that has typified Westinghouse products for the past half century. These compressors are compact, self-contained, uniquely durable, absolutely reliable in action, simple in operation, and, due to their positive control feature, assure minimum power consumption.

Built in capacity sizes, ranging from 3 to 700 cu.ft. displacement, there is a Westinghouse National Compressor particularly suited to every pneumatic requirement, in the railway shop, power house, and maintenance department.

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WESTINGHOUSE—NATIONAL
Air Compressors

No. 27380

Nos. 27902-03

For use in conjunction with the new "20" series Lighting System

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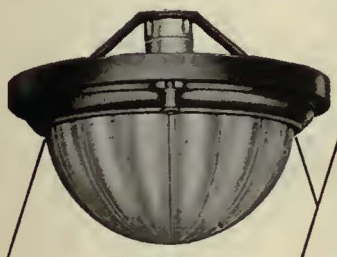
No. 27288 Fixture With No. 27440 Dome



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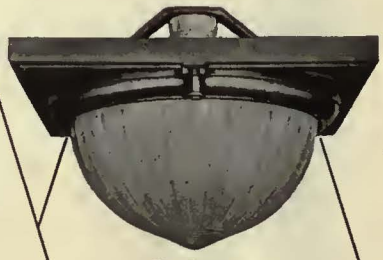

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Safety Dome-type Lighting Fixtures combine *Beauty Durability Economy*

DOME type lighting fixtures are now widely used in electric railway cars because they add greatly to the interior appearance and comfort. This single item will, practically alone, transform an ordinary car into the de luxe class.

These fixtures are highly efficient from a current consuming point of view and provide perfect diffusion of the light. The absence of glare and consequent eye-strain is, at once, noticeable and appreciated by the riding public. They practically eliminate theft of lamps.

Bowls are made of light density opal glass. Standard finish of fixture is statuary bronze, although special finishes can be supplied to order.

They are durable. Pressed steel with pressed glass of sufficient thickness to withstand extreme vibration under transportation conditions.

They permit the use of larger lamp units with consequent reduction in cost of lamp renewals, longer lamp life and simplified wiring.

Safety Dome type fixtures are made in three standard sizes accommodating 12, 10 or 8 inch glassware. No. 27902 fixture is 6½ inches overall diameter. Send for complete details.

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

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MANUFACTURER OF RAILWAY, POWER AND INDUSTRIAL ELECTRICAL MATERIAL

There is no need for elevator operators when people are glad to operate the elevators themselves.

SELF SERVICE CARS

Just as people become quickly accustomed to operating automatic elevators, so have they adapted themselves to the use of treadles for opening doors in street cars. The treadle is not only a factor in modernization but also in public relations.

TREADLE-IZE!

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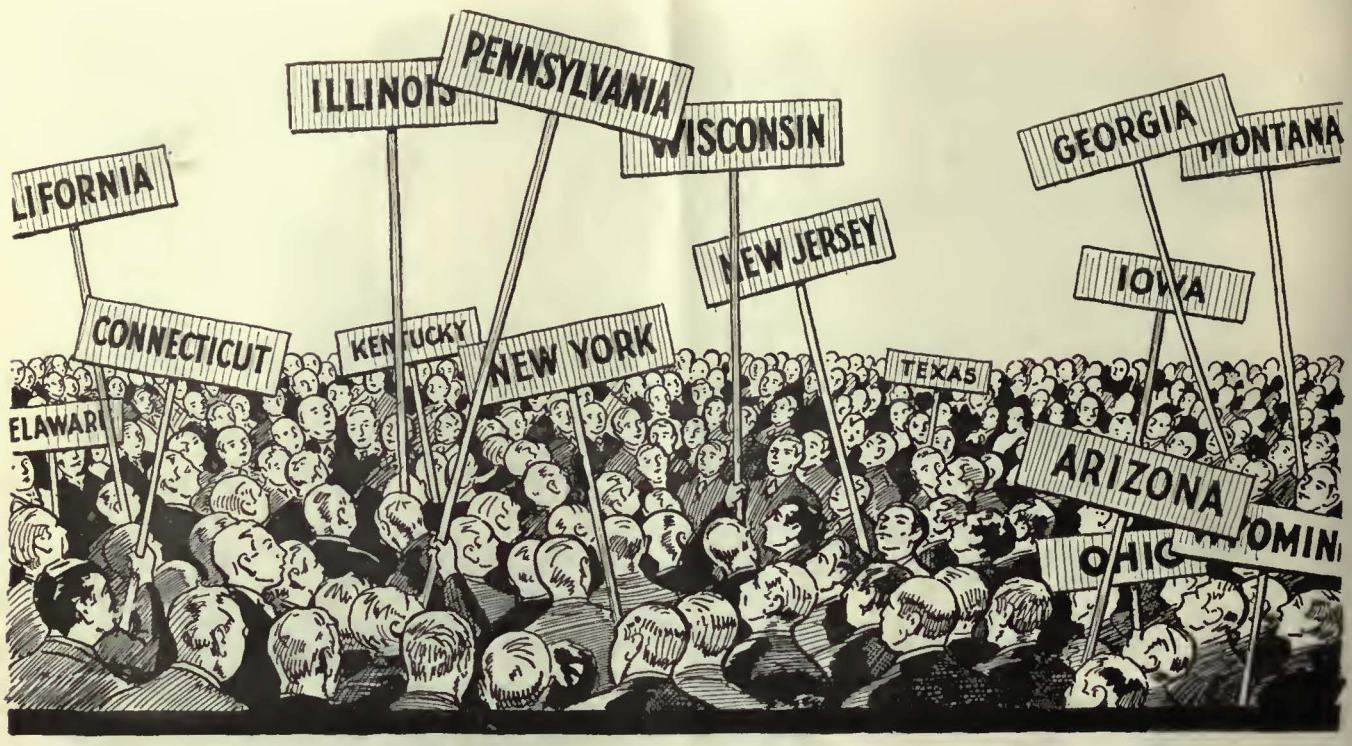

When the political conventions gather

In Kansas City

Republican delegates who have patronized the trolley cars in this Midwestern Metropolis have been riding over track welded with Thermit.

THERMIT

In Houston, Tex.

Democrats gathering in the Southwest to select their candidate, will be in another city where Thermit Welding is standard.

And in practically every other City in the Union where modern transportation methods prevail

In fact these two major political parties could scarcely have chosen an American city, large or small, where Thermit is not now used.

Thermit welding to eliminate rail joints has been accepted by engineers and managements almost everywhere, as the one permanent solution of a heretofore troublesome and costly problem. Since 1912 the use of the Thermit rail weld has been steadily increasing, until today over 60% of all the track being laid in paved streets is Thermit-welded.

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METAL & THERMIT CORPORATION

120 BROADWAY, NEW YORK, N.Y.

PITTSBURGH CHICAGO BOSTON SOUTH SAN FRANCISCO TORONTO

Called on him for 3 years Then, a $5000 order by Telephone

An Advertisement for Bell Long Distance Telephone Service

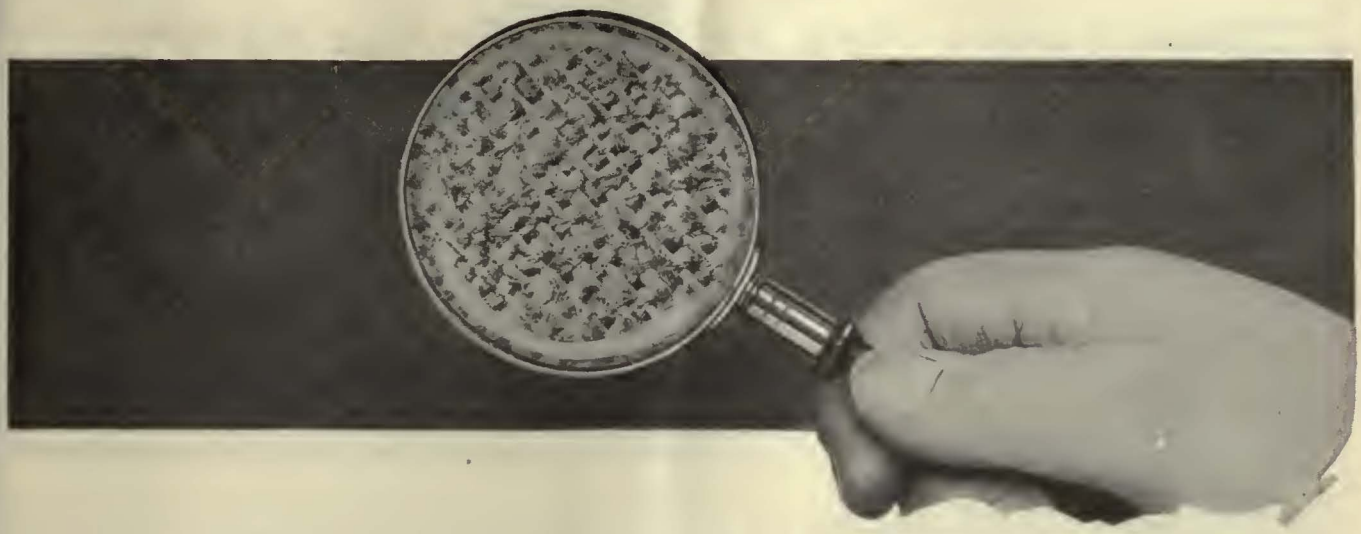
The sales manager of a West Virginia tool company made personal calls upon a Cincinnati jobber for three years—without making a sale. Then one day he learned that a large job of work was to be started. He instantly called the jobber by Long Distance. Sold him a carload of shovels. Amount of the order, $5000. Telephone charge, $1.30.

In the packing industry, reams of correspondence are often exchanged before specifications can be agreed upon. In a 10-minute telephone conversation, an Austin, Minnesota, firm took a 5-carload order and laid the groundwork for future shipments of 500,000 pounds. The new customer was 1500 miles away.

A Cedar Rapids insurance man had learned to use Long Distance while in the coal business. Each week from his desk he calls an average of 20 of his salesmen. "It enables me to talk to them just as well as if I visited them in person." In five years, his annual business has increased from one million to five and a half million dollars.

What long distance calls could you profitably make now? They are inexpensive. New station to station day rates are: San Francisco to New York, $9. Pittsburgh to Boston, $2.20. Chicago to Detroit, $1.35. Newark to Philadelphia, 60c. . . . . Calling by number takes less time. . . . . *Number, please?*

AMERICAN TELEPHONE & TELEGRAPH CO AND ASSOCIATED COMPANIES — BELL SYSTEM



Looking under the varnish

Does the varnish hide a cloth mesh clogged with starch or is the cloth thoroughly soaked with varnish? ¶Only in the latter case will the insulation afford protection—permanently. And that's the secret of G-E varnish-treated cloths and tapes—a good cloth saturated with a good varnish. ¶General Electric first made insulating materials for its own use—it had to be sure. When renewing motors, it likewise pays to be sure. Before the next motor is overhauled, look into your varnish-treated cloth. You are taking no chances when you specify G-E insulating materials.

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G-E insulating materials are sold only by G-E Merchandise Distributors located throughout the country who are equipped to give you prompt service. Get in touch with the G-E Merchandise Distributor near you or write to the Merchandise Department, General Electric Company, Bridgeport, Connecticut.

This catalog contains a complete listing of the following G-E insulating materials:

- Insulating and finishing varnishes
- Insulating oils
- Stickers
- Shellacs and paints
- Filling and sealing compounds
- Varnish-treated cloths and cloth tapes
- Flexible varnished tubing
- Insulating fibers and papers
- Motor tubing
- Asbestos and cotton tapes
- Friction and rubber tapes
- Prepared paper tapes
- Cords
- Twines

Send for your copy to the Merchandise Department, General Electric Company, Bridgeport, Connecticut.

800-201

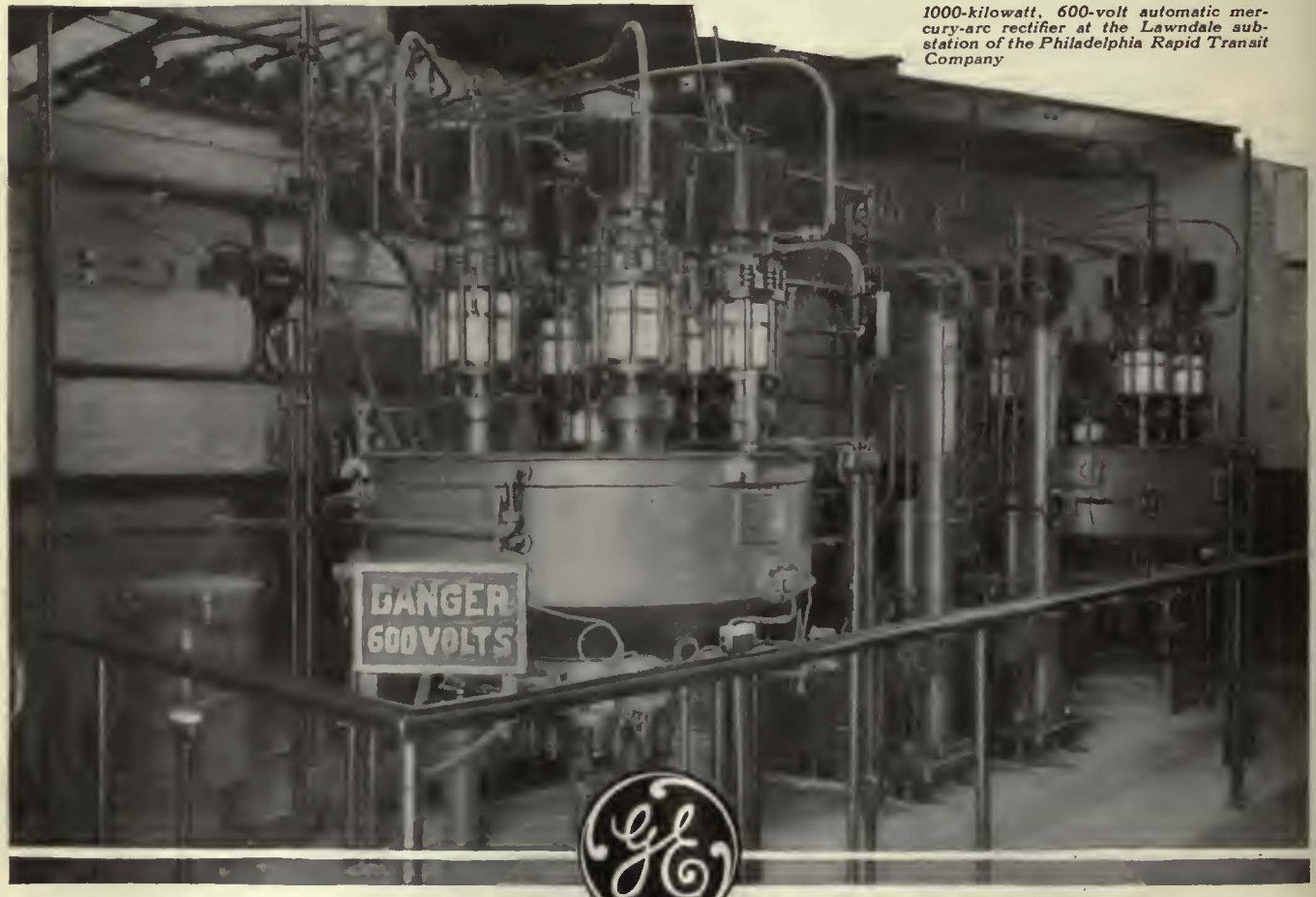
GENERAL ELECTRIC

MERCHANDISE DEPARTMENT, BRIDGEPORT, CONNECTICUT

Fully automatic—the G-E mercury-arc rectifier

Many G-E mercury-arc rectifiers now in service are fully automatic, and require only the supervision and inspection periods customary with the usual substation equipment.

Automatic switching is easily adapted to the control of mercury-arc rectifiers. Suitable devices have been developed for operating and protecting the rectifier so that it functions upon load demand with a reliability equal in every way to that of synchronous converters or motor-generator sets.



1000-kilowatt, 600-volt automatic mercury-arc rectifier at the Lawndale substation of the Philadelphia Rapid Transit Company

130-5

GENERAL ELECTRIC

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

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

McGraw-Hill Publishing Co., Inc.
JAMES H. MCGRAW, *President*

LOUIS F. STOLL, *General Manager*
CHARLES GORDON, *Editor*

Volume 71 New York, Saturday, June 23, 1928 *Number 25*

An Indicator of Progress

JUST as straws show which way the wind blows, so the trend of thought at electric railway association meetings reflects conditions in the industry. In the past there have been periods of despair, of doubt, of hopelessness. These have followed each other during the past ten years, and have shown unfailingly the attitude of the leaders. It has been interesting to note the progressive change for the better as developed in this manner from meeting to meeting.

This spring there has been a series of association meetings at which there has been a new note. There has been a distinct atmosphere of cheerfulness and an exchange of ideas that show that managers and other executives have been thinking in terms of success. The tone of the papers presented has been of a different order from that of others in recent years. They have told of improvements in methods, improvements in physical property, improvements in human relations. Their dominant theme has been accomplishment. It has not been enough to say, for example, that street traffic ought to be regulated or that it must be regulated. Speakers have told how it can be regulated and how it has been regulated. So it has been with other phases of electric railway operation.

Discussions, too, have been unusually valuable. When a man has done something different from that mentioned by the principal speaker and has reached the same or a different conclusion, he has not been hesitant to give his opinion. Such discussions can come only from men who actually have been devoting their time to intensive study and who have been trying out in practice the theories they have developed.

Signs such as these are among the most definite indications seen in many months that the industry has taken hold of itself, and has thrown off the defeatist attitude that held it back for so long. May the forward movement continue—and with ever-increasing momentum.

The Code That Conquers

"PLAY the Game Square," the vigorous title which J. N. Shannahan chose for his Mid-West paper, expresses a code that has paid in practice. He said in explanation that except in certain outstanding instances it seems to him "we. ourselves have not met fast-changing situations with as much courage as we should and certainly not with the far-sighted vision needed to grasp in full the opportunities which changing conditions bring along with difficulties."

In expressing his views, Mr. Shannahan recognized that the cynic is always just around the corner. For when he said "we must put the cards on the table face up," he was quick to add that he knew this would sound trite. Here, however, he probably had in mind the strong temptation which always exists to keep an ace up one's sleeve. This point may well be pondered in the light of what has happened in the past. True, there have been grave ills due to the play of economic forces over which the individual at best has only slight control. But that does not explain the spirit of distrust on many properties at a time when they sorely needed intelligent public understanding.

It is as true of a company and even of an industry as it is of an individual, that "As ye sow, so shall ye reap." Of course, there are those in public councils that are unfriendly to the industry. But it is likewise true that there are sometimes divided councils within the industry. Many instances readily come to mind of situations which illustrate the inestimable harm which has been done not only to individual properties but to the industry generally, by action which smacks of sharp practice.

But it was not to find fault that Mr. Shannahan said the things he did. Rather, it may be assumed, his object was to indicate the common pitfalls that lie in the pathway of the unwary in the effort to improve the condition of a property. Public co-operation may be expected to grow only out of public confidence. When a record of straightforward dealing has been established, the interests of the public and the railways are identical. But that is true only as the character of service is satisfactory, the equipment modern and the management disposed to transportation progress. And the first two of these almost necessarily embrace the last. No code to which the electric railways might subscribe could be better conceived than that reflected in the remarks made by Mr. Shannahan.

This Fine and Unselfish Example

THUS O. H. Caldwell, federal radio commissioner, characterizes the action of the Third Avenue Railway in voluntarily relinquishing its radio broadcasting license for station WEBJ, New York City. Since 1924, when radio broadcasting was expanding rapidly, this station has been operating. It has spread the gospel of safety, the proper relations between the public and a transportation company, and the mutuality of interests existing between employee and employer. It has always maintained a high degree of mechanical and electrical efficiency. Moreover, those in charge of the railway's broadcasting have taken an active part in the scientific development of radio.

Except for the unselfish and public spirited desire of its owners to assist the larger aims of radio there is no reason for its discontinuance. This is conclusively proved by the fact that it was not on the commission's blacklist

of 162 stations throughout the country, 25 of which were operating in the metropolitan area.

In making the offer to suspend operations, President S. W. Huff subordinated private interest to the public weal. He wrote the commission that his company realized "the purpose for which your commission was created and the difficulty of your work." In word and deed here is an "unselfish example" of citizenship; something more than a gesture on the part of a transportation company. This kind of executive thinking must ultimately win real dividends in public friendship and good will.

Another New Car Makes Its Bow

ANOTHER new car is presented for the industry's consideration in an article printed elsewhere in this issue. In this fact alone there is nothing to elicit particular comment. New designs of rolling stock are now beginning to appear in steady procession, with increasing frequency, as the present industry-wide movement to develop equipment better suited to meet present-day transportation requirements gets into full swing. Nor do the technical features of the car itself or of its equipment represent such wide departures from conventional practice as to warrant particular attention. True, in the elimination of the customary foundation brake rigging and the use of automotive type brake diaphragms at each wheel with an otherwise conventional type of truck, another novel design idea is being tried. But beyond this and the use of double reduction gearing with high-speed motors, the construction of this latest sample car is quite conventional.

But there are, nevertheless, other factors connected with the building of this car that are of outstanding interest to the entire industry as indicators of trends that may have far-reaching effects. First of all it is worth noting that this sample car is entirely the enterprise of a car builder—not an operating company. It is a complete piece of equipment built to be sold and including the manufacturer's own ideas of design and construction; not a contract job built to a customer's specifications.

In American industry generally, this is the accepted practice. But a complete street car, built according to the manufacturer's own ideas and with the manufacturer's money, is a novelty. Two years ago at Cleveland there was shown for the first time a sample lightweight, high-speed interurban car which was entirely the design of a car builder. Last year at Cleveland there were two additional cars shown which could be put in this classification; one of them built by a bus manufacturer. Now comes another, and this year's convention will undoubtedly bring forth others. In this trend there is promise of increased initiative by the builders which should result in more consistent development than in the past and it is therefore worthy of the fullest co-operation and encouragement from operating executives.

Another feature of this latest sample car is the attention given to the matter of proportions and appearance. The merchandising appeal of sleek, graceful lines in a transportation vehicle is being recognized today as never before. Car designers are indeed beginning to take a leaf from the automotive industry's notebook. They are recognizing that ruggedness, economy, and efficiency, although of vital importance, are no longer the sole requirements for a satisfactory vehicle design. A car which attracts no passengers is unsuccessful, regardless of how efficient it may be. Just as the average automobile buyer knows little about what is under the hood, so also does the average car rider know little and care less about the structure and equipment of the street car upon which he rides. But the passenger and prospective passenger are quick to sense new features of architecture or comfort.

Even in appearance and lines, however, there is little that is particularly novel in this sample car. The sloping front window which gives a semi-automotive appearance, is used, but this arrangement has already been adopted on so many cars that it can no longer be considered an innovation. It is to the general proportions and to the details of construction that one must look for the features of greatest interest. The bottom line of the step is carried completely around the vestibule to give balance to the two sides of the car and to give the end a finished appearance. The doors are flush with the sides of the body when they are closed and the customary awkward offsets at the vestibule are eliminated. The relation between the height of the side sheets, windows, letterboard and roof was carefully considered from the standpoint of proportions. Although a side skirt was first tried, it was finally eliminated for this particular car.

It is probable that the builder would by no means consider this a final product. One hears of other plans on every side. Further radical changes from conventional practice are promised in projects that are even now under way. Faint rumors of the entrance of bus manufacturers into the field of car construction are persistent and are getting louder. From this growing activity, whetted by the stimulus of healthy competition, there may be expected rapid progress in meeting the demand for electric railway cars that will attract riders back to the use of public instead of private transportation.

A Mere Matter of $136,000,000

PHILADELPHIA lawyers are now engaged in the pleasant pastime of trying to unscramble the Philadelphia Rapid Transit Company's underliers. It is a friendly proceeding worthy of the supernatural powers that legend lends to the Philadelphia practitioners. If they achieve their object this time, it will be for the best, but they failed before in a similar task because of inanition or exhaustion. It all came about this way. A year ago Judge C. C. McChord, special investigator for the Pennsylvania Public Service Commission, suggested that the financial eggs be made into a real omelet. Some of the eggs never have had their shells completely broken and others were slightly addled when they went in. But the omelet, such as it is, apparently awaits only the wielding of the financial wizardry of $136,000,000 of the city's funds.

If money talks, that sum ought to make a loud noise, but the holders of the securities of the underlying companies of the P.R.T. appear to be particularly hard of hearing. For good reasons they are enamored of their possessions. Others see the underliers only as the Old Man of the Sea riding on the P.R.T.'s back. It is a situation not peculiar to Philadelphia, and one that the committee on finance of the American Electric Railway Association has suggested be corrected wherever possible.

Apparently nobody except their owners loves the companies underlying P.R.T. In one way or another they extract from the property nearly $9,000,000 a year. Their number seems almost legion. Certainly their family tree is intricate. If his suggestion be correctly

understood Judge McChord proposes that the city purchase the underliers, lock, stock and barrel, for about $102,000,000 plus the face value of $33,500,000 of bonds, a total, in round figures, of $136,000,000. This estimate of the value of the underlying stocks is figured in two ways: by capitalization of their returns at 7 per cent, and by an average of their market prices over a period of eight years. The result is approximately the same, whichever method is followed.

It has been explained that on this $136,000,000 of landlord value, the P.R.T. as tenant pays each year besides $9,000,000 of rent $1,432,403 of taxes which it is said could be eliminated. The idea is that as the city could become the landlord by borrowing the $136,000,000 at 4½ per cent for the purchase of the underliers, there would be a saving for somebody of the difference between $10,303,138 of P.R.T. fixed charges and $5,780,000 of interest on the city's borrowed funds, or $4,523,138 a year in round figures.

Thus, as the Philadelphia *Record* put it some time ago, Mr. McChord has passed the magic wand over the silk hat into which have been scrambled the addled eggs of the underliers, and, rolling up his sleeve, has extracted therefrom the live rabbit. The secret, of course, seems to be the substitution of city credit for private credit. But between the apparition of the $4,523,138 a year saved and the actuality, there stand the protective committees of the underliers. It is their attitude which is being sought at the present hearing before the Public Service Commission, a proceeding probably without precedent. To that proceeding the P.R.T. is not a party. Succinctly stated the sole duty of the commission under the legislative act of 1927 is to determine the compensation or damages to be paid by the city as a partner of the P.R.T. to the owners of the property to be condemned by it. The end sought is desirable from the standpoint of economy and simplification of the financial structure of the P.R.T., but certainly if the plan is put through on the terms suggested, Judge McChord will have done more than propound a solution. He will have opened the way to a miracle.

Tangible Rewards to Careful Trainmen in Gary

VACATION time among trainmen of the Gary Railways is imminent. When the no-accident vacation report was compiled recently it became known that 96 trainmen out of 145 were entitled to five-day vacations with pay because they had gone through the year without having had a single accident charged to them. This number of no-accident vacations—just over 66 per cent—is the highest in the history of the company. Of equal significance, 27 of the 96 men have served four years without a chargeable accident, while one man who has been with the Gary Railways during the twenty years of its existence has enjoyed the benefits of the annual vacation award every year save one.

There are some who would argue that no particular consideration or reward should be attached to what, after all, constitutes simply a record of careful performance of duties. But if we are to believe modern safety doctrines, few accidents happen which could not have been prevented. Many properties have adopted various forms of awards—some use cash bonuses; others have safety dinners or outings. The vacation idea in Gary seems to offer a happy plan.

Expenditures in the settlement of accident damage claims constitute a very appreciable proportion of the gross revenue of a street railway. There is much evidence to show that the companies whose accident prevention campaigns have been most successful are those whose policy has been to share generously the benefits of accident reduction with their men.

The Added Responsibility of Their Separation

NO OTHER piece of recent news affecting the electric railways is in its way more significant than the reported sale by the New York Central Railroad of its holdings in the electric railway properties in Rochester, Syracuse, Utica and other cities. Pending the conclusion of the financial details, it is of course unlikely that any program for the future conduct of the railways will be laid down. That the roads will be operated separately from the power holdings, if the new owners retain them, does, however, appear to be certain. That is a good thing.

In the past these roads along with other properties of their kind have suffered from the distracting economic changes in the field of transportation. They have not, perhaps, been as militantly managed as might have been wished, but that no doubt is attributable to the owners rather than those charged with operation of the properties. It is easy to understand this. A steam railroad is a large and inflexible organization and the very magnitude of its operations tends toward the subversion of local impulses and reactions. Electric railways, on the other hand, are intimately associated with the affairs of a community, and must be sensitive to local conditions. It was not until the Connecticut Company had been separated from the New Haven Railroad that Mr. Storrs was able almost entirely to reverse the situation with respect to that property, and it was undoubtedly the example which he set that later caused the New Haven to confer on its local responsible operating officials in Worcester and Springfield the necessary detached authority which has enabled them to carry out the program which now promises so much for these properties.

All this is cited merely as pointing to the new owners the possible future of the roads in central New York. That future is theirs to make or mar. There is more in this suggestion than just a nicely turned phrase. The railways are, perhaps, doing as well as could be expected. Managerial talent of high order is in charge of the roads. On their part the new owners are in a position to make an adequate survey of the situation and to map out a program for the future that will permit the properties to be developed in the militant way that is needed. Already the bus and the trolley bus have come to play their part in these systems, but whether they are doing it to the extent that is possible and advisable only a survey of the kind suggested would show.

The Rochester road has an arrangement with the city in its modified service-at-cost plan that promises well for the future, and the situation in Syracuse, particularly in the matter of fares and public relations, appears to be satisfactory. With the inhibitions inherent in the former ownership removed, further improvement may be expected in the situation in upper New York. This holds true whether or not the so-called Phillips interests retain the roads. So far as they are concerned, their record with their other properties indicates they are thoroughly alive to the fact that the first step in successful public relations is performance.

Osgood-Bradley Develops

New Model Sample Car

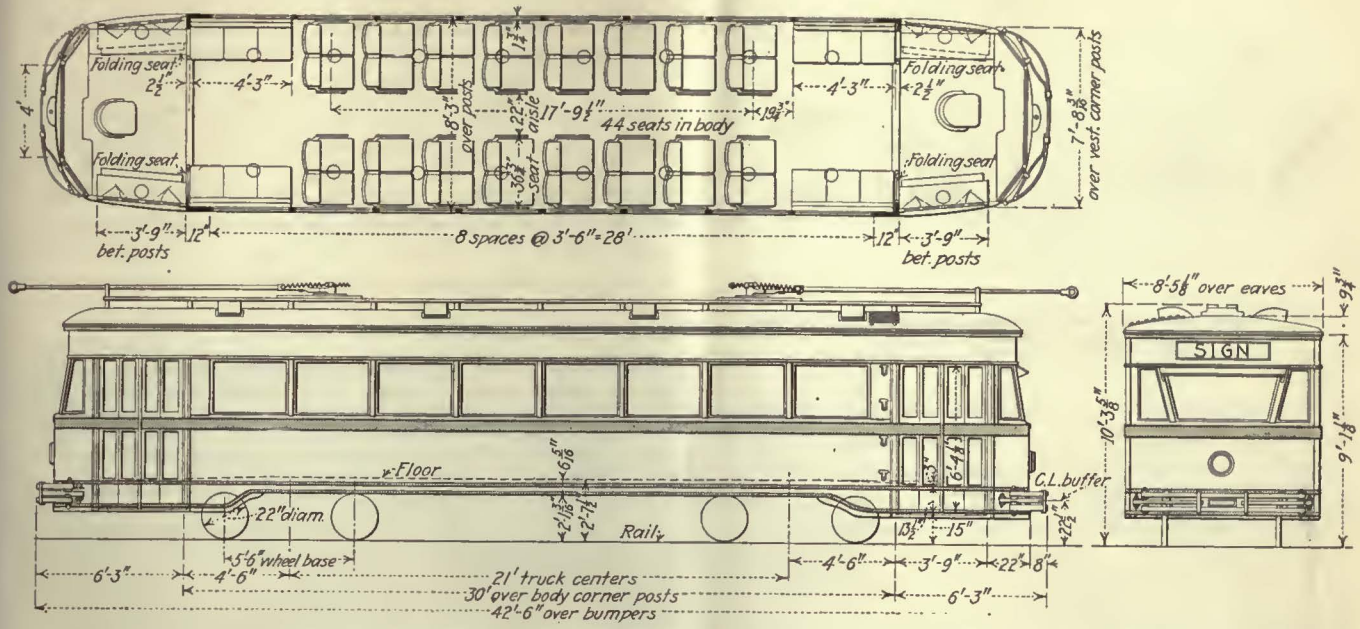
Car builder recognizes modern transportation requirements in sample unit intended for average size city conditions. Detailed attention given to improvements of appearance and performances

Sample car designed by Osgood-Bradley Car Company to meet 1929 transportation conditions. No attempt was made to achieve extreme light weight, but special attention was given to the proportions and appearance of the body

STUDY of recent trends in car design, and of the demand for an average-size city car with which to meet present-day automobile competition, has led the Osgood-Bradley Car Company to build a sample car representing the ideas of its own engineers. The objective in the design was to combine the pleasing appearance of balanced proportions and smooth body lines, with quiet operation, rugged construction and low maintenance cost. It is the intention of the builder, after tests of this sample car are completed, to adopt this model as a manufacturer's standard for average-size cities, and gradually to perfect the design as experience and customer demand dictate. The ultimate purpose is an attempt to develop a model which can be built on a production basis and which can be sold at an attractive price in small or large lots.

With these objectives in mind, the sample car is built for double-end operation and is of the straight side type with rounded ends, sloping end windows and low arch roof. Careful consideration and detailed study were given to the several factors which affect the appearance of a car. The sample unit was first built with a skirt below the side sills, extending entirely around the bottom in a straight horizontal line. Further study led to the conclusion that an upward sweep of the lower line of the body between the corner posts gives a more graceful appearance than does a straight horizontal line around the bottom. Consequently, the idea of a skirt below the body was abandoned.

Accompanying illustrations show the appearance of the completed sample car. Vestibule doors are double, folding inwardly on each side. Maximum flexibility of the car is provided by arranging the controls for either one-man or two-man operation. These doors are set flush with the body and vestibule corner posts and

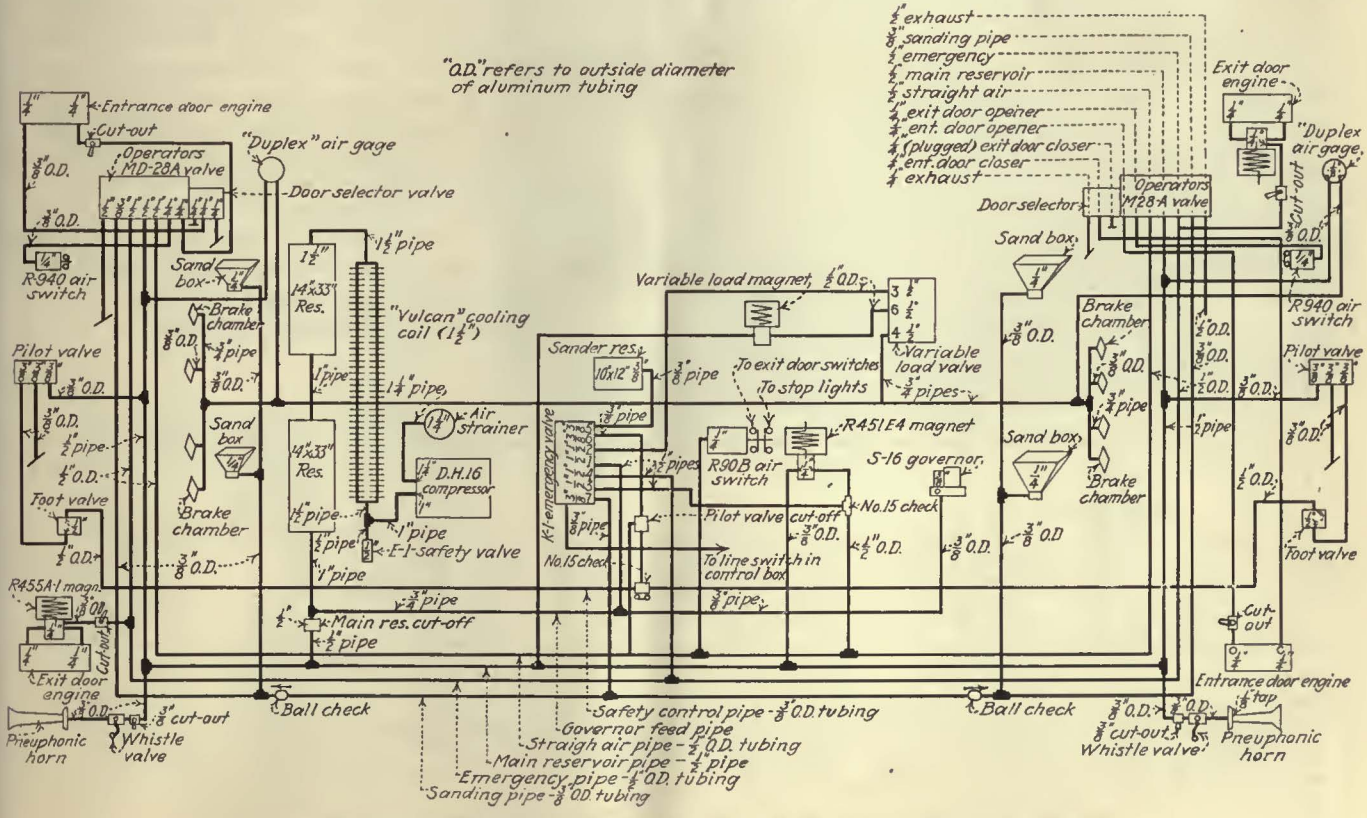


General dimensions of the Osgood-Bradley sample car are designed to meet average-size city conditions. Seating capacity in the body is 44. Folding vestibule seats increase this to 51 or 54, depending on the plan of operation

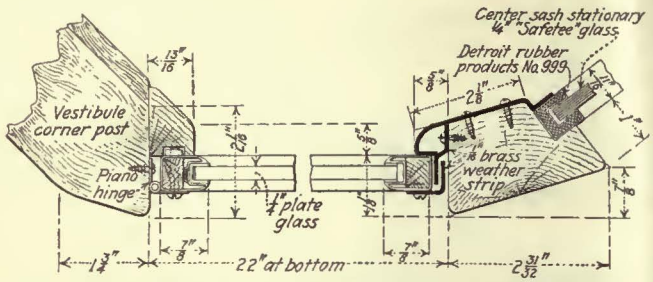
when they are closed present a smooth exterior without offsets. Horizontal lines are carried out unbroken around the body and vestibules. This is particularly noticeable around the bottom of the letterboard, at the belt rail and in the glass lines of body, doors and vestibules. Although the roof is comparatively low, there is no offset in the letterboard above the doors. Adequate headroom was obtained by careful attention to the installation of door engines and door headers, and to the arrangement of the inside step at the front and rear ends of the car.

Although no skirt is used below the sides of the body, the vestibule dash is carried down to the bottom line of the step, so that an unbroken bottom line is formed entirely around the vestibule and under the doors. This line sweeps up to meet the bottom line of the body side sheet at both ends and on both sides of the body. Thus the appearance is symmetrical on the operating side and on the blind side of the car in whichever direction it is running.

The exterior is finished in attractive, contrasting colors of Duco, above and below the belt rail, and a wide stripe



Complete piping diagram. Compressed air is conducted directly to brake chambers mounted on the trucks. The usual foundation brake rigging is eliminated



Horizontal section through hinged side sash in vestibule, showing weatherstrip arrangement

is carried entirely around the car just below the window line. Narrower stripes on the letterboard and along the bottom of the body help to accentuate the streamline effect. Although the sloping type of end vestibule window, which has been a characteristic of several recent experimental cars, is used, the vestibule belt rail and dash are curved instead of being made flat on the end as in several other recent cars.

The total length of the car is 42 ft. 6 in. over the bumpers. Extreme width over the eaves is 8 ft. 5⅛ in., and the height from rail over trolley boards is 10 ft. 3⅝ in. On 22-in. diameter wheels, the floor height is 31½ in. above the rail. The vestibule door openings are 3 ft. 9 in. between posts. The length of the body over corner posts is 30 ft. There are seats within the body proper for 44 passengers. When the car is run as a one-man unit, the right-hand front doors being used for entrance and the rear for exit, the folding platform seats on the left side may be utilized to increase the seating capacity to 51 passengers. If only the right-hand front doors are used for both entrance and exit, the seating capacity is increased to 54 through the use of both folding seats in the rear vestibule.

No effort was made to achieve ultra light weight. Standard structural shapes have been used in framing, the desire being to produce a car as light as possible consistent with adequate strength and ruggedness to withstand the stresses of regular service, with a liberal margin of safety. The car is reported to weigh approximately 30,000 lb. complete.

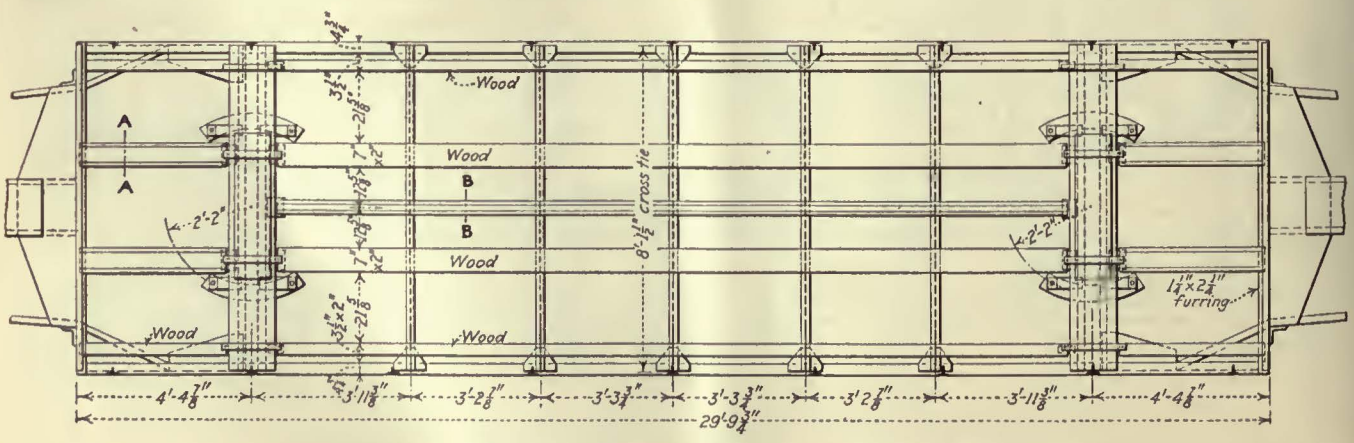
The platform framing is unusual, particularly in the design of attachments to the body end sills and body side sills. There are two platform center sills, extending from the buffer to the body end sills. To these center sills there is riveted a cover plate that forms a horizontal girder to provide lateral stiffness. At the bumper and the body end sill there are anti-telescoping plates designed to transmit buffing stresses through the platform side sills directly to the body side structure. The platforms are carried directly from the body side girder through the end sills and special steel corner post and gusset construction. The side sills are reinforced from the body corner posts across the second window panel at each corner of the car. The body bolsters are of an especially shallow built-up box girder design, and are of uniform depth throughout their length to keep the floor height at a minimum.

Rolled tee side posts and carlines of the body framing are not continuous. They are connected by double-riveted gussets, thus permitting the sides and roof to be built on jigs. This, it is claimed by the builder, will insure interchangeability of the various units and simplify repairs when the car has been damaged in an accident. The entire vestibule above the platform framing is of wood, the platform framing, vestibule end framing and hoods also being arranged for jig construction. In working out the details of the vestibule design, particular attention was given to ready replacement and repair in the event of collision damage.

Roof and Floor Details

The body roof is built of tongued and grooved poplar boards laid longitudinally and secured to the wood carlines and steel carline furrings with cement-coated nails. The whole roof is covered with a single piece of No. 8 cotton duck. The body and vestibule floors are continuous, with a ramp of 3 in. to reduce the step heights. In the car body the floor is finished with Flexolith composition laid on Chanarch corrugated steel. The floor in the vestibules is made of fir covered with wide maple slats laid transversely.

Ceilings in the body and vestibules are continuous, and are finished with Agasote headlining. Selected mahogany, stained walnut color and finished with rubbed varnish, is used for all interior wood trim and for the vestibule doors. These doors on each side of each vestibule are operated by Consolidated Car Heating Company air engine equipment. A one-man car operator, through use of the Westinghouse M-28 brake valve and selector valve, may at will control either the front right-hand doors or the rear right-hand doors, or may operate both front and rear right-hand doors simultaneously. Valves are also installed at each end of the car so that for two-man operation the conductor at the rear of the



Structural steel shapes are used to build up a rugged underframe

car may control the rear right-hand door. This arrangement makes it also possible, if desired, for a man in the front vestibule to control the front left-hand doors with the conductor's valve at that end. All steps are of the inside stationary type covered with Kass safety treads. The sample car is not equipped with treadle mechanism control for the rear right-hand doors, but arrangements are such that this device can be installed readily, if desired.

Signal lamps are arranged to indicate to the operator whether the doors are open or shut, and the door control is interlocked with the motor control so that the car cannot be started until all doors are closed. Attention was given to the design of the doors to eliminate the possibility of injury to passengers, not only from becoming caught between the two sections which meet at the center of the opening, but also to obviate the possibility of pinching a passenger's fingers between the hinged sections. This protection is afforded by composition rubber strips over the joints, similar in arrangement to the installation on the two experimental Pittsburgh cars which were described in the June 2 issue of this paper.

All control apparatus is within easy reach of the seated operator in this compactly arranged vestibule

There are eight windows on each side of the car body, with 3 ft. 6 in. center to center window post spacing. The sash are the Curtain Supply Company Rex removable brass type, arranged to lift 16 in. There are no upper sash. The vestibule center end sash are stationary and are set at an angle to prevent the reflection of light from the car body into the eyes of the operator. The conventional curtain back of the operator is thus eliminated. These center vestibule windows are glazed with Safetee Glass Company shatterproof glass and are provided with Cinch Manufacturing Corporation hand-operated windshield wipers. A sun visor is also installed above the center window on the outside. An arrangement similar to that used on the Pittsburgh experimental cars prevents the formation of sleet on these center vestibule windows. This consists of a slot or duct extending through the top of the equipment cabinet so that the hot air from an electric heater in the operator's knee pocket, conducted upward against the inwardly sloping glass, maintains it at a temperature that prevents the formation of ice.

The vestibule side windows are framed in Curtain Supply Company brass sash, hinged at the vestibule corner posts by brass piano hinges, arranged to swing outwardly for ventilation, and controlled by a simple mechanism. These swing sash are also provided with weather-stripping to preclude the entrance of wind or water when the sash are closed. The body side windows are protected on the outside with window guards of aluminum rods. These are in sections which may be hinged downward to facilitate cleaning and washing windows. There are no body side window curtains.

Sixteen Heywood-Wakefield reversible cross seats are located eight on each side of a 21½-in. aisle in the body.

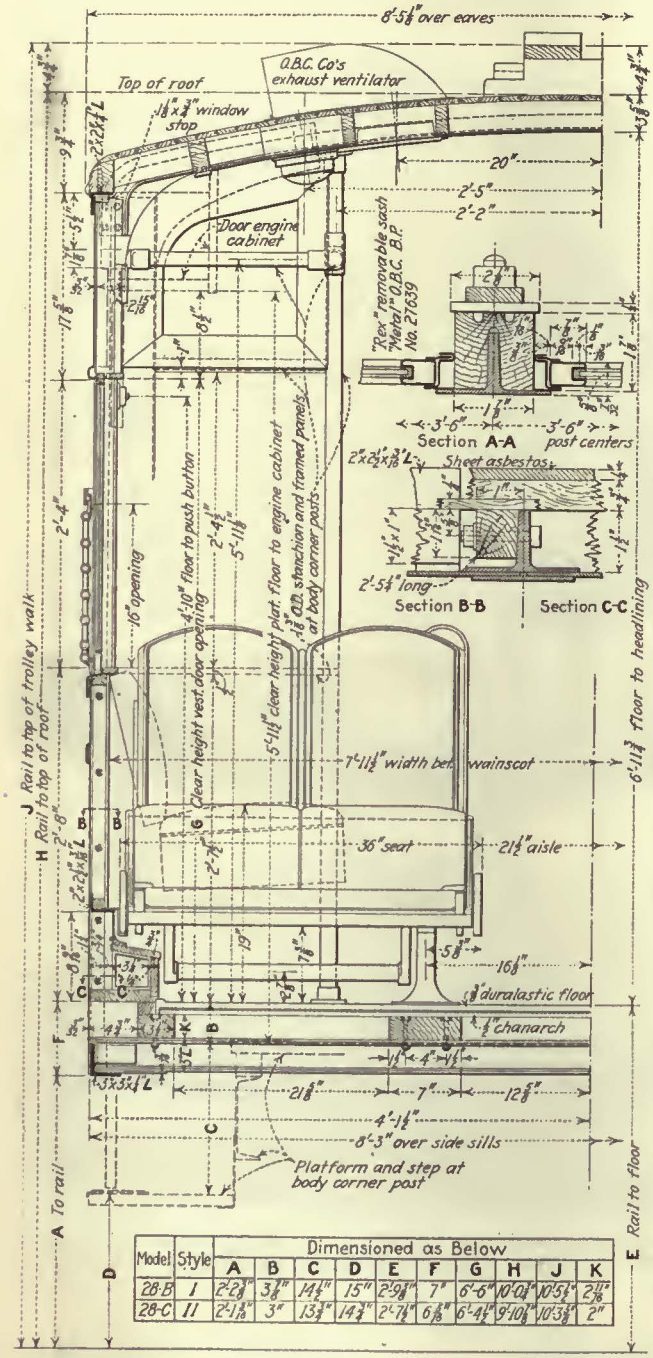
Leather-upholstered, deep spring-cushioned seats insure passenger comfort. The car is arranged for double-end operation. Note the overhead rail handholds in the corners of the body

A longitudinal seat for three passengers is built into each corner. The cross seats have grab handles and stationary foot rests. In each vestibule is an upholstered seat for the operator which is adjustable for height. It may be swung through 180 deg. to serve as a passenger's seat when at the rear of the car.

All seats are of the full-upholstered type with extra deep spring cushions and backs, the reversible seats having individual form-fitting backs. They are covered with Radel Leather Manufacturing Company chrome retanned, monkey-grain leather. Folding seats for three passengers each are provided on each side of each vestibule.

When in use these seats are folded down across the door opening. The hinges have springs so that when not in use the seats swing up out of the way into pocket spaces at the bulkhead.

At each corner of the car body a stanchion is installed. This forms a support for a stationary overhead railing handhold over each longitudinal seat for the convenience of standing passengers. Equipment cabinets and switch



Model	Style	Dimensioned as Below									
		A	B	C	D	E	F	G	H	J	K
28-B	I	2'-2⅜"	3⅜"	14⅛"	15"	2'-9⅛"	7"	6'-6"	10'-0⅞"	10'-5⅛"	2⅛"
28-C	II	2'-1⅜"	3"	13⅛"	14⅞"	2'-7⅛"	6⅞"	6'-4⅛"	9'-10⅛"	10'-3⅜"	2"

No effort was made to achieve extreme lightness in the design. This cross-section through the body shows the principal details of construction

lockers are built into the vestibules so that all miscellaneous equipment, switches, etc., are concealed, although ready access to them is provided through suitable doors and removable panels. The covers of the controllers and switches are removed and the inside of the cabinets is lined, where necessary, with heavy asbestos. The only items of equipment which are exposed are the tops of the controllers and brake valves, and the handles of the Peacock staffless brakes at each end of the car. All operating apparatus, including the controller handle, brake valve handle, windshield wiper, sign box handle, reset switch handle and register cord are within easy reach of a seated operator. An Economy energy-saving meter is mounted inside the control cabinet near the entrance door. The dial is exposed so that it may be easily read either from the platform or through the door from the outside.

Ventilation is obtained by eight Osgood-Bradley standard type of exhaust roof ventilators, each having a grille with a lever-operated adjustable shutter. At each end of the car is an Electric Service Supplies Company illuminated destination sign with 11½x46-in. opening. This sign is of unusual size so that route numbers with 10-in. figures may be used. Each end of the car is also equipped with a specially designed trip-gate lifeguard, arranged so that the single slat gate is carried out under the bumper while the lifeguard itself is well back under the vestibule. Heavy C.-G. Spring & Bumper Company automobile-type spring bumpers, similar to those installed on the Pittsburgh experimental cars, are mounted at each end of this sample car. Under each vestibule there is an Osgood-Bradley standard foot gong and a Westinghouse Air Brake Company "Pneuphonic" warning horn. The car is equipped with the Faraday buzzer passenger signal system.

Electric heaters are Gold inclosed element type, with thermostat control. There are sixteen heaters in the body of the car; twelve under the cross seats, and four panel type mounted in the risers of the longitudinal seats. Each vestibule also has two electric heaters, one in the face of the equipment cabinet and the other in the recess in the cabinet for the operator's knees. These vestibule heaters are not controlled by the thermostat but are connected to a two-point switch so that one or both may be turned on or off as desired.

Lamps in the car body are arranged in two rows of Electric Service Supplies Company No. 1022 dome fixtures, eight on each side. Two similar fixtures, one over each step, are located in each vestibule. These lamp fixtures are all wired in series, each taking one 30-volt, 1-amp., A-19 bulb. An automatic cut-out device is part of the fixture equipment so that if any one lamp in the circuit burns out the other lamps continue to burn at normal voltage and the defective lamp can thus be identified readily and replaced. Two lamps are located in each destination sign box. These are in one circuit with the headlights and there is a three-way switch arranged so that the headlight at either end of the car may be operated as desired. The headlights are of a special shallow Crouse-Hinds design equipped with special reflectors and automobile-type lenses.

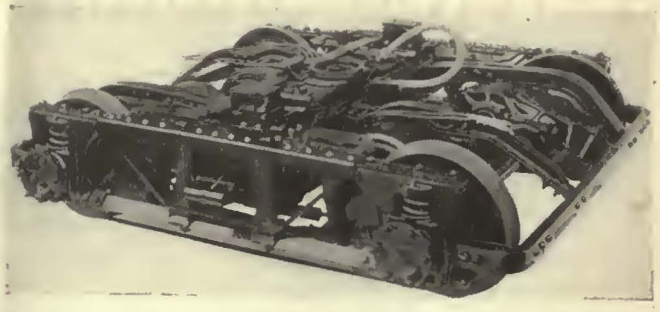
At each end of the car a stop light is controlled by the air brakes so that whenever the brakes are applied the lights at both ends are illuminated to notify an approaching vehicle from either direction that the car is either about to stop or has already stopped and may discharge passengers. Provision is made for any type of fare or transfer register equipment. If the cord-operated type is used, a special duct is built into the body so that the cord is not visible except where it extends through the vestibule finish. On the sample car, this cord extends down through the sign box where it is within convenient reach of the seated operator. Spring-mounted trolley base supports of the type described in the article on the Pittsburgh experimental cars in the June 2 issue are part of the equipment of this car.

Westinghouse Electric & Manufacturing Company

type HL electro-pneumatic, unit-switch control, with four 35-hp., 300-volt, light-weight, high-speed motors connected in series in groups of two for operation on 600 volts, comprises the electrical equipment. The electro-pneumatic switch units are mounted underneath the car body. Instead of the customary storage battery for operation of the control switches, this equipment utilizes trolley voltage through a resistance element. Wherever possible all control cables are carried in a wiring box inside the car body, and all wiring throughout the car has been installed to meet the requirements of the National Board of Fire Underwriters. The car carries their inspection plate.

Full safety car air brake equipment, with a Westinghouse variable load adjustment, is used. The usual foundation brake rigging and brake cylinder have, however, been eliminated. Air pressure is carried directly to each truck wheel through eight Westinghouse automotive type diaphragm brake chambers, the only brake connection between the car body and the trucks being through a flexible hose used to transmit the air pressure to the brake chambers. Better equalization, simplified brake rigging, and a considerable reduction in weight and maintenance are expected from this arrangement. The general scheme is similar to that used on one of the Pittsburgh experimental cars and described in detail in the June 2 issue of the JOURNAL. Air-brake pipe, wherever possible, is located inside the car body and consists of aluminum and copper tubing except for a small amount of standard iron pipe. The use of the tubing not only reduces weight but obviates the need for elbows and other pipe fittings and eliminates trouble from rust and scale.

Most of the valves and control devices in the brake system are grouped in a special equipment box under the car, which has an electric heater to prevent freezing. These several air devices are mounted on a removable tray in the box, below which are the heating units. Special electrical connectors are used for all wiring into the box,



An unusual feature of this special Osgood-Bradley truck is the use of automotive brake diaphragms at each wheel. High-speed Westinghouse motors are coupled with W-N drive to the 22-in. diameter wheels

and air lines are all brought into unions on the outside, where they are within convenient reach. By disconnecting these unions and electrical connections, the entire valve group may be removed from the box for inspection, repair or cleaning.

A valuable sequel to the recent Detroit Survey and the Dayton Survey in this issue will be the presentation next week of the

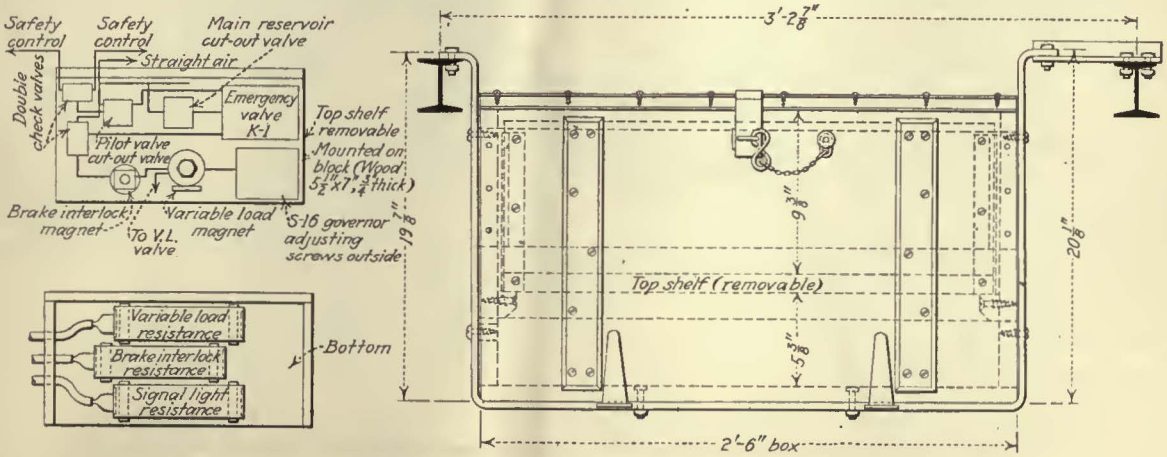
STREET TRAFFIC CONTROL PROBLEM OF SAN FRANCISCO

Every phase of the problem was covered under the directorship of

DR. MILLER MCCLINTOCK

Director Albert Russel Erskine Bureau
Harvard University

The trucks under this car are similar to the Osgood-Bradley 45-66-KDA-50 trucks with Westinghouse-Nuttall double-reduction drive, used under one of the Pittsburgh experimental cars, except that these have Westinghouse 35-hp. high-speed motors and 22-in. diameter wheels instead of the 50-hp. motors and 24-in. wheels used under the Pittsburgh car. The trucks are of the truss frame, spring pedestal type, with coiled springs over the Hyatt roller bearing journal boxes, and with conventional, double-elliptic, spring-supported, swing type bolsters with damper attachment. The brake arrangement, as previously mentioned, is similar to that on the Pittsburgh car, in which the diaphragm type brake chambers at each wheel actuate the individual truck levers. In this way all truck levers are live levers, the connection between each pair on each side of the truck consisting of a specially designed Anderson slack adjuster.



Air valves and other apparatus are mounted in a special equipment box under the car, on a tray which can be easily removed for inspection of the entire group

Dayton Should Pay Higher Fares

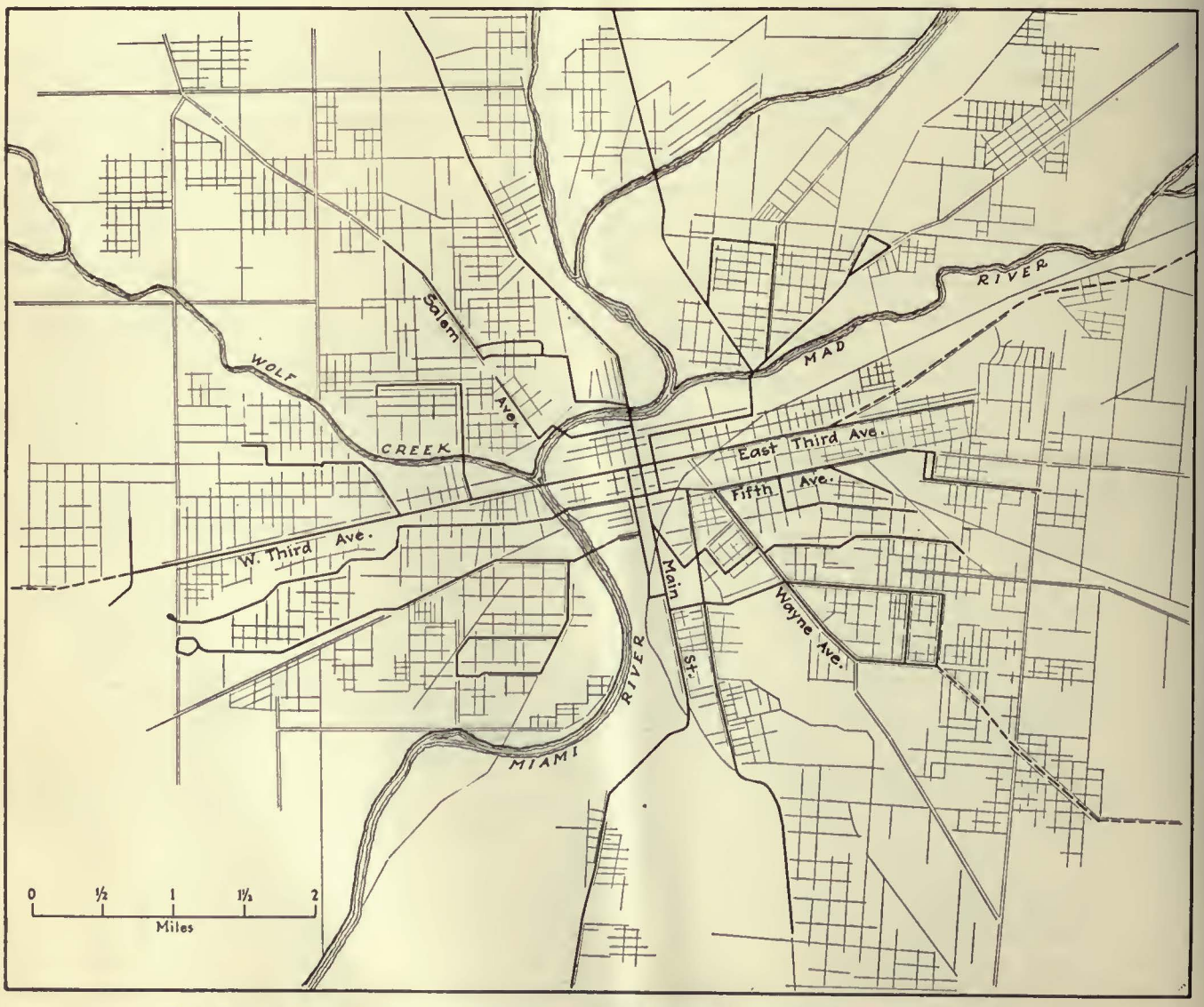
This conclusion was reached by Ross W. Harris after an extended survey. His report discusses means for relieving traffic congestion and for measuring street railway track capacity and service

DAYTON has grown from a population of 61,220 people in 1890 to 184,406 in 1927. With adjacent suburbs its population in 1927 was 194,161. It is located in the midst of a rich agricultural district and industrially is highly developed. The downtown district has spacious streets and is level. The city is an important railroad center and is intersected by the Great Miami River. The industries are not confined to certain districts as in most other industrial centers. They are scattered throughout the city.

At the request of the city manager of Dayton, the four street railway companies providing urban service in the city and the five interurban electric railways connecting it with other cities, Ross W. Harris of Madison, Wis., has been engaged in making an extended survey of the vehicular and street railway traffic situation in Dayton. It has recently been completed after nine months' work, and a report was filed with the City Commission May 1. Briefly, Mr. Harris' recommendations follow:

For general traffic, he recommends restricted parking on many streets, shortening of the traffic signal cycle, and encouragement of the construction of private parking garages immediately outside the main business section.

For the street railways, he recommends increased size of safety zones for boarding and leaving passengers, an increased fare to place the companies on a sound financial



Map showing Dayton's electric railways. Four city railways and five interurbans serve the territory

basis and permit improved service, a revision of the requirements upon the companies for paving, a reduction in the number of service stops, an increase in the number of turnbacks, installation of more electric track switches, and if possible, some corporate arrangement between the several companies supplying the city service by which there should be unified co-operative service through an operating clearing house. Earnings would then be distributed according to some equitable plan. Mr. Harris points out that such an arrangement might develop later into a service-at-cost agreement between these electric railways and the city.

Eliminating Grade Crossings

Progress is being made in the matter of grade separation in Dayton, and Mr. Harris says that the question will soon have to be settled as to the extent to which the electric railways should contribute to the city's portion of this expense, namely, 35 per cent of the cost. While he admits that the electric railways, like all other interests, will benefit by the change, they will also be put to considerable expense in the relocation and reconstruction of their tracks and in providing temporary facilities during the work of grade separation. This should be considered. On division of expense, he suggests:

In general, the cost should be divided in proportion to the relative width and use of the street car strip and the balance of the street. As the railway strip is used jointly by the automobile and street car, the exact basis of division as to its use should be determined by the number of cars passing and the number of vehicles passing within a normal day, giving a weight of ten to each street car and one to each vehicle. The total cost so determined, however, should not exceed a fair amount based on the net benefits to the electric railways, after an allowance has been made for the additional cost occasioned to them by the construction of grade separation facilities. It should be remembered, also, that the railways pay a general tax like the other interests or individuals, out of which the city's portion of 35 per cent will be paid. An approximate appraisal of the net benefits to the electric railways from this change has been made. It was found that the amount chargeable against the electric railways should not exceed $1,400 per year for ten years for a single electric railway track at the intersection, and $2,800 for two tracks.

An abstract of Mr. Harris' detailed treatment of Dayton's transportation problem is of particular interest to operators in other cities owing to the possibility of applying in their localities the remedies suggested for Dayton. The remainder of this article will therefore be given up to an abstract of those portions of the report.

The Parking Problem in Dayton

Public investment in the improvement of streets has been primarily for the accommodation of moving traffic. The extent to which the streets should provide storage space for automobiles depends on what is the greatest benefit to the public. While, superficially, the parking of automobiles in front of a certain store may seem advantageous to the particular merchant, yet such private gains, if any, from this source, may react against his interest by increasing congestion and creating a measure of inaccessibility, thus encouraging the development of business elsewhere in more easily accessible locations.

A count at 10 a.m. on Aug. 4, 1927, showed 1,651 automobiles parked within the area bounded by Monument Avenue, St. Clair Street, Pitt Street and Wilkins Street (the business district). This number is 4 per cent of the total passenger automobiles licensed in Dayton. At 2 p.m. and 5 p.m., 3.9 per cent and 3.7 per cent, respectively, were parked in this area.

Even now the general street congestion caused by parking in the downtown area, and the continued movement into and out of the parking spaces there, is so serious that steps should be taken to relieve the situation. Parking should be prohibited on certain streets between 7 a.m. and 7 p.m. on all days except Sundays and holidays. It should also be prohibited between safety zones and curbs or within the 25 ft. next in rear of a safety zone and the curb. Diagonal parking should be permitted only on certain streets.

Many of the street railway safety zones in the downtown district should be extended so that they can accommodate at least three cars. The maximum length now is for two cars only.

Street Area Occupied by Automobile and Street Car Riders

In Dayton the average automobile, when still, occupies 133.76 sq.ft., including an allowance of 1 ft. on each side and 1.5 ft. front and rear for clearances. The average number of passengers per automobile, determined by count, is 1.56. This amounts to an average of 85.8 sq.ft. of street area per auto passenger.

The Dayton street car, when still, occupies an average of 458.54 sq.ft., including an allowance of 1 ft. on each side and 2.5 ft. front and rear for clearance. During the evening rush the average load per hour for all cars outbound, past the point of maximum loading, is 49.8 passengers. Thus the average still area required per passenger is 9.2 sq.ft.

With an additional allowance of 20 ft. per auto for safe spacing when running at a reasonable speed, 183.2 sq.ft. of street space is required per passenger. To serve the average street car load of 49.8 passengers, the automobile would require 563.2 lin.ft. of street when still, and 1,203.2 ft. when running. The average length of the Dayton closed street car over all is 40.4 ft.

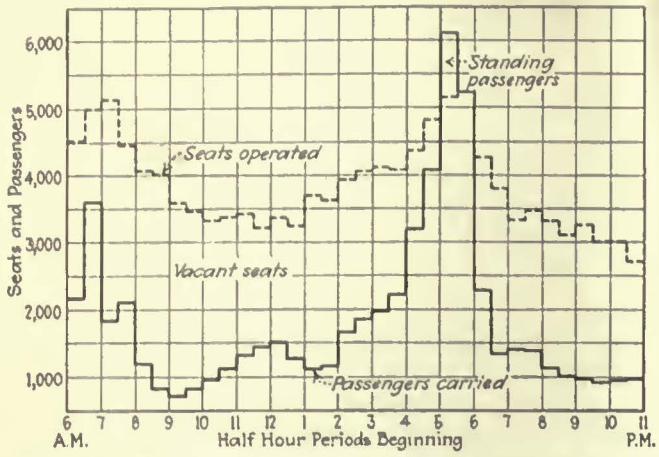
A four-day check was made of the patrons of four leading retail stores on Jan. 9-12, 1928, to determine the means of transit used by them in reaching the stores. The results follow:

7,466 customers or	28 per cent used automobiles.
14,287 customers or	54 per cent used street cars.
4,148 customers or	15 per cent walked.
164 customers or	1 per cent came by interurban cars.
556 customers or	2 per cent came by bus.
118 customers or	0 per cent came by miscellaneous means.
26,739	100

Speed and Service of Dayton Street Railways

The average annual speed in miles per hour in Dayton of the City Railway, Peoples' Railway, Oakwood Street Railway, and Dayton Street Railway for 1922 to 1926, inclusive, has been compiled. In 1922 the figure was 9.04 m.p.h. In 1926 it was 8.66 m.p.h. The corresponding speed in Memphis is about 10.3 m.p.h. As the tendency in Dayton has been downward in recent years, special effort should be made to permit faster speed. An average speed of slightly better than 10 m.p.h. is attainable in Dayton, but this will require careful supervision of service by the company and constructive cooperation on the part of the city authorities.

Dayton street car riders receive 0.89 seats per outbound passenger during the heaviest hour of travel at the



Seats and passengers when passing points of maximum loading on typical week day, Dayton city lines only

point of maximum loading, when the entire system is considered. From 9 a.m. to 2 p.m., the non-rush hours, the car riders receive 2.70 seats per passenger at points of maximum loading. This service fully equals that given in other cities the size of Dayton.

Duration of Signal Cycle in Downtown District

The traffic signals in the downtown district at present are synchronized and alternate, that is to say, signals will change at the same time at all corners, but where green shows in a certain direction at one intersection, red shows in the same direction at the next intersection. The duration of one cycle is as follows: green (north and south), twenty-one seconds; amber, five seconds; red, twenty seconds; amber, five seconds; total 51 seconds.

This period does not synchronize well with the speed of pedestrians, street cars or automobiles, so that their through movement cannot be continuous. Observations showed that their average speeds in the downtown districts were: Pedestrians 3.05 m.p.h.; street cars 4.04 m.p.h.; automobiles 15 m.p.h. The length of the signal cycle should be determined for one of these means of travel, with the speeds of the others bearing a definite relation to it. Thus, on the basis of figures quoted, the time allotted to the street cars to pass between two intersections should be five times the total of one red and one amber light, and for the average speed of the pedestrian seven times. The duration of the cycle for an automobile should be twice the time required by it to travel from one intersection to the next. If an automobile requires eighteen seconds to travel the length of the average block in the downtown district (508.3 ft.), 36 seconds is the proper duration of a cycle properly to fit automobile traffic. This establishes 90 seconds and 126 seconds as the time required for street cars and pedestrians to travel the same distance at their respective speeds. The 36-second cycle would then be made up: Green, fourteen seconds; amber, four seconds; red, fourteen seconds; amber, four seconds. Observation of the time required for the average pedestrian to cross intersections between curbs in the downtown district is 14.5 seconds. As he can use the duration of one green and one amber signal, he would have eighteen seconds to clear the intersection.

It may be suggested that a short signal cycle might be satisfactory for light traffic and unsatisfactory for heavy traffic. This is true theoretically. Practically, however, the longer cycle is of but little additional advantage to heavy traffic, and makes much less efficient use of street capacity.

Characteristic Zones of Travel

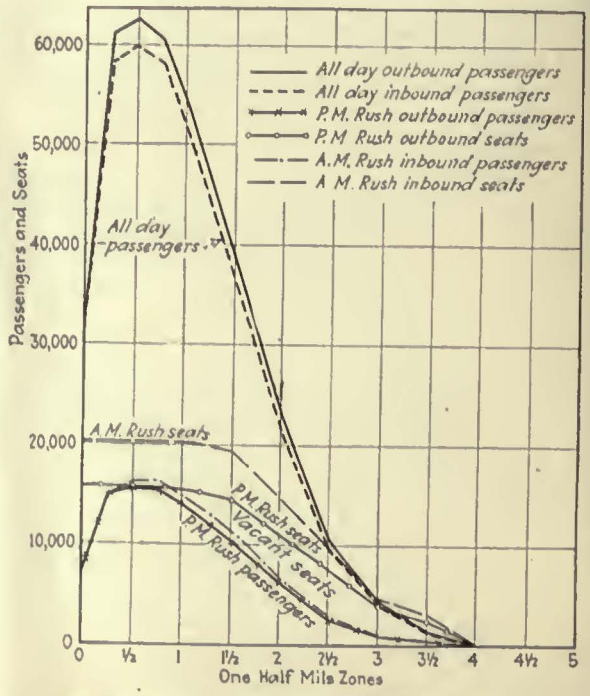
Every route from the center of the city of Dayton into its outlying districts has three distinct zones; a central zone, a transmission or neutral zone, and an outer zone. The central zone is located in the downtown business district. The transmission, or neutral zone, is just beyond the central zone and most passengers ride completely through it. It contributes less revenue than the other zones, and in it, during the peak hours of travel, there are usually more passengers than seats. The outer zone includes the residential district. Most of the rush-hour vacant seat-miles are found in this zone.

An accompanying chart shows the ratio of passengers and seats for all city lines in Dayton. Another gives the seat distribution by half-hour periods for week-day service.

An analysis of the data relating to standing passengers and vacant seats in Dayton during 1927 shows there are 15.28 vacant seat-miles for each standing passenger-mile. This is a large proportion.

It was also found that the average passenger ride is 1.83 miles, which is approximately equal to 54 per cent of the average one-way car trip.

Free movement of cars requires that the time spacings between consecutive cars be not less than the average length of service stop. The average service stop in the Dayton downtown district is 36.75 seconds with traffic signals and 22.69 seconds without traffic signals. With this figure, an assumed rate for acceleration and braking of 1.5 m.p.h.p.s. and at least 5 ft. of free space between cars when standing on main-line track, the normal carrying capacity of track in the downtown district in Dayton can be calculated. It must be borne in mind, however, that such a calculation assumes that there will be no interference with the free movement of cars from sources other than those involved in the length of service stop and factor of safety. If the track between consecutive



Ratio between seats and passengers in different zones on typical week day, city lines only

cars is used by vehicles, for example, the extent to which the full theoretical track capacity may be utilized is materially affected.

Car Seating Capacity

The seating capacities of the various city cars in Dayton range from 28 to 70, depending on the type. In all, there are 27 types of cars and, with but a few exceptions, they are one-man cars. They average 47 seats each. Observations of the average normal standing load, which may be taken as 22 passengers, show that they will arrange themselves on city cars under average conditions as follows:

Average Area per Standing Passenger (Normal Standing Load)	
Front vestibule	One passenger for each 3.30 sq.ft.
Aisle	One passenger for each 4.01 sq.ft.
Rear vestibule	One passenger for each 5.94 sq.ft.
Car as a whole	One passenger for each 4.08 sq.ft.

The minimum space per passenger observed at various times under voluntary election of standing space in different crowded cars was as follows:

Average Area per Standing Passenger (Crowded Cars)	
Front vestibule	One passenger for each 1.03 sq.ft.
Aisle	One passenger for each 1.47 sq.ft.
Rear vestibule	One passenger for each 1.08 sq.ft.
Car as a whole	One passenger for each 1.50 sq.ft.

The average city car has 86.9 sq.ft. available for standing passengers, and on the basis of 1.5 sq.ft. per passenger, will accommodate 58 standing passengers in an emergency, or 123 per cent of its average seating capacity.

Unit for Measuring Service

No one unit for measuring service in all its phases has been devised. Many have been suggested, but they are not entirely adequate. On the basis of pure transportation, however, the unit "Car-Mile Per Revenue Passenger" may be used. Actually, this has been decreasing in Dayton, as shown by the table on page 1030, representing the car-miles per revenue passenger on the Dayton city lines of the City Railway, Oakwood Street Railway, Dayton-Xenia Railway, Peoples' Railway, Dayton Street Railway and Cincinnati, Hamilton & Dayton Railway.

A car rider has a right to expect satisfactory service, but it is difficult to decide what service is satisfactory. Some may want speed, others reliability, others vacant seats, or it may be that property or business interests may be the deciding factor.

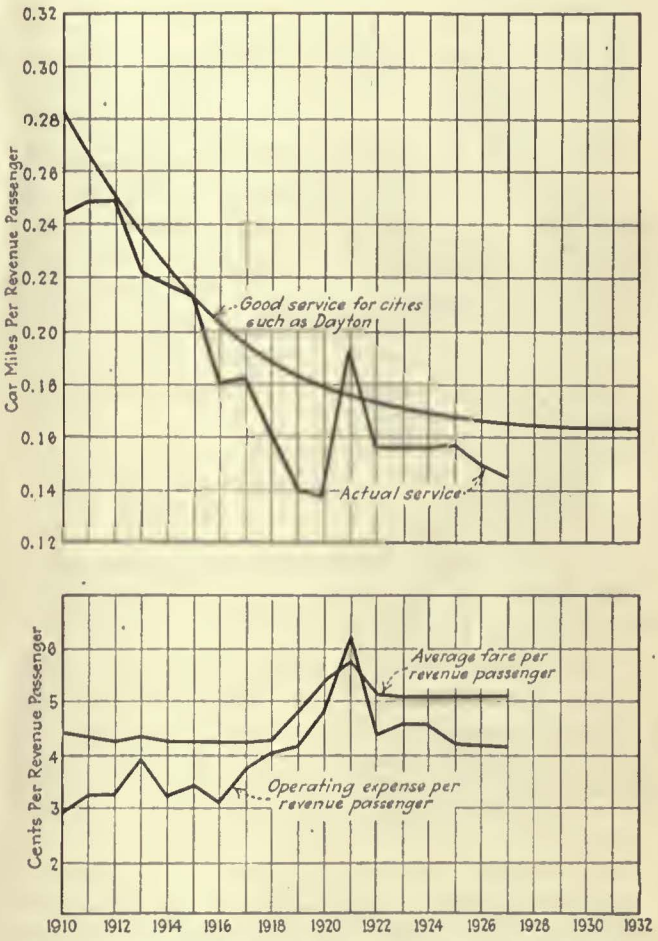
Attempts have been made to establish a standard of service based on an average load or the number of seats per 100 passengers over a given period of time. These efforts have not proved successful because they are not conducive to efficient operation nor do they guarantee an equitable relation between service, fare and cost.

A standard of service based in such a way as to maintain an equitable relation between revenue and cost could be developed somewhat as follows: Estimate the future revenue for several months, preferably a year; then deduct an amount required to maintain the integrity of the money invested, i.e., return, renewals and replacements, maintenance, and a small margin for profit and loss. The balance, after deducting an amount to cover taxes, comprises all the money which is available for service.

Next, determine the aggregate mileage that this amount of money will pay for at the prevailing rate of cost, then distribute it to the various months according to seasonal conditions and requirements; then to the various routes, and then to the various days of the month. Then, from somewhat similar estimates of earnings for each route a continued measure of service may be evolved in the form of "Earnings Per Car-Mile" by lines for each month and each day. Such a standard may be designated "Daily Line Standard."

Division of the earnings in service of each of the routes by the unit "Earnings Per Car-Mile" will then give the largest amount of mileage which should be operated on a given date. With this determined, the next problem is to distribute this mileage along the line and throughout the day. This is a matter of schedule design.

A diagram included in the report gives the car-miles per revenue passenger since 1910 for the City Railway, Peoples' Railway, Oakwood Street Railway and Dayton Street Railway. Other companies rendering city service were not included because a complete separation of operating expenses between their city and interurban services was not available.



Trend between actual service and suggested good service as well as between expenses and fare per passenger, Dayton city lines only

The curve representing good service is drawn in as a matter of judgment. The actual service is below this curve except in 1921, when there were abnormal conditions, due to a strike. The lower curve shows that during these years there was only a narrow margin between operating costs per revenue passenger and the fare. This margin was too small to be conducive to rendering good service. As a result, the city as a whole paid through a reduction of service below normal good service.

If the proposed standard should be adopted, it is believed that it would distribute service equitably and give

to the public all the service a given fare will permit, and to the company assurance that the integrity of its investment will be protected. All of this lends itself to furthering the development of the community.

With such an arrangement there should also be a limit to the size of load to be carried. Thus, subject to the limitations of service already discussed, the loads carried past the point of maximum loading, averaged over a period of twenty minutes, should not regularly exceed the normal capacity of the car, or seating capacity plus one standing passenger for each 4 sq.ft. of standing area. Further, no regularly occurring maximum load should exceed the emergency capacity of the car, which is seated capacity, plus one passenger for each 1.5 sq.ft. of available standing area.

The fare required in Dayton to provide good service there under present operating conditions can be determined as follows:

AVERAGE FARE PER REVENUE PASSENGER REQUIRED TO PROVIDE GOOD SERVICE IN DAYTON UNDER PRESENT CONDITIONS

Average length of one-way car trip, miles	5.43
Operating expenses per car-mile in cents (normal for Dayton)	21.7
Operating expenses per one-way car trip	$1.1783
Ratio of operating expenses to gross revenue, per cent	55.4
Gross revenue required	$2.1269
Car-miles per revenue passenger	0.1650
Revenue passengers per average one-way car trip	32.9091
Average fare required per revenue passenger in cents	6.46

This average fare could be obtained from the following rates.

Half-fare tickets	3 cents
Full-fare tickets	Four for 25 cents
Transient fare in cash	8 cents
Extra charge for transfers	1 cent

The division of these fares paid would probably be approximated as follows:

	Fare in Cents	Per Cent	Product
Half-fare tickets, no transfer	3	3.7	11.1
Half-fare tickets, with transfer	1	0.8	3.2
Four tickets for 25 cents, no transfer	6¼	70.0	437.5
Four tickets for 25 cents, with transfer	7¼	15.5	112.4
Cash fare, no transfer	8	8.2	65.6
Cash fare, with transfer	9	1.8	16.2
Total (average)	6.46	100.0	646.0

Increased operating expenses would change the fare required. Thus a 5 per cent increase in wages would make necessary an increase in receipts of 0.06 cent per revenue passenger, and a 10 per cent increase in wages would mean a necessary increase of 0.13 cent per revenue passenger.

To insure adequate service to the public and ability to keep abreast of the city's development, new capital is constantly required for electric railway facilities. Electric railway securities should be made as attractive as other corresponding forms of investment, both for income and security. Certain rules have been set down which, if complied with, will establish the electric railway securities of Dayton on a proper basis. Briefly, these rules are:

1. Net earnings should not be less than 2.5 times fixed charges.

2. Fixed charges should not be greater than 4.24 per cent of rate base (or amount on which the company is allowed to earn a return).

3. Fixed charges should not be greater than 16.112 per cent of gross revenue from all sources.

SERVICE: CAR-MILES PER REVENUE PASSENGER, ON DAYTON CITY LINES OF CITY RAILWAY., OAKWOOD STREET RAILWAY, DAYTON-XENIA RAILWAY, PEOPLES RAILWAY, DAYTON STREET RAILWAY, AND CINCINNATI, HAMILTON & DAYTON RAILWAY

Year	Car-Miles	Revenue Passengers	Car-Miles per Revenue Passenger
1910	7,372,408	30,041,325	0.2454
1912	7,849,434	30,848,534	0.2544
1914	7,532,742	33,441,835	0.2252
1916	7,447,799	39,503,027	0.1885
1918	6,878,142	41,568,427	0.1655
1920	6,376,661	44,933,105	0.1419
1922	6,767,156	42,697,635	0.1585
1924	6,884,446	43,227,938	0.1593
1926	6,830,366	44,438,428	0.1537
1927*	3,430,400	22,981,478	0.1493

*Estimate for first six months.

4. Net earnings should not be less than 40.28 per cent of gross revenue from all sources.

5. Face value of bonds should not exceed 6.667 times net earnings.

6. Face value of bonds should not exceed 2.6853 times gross revenue from all sources.

7. Face value of bonds should not exceed 70.6658 per cent of rate base.

In the above, net earnings are taken to be gross revenues, less operating expenses and taxes; gross revenues mean revenues from all sources; fixed charges equal annual interest charges or bonds; rate base is the recognized amount on which a return is allowed to be earned. In this method of calculation prudent management and sustained earnings are assumed.

Under present conditions a full compliance with rule 4 is not probable for any of the companies in Dayton, except by greatly reduced operating expenses. With that exception they come through with a pretty clean slate.

New Bus Seating Plan

Seats over the wheel housings in this Twin Coach are a departure from the ordinary type

SEATS over the wheel housings of buses ordinarily are of little utility. F. C. Miller, manager of the Cleveland-Akron-Canton Bus Company, has devised an arrangement to obviate the difficulty and seats of his design are installed in the six Twin Coaches just put in service on the Cleveland-Akron-Canton run. The seats directly over the housing are longitudinal, and are combined with transverse seats immediately behind. A continuous padded back sweeps in a quadrant behind the seats, as shown in the illustration. The plan has increased the total capacity of the coach from 37 to 40 passengers.

Are We Merely Running Cars?

Modern standards of public transportation must be created to meet the relentless pressure for improved facilities. Readjustment in thinking, planning and managing can retain the position of prosperous leadership for each management

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

Speaking at the recent annual convention of the Canadian Electric Railway Association, Mr. McIlraith brought out that the railway business is in a state of change and that to meet the present-day competition a complete readjustment is necessary. As a foundation for planning and supervising a readjustment he listed and discussed fourteen items that hold many possibilities for individual operators.—EDITOR.

PUBLIC transportation is necessary in all cities and some organization must operate each system, but the relentless pressure of the last ten years for improved facilities is not slackening. There is no chance of dodging the issue. Each management is being forced to the defensive and only the active, aggressive and progressive will survive. The railway business is in a state of change, and only readjustment in methods, in modernization of equipment, in thinking, planning and managing can retain for each management the position of prosperous leadership.

All business customs and procedure are changing. As Merle Thorpe says, in The *Nation's Business* for April:

> Change is the immutable law. Eternal adaptability is the price of survival. Competition and change march together as one.
>
> Together they plan new things to supplant old things, to dominate new markets, and to wrest the patronage from old-time customers and customs. Together they see to it that a commercial house of a century's standing may be destroyed with bewildering suddenness. At the same time an infant enterprise becomes overnight a national institution. . . .
>
> Competition never rests. Competition may be the life of trade but it is also the death of traders. . . .
>
> Out of the flux and ferment emerge the victors. Men clear-eyed, alert, resourceful, they win that all of us may live more fully. It is the law.
>
> The world steps aside to let any man pass who can see a year ahead.

Railways are no exception to this general rule. Present-day standards must be served. The public should be surprised by a better quality and comfort of public service than it has yet grown to want.

The purchaser doesn't buy merely what is necessary any more; he is sold something better, bigger and more luxurious than he had wanted. He cheerfully pays for newer, better automobiles, lives in newer, better homes, wears more expensive clothes, changes even his furniture to suit the prevailing vogue. But the electric railways are not modernized in sales practices. The people are not even getting what they timidly hope for; much less are they surprised by what is offered.

Here and there someone is showing either a new idea or a better adaptation of an old one. Scattered efforts are building for us the nucleus of the modernized scheme of transportation that will serve the public well. The alert management is searching for these, and will develop them so as to deserve public commendation and secure favorable operating conditions from the city government.

Many competent minds have been active in trying to determine the ultimate or best development for public transportation. It is idle to think now of some unexpected panacea or some drastically different development that will revolutionize our business. Electric railways will continue for an indefinitely long period to be the most effective form of public transportation. It does not follow that present electric railways are operating at their best. None even approaches a condition which might be considered completely satisfactory, and most of them are very far short of the standard. Successful management and operation call for intimate attention to much detail and great improvement on many existing practices. Circumstances often prevent the attainment of the management's dreams. Often the obstacles are more fancied than real. Often the ideal set is far short of being appropriate to the circumstances. But whatever the condition and in all circumstances, the quality of the service and the success of the business is a direct measure of the ability of the management to follow through in planning and in supervising, so as to insure intelligent and competent attention to all the details involved.

There are a few outstanding items that are being done here and there and that should be given complete attention by each property. These fourteen items may serve as a foundation:

1. Traffic regulation and improvement of street use.
2. Promoting an active, competent committee of representatives of influential and interested industries or organizations to study and develop planning for street betterments.
3. Reducing time wastage in operation.
4. Building appropriate comfort into cars.
5. Building high-powered cars.
6. Building attractive cars.
7. Building high-grade machinery principles into the car equipment.
8. Scheduling service that is suited to the different districts served.
9. Providing express service by suitable buses.
10. Using well the possible auxiliary equipment such as buses of various types, or trackless trolleys.
11. Scheduling service with thorough technical skill after careful analysis of the necessary traffic data.
12. Thorough training of the operating force in good principles of safe, and yet fast, operation.

13. Active and effective supervision of the operation to insure performance of the standard set.
14. Planning for better and bigger city growth.

A brief discussion of some of these items will illustrate the possibilities.

Regulation of Traffic Requires Co-operation

Traffic regulation in its broadest sense is a definite problem on which railway managements should be the best informed specialists and most effective workers. It involves not only signal control and traffic routing or segregation, but also all the basic principles of street use such as proper regulation of all movements, parking, street obstructions (including manhole openings and street repairs), routing of cars or buses, operation of taxicabs or sightseeing buses, loading or unloading of goods or materials, operation of service vehicles and the creation of special streets, boulevards and heavy traffic thoroughfares.

Traffic planning of this sort is not a police job, nor one for consulting engineers alone. The local organizations should be intelligently led through a study of the details so as to create traffic conditions that are appropriate to the best public welfare. Full sympathy can be obtained from all interested business organizations if the data are carefully collected, are thoroughly discussed and the conclusions reached are based on what is clearly for the greatest good to the greatest number. The notable success in the development of traffic regulation in Chicago has been due to the complete understanding reached in the street traffic committee of the Association of Commerce.

Fast Operation Appreciated

Much time is wasted in ordinary street railway operation. Speed is a very essential element of good service and has much to do with the growth in business. Reckless speed is not wanted, but faster operation can be attained by reduction of delays to a minimum and by alertness on the part of the train crew. The Chicago Surface Lines is operating with an average speed of 11.26 m.p.h., in spite of the intensity of street use along car lines.

The failure to increase the average speed of operation is one of the major factors in preventing an increase in business in most cities. Our customers are severely critical of service that hints of inefficiency, but respond to an alert crew that hurries without rushing.

In order to maintain a high average speed it is necessary to have adequate motor capacity. High accelerating rate and high free running speed are needed if the street car is to compete successfully with any vehicle in the street. With the faster car the standard of service on a line can be maintained with a smaller number of cars and consequently a lower cost for housing, and the cost of operation in trainmen's hours also is reduced.

Comfortable and Attractive Cars Are Needed

Many railway organizations have been trying to build comfort into street cars and much has been accomplished, but all too slowly. Cars should be renovated more rapidly. Most of those now in use are a product of the age when people had to ride street cars. Managements should have moved faster in meeting the competition of comfortable seats in private automobiles. Public conveyances cannot be quite so comfortable, but there is too great a difference. The noise and rattle, insufficient ventilation, width of aisle, the width and convenience of the doors and platforms, and the method of using doors are all subject to severe criticism.

The new car on trial in St. Louis looks like a good type for most lines. It has individual seats arranged along the sides, each at an angle of about 45 deg. from the line of the side of the car. There are 43 seats and a very wide aisle. This arrangement affords unusual accessibility, prevents all jostling during non-rush hours, and enables each passenger to enjoy a degree of luxury and exclusive comfort not possible when two persons are crowded on one seat. The ordinary street car or bus subjects passengers to an undesirable degree of personal contact.

The attractiveness of the car too often has been largely overlooked in the desire to secure minimum maintenance cost; but the railway can well afford higher cost if by doing so it attracts riders. Only a few added riders will pay for the slight additional expense of providing pleasing interiors.

Some of the interiors exhibited at last year's American Electric Railway Association convention in Cleveland were surprising departures from the older types, and simplicity of arrangement may result in reduced costs of construction.

Possibilities with Special Service

In Detroit a so-called jitney service is operating. Bus service of both local and express type is also given by competing companies. It is very interesting to note the apparent demand for the comfort of the express jitney service and of satisfactory express bus service without concern as to price. There is no doubt that many people resent the jostling within a street car and are willing to pay a higher fare for specialized express service. Comfort and convenience are quite in demand, and will be paid for cheerfully at any rate in keeping with the comparative exclusiveness of the patronage. The possibilities of such auxiliary express service have been very incompletely explored to date, even though several cities are giving a few sample runs of this type.

A special division of a company's organization established to build up express service would make possible the elimination of much private automobile use and should fill a recognized need as an auxiliary of the public transportation business. No doubt this service can be made profitable, because it can be rendered only at the price and where the business can be done profitably. The use of buses as supplementary equipment offers broad possibilities.

Importance of Scheduling

The department handling the traffic and schedule analysis is responsible for the number of cars owned and operated, for the car-miles covered, and for the quality of service rendered. The operating schedules may include useless car mileage that is not apparent nor suspected. Much of the cost, therefore, of the electrical, of the way and of the equipment departments is controlled by the skill with which the schedule department does its work. The cost of trainmen's wages is usually greater than the cost of these three maintenance departments put together. The accuracy with which the schedules may be maintained on the street is dependent upon the care with which the schedule department has analyzed the problem, has established the running time and the standard of car loading, and has worked out the solution in car-hours of operation. The effectiveness of each car-hour schedule is controlled by the schedule maker.

It is impossible to judge the quality of schedule making without intimate analysis of the detail. This is rarely discussed outside the schedule department, and in some cities not even the schedule makers are trained to interpret the problem. Too often schedule making is treated abstractly as a sort of puzzle. It is a very live problem involving the satisfaction of thousands of travelers, the living conditions of the trainmen and their families, as well as the development of income and most of the expense of the company. It is not a casual job for unsympathetic or less careful handling than that of the most skilled men. In fact, the prosperity of the company rests principally with the skill and ability of those in charge of the schedule and traffic department. Of course, the manager may be sufficiently active and so thoroughly informed as to provide for the schedule department the necessary judgment; but is sufficient recognition of the importance of scheduling really given?

Millions of dollars per year may be wasted in a large company without any suspicion being raised as to that waste. It is time more railway organizations were employing the highest technical skill to reorganize this most important planning and production department.

Training of the Operating Force

No matter how good scheduling may be, the result on the street will be disappointing unless the operating force is trained in sound principles of safe and fast operation. The safety organization, together with the regular trainmen's school force, can instruct the men in safe practices that provide alert efficiency in saving moments of needless delay. The training of the motorman and conductor and the use of care to get them working in sympathy with a sound, well-planned viewpoint is a major portion of the problem of obtaining higher speed and lower accident costs.

The supervisory force, including all from the superintendent of transportation through to the supervisors and starters, must be alert, active, well-organized and constantly applying pressure. They must have the respect and assistance of the train force. The trainmen must be well instructed in the details of their work, and like all human beings must be constantly followed up to see that they do that which is laid out for them. Irregularities in operation will develop. Effective methods must be produced to restore good service. The public must be assured of regularity of operation, regardless of the handicaps that come from operation in streets. The supervisory force must try to keep operation as closely as possible to the schedule, but in small or large emergencies the principal emphasis in adjusting cars to make up for delays should always be to provide the best possible service adjustments regardless of the inconvenience to the train crew or of the overtime pay required. A record for dependability of service and for care in avoiding delays and inconvenience to the public can produce the good will that is so invaluable.

Railway Management's Obligation in City Planning

There is an outstanding obligation upon the railway management to be planning long in advance for the growth and development of the city it serves. The pressure of the modern density of traffic on the streets is producing new ideas on city planning. The old theory of a beautiful city plan involving noble architecture and magnificent geometrical arrangement for streets is quite incomplete in meeting the actual needs for regional planning of a city's transportation and traffic system. A true plan involves much more. The Regional Plan of New York is building towards the establishment of correct, scientific investigation of the reasons for the present types of city growth and development, the purpose of cities and the desirable layout that will fit best with the true economics involved.

Predictions of the future cannot be made with absolute accuracy, but foresight will prepare a general plan that will be quite adaptable to the future, and can stabilize the growth of the city, the land values and the business prominence of the city, because it can provide for continuous convenience of accessibility. Cities must establish a confidence of sound management in order that industry and commerce may expand, or that new industry or more business organizations may be willing to locate within them.

The railway organization is involved to an unusual degree in this city planning work. It is involved also in the detailed day-by-day job of fitting regulation to the needs of the users of the city streets. The managements must take the broadest possible point of view in meeting these problems. By becoming thoroughly competent to take leadership, and then showing an absolute impartiality in point of view in working out the very best results for all users of the street, the railway management can produce tremendous benefits for the community it serves.

Most railway managements are working on what is equivalent to a service-at-cost plan, because of commission rule and commission control. The management is, then, in reality representing the people as an agent in providing for public use one of the major necessities of a city. It owes a definite obligation to serve in the most complete way the needs of these citizens. Nearly all patrons served use both automobiles and public carriers, and practically all of the citizens of the city are in some way directly benefited by street railway service, although some use street cars only occasionally. The elected representatives of the people are elected by only a small majority of voters and are holding office only for a short term. The railway management's responsibility is continuous. Its interest in the city welfare is more vital than that of the elected officials because of the continuous commercial responsibility. It is more critical because of the absolute necessity of providing a continuing facility that grows more and more essential to the life of the community. The railway management is, then, entitled to assume the position of the most interested spokesman and best qualified agent with an obligation to all those using the streets.

These outstanding obligations rest upon the railway management's shoulders: It must first put its own house in order by intimate attention to the details of its own business, so that city transportation may become of maximum service to the community, affording the highest possible degree of comfort. It must help control the traffic problems of the moment, which are frequently embarrassing, and it must assume a major part of the burden of the development of a city plan that will be appropriate to the best comfort and prosperity of the citizens.

Each of us should ask himself critically, whether he is doing his part towards leadership in his community. Are we merely running cars, or are we planning, thinking, developing and giving the best service that the conditions of our city will support?

Instruction Panel Explains Treadle Door Operation

By J. W. Weir

Assistant to General Superintendent of Maintenance Kansas City Public Service Company, Kansas City, Mo.

INSTALLATION of rear door control equipment representing a departure from previous standards, necessitated the training and instructing of carhouse and shop employees of the Kansas City Public Service Company in its proper adjustment, inspection and maintenance. A "general order," or maintenance instruction bulletin, explaining the adjustment and maintenance of the equipment, was issued and a portable panel with the various units comprising the treadle control was built.

The panel was taken to each carhouse by a representative of the engineering department thoroughly familiar with the equipment, and the operation of each unit explained to the workmen. The men were shown how the switches, valves, controls and other parts functioned, and how possible troubles could be cleared. Short circuits in wiring, poorly adjusted contactors, stuck valves and other troubles were duplicated on the panel.

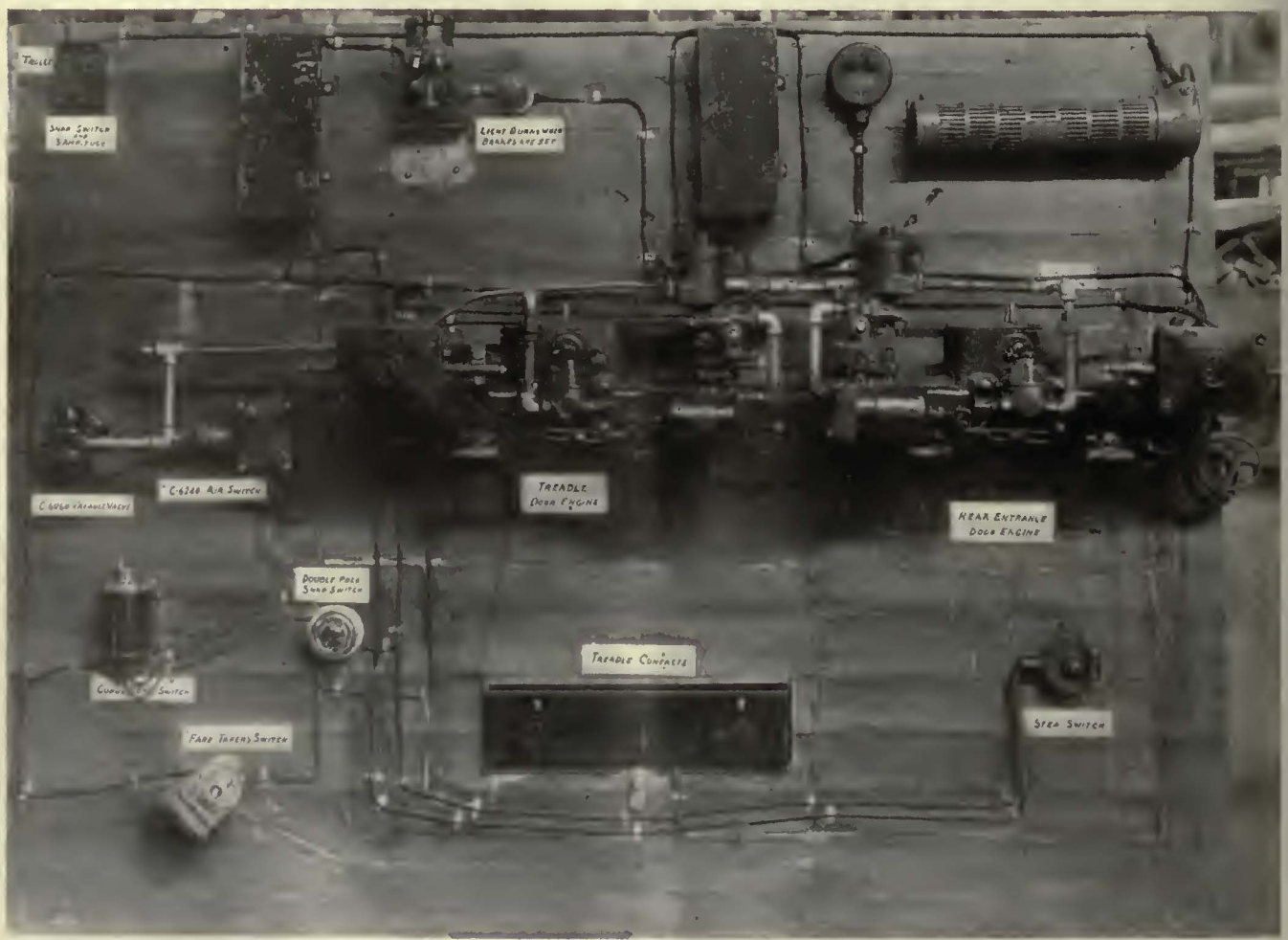
Kansas City will have 746 one-man cars when its rehabilitation program is completed, and of this number 621 will be equipped with special rear doors, electropneumatically operated. Two separate doors are used for the rear platform of each car, one for exit and the other for loading. The forward or exit door is actuated by a treadle, while the rear door is opened and closed by a street fare collector and is used for loading at points of heavy traffic. Since the cars also are designed for two-man operation, provision has been made for the control of both rear doors from the conductor's position. The switches used by the conductor and fare collector also are mounted on the panel.

The operator cannot release the treadle door until a predetermined pressure exists in the brake cylinder, and once the treadle door is opened the air brakes cannot be released until the door has closed. Also, if the rear doors for any reason are opened while the car is in motion, the brakes are immediately set with full reservoir air pressure.

Baltimore Employees Save $9,000

FIVE years ago the United Railways & Electric Company of Baltimore told its employees that if they would place their orders for domestic coal with it, they could get the benefit of the minimum rate for coal which the company is able to obtain by buying in large quantities and by paying cash. The employees are permitted to repay the company for their coal at the rate of 75 cents a ton each pay day until the account is settled.

On this basis, employees have been purchasing each year from 6,000 to 8,000 tons of coal. The coal purchased for the winter which has just passed amounted to 7,800 tons, and for the previous winter 8,189 tons. On the basis of the 25 cents cash discount per ton which the company gets and passes on to its employees, their aggregate saving during the five years has been $9,140.50.



Treadle door control units are mounted on a portable panel in Kansas City for the instruction of maintenance men and car operators

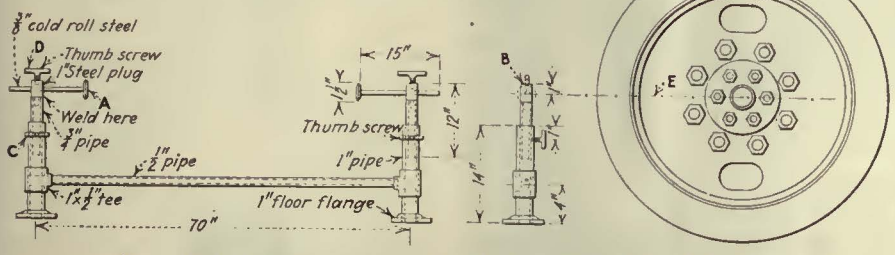
Maintenance Methods *and* Devices

Bus Wheel Aligning Gage*

By Charles Herms
General Foreman San Diego Electric Railway, San Diego, Cal.

WHEELS of the San Diego Electric Railway's buses are aligned by the gage shown in the accompanying sketch. This was built of odds and ends of pipe and fittings in the shops. Previously a standard alignment gage was used, but it was found unsatisfactory.

To check the bus front wheels they first are jacked up until they are clear of the floor, and the vertical $\frac{3}{4}$-in. pipe is adjusted so the sharp-edged disk



Bus wheel alignment gage used by the San Diego Electric Railway

A is even with the wheel center line *E*. The disk *A* should then be adjusted until it strikes the tire as near the center of the tread as possible. The disk *A* is mounted firmly on the $\frac{3}{8}$-in. cold rolled steel rod. With the disk bearing lightly against the tire the latter is revolved slowly. When a complete revolution has been made a dark line will be noticed on the periphery of the tire tread. Sometimes it is necessary to chalk the treads in order to get a clear mark.

The next checking is with the wheels lowered so that they support the bus weight as in normal operation. The disks *A* are readjusted until they register with the marks on the treads of the two wheels. By tightening the thumb screws securely, and without moving the wheels, the gage is taken to the rear side of the front wheels and registered with the marks on the tire. By measuring the variation between the opposite disk and the mark on the tire an indication as to the correctness of the wheel gage is obtained. If the marks are closer together than the setting of the gage it indicates that the wheels are toed out and should be readjusted. This can be done by adjusting the cross-carrier rod wheels.

Wheels should always toe in, and the correct setting is between $\frac{1}{8}$ and $\frac{1}{4}$ in. toe-in on practically all types of buses. It is safe to assume that the first $\frac{1}{8}$ in. toe-in in excess of $\frac{1}{4}$ in. will decrease the tire life by 5 per cent; $\frac{1}{4}$ in. excess will decrease the tire life 20 per cent. An excess of $\frac{3}{8}$ in. will decrease the tire life 40 per cent, and anything over that will cause all kinds of complications. Experience has shown that the best way to check wheel alignment accurately is to make the measurements directly on the tread and as near as possible at the center line of the wheel.

*Submitted in Electric Railway Journal Prize Contest.

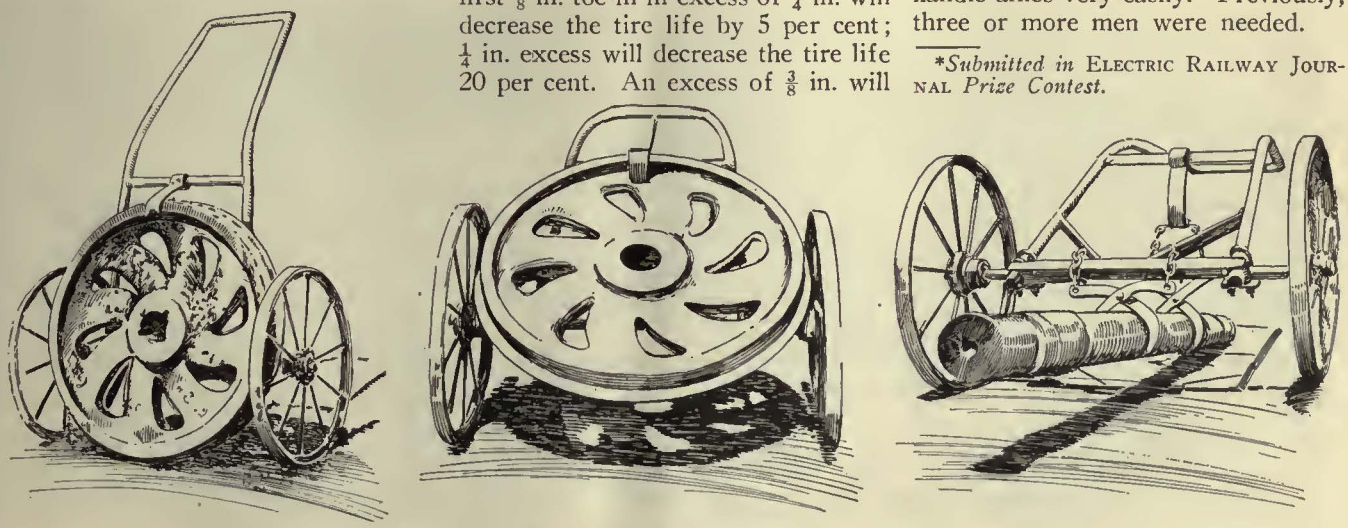
Truck for Handling Car Wheels and Axles*

By Ed. C. Kelly
Shop Foreman Eastern Division, Virginia Public Service Company, Hampton, Va.

PARTICULAR value attaches to a small truck for handling car wheels or axles in the shops of the Virginia Public Service Company, Hampton, Va. The usual method of rolling wheels on the flange requires considerable skill and is sometimes attended with danger or injury to the worker. This has been eliminated and the time of handling has been reduced greatly through the use of the truck. The wheels of the truck are mounted wide enough to straddle a car wheel. When the handle is raised the lower member of the frame engages the hub of the wheel to be handled and a hook from the upper member is placed over the rim. With the handle in its lower position the wheel is drawn upward and rests in a balanced position so that very little effort is required to push the truck.

With the addition of tongs or hooks as shown in one of the accompanying illustrations a man can handle axles very easily. Previously, three or more men were needed.

*Submitted in Electric Railway Journal Prize Contest.



The first and second views show how a car wheel is handled by means of the truck, while in the third view a car axle is in position

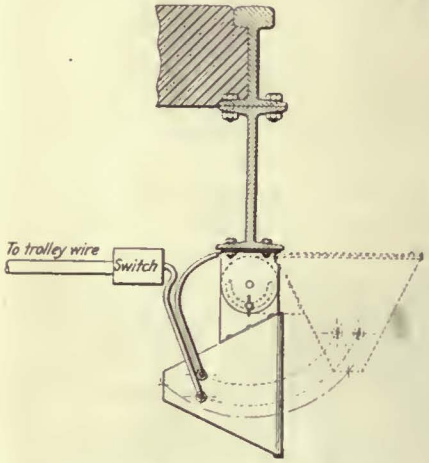
Adjustable Pit Light*

By H. S. Williams
Assistant Superintendent of Equipment Department of Street Railways, Detroit, Mich.

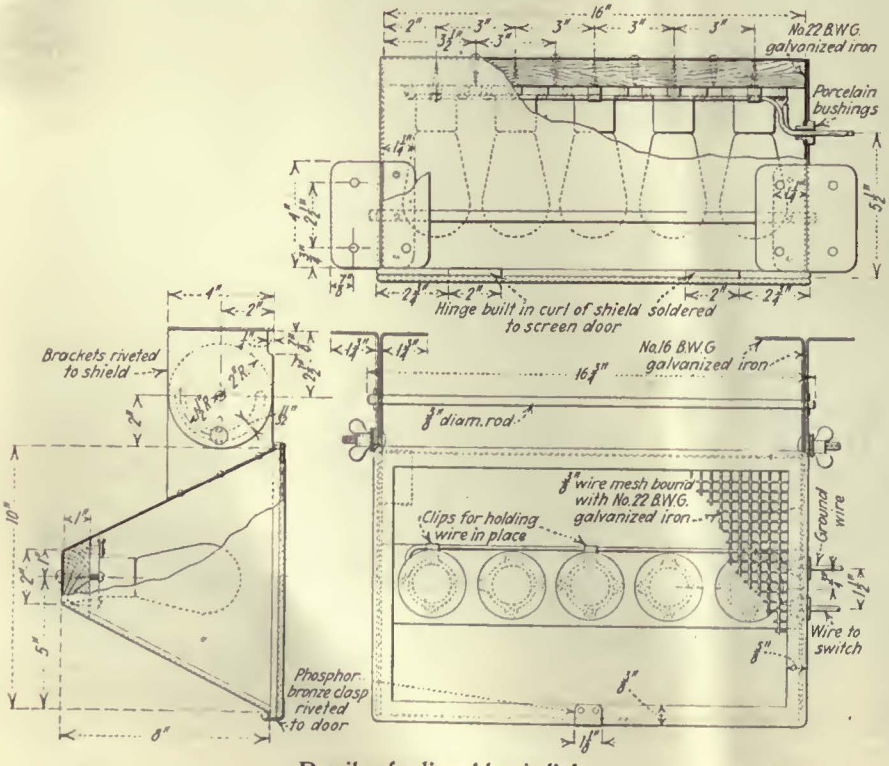
PIT lighting has always been a vexing problem. The scheme presented herewith has good points. Its object is to throw a flood of light upward to illuminate the underside of the car and at other times to provide the usual form of pit lighting.

It consists of a series of five lamps with a control switch placed conveniently. The lamps are mounted in a reflector which is guarded on the open side by a wire-mesh screen door. The reflector is mounted on suitable brackets and arranged to rotate upon a horizontal axis. This allows the fixture to be turned so that it is entirely out of the way when not needed and may be pulled out as desired to throw its light upward. Two such fixtures will completely illuminate the underside of a double-truck car.

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



Connections for adjustable pit light



Details of adjustable pit light

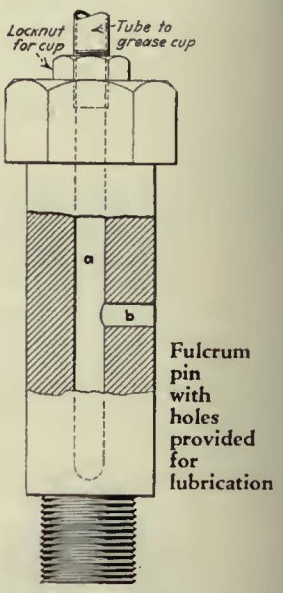
Better Method of Lubricating Brake Rigging Needed

By Albert M. Thomas
New York, N. Y.

IMPROVEMENTS have been made in the material and construction of the many joints, pins, levers, rods and brackets used in the brake rigging of electric cars. Hardened steel bushings and pins are quite generally used, but when these parts are dismantled at a general truck overhauling, it is usually found that the method of lubrication has not proved effective. Insides of joints are worn badly, pins are grooved and cut beyond the point for further usefulness, and the wearing surfaces are perfectly dry and show no trace of the lavish distribution of grease which smears the outside of the joints.

There are two important reasons for this dryness. First, the grease used is usually heavy and sluggish and lacks the penetrating quality necessary to reach the parts to be lubricated, and, secondly, the heavy, sticky grease smeared on the outside of the joint accumulates much dust, dirt and grit which is harmful to the joints. The heavy lubricant used is necessary, due to the design of the joint, and the thick coating mixed with dirt forms a grinding compound rather than a lubricating material. This also forms a thick coating through which additional lubricant cannot penetrate to get to the vital parts.

A method which has proved satisfactory, and which I believe merits wider use, is illustrated herewith. The broken cross-section shows a hole drilled along the longitudinal



center of a fulcrum pin. Another hole, or several, if needed, is drilled so as to lead from the central hole to the circumference of the pin. These holes are used for supplying lubricant to the wearing surfaces. One end of the pin is arranged to take some standard form of grease fitting or is threaded to take an oil or grease cup. Where the grease cup is used, the cover is screwed on and fastened with a spring clip so that jarring when the car is in motion will not cause it to fall off. A locknut also keeps the end nut in place.

With this arrangement, oiling of the various parts is simplified and a thinner type of lubricant can be used to advantage. The tendency of the oil is to work from the inside of the joint to the outside, and this is of particular value in connection with the type of joint found in electric car brake rigging, as the forcing of the lubricant out also clears the wearing surface of any dirt or grit which may accumulate, keeping the surface clean as well as lubricated. It insures that the oils reach the points where they are needed most and so adds greatly to the life of the pins, rods, brackets, and other vital parts of the present brake rigging system.

New Equipment Available

Reciprocating Grinder Car for Baltimore

RAIL corrugations on the United Railways & Electric Company, Baltimore, Md., are being removed with a heavy-duty reciprocating grinder installed in a car. The grinder, furnished by the Railway Track-Work Company, Philadelphia, Pa., consists of two units, one on each rail. Each unit operates four abrasive bricks 4 in. long, 10 in. high and 3 in. wide. The grinding bricks reciprocate on the rail at the rate of 570 4-in. strokes per minute. Each unit is driven by a 10-hp., 1,200 r.p.m. motor connected by a silent chain to the crankshaft of the grinder.

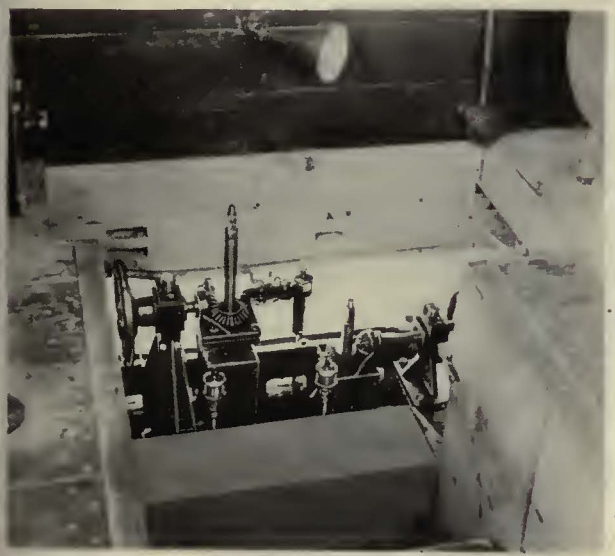
The reciprocating grinder was installed in an old type car. All seats were taken out except one for the workmen. The floor was removed at the center of the car and lowered to form seats for the two operators, who sit back to back, one in charge of each grinding unit. Within reach of each man are all controls for his unit. These include switch, starting rheostat, lever for adjusting water supply and a megaphone for communicating with the motorman. A handwheel controls the pressure of the bricks on the rail to compensate for brick wear. There is also a handwheel for controlling the wedge which clamps the bricks together.

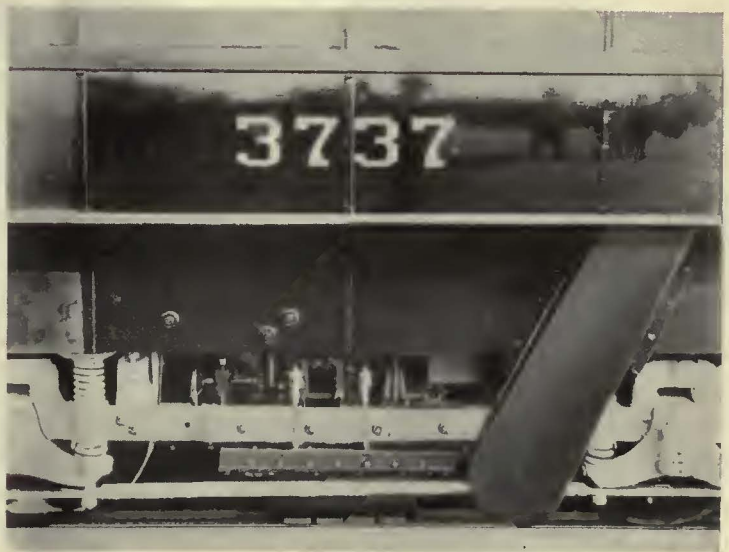
An improved feature of this heavy-duty reciprocating grinder is that the handwheels are stationary, that is, they do not reciprocate with the unit. This makes it easier for the operators in handling the work. Provision is made in the car for carrying the supply of water necessary for reciprocating grinding, 500-gal. having been installed.

The great advantage of reciprocating the bricks of a grinder car instead of merely dragging them over the track has been shown conclusively in a comparison of both methods made by the United Railways & Electric Company. In addition to a very considerable saving in energy the reciprocating method also does its work with a thoroughness not obtained without reciprocation. If corrugations are not eradicated completely they will return very soon. The reciprocating grinders in the car may be operated as slowly as may be required to finish its work as it proceeds, or speeded up to accommodate schedules of passenger cars running on the same track.

If necessary to slow down or stop, in order to grind out heavily corrugated spots, this car can do it, whereas the drag car type of grinder cannot stop and work at the same time. Standard light-weight railway motors propel this car even when the grinders are under maximum load.

Interior arrangement of grinder car





At left—An operating pit is devised in the floor for convenience of the operator. At right—Exterior of the car showing method of installing grinding equipment

Association Activities

Making More Efficient Use of Existing Streets*

By John A. Miller, Jr.
Editor "Aera," Associate Editor, Electric Railway Journal

DELAYS to traffic caused by street congestion in Greater New York are resulting in an annual loss of more than $540,000,000, according to recent reliable estimates. This sum is $28,000,000 more than the city's budget in 1927. Everybody knows that traffic congestion is an extremely serious problem but perhaps not all of you have had time to analyze the causes of congestion and the merits of various plans proposed to relieve the present situation.

To get down to fundamentals. What causes traffic congestion? Are there more vehicles in the streets than the present roadway area can accommodate, or is there something wrong with the way that these vehicles are being operated—that is to say, something wrong with the way the operation is being regulated?

From numerous personal observations in various cities I am thoroughly convinced that existing roadways are ample to take care of the present traffic if its operation is properly regulated. In no instance that I know of, has the actual capacity of an existing street been reached. Fifth Avenue, New York City, is generally considered an example of extraordinarily severe congestion. Nevertheless, it would be entirely possible to move four or five times as many vehicles through this street as are now using it.

At present in the afternoon rush hour the north-bound private automobiles move in two lanes at an average speed of about 4 miles per hour. There is no good reason why they should not move in three lanes at an average speed of about 12 miles an hour. This has been found to be approximately the speed which gives a maximum capacity. When the speed is increased beyond this the spacing between vehicles is also increased so that no gain in capacity results. A similar increase of several hundred per cent in the traffic capacity of other streets could easily be accomplished.

Entire Roadway Needed for Moving Traffic

The first thing that is needed is to use all the available roadway for moving traffic. This is seldom done at present. Parking along the curb, dumping of building material in the roadway, opening up of pavement and other similar obstructions are common in every city.

Many retail merchants are opposed to any restrictions of automobile parking because they fear it will injure their business. This attitude is based on the misapprehension concerning the means of transportation used by customers to reach their stores. Careful checks made of nearly 500,000 customers at 76 big stores in New York, Chicago, Detroit, Cleveland, Los Angeles, Baltimore and other cities show that less than 15 per cent of the customers came by private automobile. The proportion was about the same in each one of these cities where a count was made.

The no-parking restriction in the loop district of Chicago is working extremely well. Two of the largest retail stores state that without question they have many more people coming to their stores by private automobile today than before the restriction. Checks made during May of this year compared with previous counts show a marked increase in the number of automobiles entering the loop district; the increase being 14.1 per cent while the increase in automobile registration was 10.6 per cent. This is in spite of some reduction in business activity in general. Thus it is evident that elimination of parking does not decrease the usefulness of the streets but actually increases it.

The average automobilist appears to believe that he has an inherent right to park his automobile in the public street. This is a fallacy. The streets were created primarily to permit movement of persons and vehicles. This has been pointed out clearly in the convincing window posters of the New York Railways. The legal principle involved was settled more than 100 years ago when Lord Ellenborough, Chief Justice of England, stated that "No one can make a stable-yard of the king's highway."

While parking is undoubtedly the largest single factor in obstructing a free movement of vehicles in the streets, other factors are by no means negligible. Loading and unloading of merchandise is a serious obstacle to moving traffic. Vans used for this purpose ordinarily back perpendicular to the curb, or at a slight angle, and thus create a worse obstruction than does a parked automobile. They usually remain for considerable periods. The cure for this is to require that such loading and unloading be done at night or that it be done within the property lines of the buildings. Either of these plans would be more expensive than the present practice. The seriousness of the present situation must be recognized, however, and people must be willing to pay a considerable price to cure it.

Building construction is a serious obstruction. Competent engineers have stated that there is no real reason why building materials cannot be stored within the property lines during construction. It would be more expensive and less convenient than to store them in the street but it is perfectly possible and should be done.

The public utilities themselves are not without blame in the matter of creating obstructions. They appear to have little or no compunction about opening manholes, or even the pavement itself, on the busiest streets during the busiest hours. Electric railways sometimes choose such occasion to repair their tracks. In these instances, too, it would cost more money to do the work in some other way, but so long as these practices continue the railways are in the position of "the pot calling the kettle black" when they criticize the obstruction to traffic created by others.

Traffic Should Move Faster

While the use of the entire roadway area of existing streets will contribute substantially to the relief of congestion, it is equally important that advantage be taken of every possible means of moving the traffic as expeditiously as possible. Since the establishment of traffic control lights on Fifth Avenue in 1918 the craze for signals of this kind has spread all over the country. Undoubtedly such signals are a good thing when properly used. Unfortunately, however, a large number of them are entirely unsuited to the conditions on the street where they have been installed. A study of the proper kind of lights and the best way to operate them is an imperative need at the present time.

To begin with, the real purpose of installing these lights should be determined. They are variously credited with speeding up traffic, saving policemen's wages, and preventing accidents. Under certain circumstances they may do any of these things, but it is expecting too much to think that all three can be successfully accomplished by one set of signals.

Much emphasis has been laid on the thousands of dollars saved in New York City by replacing traffic policemen with automatic lights. It has been stated by the deputy police commissioner in charge of traffic that when the program now under way is completed, traffic will be controlled mechanically at 2,243 intersections in the city, doing the work of 4,486 policemen. He is optimistic enough to believe that traffic will be

**Abstract of a paper presented at a meeting of the New York State Electric Railway Association, Coney Island, N. Y., June 14-15, 1928.*

speeded up by the operation of these lights. Drivers of automobiles, however, make every effort to avoid using the streets on which these lights have been installed. This was admitted when the city authorities asked for an appropriation to increase the number of installations. It was stated that the purpose of extending the system was to prevent drivers from escaping to streets not so controlled.

The situation was well described in a recent editorial in the Detroit *News* which said that when a senseless mechanical contrivance winks its illuminated eye and brings to a halt several hundred vehicles and keeps a thousand or more people waiting while the clock ticks off the allotted time, but no one wants to use the cross street, there is reasonable doubt of the economy of automatic signals. In the course of a year, millions of people are inconvenienced and minutes totaling the equivalent years are wasted. Is it worth while to save the wages of a few policemen and produce this result?

The matter of accident prevention is more difficult to analyze. It has been stated that accidents are fewer on streets where traffic is controlled by automatic lights. Probably that is true. To what extent the result may be influenced by the tendency of automobile drivers to use other streets is difficult to determine. In any event there is no reason to suppose that unsatisfactory lights will prevent accidents more effectively than would a system of efficient lights. On the contrary, an inefficient system breeds contempt and lack of observance whereas a good system is likely to find favor with the drivers of vehicles and will encourage observance of regulations. The first consideration in the installation of signal lights, therefore, should be to expedite traffic.

Three kinds of control are now in general use. These are: (1) Synchronized signals whereby all lights show green for a given period and then red for a given period, (2) the wave or platoon system whereby all lights change at the same time but alternate signals or groups of signals give different indications—when properly arranged this permits continuous movement along the street—and, also, (3) the co-ordinated lights, such as have been installed on certain streets in Chicago and Cleveland, carefully adjusted to the needs of each intersection.

Engineering opinion is practically unanimous that the co-ordinated system is the most efficient and that the synchronous system is the least satisfactory. Apparently the chief reason for the continued use of synchronous lights is a kind of local pride which refuses to profit by the experience of other cities. Co-ordinated lights are expensive to install and some cities cannot afford them. Excellent results, however, can be obtained with the platoon system, as shown by the experience of Sixteenth Street in Washington, D. C., where the average speed of vehicles is somewhat more than 20 miles per hour. No general rule can be laid down for the installation of traffic signals, but it is of the highest importance that the system used be adapted to the needs of the particular situation. Municipal authorities must not think when they have installed traffic control lights that they have done everything possible to relieve congestion. They must install the right kind of lights, something that a great many cities, including New York, have failed to do.

Despite all the measures that may be adopted to increase the efficiency of traffic movement, however, the capacity of the streets will never be sufficient to accommodate everybody in his own private automobile. As a matter of fact there are many people, even today, who do not own automobiles, and there are many who do own them, but do not want to use them. Public transportation is, and will remain, a vital necessity in every urban community. The agencies which furnish public transportation will benefit by anything that improves general traffic conditions.

Increasing the Capacity of a Street System*

By Hawley S. Simpson
Traffic Engineer, Essex County, N. J.

PASSENGER-CARRYING capacity of a street system may be increased by two general methods; that is, by actual adding to (1) the street area, and (2) by making the most efficient use of existing facilities.

The first, and obvious way, is the plan on which the attention of the public can be most easily focused, and visionary schemes of multi-level cities of the future have become the vogue in Sunday supplements. It is extremely doubtful that such plans provide the ultimate solution, and in congested centers are economically prohibitive except in very exceptional cases.

Experience has shown that construction of new roadways, whether elevated or otherwise, rather than relieving congestion has the effect of attracting additional motor vehicles, until a balance point of equal congestion is again reached. Jefferson Avenue in Detroit is the heaviest traffic street entering the business district. Two parallel streets were narrow and poorly paved in 1924. One was widened and repaved between 1924 and 1925. Traffic in and out of the central business district increased about 11 per cent in 1925 over 1924. Traffic on Jefferson Avenue decreased 3 per cent, indicating a net decrease from the normal expected traffic of about 13½ per cent. Traffic on the repaved street increased 670 per cent, and the net increase on the three streets was 27 per cent, almost 2½ times the increase for the entire district. Following the improvement 2,600 more motor vehicles were driven into the downtown district and, instead of relieving congestion, actually made a bad condition worse.

Realizing that construction of elevated roadways and new highways in business centers is in general of questionable economic value, attention must then be directed towards the second and more immediately available method of relief, that of using to maximum capacity that which we now possess. The city of Chicago probably presents as good an example of the two methods of attack as exists anywhere. Wacker Drive, costing $22,000,000 for less than ½ mile of construction, will probably not have the beneficial effect that the co-ordinated signal system and no-parking regulations in the downtown district have had. Yet the latter two improvements cost comparatively little and are little known, while the former is known the world over.

Of all the unnecessary street obstructions probably none is so detrimental to a fluid movement of traffic as curb parking, although terminals of some sort are a necessity in fulfilling the act of transportation.

To analyze better the parking problem, vehicles stopped at the curb may be divided into three general classes, defined as follows:

1. Loading vehicle—A standing vehicle engaged in the process of expeditiously receiving or discharging passengers or merchandise.

2. Parked vehicle—A vehicle (excepting loading vehicles) standing not longer than a reasonable period.

3. Stored vehicle—A vehicle (excepting loading vehicles) standing longer than a reasonable period.

What constitutes a "reasonable period" has been quite definitely fixed at one hour for the average business district. Surveys have been made by the United States Department of Commerce which indicate that more than 90 per cent of all retail shopping trips can be concluded within one hour, which fixes quite definitely the dividing line between parked and stored vehicles. Shorter periods are difficult of enforcement, longer periods are proved unnecessary and, eliminating consideration of exceptional conditions, when and where parking is to be allowed it should not be for a period exceeding one hour.

Surveys of business districts will reveal areas in which parking is no detriment to traffic and may be a benefit to business, and again, there certainly are areas in which I would absolutely prohibit even stopping for loading and unloading during morning and evening rush hours.

The street is primarily designed for moving traffic, but where loading and parking do not interfere, they both become legitimate uses of street space. Upon the most heavily traveled arteries it is becoming necessary during rush hours to absolutely prohibit loading and unloading of both passengers and merchandise. Passengers may use side

**Discussion of a paper presented at a meeting of the New York Electric Railway Association, Coney Island, N. Y., June 14-15, 1928.*

streets during these hours, merchandise delivery schedules must be arranged for other hours, heavy freight may be more economically handled at night, and light deliveries may be made during slack daytime hours. During the remainder of the business day, loading or unloading may be allowed in the center of the block, the no-stopping provision remaining in effect for a distance sufficiently far from the intersection to permit full use of the street at the critical point.

Rush hour regulations on medium traffic streets would be similar to slack hour regulations on the first mentioned street, no stopping being permitted near intersections and loading and unloading allowed only in the center of the block. During the base period of the day, when traffic does not require the full paved width of the street, one-hour parking could be allowed in the block, loading and unloading being allowed only near intersections.

There are few really light-traffic streets in present-day business districts, but *cul-de-sacs,* streets only one or two blocks in length, and similar streets having none of the characteristics of through or major feeder streets, do not require as stringent treatment as do streets carrying heavy traffic, and no-parking restrictions are neither necessary, obeyed, nor enforced. On such streets it is permissible to allow one-hour parking, reserving, however, a certain space, either near the intersection or in the center of the block, for loading and unloading.

Street storage in any business district should never be permitted, and this, rather than legitimate parking, is largely responsible for double parking. Although the connection is not at first apparent, storing, as defined herein, is responsible for much unnecessary street traffic. In a survey of Detroit's business district, 22 per cent of all curb cars were stored, and by virtue of their longer time at the curb (averaging three hours and four minutes) pre-empted over 60 per cent of the curb space. Parked cars (averaging 37 minutes) never exceeded 50 per cent of the available parking space. But the maximum momentary curb load was 25 per cent in excess of available curb spaces and standing cars exceeded curb space 6½ hours of the nine hours from 8 a.m. to 5 p.m. It is this 25 per cent shortage in curb space that was responsible for the illegal and double parking, when the number of cars actually parked at any one time would have occupied but half the available space.

In two locations in Detroit, one in the hotel and one in the retail shopping district, in one case 20 per cent, and in the other case 35 per cent of all traffic consisted of empty private cars passing the same point twice or more, the maximum being reached by one empty car which passed the same point 24 times in 33 minutes. At one of the locations ten private cars averaged 131 trips past the same point, producing thirteen times the traffic that would have resulted if curb parking space had been available.

All of this is due mainly to street storage, elimination of which requires first that enforcement be made more rigid, and second that sufficient storage garages be constructed to handle the long-time parker. Construction of storage garages will follow as a natural sequence to rigid enforcement and not before. Free street space is like a colored fly to a hungry trout, it may hurt if caught, but the chance seems worth the try.

If traffic surveys prove as they did in Detroit that street storage is a contributory cause of congestion, then such a city can well afford to employ sufficient police to rigidly and impartially enforce these regulations. When this is accomplished it is certain that no-parking areas can be extended to include all the heavy and secondary arteries. Such parking space as remains will not be a deterrent to moving traffic, but will be sufficient for the normal needs of the city.

Signals Often Hinder Traffic Movement

It may seem strange to class electric traffic signals under the head of obstructions to traffic flow, but in many cases they may be described as "nothing else but." The use of automatic traffic signals is becoming more and more prevalent among congestion-gripped cities in an attempt to remedy existing conditions, and to relieve a top-heavy budget.

At their best, traffic signals are not remedies, but only palliatives, and in many instances have failed to be of any benefit, having even further obstructed already impeded traffic. Unfortunately for traffic signalling, saving in policemen's salaries has in many cases been the prime objective to be attained, all considerations of increased safety and expedition of traffic movement being relegated to the discard. Four-way overhead installations using synchronous control were at one time standard practice and because of their prevalence many communities continue to erect such signals without having given the subject of a great deal of attention. The layout, construction and operation of a modern traffic signal system is not a job for which the average police official is fitted. Resort is had to the advice of an engineer employed by a signal manufacturer who, because of his connections, is not fitted to give impartial advice, nor does he have the facilities to make the necessary field surveys. No traffic signal system should ever be installed without an intensive survey to determine its necessity, and when this is done signals can be of real value.

It can be shown that for an average street layout the synchronous system of control will pass less than 50 per cent of the capacity of the street provided all grades were separate. "Wave" or "staggered" systems are little better and will pass no more traffic, but because traffic can be kept moving have a higher efficiency in the motorist's mind. However, this type of installation has been abused, and because of its inherent inability to allow more than one-half of the total cycle to the heavier traveled street, severely penalizes the major portion of traffic, while allowing unnecessary time for relatively unimportant cross streets. Where cross street and main street traffic are about equal, such a system is fairly valuable. But it must be remembered that this type of control is actually progressive only for a portion of the vehicles passing a given signal. If signal colors are reversed every two blocks, only the first half of a group of vehicles can pass the system without stopping, when three signals are tied together only one-third can pass, with four only one-quarter, and so on. It is such a simple operation to transform a synchronous system to the wave type that the change is often overdone. Wherever more than two signals show similar colors, I fully believe synchronous would be preferable, although in a large area where both north and south and east and west streets are controlled by the "stagger" system, a three-block "stagger" might be better than synchronous operation over the whole area.

There is no question but that on practically all street systems, a co-ordinated or "flexible progressive" system has advantages which no other control has,

COMING MEETINGS OF *Electric Railway and Allied Associations*

June 25-29—**American Institute of Electrical Engineers, summer convention, Cosmopolitan Hotel, Denver, Col.**

June 27-28—**Motor Bus Division, American Automobile Association, annual meeting, Hotel Gibson, Cincinnati, Ohio.**

June 28-29—**Central Electric Railway Association, Cedar Point, Ohio.**

July 8-12—**Public Utilities Advertising Association and International Advertising Exposition, Detroit, Mich.**

July 12—**New York Railroad Club, annual outing, Indian Point, N. Y.**

July 13—**A.E.R.A. Executive Committee on yacht "Florida," New York, N. Y.**

July 18-20—**American Society of Civil Engineers, annual convention, Buffalo, N. Y.**

July 19-21—**Pacific Claim Agents' Association, annual convention, San Diego, Cal.**

July 25-27—**Electric Railway Association of Equipment Men, Southern Properties, Cincinnati, Ohio.**

July 27-28—**Central Electric Railway Accountants' Association, Detroit, Mich.**

Aug. 16-17—**Wisconsin Utilities Association, Transportation Section, Sheboygan, Wis.**

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American Electric Railway Association, 47th annual convention and exhibit, Cleveland, Ohio.

and such installations as now exist are ample proof of this conclusion. During the past year it has become possible to install a co-ordinated system, using apparatus manufactured by at least four reputable concerns, at a cost exceeding by little, if any, the simplest kind of a synchronous system. This is not the type used in the loop district in Chicago which involves a complicated central station, but an installation with timers at every intersection controlled by a simple impulse timer at a central point. The latter does not have the instantaneous flexibility of the Chicago installation, but it provides a reasonable flexibility to the extent actually used in Chicago.

Beyond this point, a co-ordinated system of somewhat less flexibility not quite so easily controlled nor so fool-proof in operation, is available at less cost than the synchronous, and experimental work has been completed on a control apparatus superior to any now existant and which promises to be less expensive.

If you railway men, who are vitally concerned in the type of signal system which is adopted, are confronted with the "can't afford it" story, you should be in a position to call the bluff and to prove the economic superiority of the best. What is most important of all, insist upon having the best of engineering study given to the local problem, rather than be content with opinions of manufacturers who are both the consulting engineers and the contractors.

Selection of Men As It Affects Service*

By Dr. C. P. Segard
Assistant Secretary Third Avenue Railway
New York, N. Y.

LIKE many other of our industries, the street railway has given more of its attention to equipment and operation than it has to the most important factor in its growth and success, man power. In the first place man power is the most expensive part of any organization. Steam railroads pay out 41 per cent of their income in wages, street railways around 50 per cent. This fact, if no other existed, should show how important man power really is.

A purchasing agent recently told me how he selected the galvanized buckets for his company. There were twenty to thirty points about a bucket that he considered important. Before making a selection the sample bucket was thoroughly inspected. Do we pay that much attention to the selection of men? Some companies have purchased more than one make of bus for there are different conditions under which they must be operated. In making a selection, every expert of any one particular part of the bus equipment passed judgment. Hours were spent in determining the type and kind. Yet it was, in the last analysis, worthless without the human element selected to run it.

Man Power Determines Production and Service

Machine production is a predetermined amount and it runs close, whereas man power is not so certain. A man is selective with regard to tools, material and action, whereas a machine has no such function. But there is another point of likeness and a point of difference that is even more important. Before you buy a $5,000 piece of machinery you look over the entire competitive field before you make your selection. The choice finally rests on the one that you and your associates, who professionally know that particular line, believe to be best suited to the purpose. Delivery is effected, the machine protected, foundations laid, machine tried out and watched for weeks. Frequently it is polished and dusted, oiled more frequently than necessary and shown to visitors as class A exhibit of the company. Not one quarter of this attention is usually given to an employee who renders more service, if efficient; costs more, if inefficient, and may be replaced by another individual about whom we know nothing.

There have been changes in the growth and development of the study of human beings. There have been discoveries in the sciences of medicine, psychology, sociology and economics. Just as we have kept abreast of the new in the electrical, mechanical and operating field, so we must keep abreast of the new in the study of man at work. There is much that is new in this field not being used generally. While the industry has had 40 years of growth and improvement, only the last ten have been used in improving the human relations. Not that we are 30 years behind, but rather that we have been slow to use the improvements offered in this field. Too often have we been content with the present. It is characteristic that the fads we knew so well 30 years ago are but tradition and opinion today. Some continue to live, yet the reason for their living has been lost or died of old age.

In the field of human relations policy must change because of other changes. Production requirements and machinery have so split up and simplified jobs that the semi-skilled learn in a few weeks a part of a job formerly done by journeymen. For that mass production job he earns greater economic independence and more leisure. Regardless of what is preferred you must adapt yourself to the present situation. Public policy and the public have changed.

To adapt ourselves to this situation we must know something of the human being himself. For it is just repeating the trial and error method to do something because some one else does or because it sounds well. Reasoning is required in the field of human activities as else where. There is a great deal of research available. Medical science has shown how to prevent disease and increase our vitality. Sociology has shown us the close relation between the home conditions and the employee's work. Psychology has shown us better methods of selection and training. We should be in touch with these improvements in man power just as much as we are in touch with the electrical, mechanical and operation improvements.

In the field of human relations, both industrial and public, there should be co-operation for the reason that all departments are involved. Public relations are absolutely and definitely dependent on your industrial or employee relations.

Methods in the selection of men for a specific purpose are becoming more scientific because we know more about them. One of the first problems we face is modern selection of employees and 1900 reception. In other words, though selection may be modern, the supervisory force may still be using methods of twenty-odd years ago in fitting the employee into the job. Both should improve equally.

Choosing Employees

The selection of an employee for any job, from unskilled to skilled, should not rest on the decision of any one person. This has been proved very often. No one individual, whether he be physician, psychologist, instructor or employment superintendent should ever alone make the rejection in cases of doubt. The physician can reject the weak heart, the psychologist the idiot, the superintendent the ignorant, but in doubtful cases, weight should be given to each factor. For it is from that doubtful group that the semi-skilled are found and in that group are the permanently loyal, with its corresponding low labor turnover.

We are selecting men with three points in clear view: (1) Those we believe are capable of doing the job of operating a trolley or bus; (2) those we believe will appreciate the necessity of service with safety; and (3) those that will make pleasing contacts with passengers.

As to the first, physical ability to do the particular job is easily determined. As to mental ability, it is just as well to pause a moment and take stock. Selection on this point has been a matter of decision by interview. It is today in many quarters wholly governed by one interview. In many cases it is sufficient, but some believe that one interview is not enough. In addition, the free use of such material as various sciences have to offer in selection is slowly being adopted.

As to the second, we have tried to determine what human factors lead to accidents in order not to select men with those factors. These factors are emotional instability, certain physical defects and age. Fisher groups eight

**Abstract of a paper presented at a meeting of the New York State Electric Railway Association, Coney Island, N. Y., June 14-15, 1928.*

types of minds of the average individual as causes of accidents. These are puzzled, misguided, stubborn, involuntary, diverted, physical, tired, and troubled. To these we may add those types that are obviously abnormal. If these types are permanent in the individual, the interview or the interview plus the period of training, may reveal the condition. To find them in a group of applicants is not always easy and requires experience, observation and cooperation with other interviewers. I may as well admit here as anywhere that I favor the training, no matter how brief, of all new employees in this industry.

Importance of Courtesy Not Always Appreciated

The third point—that of courtesy in contacts with the passenger—is more important than we recognize. Your conductors, motormen and bus operators are each in daily contact with hundreds of passengers. Most passengers will not notice particularly a courteous, thoughtful agent of the public utility—but let him become crabbed, disgruntled, or in the slightest degree disagreeable, and every passenger will immediately side against him. Not only against him but against every employee of that utility and sometimes it reflects on every employee of every utility concerned. Good contact men are an asset to any business and this is especially true of the street railway industry. Facing a rubber competition, by individual car, as well as bus, it must not only preserve its customers but secure new ones.

In cities of any size it must go after the short-haul group. In my opinion this group is not only essential but it is there for the asking. Just as the five and ten-cent store entered a field where all the wise ones predicted failure, so the trolley can continue to serve as the economic mode of transportation. Just as the five and ten have made it easy to shop in their store, so the contact men must make it easy and pleasant for the short-haul riders. It must be remembered that the short haul has a wide variety of choice and you want him to be your customer. Why do I go to one store in preference to another when the goods and prices are almost the same? Service and the attitude of those who serve. We do not lose the short haul because of inconvenience, waiting, or lack of comfort; not at all. He has to put up with inconveniences when he walks or taxis. If he is treated as though he were a necessary inconvenience by the company's representatives, he walks. If the contact man of the public utility is going to make the prospective customer feel as though he were being favored, he will not want to ride. He does not wish to be irritated, spoken to in a disrespectful manner or treated in a way that interferes with his customer attitude. I am fully convinced that the short-haul business belongs to the steel or steel mode of transportation if the customer-salesman attitude of new business is present on our lines.

Lack of Progress in Car Cleaning*

By Hugh Savage
Superintendent of Equipment Brooklyn City Railroad, Brooklyn, N. Y.

VEHICLES must be kept well painted in attractive colors, and unless they are kept exceptionally clean both inside and out they will cease to attract patrons. It is necessary to provide for daily washing of the exterior, thorough sweeping and dusting the interior, cleaning the windows and lamp globes each day and giving the inside of cars a general cleaning at regular and frequent intervals before we can say that we are not lacking of progress in car cleaning methods. After all this is done we still lack perfect methods.

There is no more effective form of advertising, nothing which will do more to create a desire to ride, than clean cars. All the fancy upholstery, bucket seats, swivel chairs, mosaic floors and fancy trimmings that can be installed cannot compensate for dirty floors, dusty and dirty walls and window capping, dirty windows and lighting fixtures or an accumulation of gum and candy wrappings, newspapers, transfers, etc., in the car.

In order to have clean and inviting cars during the off-peak hours, which is the time during which we all are trying to encourage more people to ride, it is necessary that cars be given some cleaning after the morning rush hour. In addition to this, cars should receive a daily cleaning inside and outside and have all glass cleaned. This should be done at night to insure cars being clean on the first trip out in the morning. Car crews should make more effort to keep cars clean. To clean cars more frequently will cost money. Expenses will increase. This is admitted without argument if car cleaning continues to be done with the facilities and under the conditions existing on most of our properties now.

In general, properties are doing about all that can be done with the facilities provided, and it seems that it is high time the industry as a whole began to look the situation squarely in the face and for the managements to ask themselves "are we really sincere when we say we are doing all that we can to build up our business by giving better service and creating better public opinion?"

In the early days street car cleaning was done in a very simple manner. A pail of water and a long-handled brush were the material and equipment employed, along with plenty of elbow grease on the part of the car washer. Many properties today use the same methods. About 30 years ago solutions of soap containing varying amounts of alkali or solutions containing acid or abrasives were in more or less general use, it having been found that water and mild soap would not remove the greasy grime. The use of such solutions resulted in decided damage to the finish unless quickly applied and very thoroughly rinsed off. The abrasives scratched the surfaces, causing more grime to stick. During these times labor was cheap, the urge for speed in all operations was not so strong, and there was no competition from bright, shiny and clean automobiles.

During later years the problem of cleaning cars has in general received more attention and some efforts have been made to approach the subject in a more scientific manner. Competent chemists have studied the character of the deposits of dirt, grime, etc. As a result, cleaning compounds are now available which give a maximum of cleaning action with a minimum of injury to the varnished or enameled surfaces. In general they are of a slow drying nature and in liquid form, which makes the necessary thorough rinsing easier.

Seat Maintenance Important

Cleaning, dyeing and refinishing materials are also being produced for use in cleaning, coloring and refinishing plush or cane covered seats, and for cleaning curtain materials. These compounds will remove grease and stains on seats or curtains. The coloring compounds will restore or color materials, making badly discolored seats and curtains look comparatively new.

The demand for cleaner cars, and such studies as have been made as to how to obtain them, have called attention to the antiquated methods and appliances used. During the past few years there has been some development along the lines of labor-saving devices with which to clean cars quickly, thoroughly and cheaply. The trend today is toward vacuum cleaners for cleaning the inside of cars and power washers using a spray and revolving brushes for cleaning the outside of cars.

Vacuum cleaners have been a common household article for years and there are many large buildings cleaned by this system, but the number of railways using anything but the old sprinkling pot and the stubby broom can be counted on a very few fingers. The situation today is that there has been so little interest displayed on the part of railways that there is not available on the market apparatus suitable for this work which can be used where 600-volt d.c. is the only power available, neither have suitable portable outfits for use in unpaved storage yards been developed. There is little doubt that if there is sufficient interest, manufacturers will develop adequate apparatus and cars can be cleaned inside and outside more frequently and at less cost.

**Abstract of a paper presented at a meeting of the New York State Railway Association, Coney Island, N. Y., June 14-15, 1928.*

To obtain the full benefit of a power washer for car exteriors it is necessary that tracks be so located as to permit of rapid and easy movement of cars to and from the wash house or wash track, so that extra car movements will be reduced to a minimum. To do this work properly the car should first enter a heated room in the winter, and after washing should be dried thoroughly, either in winter or summer, before being put in service or stored.

There has been developed recently a power washer outfit which is claimed to be almost entirely automatic, requiring only one man, whose duties are to operate the car slowly through the washing apparatus. It is to be hoped that this apparatus will be developed fully along with a real vacuum sweeping outfit, and adequate trackage and housing facilities made available to those of us who wrestle with this problem, so that when we are asked, "Are you lacking of progress in car cleaning methods?" we can answer "No," we preach and practice that cleanliness is next to godliness.

Modernizing Car Equipment Maintenance*

By Niles Persons
Superintendent Surface Line Shops Brooklyn-Manhattan Transit Corporation

RAILWAY equipment men today must resort to every conceivable means known to maintain the equipment at the high standard demanded and at the same time keep the costs down. Labor cost is the big item in maintaining car equipment. We have learned a great lesson from our brothers in the automotive industry and are gradually purchasing modern machinery and tools to perform the work.

Our company has spent in the past three years, for the surface division, an amount approximating $1,500,000 on new shops and machinery. As a result car failures are reduced to a minimum. The company has also expended for machines and shop equipment for the rapid transit lines approximately $2,000,000. These are installed in shop buildings constructed by the city of New York at a cost of approximately $4,000,000, exclusive of grounds and yards.

Owing to the large territory covered by our system, cars are assigned to various inspection shops and storage yards conveniently located for economical operation. Each inspection shop has a storeroom where sufficient repair parts and supplies are kept to make the necessary minor repairs to cars. These materials and repair parts are stored in steel bins, neatly lettered and cataloged so as to make replacement easy.

All these shops are equipped with automatic air compressors. Pipe lines lead to various locations about the buildings supplying compressed air for blowing out of motors, for control and for the operation of pneumatic tools. In each inspection shop there is a small machine shop, which is provided with lathe, drill press, grinder, bearing boring machine and blacksmith shop equipment. Overhead electric-operated traveling cranes facilitate the quick and easy handling of the heavy parts.

Special attention has been paid to the lighting of these shops and in all cases where possible, skylights have been installed. The concrete pits where adjustments and repairs to trucks and motors are made have been equipped with lamps evenly distributed along both sides so as to furnish adequate light for the workmen under the cars. In winter, these pits are heated. Throughout all our shops special efforts are made to keep them clean. Steel racks are available to hold spare armatures, iron, lumber, extra draw bars, etc., to keep them off the floor and permit easy cleaning. Plenty of large galvanized cans are distributed about for holding waste and scrap material, and these are emptied every night. In the clean and attractive locker rooms each man is furnished with a steel locker large enough to hold his personal belongings. Large circular sanitary wash basins with hot running water are provided for employees.

Better Car Cleaning Equipment Needed

Car cleaning is one of the important duties assigned to the inspection shops. A concrete wash track at one of our inspection shops is installed in a bay with Kinnear roller doors and heated so that washing can be carried on regardless of the weather. The wash bay has two concrete troughs, one on either side of the track. The troughs are 10 in. wide, 10 in. deep, and 65 ft. long. The floor has sufficient slope and is connected to the sewer so as to carry off the surplus water. The two long troughs are filled with a continual flow of clean fresh water, hot or cold, as desired. Car washers stand on either side of the car bodies with long handled soft brushes which they dip in the troughs of clean water to wash the windows and also the sides of the cars. At the same time that the outside is being cleaned, men are working inside.

When one car is finished, it is moved up and another one immediately takes its place on the stand. By this method, we have been able to concentrate all the cleaning of one carhouse at one point, which makes supervision easy and at the same time, by the adoption of piece work, we have speeded things up. Results obtained by this installation are so satisfactory that plans have been completed and work is under way to equip all our inspection shops. Paint and varnish on the cars stand up much better under this method of cleaning because plenty of water, free from dirt and grit, is used.

All heavy repairs, overhauling, rebuilding and construction work is handled at the main surface repair shop, which is known as DeKalb shop. Here we have a large, modern plant, which was finished in 1926 and equipped with everything to facilitate the speedy repairs to surface cars. Here, also, large windows and skylights are placed so that plenty of daylight is furnished to every location. Artificial light is also provided by a well distributed system.

Tracks where the car bodies are repaired are spaced far apart so that plenty of room is available about the cars for scaffolds, etc., also allowing plenty of aisle room for the unobstructed passage of electric trucks handling materials. Large traveling cranes pick up the car bodies, trucks and other heavy parts, and deposit them where desired. All departments also have small traveling electric cranes for the speedy handling of heavy units. Machines are all independently motor-driven, with push-button control. This eliminates all overhead shafting and belts.

Abstract of a paper presented at a meeting of the New York State Electric Railway Association, Coney Island, N. Y., June 14-15, 1928.

National Bus Association Completes Program

PRACTICALLY all phases of bus transportation will be discussed at the second annual meeting of the Motor Bus Division, American Automobile Association, to be held in Cincinnati, Ohio, June 27-28, at the Hotel Gibson. The following program has been announced:

Wednesday, June 27—10 a.m.

Address of Welcome, followed by reports of chairman, secretary, and special and standing committees.

1 p.m.

"The Motor Bus—A Specialistic Transportation Unit," by F. R. Fageol, president Twin Coach Corporation.

"How Motor Bus and Railroad Service Should Be Co-ordinated," by H. P. Fritch, president Boston & Maine Transportation Company.

"Bus Terminals and How They Should Be Established and Operated," by W. E. Travis, president American Motor Transportation Company, Oakland, Cal.

"Equipment Maintenance and Its Importance in Bus Operation," by A. E. Hutt, Vacuum Oil Company.

Thursday, June 28.

"System in Motor Bus Operation," by Guy Huguelet, president Consolidated Coach Company.

"Commission Control Over the Certificate of Convenience and Necessity," by E. Blythe Stason, professor of law University of Michigan.

"Merchandising the Bus Business," by Edward A. Keenan, advertising manager Philadelphia Rapid Transit Company.

Thursday afternoon will be devoted to a business session of the association, including the appointment of special and standing committees.

News of the Industry

Seven Cents Sought in Harrisburg

New rate will go into effect on July 17 unless commission suspends the revised tariff

THE Harrisburg Railways, Harrisburg, Pa., has filed with the Public Service Commission a new tariff, to become effective as soon as legally permissible. It provides an increase of one cent in the rate of fare. According to the company the new fare of 7 cents, is the minimum which the railway can charge and continue to give satisfactory service to the public.

Since its organization, the street railway system of Harrisburg has made only one increase in the fare. That was in 1918, when the 5-cent fare was increased to the present fare, 6 cents.

The company explains that compared with the rate of fare charged in other cities, Harrisburg will continue to be among the communities where the lowest rates are charged. In this connection it says:

> The fare which the Harrisburg Railways proposed therefore is less than the average cash fare in the country, and lower than the rate of fare charged in the majority of Pennsylvania communities. It is lower than the ticket rates in Philadelphia and Pittsburgh, and in many other communities.

This is how the company see it:

> The change in fare is made necessary by the condition the company faces. It must continue to render good service at all times of the year and under all conditions, for its service is recognized to be necessary to the continued prosperity and convenience of the city and its people. The increased use of private automobiles has caused a decrease in the number of passengers carried, without making possible any decrease in expenses. The company has been compelled to discontinue paying dividends. It faces heavy expenditures for paving and other public improvements. It is economically managed, and strives to render not only good service but courteous service to the public.
>
> To continue rendering efficient service, it must have revenues adequate to meet the cost of the service and to earn a reasonable return upon the value of the property. The situation compels an increase in the rate of fare.

Faced with a curtailment of service or an increase in fare, the company is working upon the theory that the public is willing to pay for continued good service. The feeling of the company is that it can at least maintain its present service under the new rate.

The April 1 payment of dividend was passed because it was not earned, company officials said. Dividends immediately previous had been paid, but several others in late years have been missed.

Levies against the railway for several public improvements, including a paving program, the Market Street subway and the Paxton Street cut-off, have made inroads into the net earnings, it was declared, while necessary construction work on the company's own lines has required a large sum. Track replacements and new equipment for 1928 demand an outlay of $180,000.

The fund of approximately $300,000, which the company recently obtained from the sale of majority holdings in the People's Bridge Company will be applied to the debts for improvements, and cannot be diverted to dividends, according to the company's spokesmen.

Notice of the proposed new rate will be supplied interested parties by the Public Service Commission, and a date for hearing set, following the filing of protests, if any are filed.

Revision of Detroit Finances Suggested

Report to Mayor says that unless Municipal Railway's annual debt maturities can be rearranged fares should go up to meet spirit of city charter, if not its letter

IN A REPORT on the Detroit Municipal Street Railway Department, Ralph Stone, chairman of the board of the Detroit Trust Company, pointed out that unless the Street Railway Commission refinances the debt of the D.S.R. so as to extend it over a longer period of years than is provided under the present scheme, an increase in fares is necessary to comply, at least, with the spirit of the Detroit charter.

Two months ago Mr. Stone was requested by the Mayor to make the report for the purpose of reconciling the two separate audits for the year ended June 30, 1927, rendered by Price, Waterhouse & Company and by William M. Hauser, former auditor of the D.S.R. According to Mr. Stone's report the controversy arose over the matter of depreciation and the different ways in which it was considered.

Mr. Stone reported that no attempt was made to discuss in the precise professional language of accounting the questions that seem to be at issue between the auditor and the public accountants, but the report has been rendered as it would be stated by a business man experienced in dealing with public utilities and in analyzing financial statements.

In the report no attempt was made to define depreciation. Mr. Stone merely says, in terms that are not intended to be technically accurate or inclusive, that "it (depreciation) is a sum taken out of earnings (revenue from fares in the case of street railways) and set aside, either in cash or a credit to a depreciation reserve which is merely a bookkeeping account, to represent or care for the wearing out or obsolescence of property."

It is pointed out that Price, Waterhouse & Company set the depreciation for the fiscal year ended June 30, 1927, at $1,568,255, computed, "at the rate of 3 per cent per annum on the book value of depreciable property, excluding motor coaches." Mr. Hauser arrived at the figure $1,223,380 as the depreciation, using two methods, one being a balance in the income and profit and loss accounts, and the other by computing 3 per cent on an amount which he said was the depreciable cost of the properties. This cost Mr. Hauser stated as $31,718,463, but he fails, according to Mr. Stone, to explain how he arrived at that sum. Mr. Stone prefers the Price, Waterhouse & Company method of computing the depreciation. That company's figure is $344,874 in excess of Mr. Hauser's.

The Price, Waterhouse & Company report stated that it was to be regretted that a more specific statement as to what was intended to be contained in the expression "fixed charges" was not set forth in the charter especially with regard to the element of depreciation.

"From an accounting standpoint, depreciation is generally a fixed charge, so that from that standpoint the city charter requires that the rate of fare shall be sufficient to cover both the ele-

> RALPH STONE, chairman of the board of the Detroit Trust Company, stated in a report Mayor John C. Lodge made public on June 16 that an increase in fares on the Detroit Municipal Railway is necessary, barring a possibility that the problems of the D.S.R. can be met by rearranging annual debt maturities.
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> After referring to the matter of extending the time for the debt payments, Mr. Stone said:
>
> "Unless this is done, it looks from such information as we have that a raise in fares will be needed to comply with at least the spirit of the city charter, if not its letter. It is not possible to say that an adjustment of the existing rates of fare could be avoided by a rearrangement of the debt maturities."

ments of debt, retirement and depreciation," the accountants stated in their audit. "On that basis and accepting as adequate the depreciation provisions made in the accounts, the net income for the year under review (1927) was insufficient to the extent of $687,329." By using Mr. Hauser's figures and deducting depreciation from the gross income, the net income was $609,425 short of meeting sinking fund requirements, according to Mr. Stone.

It is pointed out that Mr. Hauser objected to deducting the depreciation, saying in a communication to the Mayor and Council on Feb. 10, 1928, that "it is impossible to pay for two plants at the same time, and that is, in effect, what is being done when depreciation and sinking funds are both established." Mr. Hauser obtained a figure of $613,955 excess of income by excluding depreciation except depreciation on motor coaches. This he charged as an operating expense.

Mr. Stone states that the difference in viewpoints of the auditor and the public accountants raises a question of construction of Section 14 of the city charter which he understands has been submitted to Corporation Counsel Clarence E. Wilcox. He further says that it seems to him that "sound public policy contemplates that the property should be paid for out of earnings and at the same time be kept in good operating condition. Keeping it in good operating condition means not only expenditures for maintenance, upkeep and repairs, which are items of operating expense, but also for replacing property worn out or become obsolete, which is depreciation." Mr. Stone continues:

If this is true, then depreciation should be included in the rate of fare, and if the corporation counsel determines that as a matter of law depreciation is not a fixed charge, the city charter should be amended to include it.

Naturally the charter should provide that the railways, through their operation, should pay the expense of operating them, taxes, interest on their debt, expense of keeping them up in good operating condition by repairs and replacements (depreciation), and the principal of their debt—and all that must be done out of revenues and fares.

Obviously, a charter is only a statement of principle and if it does not state it clearly it should be so amended that it does. It should not specifically and in detail instruct the Mayor, Council and Railway Commission how to do these things, because conditions change. It should be flexible in its terms.

I am not qualified to interpret the charter, but it seems to me that Section 14 of the charter is sufficiently flexible in its terms to permit depreciation to be included as a fixed charge, and if, after doing that, the existing rate of fare results in a deficit, the city authorities have it in their power to ameliorate the situation.

In other words, if including both depreciation and sinking fund charges results in a depreciation so that the rate of fare must be raised to comply with the charter, the authorities have power to reduce the sinking fund charges by refinancing so as to extend the maturities of the bonds to be paid in each year out of revenue from fares. If the phrase in Section 14 of the charter—"in the sound discretion of the board"—does not mean this, it would seem to be true that the board would have power anyway to refinance so as to rearrange the maturities of its existing debt.

If rearranging the maturities still leaves a deficit then the rate of fare must be raised, and that is only common sense. If it is not done nothing is gained and only trouble follows. The trouble would be the deterioration of the physical property of the railways and that in turn means poorer service and ultimate breakdown of the system.

Revenue and net income of the system as arrived at by the two audits, and the auditors' distribution of expenditure to capital and expense accounts, is also discussed in Mr. Stone's report. In this connection it is pointed out that Mr. Hauser differed throughout from Price, Waterhouse & Company on his report of the revenues and income of the D.S.R. Mr. Stone says that they practically agree, the average of the income given in the two reports being $3,488,582.

It is further pointed out that the accountants contended that some items charged as capital expenditures by Mr. Hauser should in part have been charged to operating expenses and that if the items were not correctly apportioned at the time of original entry, it would be difficult to make a correct apportionment now.

Mr. Stone is further quoted in his report:

I am advised that the executive engineer of the D. S. R. is now compiling the cost or value of the properties as a basis for this distribution and when that is done the difficulty of allocating to capital and expense will be remedied. This applies likewise to the cost of rehabilitating the properties acquired from the Detroit United Railway.

Therefore, I believe this difference between the two reports may as well be dismissed even though it leaves as an open question the amount of 1927 net income from operation. If the same form of accounting is maintained hereafter it will be important to have the different kinds of expenditures allocated under direction of the executive engineer.

Survey Commission Bill in St. Louis Passed

The St. Louis, Mo., Board of Aldermen with only one dissenting vote on June 8 passed Mayor Victor J. Miller's bill providing for the creation of a transportation survey commission to make a comprehensive survey of the mass transportation needs of the community. A fund of $50,000 is provided for the expenses of the commission, which will consist of sixteen members. It will study both electric railway and motor traffic conditions as well as the city's rapid transit needs, such as proposed subways and elevated systems.

The commission will include the Mayor, comptroller, presidents of the Board of Aldermen and Board of Public Service, the director of streets and sewers, a representative each of the Missouri Public Service Commission, the St. Louis Public Service Company and the City Plan Commission and seven private citizens.

Utility Hearings Concluded

Commissioner McCulloch of the Federal Trade Commission, who has been conducting the hearing in the public utility investigation, announced that after July 7 no further hearing will be held in the investigation until Sept. 1.

Delegates at Kansas City Handled With Ease

Additional crowds at the recent Republican National Convention in Kansas City, Mo., were handled with ease and expedition by the Kansas City Public Service Company by bus and car. The greatest strain on the local transportation system occurred during the parade on the opening night of the convention. Estimates place the number of people who on that occasion crowded into the downtown district at between 200,000 and 300,000. The service on both cars and buses was doubled to take care of the incoming crowds from 6 o'clock until 8, and again after the parade to return them to their homes.

A special bus service was established from the Union Station to the hotel district, beginning Sunday, June 10, to handle the incoming delegates to the convention. The service was reinstated again the last of the week for the benefit of the departing visitors. This was a regular 15-cent line, giving 10-minute service.

The greatest increase in patronage was on the Gray Line sightseeing buses, with from one to seven buses leaving each hour. The regular schedule is three trips a day.

Preparations for Arbitration in Toronto

D. W. Harvey, general manager of the Toronto Transportation Commission, Toronto, Canada, sent a letter to W. D. Robbins, secretary of the employees' union on June 13 stating that the commission had withdrawn the alternative of June 8, namely, a renewal of the existing agreement, since this alternative was not accepted by the men at the mass meeting held on June 9. The other alternative had been the offer of a board of arbitration to consider all wages and working conditions. Since the men, however, had agreed to submit all proposals which either the men or the commission might make as to future wages or working conditions to arbitration there was no reason why two impartial and disinterested appointees should fail to agree upon a chairman. If they should fail to agree upon a chairman the commission would be willing to leave such choice to the Mayor of Toronto. Following this communication the men named James Simpson as their representative.

At the mass meeting of June 9 the men had voted to submit the whole matter to conciliation under the Lemieux Act, but Mr. Harvey pointed out that the provisions of that act did not apply to that commission.

Bankers Prepare to Finance Cleveland Subway

Announcement was made in New York on June 22 that a syndicate headed by the Equitable Trust Company, New York, has been formed to underwrite an issue of $30,000,000 bonds and preferred stock to finance the construction of the proposed subway system in Cleveland, Ohio, to which reference has been made before in ELECTRIC RAILWAY JOURNAL. It is intended to incorporate the Cleveland Subway Company, which would be under the control of the city, to build the subways. An ordinance authorizing the construction of the system will be introduced in the City Council, probably on June 25.

According to the plan now being considered, the subways will be operated by the Cleveland Railway. It is planned to sell the bonds and preferred stock in the Cleveland Subway Company to pay for the cost of construction and to place the common stock in escrow, to be turned over to the city when the system is paid for out of earnings. The idea is to make the new securities quasi-municipal obligations, payable out of revenues of the utility and not from the general city taxes. In this way the improvement can be made without increasing the debt limit of the city.

Hearings in Baltimore Fare Case Concluded

The Court of Appeals of Maryland, sitting at Annapolis, has completed the hearing of arguments in the court case growing out of the action of the Maryland Public Service Commission in granting the United Railways & Electric Company, Baltimore, a 9-cent fare or three tokens for 25 cents. A straight 10-cent fare had been sought.

Following the decision by the commission the United took the case into the Baltimore courts and Judge Joseph N. Ulman held that the commission's decision allowing 6.26 per cent earnings annually on a $75,000,000 valuation was confiscatory. The court also held that it was illegal to limit the company to a 9-cent fare. It was on this decision that the Public Service Commission appealed the case. Pending the final action of the Court of Appeals the United made no change in its rates.

Before the Court of Appeals the hearing consisted largely of discussing at length the same points brought out at the hearing before the commission and before the lower court. The court did not announce when it would hand down its decision.

Library in Portland Grows

An announcement has been made that an unusual number of new books, magazines and pamphlets has been added to the library shelves of the Portland Electric Power Company, Portland, Ore. The most important, says the *Pepco-Synchronizer*, the company publication, are the 63 volumes published by the International Correspondence Schools covering a wide range of subjects.

Higher Fare Sought by Capital Traction

An application for relief was filed on June 15 with the Public Utilities Commission by the Capital Traction Company, Washington, D. C., requesting a straight 8-cent cash fare or a 10-cent fare with four tokens for 30 cents. The present rates are 8 cents cash or six tokens for 40 cents on both systems of the District.

In an advertisement "A Statement to Washington Street Car Riders" John H. Hanna, president, said that because of the postponement of the proposed transit merger the company had been forced to appeal for relief as for more than three years it had failed to earn a dividend of 7 per cent. The value of the property used for public service was fixed by the courts at $26,000,000. To enable the company to earn such a return a flat fare of 10 cents would be necessary, but it was "very much disinclined to ask for a greater increase over existing rates than is necessary to take care of the present urgent situation." He said that public esteem was an asset of the highest value but, confronted with the hard facts stated, the company could not continue to jeopardize the investment and income of thousands of stockholders through failure to seek relief to which it was legally and morally entitled. He quotes 26 cities of more than 100,000 population in the United States where a 10-cent fare is charged. In concluding his statement, Mr. Hanna says:

No individual or corporation owns as much as 5 per cent of the Capital Traction Company's stock. The bulk of it belongs to Washington men and women, who depend largely upon it for their living. The directors of the company are merely trustees for the stockholders. They believe the public generally, when they become familiar with conditions, will be willing to pay the moderate increase in fare requested.

Officials of the Washington Railway & Electric Company have announced that they are not a party to the petition of the Capital Traction Company for an increase in fare, but it is generally accepted that the Utility Commission of the District of Columbia will require both companies to maintain the same fare in case the increase is granted. The present position of the two railways is just the reverse of what it was at the last time their fares were adjusted.

The Washington Railway & Electric Company earnings are better due to the return on its investments and due to operating economies which it has been possible to bring about by securing the entire allocation of one-man car operation allowed by the Utility Commission. Moreover, the company has secured practically the entire benefit of the development in the suburban districts, which it serves almost exclusively.

Chicago Fare Case to Be Concluded

Final arguments for and against the proposed 20 per cent increase in fares of the Chicago Rapid Transit Lines will be heard by the Illinois Commerce Commission on June 26. With the presentation of testimony of its sale witness, a city accountant, other brief evidence against the application at a hearing in Chicago on June 14, attorneys for the city completed their arguments. The elevated lines are asking for the abandonment of the three-for-a-quarter ticket rate and $1.25 weekly pass and the substitution of a straight 10-cent fare.

Since the filing of the company's petition on Feb. 21, the city, through its counsel, has contended that the company cannot obtain a fare increase without first having made a new valuation of its properties and that the company has failed to introduce such figures in its evidence. Company representatives, on the other hand, insist that a new valuation is unnecessary, maintaining that the valuation accepted by the commission in 1921 at $86,250,000, plus $7,750,000 of net additions to property since that time, is just and reasonable. This valuation was based upon a reproduction cost of $95,000,000 less depreciation reckoned at $14,750,000, and to which amount $6,000,000 was added later for working capital.

The principal argument brought out by the city was that the 1921 valuation should have been only $60,000,775 and that subsequent additions bring the present total to only $68,360,724 instead of the $94,000,000 claimed by the company's officials. Under this valuation, the municipal attorneys declare, the proposed fare would yield a return of 11.3 per cent as compared with the 6.02 per cent estimated by the elevated lines' representatives. Testimony introduced by company attorneys showed that in 1927 the Rapid Transit Lines earned only a 2.89 per cent return, and receipts for the first five months of 1928 show this has dropped to 2.28 per cent.

W. J. Smith, one of the commissioners who is hearing the case, announced after the conclusion of the city's arguments that engineers and accountants for the commission would continue their independent investigation of the evidence, and if further testimony is believed to be necessary to an equitable decision the commission may offer some testimony on its own behalf.

Blue Ribbon Specials for Sale in Jacksonville

In conjunction with the annual merchandising event at Cohen Brothers, Jacksonville, Fla., from May 7 to May 14, the Jacksonville Traction Company operated Blue Ribbon Specials on May 7 to carry patrons to and from the store free of charge between the hours of 9 a.m. to 10 a.m. and between the hours of 2 p.m. and 3 p.m. "The Big Store" engaged the services of every car in Jacksonville and south Jacksonville.

Celebrates Safety Broadcasting

Nashville Railway & Light Company entertains in a two hour program. General manager states purpose of educational method. Others speak on safety

COMMEMORATING the first anniversary of its safety department broadcasting its meetings and messages to the public, the Nashville Railway & Light Company, Nashville, Tenn., recently held a two-hour program over station WLAC. Present were Joel B. Fort, representing the state; Gen. J. Washington Moore, the city; William Gupton, the school children of Nashville; Charles Peay of the Nashville Automobile Club; A. M. Burton of the Life & Casualty Insurance Company's radio station, and more than 100 others in addition to the 400 Nashville street car operators. The exercises opened with the program of the Rail-Light band. A choir of the Edgefield Baptist Church sang and there were also other features by the Rail-Light employees.

Telling Tennessee the safety story

REASON FOR FEWER ACCIDENTS

J. P. W. Brown, vice-president and general manager of the company, made the salutatory address. He said the chief aim had been the spread of the gospel of safety and to stress the need of safety education in order to cope with the rapidly growing dangers of the street and highway. In addition to that branch of safety the company was also interested in industrial, home or any other branch of safety that would make the city and country a better and safer place in which to live. He said that the operators of the Nashville cars had for the past several years made records comparable with any others that he could find and that in the last year, 1927, less than 30 per cent of accidents was chargeable in whole or in part to the negligence of the street car operators. During the year 400 automobiles struck street cars at the rear, sides or in front while the cars were standing. These were carried on the records as accidents and it was this type of accident his company had hoped to decrease by broadcasting the need for safety. During the past eight years the operators had reduced their total accidents from 2,800 to 900.

Mr. Brown introduced Col. Joel B. Fort, representing the Governor of Tennessee. Mr. Fort traced the industrial safety movement in America and discussed the annual saving in money. William Gupton, president of the City Board of Education, said that safety was chiefly an educational matter and that everyone should recognize his obligation to further the great and worthy movement in order to make the country safer and conserve the lives of the young boys and girls.

INSURANCE MAN PRAISES COMPANY

City Attorney Moore said that there was yet much to be done in the field of accident prevention. He praised the results that had been accomplished through traffic regulation, truck-driver schools, conducted by the Safety Department of the Chamber of Commerce, and by penalties imposed by the courts on reckless and careless drivers.

In the opinion of A. M. Burton, president of the Life & Casualty Insurance Company, the citizens of Nashville and surrounding country owed much to the Nashville Railway & Light Company for the great movement of "Safety First," the need for which it had been trying so earnestly to impress upon the public. He said that congratulations were in order for the far-reaching method adopted by that company for promulgating this safety propaganda. He said that in addition to the stimulating influence for public safety, the musical and entertainment features of the program had been very wholesome and had brought happiness and sunshine to the hearts of a wide circle of friends.

Reduced Rates for Pacific Electric Employees

Employees of the Pacific Electric Railway, Los Angeles, Cal., are reminded that special books of tickets—five for $1—good for employee and dependent members of his or her family, can be obtained at the Redondo Beach Bath House, by presentation of railway pass or club membership card. Tickets include use of suit, towels and locker. Also books of dance tickets—40 for $1—can be obtained in the same way from the supervisors in the ballroom.

Connecticut Wage Issue at Standstill

Employees of the Connecticut Company, New Haven, Conn., have rejected a continuation of the wage agreement which terminated on June 1 and the company is against arbitrating, feeling that in view of a decrease in living expenses, present wages are adequate. An attempt was made to bring about an amicable settlement when officials of the railway were in conference with representatives of the employees. However, no progress was made and subsequent to that action a vote of the men disclosed two-thirds were in favor of authorizing the union officials to declare a strike if necessary.

New Group Insurance in New Jersey

Thomas N. McCarter, president of the Public Service Railway, Newark, N. J., in connection with the 25th anniversary of the corporation announced on June 15 that the employees of the corporation and its subsidiaries will have an opportunity to double the amount of life insurance carried under the group insurance plan at a substantial reduction in premium.

Judge Named for Piedmont & Northern Hearing

An order naming Judge Morris A. Soper to sit in the case of the Piedmont & Northern Railway in the United States Court for the Western district of South Carolina, has been issued. The Piedmond & Northern is seeking in federal court to have a ruling of the Interstate Commerce Commission set aside refusing the electric railway authority to extend its lines in South Carolina and North Carolina. An order of Judge Edmund Waddill, Jr., senior circuit judge of the Fourth Federal circuit, appointed Judge Soper to sit in the place of Judge H. H. Watkins, Anderson, S. C., who disqualified himself on the grounds of previous legal connections with a railway concerned in the suit. Coincidentally with announcement of Judge Soper's appointment, it was made known that counsel for the Piedmont & Northern had asked the court that three judges sit in the case.

Recently, seven steam railroads operating in the Carolinas filed a petition in federal court, asking to be made "parties defendant" with the government in the suit, declaring that they were "directly and indirectly" affected by the proposed extensions of the electric railway.

Franchise Draft Accepted in Omaha

The Omaha, Neb., City Council has accepted the draft of a new franchise for the Omaha & Council Bluffs Street Railway drawn by Corporation Counsel Van Dusen. J. N. Shannahan, president of the company, says that while it contains features that were objectionable, the city has shown a desire to cooperate with the company in maintaining railway service, and that if voted by the people next November the grant will be accepted by the company. He thinks that its provisions are such that the company will be able to refinance itself and continue service. Mr. Shannahan expressed pleasure over the amicable settlement, commending the city for fairness and evidence of its intention to retain service within the municipality.

The franchise has a life of 30 years, and while amendable by the city a change can be made only when it is vitally important for the interests of both parties to the contract. The franchise is not exclusive, and levies upon the company the old obligations with respect to grading and paving where streets are improved or resurfaced. Extension of lines may be ordered by the city, while the company cannot change from car service to bus service without Council permission. The company may utilize bus service where this type is agreed as and is jointly desirable. The city abandons its old contention for free rides for certain classes of employees.

Zone System in Cleveland Sought

Joseph H. Alexander, president of the Cleveland Railway, addressed a letter to the City Council of Cleveland, Ohio, under date of June 18, inviting the Council to try a zone system of collecting fares for a period of not less than 90 days. He took this action in accordance with recommendations of the board of arbitration which recently raised the fare in East Cleveland, so that for the next five years it will always be higher than the Cleveland rate of fare, rising or falling with the Cleveland rate. The board of arbitration predicted the eventual scrapping of the Tayler plan if a zone system were not adopted.

Mr. Alexander proposed that the Council set up an inner and outer zone. The fare within both zones would be governed by the condition of the interest fund, as at present, rising when the interest fund goes below $500,000, and going down when the interest fund passes the $1,100,000 mark. For a through ride between the zones he suggested that the same schedule of fares prevail as that fixed by the arbitrators for East Cleveland in the case recently decided by them.

This would in effect establish a 9-cent fare for certain outlying sections of Cleveland, such as West Park and Collinwood. All crosstown lines and a number of the main lines would be wholly within the inner zone.

It is not expected that the Council will consider the proposal seriously unless some arrangement is made to put the high rate of fare in effect in Cleveland Heights and Lakewood, two of the major suburbs.

Increased Fares in Galveston

City Commissioners of Galveston, Tex., have adopted ordinances increasing car fare rates of the Galveston Electric Company. The ordinance provides for a sliding scale of fares from 10 cents to 5 cents. On June 30, 1927, the company submitted to the Mayor, City Commission and to the public a statement of its financial status indicating the unprofitableness of the railway lines. Later an adjustment in fare schedules was suggested by the company.

Situation in Rome, Ga., Will Be Studied

Decision in the case of the Georgia Power Company asking permission to increase fares in Rome, Ga., has been deferred by the Public Service Commission until a more thorough investigation can be made. The company proposes to increase its cash fare to 8 cents and to sell two tickets for 15 cents, with changes in the rates to school students as well. The petition stated that, with the present rates, the railway was losing money and was supported by the Rome Chamber of Commerce and representatives of the City Commission. On the other hand, a vigorous protest was made by two citizens of Rome in behalf of "the poor people of the city." They filed a detailed statement charging that the railway department might be losing money, but that the sale of power was more than profitable for the company.

St. Louis-Kansas City Line Permit Again Denied

The Missouri Public Service Commission at Jefferson City has again denied the application of the St. Louis-Kansas City Short Line Railroad for a certificate of convenience and necessity for the construction and operation of an electric interurban railroad connecting St. Louis and Kansas City. After the first application of the railroad was denied in May, 1925, a second application was filed with the commission on Oct. 7, 1927, and many hearings were held.

The ruling of the commission was that the showing of the proposed railroad as to revenues that could be earned to support it was not sufficient to warrant granting the certificate. Commissioner John H. Porter, who wrote the decision, further held that the commission was not satisfied with the financial structure of the proposed 237 mile railroad.

Steam railroads operating between the two chief Missouri cities opposed the proposed electric line.

Seattle Official Takes Rest

D. W. Henderson, superintendent of the Seattle Municipal Street Railway, Seattle, Wash., has applied for and received permission from the City Council for an extended leave of absence, on account of illness and to provide a needed rest. Mr. Henderson has been in active charge of the operations of the municipal lines in Seattle since the road there was taken over by the city from the Puget Sound Power & Light Company, by which he was formerly employed.

Mr. Witt Thrives on Politics

Peter Witt, former street railway commissioner of Cleveland, Ohio, and inventor of the Peter Witt car, is a candidate for the Democratic nomination for Governor of Ohio at the primaries on Aug. 14. He is running on an "elect Al Smith" platform.

Last December Mr. Witt completed four years of service in the Cleveland City Council. He was not a candidate for re-election and announced he had made up his mind to keep out of politics. But recently a group of his friends at the City Club at noon got up a petition nominating him for Governor and by nightfall Mr. Witt had decided to run.

Nation's Traffic Award Made to Two Railway Men

Two railway men were among the victors in *Nation's Traffic* national traffic contest and received prizes from the Committee of Awards which met in St. Louis May 21 and 22 to judge the several hundred manuscripts entered. The first award of $2,500 for "Text for Uniform Traffic Ordinance" was divided in equal amounts between Walter W. Kennedy, assistant to the vice-president of the Birmingham Electric Company, Birmingham, Ala., and Robert H. Nau, secretary of the street traffic committee, Chicago Association of Commerce, Chicago, Ill. The award of $1,000 for "Plan for the Solution of Municipal Parking Problems" was won by Leon R. Brown, safety engineer of the New York State Railways, Rochester, N. Y., and chairman of the traffic committee of the Rochester Engineering Society. Other awards dealt with traffic violators and adult and juvenile education.

The eight participants were awarded a total of $6,850. The significance of the contest, according to *Nation's Traffic* was evidenced by the number of prominent men who deemed it of sufficient importance to devote time to it.

In the report of the Committee of Awards it was stated that outstanding plans or suggestions of a practicable and generally useful nature other than those which have been the subject of past experiments were not presented in this contest; also that several of the suggestions to which awards had been made were not so complete or so competent as might be produced by combinations of plans now in effect in different parts of the country.

Recent Bus Developments

Modified Proposals in Knoxville

The motor bus committee of the City Council of Knoxville, Tenn., has received a new proposition from the Knoxville Power & Light Company for the operation of buses in co-ordination with street cars. That company now has two proposals before the city.

The first one was to establish four bus routes, to be known as the Sevierville Pike, Beaumont, Whittle Springs and Lonsdale routes. The company proposed that riders getting on street cars and transferring to buses pay 4 cents extra for transfers, in addition to the 6-cent token. Riders who boarded buses first would pay 10 cents whether or not they transferred to street cars.

The Council committee then demanded that Power-Light eliminate the 4-cent transfer, give school children 5-cent fare, and relocate the Kingston Pike street car line to the middle of the pike. The company in its reply refused to eliminate the 4-cent transfer, but agreed to relocate the track if the city would pay half the cost. The city refused, and City Manager Roehl intervened and asked for further time. Mr. Roehl presented this proposition from Power-Light:

First, Power-Light agrees to put on the four bus lines recommended by the City Planning Commission, provided the city would grant franchises over the routes subject to approval of the company's legal department.

Second, the company will abandon its Kingston Pike right-of-way so the pike can be widened and paved by the city, and agrees to put on a trackless trolley on present Lyon's View route, if the city will give the necessary franchise which would be subject to approval of the company's attorney. The city was asked to let the present tracks remain until the pike is paved. All obligations against the company for paving cost on the pike would be eliminated.

Third, sanction by the city of a 7-cent token fare, with a universal free transfer from street cars to buses, and vice versa.

C. H. Harvey, president, said the Knoxville Power & Light Company would put on the trackless trolley under either the original or alternative proposition.

Applications and Opposition in St. Louis

The St. Louis, Mo., Board of Public Service held a public hearing on the application of the People's Motorbus Company on June 13 for a permit to operate buses on Oakland Avenue westward from Kingshighway to the Zoo in Forest Park. Opposition was voiced by the St. Louis Public Service Company because the proposed bus line would compete with its Market car line in the territory south of Forest Park. At the hearing the railway asked to operate a bus line of its own from Arsenal Street into the Lindenwood district, now served by the Russell Boulevard-Southwest Avenue line of the People's Motorbus Company.

The People's Motorbus Company has also applied for a permit to operate a 5-cent loop bus line to the levee for the convenience of river excursionists.

New Service in Prospect on Indiana Line

Five new 21-passenger buses will be put into operation shortly by the Evansville & Ohio Valley Railway. Three of these will replace electric railway service between Evansville and Mt. Vernon, Ind.

Acquisition of Bus Line by Roanoke Railway

Control and management of the Safety Motor Transit Corporation, Roanoke, Va., has passed from the hands of the former officers of the corporation to these of the Roanoke Railway & Electric Company. Officers of the Safety Motor Transit Corporation have resigned, but it is understood that the employed force will be retained practically intact by the owners.

Plan in Seattle Suburb Under Consideration by New Regime

The proposition of starting a combination bus and railway service to provide more adequate transportation to the suburban district of Green Lake, Seattle, Wash., which has been under consideration for months, has been temporarily abandoned. A plan evolved by D. W. Henderson, superintendent of railways, and approved by the City Council utilities committee, has been turned over for consideration to the new administration, headed by Mayor Frank E. Edwards, who succeeded Bertha K. Landes, on June 4.

Washington Company Buys Suburban Line

The Washington Railway & Electric Company, Washington, D. C., has announced that it has brought to a successful termination the negotiations involving the purchase of the Montgomery County bus line. Since this bus line parallels one of the railway company's suburban lines, the services may be coordinated. Under the terms of the purchase agreement, the bus line retains its corporate identity. The bus line is owned and controlled entirely by citizens of Rockville. Four buses have been making thirteen round trips a day between Washington and Rockville, Md.

Would Seek Certificate in San Bernardino

The Pacific Electric Railway has applied to the California Railroad Commission for a certificate to operate motor coach passenger service between its Third Street station and Pickering Park in the city of San Bernardino.

Jitneys Barred in Louisville

Announcement was made in Louisville, Ky., on June 18 that jitney buses would be eliminated from the streets of Louisville on July 1. Such transportation was first established in Louisville about fifteen years ago, and while it has never amounted to a great deal in the better-class sections of the city, there have been a good many buses on Market Street, which carries two of the best revenue-producing lines of the Louisville Railway. Mayor Harrison after a conference with James P. Barnes, of the Louisville Railway, and City Attorney James P. Baskett, in a formal statement to the press, stated that he would confer with the City Attorney and Board of Safety looking to the enforcement of that part of the traffic code on jitney elimination.

Under decision of the Court of Appeals last year no bus may operate in Louisville without a franchise, and the Louisville Railway holds the bus franchise and is operating several lines. City officials expressed the opinion that the jitneys were being illegally operated. Under a new traffic ordinance that is now in effect, they are barred from the streets, unless under franchise.

Mayor Harrison, just back from the Republican Convention in Kansas City, commented on the fare there being 6⅔ cents for tickets, and 8 cents cash; 10 cents bus, with free transfer privilege; and 15-cent bus fare where the bus follows the car line.

Service Improves in Oklahoma City

The entire system of the Oklahoma Railway, Oklahoma City, Okla., was brought closer together by the establishment of the new Seventeenth Street Loop cars and the increase in service in the northwest section. In line with the scheme of bus operation in other large cities, two bus routes have been made feeder lines. Bus service on the lines affected is at closer intervals during the day than formerly, while street car schedules are also much increased. The routing and scheduling of cars made the entire system more accessible by eliminating the necessity for cross-town passengers to come all the way downtown through traffic and back and speeded up service over the entire line. Northwest Oklahoma City, where the first improvements in car and bus service were offered to the public as the result of recent surveys made by the railway, has been highly pleased, according to a canvass of the routes made recently.

Financial *and* Corporate

Underlier Hearing Started

Commission begins inquiry into possibility of city purchasing Philadelphia Rapid Transits' leased lines

HEARINGS were started on June 18 before the Pennsylvania Public Service Commission on the application of the City of Philadelphia for placing of valuation on properties of the underlying companies making up the Philadelphia Rapid Transit Company system, as a step looking to their condemnation by the city.

At the outset Commissioner Benn read a statement which follows in part:

The proceeding before the commission is unusual and, so far as we are able to determine, without precedent. We are not called upon, as the Public Service Commission, or in any other capacity, to express approval or disapproval of the condemnation of the properties of the underlying companies. The commission's certificate of public convenience is not asked for, nor is it necessary, and the commission's regulatory or administrative judgment is not invoked or involved in this proceeding.

It is possible, even probable, that later proceedings must be taken under the provisions of the Public Service Company law in the event that the city consumates the condemnations authorized by the Legislature. Not until then, in this matter, will the commission function under the provisions of the act of July 26, 1913, and its supplements.

As we view the Act of 1927, the only parties who have the right to appear at this hearing and be made parties to the record are the city of Philadelphia and the underlying companies named in the petition. The sole duty or function of the commission under this act is to determine the compensation or damages to be paid by the city to the owner or owners of the property.

In a friendly action, in which counsel and officials of the underlying companies have joined with the city solicitor and his staff, the commission has been petitioned to appraise the holdings of the underliers and fix a fair price for their acquisition by the city.

Under the McChord plan, which was submitted last year to the commission and the city, the city, it was said, could effect a saving of $4,500,000 a year by substituting itself as lessor in place of the underliers and collecting the approximately $9,000,000 which the P. R. T. pays each year to those systems in rentals. The price recommended to be paid for the underliers by Mr. McChord was $136,000,000 and not $36,000,000 as was made to appear in the JOURNAL for June 16.

The underliers have formed four committees to represent the stockholders of the lessor companies.

At the opening hearing city Solicitor Ashton moved that the commission issue an order on the underlying companies party to the valuation calling on their representatives to answer within 30 days the city's petition, filed with the commission, announcing its "declaration of intention" to take over the franchises by condemnation.

The order was issued accordingly, and counsel for the underliers announced that they would file answer within that time. The city, Mr. Ashton said, is prepared to proceed with the hearings meanwhile, and Mr. Benn announced in conclusion that if the underliers assented, a date convenient to all would be fixed for the next session.

Mr. Maltbie Retained in Washington Case

Milo Roy Maltbie, former Public Service Commissioner of New York, has been retained in connection with the valuation survey of the railway lines and the bus company in Washington, D. C., which it is intended shall be consolidated. The matter was before the District of Columbia committee of the Senate at the recent session of Congress, and was referred to a sub-committee for a report in the fall. The railways fixed a valuation figure of $50,000,000 on their properties, but contended that under allowances made in other valuation cases their holdings would scale $62,000,000.

Pennsylvania Line Suspends Service

The Fairchance & Smithfield Traction Company, Uniontown, Pa., ceased operation on May 14, 1928. Receipts had been less than expenses since January of this year. Proceedings are pending for dissolution of the company. Trackage covers 2.75 miles.

Preferred Stock Offered in St. Louis

The Missouri Public Service Commission has authorized the St. Louis Public Service Company, St. Louis, Mo., to issue 27,000 shares of Series A preferred 7 per cent stock to be used in conversion of approximately $2,250,000 of five-year gold notes issued when the company took over the properties of the defunct United Railways. The conversion must be made before Dec. 31, 1928.

Short Abandonment in Washington Authorized

Permission to abandon about 3 miles of track of the Spokane, Cœur d'Alene & Palouse Railway, formerly in the Inland system, has been granted the Spokane, Wash., company by the Interstate Commerce Commission. About a third of a mile is within the Spokane city limits and about 2½ miles is east of the city limits.

Upward Trend in Recent Income Statements

For the eleven months ended May 31, 1928, gross revenue of the Interborough Rapid Transit Company, New York, N. Y., was $61,886,726, an increase of $3,747,409 over the eleven months ended May 31, 1927. The balance after consideration of dividend rentals was $2,949,612, representing an increase of $1,583,939 over a similar period of 1927.

On the Brooklyn-Manhattan Transit System, Brooklyn, N. Y., total operating revenues were $43,411,306 for the eleven months ended May 31, 1928, compared with $42,735,617. The net income after total income deductions was $5,938,320 for this year's period compared with $5,805,322 for a similar period of last year.

International Railway, Buffalo, N. Y., reports to the New York State Public Service Commission for the quarter ended March 31, 1928, net income of $123,048 after fixed charges compared with net loss of $124,888 in the corresponding quarter of 1927.

Operation of the Cincinnati Street Railway, Cincinnati, Ohio, run under a service-at-cost arrangement, for May resulted in a surplus of $1,658. The figures follow: Net operating revenue $213,690; operating income $145,433; non-operating income $1,938; gross income $147,371; rental, interest sinking fund, and return on capital $145,713; surplus $1,658.

The United Electric Railways, Providence, R. I., reports for May net income of $42,606 against $28,863 in May 1927. Net income for five months ended May 31, 1928, was $252,275 against $243,305 in the similar period of 1927.

The Chicago Surface Lines carried 138,464,269 passengers in May, compared with 133,359,809 in April and 133,938,656 in May, 1927. Revenue passengers carried showed an increase of 1,482,650 over the same period last year. The largest number of passengers carried in any one month was in March, 1928, when 139,179,092 riders were transported.

Gross for May of this year was $5,304,553 against $5,205,735 in the similar month in 1927. Divisible receipts for the month totaled $465,245 against $452,579 in May of last year. These divisible receipts are the largest reported since December of last year.

Maine Branch Line to Be Abandoned

The Biddeford & Saco Street Railway, Biddeford, Me., has announced that the branch line between City Square and West Street will be discontinued on June 30. Last winter there was much public opposition to abandoning this line. Many persons who own automobiles have since taken occasion to ride the trolleys whenever possible so that the line might be continued. Despite the aid of a loyal public the management has found the line does not derive sufficient revenue to pay operating expenses.

City Supervisor Commends Dallas Railway

During the year ended April 30, 1928, the Dallas Railway & Terminal Company, Dallas, Tex., completed and put into operation 2.9 miles of extensions and 8.8 miles of bus lines. Everman Plan No. 4 was completed with the exception of the Junius Height extension held up by legal proceedings. These facts were contained in the report of John W. Everman, the Supervisor of public utilities of the city of Dallas. He stated that the four utility companies worked closely with the department and in co-operation with each other in all matters looking to the interests of the city.

The report says that the railway service is generally satisfactory, the company exerting every effort to keep it up to a high standard. Both the number of cars in operation and the total mileage in the past year have been increased. The speed of cars has been increased from 9.10 m.p.h., last year to 9.28 this year.

In reviewing the statistics of the road, Mr. Everman said that the company was operating 121.83 street car track-miles and 13.2 bus-miles, that 102 double-truck one-man cars were in operation, of which 50 were rebuilt and placed in service during 1927.

During the past year the company rebuilt and repainted the 62 one-man Birney cars and also overhauled and repainted 50 of the practically new 60 Peter Witt cars. The other ten will go through the shops for similar improvement in the near future. Outstanding improvements and betterments to track and right-of-way in the way of extensions, rebuilding of tracks, paving and repaving completed in the past year totaled $413,672 in cost, and improvements made over and above the ordinary maintenance cost $75,000.

The report refers to the company's application to the Mayor and Board of Commissioners for increase in existing fares and the withdrawal of the petition following a recommendation made by a citizens' committee that it take this action. No change was made and the rates at the time the application was made are still in effect as follows:

Adults, 7 cents cash.
Adult ticket fare, five for 30 cents.
Students' tickets, 3 cents.
Children five to twelve years of age, 3 cents.
Free universal transfer.

Later certain matters which had been under consideration for a long period were satisfactorily adjusted by the company and the supervisor. These included the return to surplus reserve by the company of $41,922, representing an amount heretofore withdrawn from surplus reserve over and above the current 7 per cent fixed return credited to the deficit in fixed return; and also full settlement was made as between the Dallas Power & Light Company and the Dallas Railway & Terminal Company covering bills for power rendered dating back to June, 1921, and governing in the future in rendition of bills until further notice. In rendering these bills originally there was a misinterpretation of the order setting forth the rate to be charged and in the final adjustment the companies accepted the supervisor's interpretation and the Dallas Power & Light Company returned $245,577 to the Dallas Railway & Terminal Company. This sum was credited to surplus reserve of the Dallas Railway & Terminal Company.

Changes in Conspectus of Indexes

Three changes will be noted this month in the Conspectus of Indexes which is compiled for the ELECTRIC RAILWAY JOURNAL by Albert S. Richey, Worcester, Mass. One of these changes consists of the inclusion of an index which is entirely new to the Conspectus, the second is in the form of one of the indexes, and the third is a change in the period covered by the peak figures. These changes are shown in the accompanying table.

The Industrial Activity Index of the *Electrical World* is now included in the Conspectus. This index is based on the amount of electrical power used for power purposes by industrial concerns in the United States, and is referred to the average monthly index for the years 1923-1925, inclusive, as a base. It is corrected for the number of days in the individual months and by the elimination of Sundays and general holidays. This index represents the relative daily use of electrical power by manufacturing industries, and is generally considered a very good index of industrial activity in the country as a whole. It should be of considerably greater value than the monthly figure of Unfilled Steel Order tonnage, which it replaces.

Beginning with this number, Bank Clearings outside of New York City are shown as an index number (with the average of 1926 as a base) instead of the dollar figure in billions as heretofore. Bank clearings in 126 cities outside of New York City are included, and in the calculation of the index the average daily figure is used, eliminating Sundays and nine general holidays. The index is also corrected for the seasonal variations which occurred in the years 1923-1927, inclusive. The new index form should be of considerably greater value than the uncorrected dollar figure which has been shown heretofore.

The last two columns of the Conspectus now show the high and low figures for the last preceding five years instead of since the World War, as formerly. The years 1919-1922 included abnormal fluctuations of several of the indexes, principally due to the violent changes in the readjustment of affairs immediately following the close of the war. Since 1923 there have been no such abrupt changes and most of the indexes have been following trends which now may be considered as more or less normal. For this reason it is believed that at present there will be more interest in a presentation of the high and low peaks for the last five years.

Conspectus of Indexes for June, 1928

Compiled for Publication in ELECTRIC RAILWAY JOURNAL by

ALBERT S. RICHEY
Electric Railway Engineer, Worcester, Mass.

	Latest	Month Ago	Year Ago	Last 5 Years High	Last 5 Years Low
Street Railway Fares* 1913 = 4.84	June 1928 **7.62**	May 1928 **7.62**	June 1927 **7.44**	May 1928 **7.62**	May 1923 **6.88**
Electric Railway Materials* 1913 = 100	June 1928 **141.4**	May 1928 **140.4**	June 1927 **143.0**	April 1923 **175.3**	Feb. 1928 **139.5**
Electric Railway Wages* 1913 = 100	June 1928 **229.2**	May 1928 **229.2**	June 1927 **227.5**	May 1928 **229.2**	March 1923 **206.8**
Am. Elec. Ry. Assn. Construction Cost (Elec. Ry.) 1913 = 100	June 1928 **202.7**	May 1928 **201.9**	June 1927 **200.6**	March 1924 **206.8**	Jan. 1923 **187.3**
Eng. News-Record Construction Cost (General) 1913 = 100	June 1928 **206.2**	May 1928 **207.0**	June 1927 **205.6**	March 1924 **224.7**	Nov. 1927 **202.0**
U.S. Bur. Lab. Stat. Wholesale Commodities 1926 = 100	May 1928 **98.6**	April 1928 **97.4**	May 1927 **93.7**	March 1925 **104.8**	April 1927 **93.7**
Bradstreet Wholesale Commodities 1913 = 9.21	June 1928 **13.19**	May 1928 **13.44**	June 1927 **12.43**	Dec. 1925 **14.41**	July 1924 **12.23**
U. S. Bur. Lab. Stat. Retail Food 1913 = 100	May 1928 **153.8**	April 1928 **152.1**	May 1927 **155.4**	Nov. 1925 **167.1**	May 1924 **141.0**
Cost of Living Nat. Ind. Conf. Bd. 1914 = 100	May 1928 **161.5**	April 1928 **160.8**	May 1927 **163.7**	Nov. 1925 **171.8**	Feb. 1923 **157.5**
Industrial Activity Elec. World—Kw.-hr. used 1923-25 = 100	May 1928 **110.0**	April 1928 **119.3**	May 1927 **122.5**	Feb. 1928 **127.7**	July 1924 **73.4**
Bank Clearings Outside N. Y. City 1926 = 100	May 1928 **108.4**	April 1928 **105.6**	May 1927 **102.4**	May 1928 **108.4**	Aug. 1923 **81.6**
Business Failures Number	May 1928 1748	April 1928 1672	May 1927 1617	Jan. 1924 2231	Aug. 1925 1353
Liabilities (Millions)	**36.64**	**41.13**	**39.92**	**122.95**	**27.22**

*The three index numbers marked with an asterisk are computed by Mr. Richey, as follows: Fares index is average street railway fare in all United States cities with a population of 50,000 or over except New York City, and weighted according to population. Street Railway Materials index is relative average price of materials (including fuel) used in street railway operation and maintenance, weighted according to average use of such materials. Wages index is relative average maximum hourly wage of motormen, conductors and operators on 136 of the largest street and interurban railways operated in the United States, weighted according to the number of such men employed on these roads.

London Reports Good Year—1,668,827,029 Passengers

In reporting upon the operations of the London Underground group, Lord Ashfield, chairman, said 1927 constituted a record for that group of companies. The group covers the Metropolitan District Railway, London Electric Railway, City & South London Railway, Central London Railway and London General Omnibus. The number of passengers carried was almost 1,669,000,000 and in addition 604,000,000 passengers were carried by other companies with which the Underground is associated. He said the local traffic in London was exceeded only in New York. The number of passengers carried by the London Underground group increased 110,000,000 over 1926. These facts were disclosed at an ordinary general meeting held on Feb. 23.

Gross traffic receipts for the year were £13,951,391 representing an increase over 1926 of £753,764. Miscellaneous receipts amounted to £978,325, an increase of £51,215 over 1926. This was attributed to the successful way in which the commercial advertising was handled. Gross receipts of the group for the year were £14,929,716. Managing Director Ashfield explained the distribution of this sum of money. The average rate of return for the year was 4.66 per cent against 4.09 per cent a year ago, which he claimed was "short of that reasonable return to which we are fully entitled."

He summarized the gains of the year stating that the car-miles run by trains and omnibuses had increased by 21,000,000 but the cost per mile had decreased by 7 per cent. The company had £50,000 more carried to reserve, £236,000 more paid away on the prior charge securities, £112,000 more distributed in dividends and £108,000 more carried forward, representing in all £506,000. This confirmed Lord Ashfield's statement that the year 1927 was a better one than at first might appear from the annual accounts and returns.

COMPARATIVE STATEMENT OF THE OPERATING RESULTS OF THE LONDON UNDERGROUND GROUP, YEAR 1927, COMPARED WITH 1926

	—Railways Total— 1927 £	Increase £	London General Omnibus Company, Ltd. 1927 £	Increase £	Total 1927 £	Increase £
Traffic receipts after the operation of the common fund under the terms of the London Electric Railway Companies' facilities act agreement, dated Dec. 21, 1915, and supplemental agreement, dated Dec. 8, 1921	5,404,659	578,745	8,546,732	175,019	13,951,391	753,764
Expenditure	3,225,350	217,454	8,061,259	62,344	11,286,609	279,798
Net receipts	2,179,309	361,291	485,473	112,675	2,664,782	473,966
Miscellaneous receipts, net	596,329	58,630	381,996	*7,415*	978,325	51,215
Net income	2,775,638	419,921	867,469	105,260	3,643,107	525,181
Interest, rentals and other fixed charges	1,433,289	210,669	259,845	25,510	1,693,134	236,179
Balance	1,342,349	209,252	607,624	79,750	1,949,973	289,002
Appropriation to reserve for contingencies and renewals	185,000	30,000	345,000	20,000	530,000	50,000
Balance	1,157,349	179,252	262,624	59,750	1,419,973	239,002
Dividends on guaranteed and preference stocks	389,477	.....	.....	.....	389,477	.....
Balance	767,872	179,252	262,624	59,750	1,030,496	239,002
Add balance from last year's accounts	242,191	*15,482*	64,125	*3,376*	306,316	*18,858*
Total amount available for dividends on ordinary stocks and shares and for other purposes	1,010,063	163,770	326,749	56,374	1,336,812	220,144
Dividends on ordinary stocks and shares	681,718	77,615	240,625	34,375	922,343	111,990
Rate per cent, per annum	4	.46	7 (Free of Tax)	1	4.66	.57
Balance carried forward to next year's accounts	328,345	86,155	86,124	21,999	414,469	108,154

Italics denote decrease.

MISCELLANEOUS STATISTICS OF LONDON UNDERGROUND GROUP FOR YEAR 1927 COMPARED WITH 1926

	—Railways Total— 1927	Increase	London General Omnibus Company, Ltd. 1927	Increase	Total 1927	Increase
Passengers carried—						
Ordinary	234,594,270	24,124,062	1,323,423,819	74,070,591	1,558,018,089	98,194,653
Workmen	57,872,186	7,291,622	.....	.....	57,872,186	7,291,622
Seasons	52,936,754	4,209,252	.....	.....	52,936,754	4,209,252
Total	345,403,210	35,624,936	1,323,423,819	74,070,591	1,668,827,029	109,695,527
Average daily number of passengers carried	1,020,393	98,820	3,909,672	196,884	4,930,065	295,704
	—Miles—					
Route-miles owned or leased	78	.775	...	...	78	.775
Route-miles run over by companies' trains	128	.281	...	...	128	.281
Road-miles run over by companies' omnibuses	...	....	880	20	880	20
Number of stations	125	....	...	...	125	...
Number of garages	...	....	46	2	46	2
Number of elevators	171	....	...	...	171	...
Number of escalators	67	4	...	...	67	4
Number of car-miles run in relation to passenger receipts	79,005,322	13,607,193	146,283,963	7,499,788	225,289,285	21,106,981
Number of car-miles run by companies' trains or omnibuses	86,038,811	13,731,157	146,283,963	7,499,788	232,322,774	21,230,945
Number of cars or omnibuses owned	1,793	23	*3,990	55	5,783	78

*The number of omnibuses owned and/or worked by or in conjunction with the London General Omnibus Company, Ltd., is 4,887, compared with 4,703 in 1926.

Preferred Issue of Philadelphia Rapid Transit Increased

Stockholders of the Philadelphia Rapid Transit Company, Philadelphia, Pa., on June 18 approved an increase of $5,000,000 in the preferred stock, bringing the authorized total to $35,000,000. Proceeds from the sale of the increased preferred will be used to relocate the Market Street subway tracks under City Hall, for the erection of a bus terminal building and establishment of a garage terminal.

Common stockholders were asked to waive their rights to subscribe to the new preferred. Unless waived, rights go to stockholders of record June 22 in the ratio of one new preferred share for each six of the common held.

Riding on Increase in Los Angeles

Traffic by both bus and street car on the lines of the Los Angeles Railway, Los Angeles, Cal., for the five months' period ended May 31, last, reached a total of 148,155,565 passengers. This is an increase of 2,823,800 passengers, or approximately 2 per cent, over the volume of traffic in the similar period of last year, which totaled 145,331,765 passengers.

Bus traffic figures for the period aggregated 7,098,486 passengers, as compared with 5,508,276 in the similar period of 1927, a gain of 1,590,210, or nearly 3 per cent. Passengers by street car numbered 141,057,079, against 139,823,489 in the corresponding period of last year, an increase of 1,233,590 fares, or nearly 1 per cent.

On May 4, the Los Angeles Motor Coach Company was organized jointly by the Los Angeles Railway and the Pacific Electric Railway and a part of the bus transportation system of the Los Angeles Railway, approximating 25 per cent of the traffic, was transferred to this company. The consequent decrease in bus traffic figures for the month of May was not in direct proportion to the cut. This indicates an increase in other lines still under the operation of the Los Angeles Railway.

The number of passengers traveling bus lines in May was 1,148,855. This compares with 1,173,714 in May, 1927, which is a decrease of 24,859 passengers, or slightly more than 2 per cent. Street car traffic for the month showed little change from that in May, 1927, and numbered 28,218,201 passengers, against 28,115,348 last year.

As an indication of the increasing

popularity of the bus lines, figures for April, before transfer of part of the system to the Los Angeles Motor Coach Company, showed a gain of 3.7 per cent over traffic figures reported for April, 1927. The company is now operating seventeen bus lines, as against sixteen at this time last year. It has just received a permit from the Railroad Commission to extend the Beverly Boulevard line from Vermont Avenue to First Street and Bonnie Brea Avenue.

Deficit in Terre Haute

For the year ended Dec. 31, 1927, the Terre Haute, Indianapolis & Eastern Traction Company, Terre Haute, Ind., realized a surplus of $145,920. From this sum $226,730 sinking fund requirements were subtracted, leaving a deficit of $80,810 for the year. This was disclosed in the annual report submitted at the annual meeting on June 13.

There was expended and charged to capital account on owned lines $41,315 and on leased lines $103,833, making a grand total of $145,148 on owned and leased lines. Considerable reconstruction and improvement work was accomplished on the different divisions of the company.

Freight earnings for 1927 were $603,486 compared with $593,329 in 1926. Total mileage was 430.87 and total main line route mileage 433.07.

MISCELLANEOUS STATISTICS OF THE TERRE HAUTE, INDIANAPOLIS & EASTERN TRACTION COMPANY
Year Ending Dec. 31, 1927

Passengers carried—Interurban lines	3,950,127
Passengers carried—City lines	18,798,477
Total passengers carried	22,748,604
Freight handled, tons	211,741
Express handled, tons	9,541
Car-miles operated—Interurban lines	6,470,379
Car-miles operated—City lines	3,764,611

The report also contains some facts of the leased properties, the Indianapolis & Northwestern Traction, the Indianapolis & Martinsville Rapid Transit Company, the Terre Haute Traction & Light Company, the Terre Haute & Western Railway and the Indianapolis, Crawfordsville & Danville Electric Railway.

EARNINGS AND OPERATING EXPENSES OF THE TERRE HAUTE, INDIANAPOLIS & EASTERN TRACTION COMPANY

	1927	1926
Gross earnings	$5,616,529	$5,611,653
Operating expenses	4,463,122	4,436,221
Net from operation	$1,153,406	$1,175,432
Taxes	$166,108	$181,819

MAINTENANCE EXPENSES OF THE TERRE HAUTE, INDIANAPOLIS & EASTERN TRACTION COMPANY

	1927	1926
Maintenance of way and structures	$778,266	$683,616
Maintenance of equipment	437,050	419,683
Maintenance of power plant Buildings and equipment	108,601	128,313
Total railway maintenance	$1,323,868	$1,231,612
Maintenance of light and power	183,065	185,520
Tota maintenance	$1,506,934	$1,417,132

Personal Items

Toronto Man Association President

D. W. Harvey, responsible operating official of Toronto Transportation Commission, elected to head Canadian Association

D. W. HARVEY has had conferred upon him the highest tribute within the power of Canadian electric railway men to bestow. At the meeting of the Canadian operators held recently in Toronto, he was made president of the Canadian Electric Railway Association. It is a big job that Dave Harvey holds at Toronto. He is responsible for the conduct of 200 miles of electric railway formerly included in the system of the

D. W. Harvey

Toronto Railway, privately owned, and the Toronto Civic Railway, brought together some time ago under the auspices of the Toronto Transportation Commission. He is a very young man to occupy so important a post, particularly as he was only 37 years of age 4 years ago when he was chosen to succeed H. H. Couzens as manager at Toronto.

As if it were not enough for Mr. Harvey to have managed the railway successfully and militantly, the main responsibility has been his of developing the radial lines out of Toronto, the local motor coach services and the special de luxe services. Still more recently the conduct of the municipal ferries has been entrusted to him.

Mr. Harvey and Mr. Couzens were chiefly responsible for rehabilitating the railway lines at Toronto following the taking over of the property of the Toronto Railway, and the measure of success that has followed is undoubtedly due in large part to the fact that both Mr. Harvey and his predecessor were left untrammeled and unusually free from political interference. No left-handed thrust is intended at the Toronto Railway when it is said that the properity to which the city succeeded was in a deplorable condition at the time the city succeeded the private company. The former owners, uncertain of the final disposition of the property, were loath to do more than keep the property going in the face of the political uncertainty.

The first task was to rehabilitate the property physically. This was accomplished with an unusual degree of celerity. That work has been followed on the part of Mr. Harvey and his associates with an intensive campaign to sell the services of the system to the public in which a great deal of resourcefulness has been shown. This is a record that has gone down in black and white in the ELECTRIC RAILWAY JOURNAL from time to time so that he who runs may read.

For seventeen years Mr. Harvey has been serving the city of Toronto. He really began to visualize the city's transportation needs as long ago as 1911, when the first of the so-called civic lines was placed in operation. On that line he was construction engineer. In 1912, when he was only 26 years old, the operation and maintenance of the civic lines were placed under Mr. Harvey's supervision. He continued in these capacities until appointed to be assistant manager of the Toronto System in 1921 after the lines of the Toronto Railway had been acquired by the city.

Mr. Harvey was born in London, Ont., on Feb. 24, 1887. He was educated in the public schools and the Collegiate Institute there. In 1906 he became a student in the Applied Science Faculty at Toronto University, taking the course in civil engineering and graduating in 1910 with the degree of B. A. Sc. In the same year he entered the Ontario Power Company service in Niagara Falls on construction work. In 1911 he was appointed to the City of Toronto Works Department, and had charge of constructing and operating the Toronto Civic Railway until Sept. 1, 1921, when the city took over the Toronto Railway. He was then appointed assistant manager of the Toronto Transportation Commission. On May 1, 1924, on the resignation of H. H. Couzens he was appointed general manager of the commission as the logical successor to that office because of his previous record and his intimate knowledge of the system and the needs of the city.

Resignations on Ohio Property

Earl Lemaster, superintendent of the Newark division of the Southern Ohio Public Service Company, Newark, Ohio, J. A. Hewitt, superintendent of the Zanesville division, and F. J. Clunis, general manager of the midwest section of the company, have resigned effective July 1. Following the announcement of the resignations the statement was made that the Southern Ohio Public

Service Company had sold to a Chicago corporation, but this has not been confirmed.

It was further announced that Mr. Lemaster will join an eastern interurban company; that Mr. Clunis will go with the Tulsa Interurban, Tulsa, Okla., and that Mr. Hewitt will be similarly employed with a Seattle interurban company in Seattle, Wash. The Southern Ohio Public Service Company was formerly included in the system of the Ohio Electric. It extends from Zanesville to Lima, Cincinnati, Fort Wayne, Columbus and way points.

British Columbia Personnel Unchanged

George Kidd, president of the British Columbia Electric Railway, Vancouver, B. C., has just returned from Eastern Canada where he attended a conference of the purchasers of the company. When he was offered the presidency of the British Columbia Power Corporation, which now controls the British Columbia Electric Railway and all its subsidiaries, Mr. Kidd was assured that the past policy and management of the railway would be continued and that there was not the slightest intention on the part of the new owners of interfering in any way with the rates or affairs of the company as they have been conducted for many years.

His request for a local representation on the board has now been met, with the result that W. G. Murrin, long vice-president of the railway, has been made vice-president of the British Columbia Power Corporation and Mr. Goward will occupy a similar position in Victoria, and Sir Frank Barnard, described as the father of the old British Columbia Electric Railway, also accepted a position on the directorate, together with Blake Wilson.

Mr. Kidd says the price paid by the new owners to the English shareholders for the property is not high, compared with the quotations for other similar utility securities. For purposes of comparison it must be remembered that the shareholders of the old British Columbia Electric Railway were receiving a dividend of 8 per cent free of English income tax, which meant that on the present yield of the other leading public utilities, the stock was worth between $300 and $400, an amount probably in excess of the sum paid for it by the new owners.

The new owners are men who have for many years taken the leading part in the development of public utilities throughout Eastern Canada and have been most successful in developing those utilities and in bringing new industries to absorb the power available. The opinion of the new owners is reflected best, perhaps, in the optimism of Sir Herbert Holt, who has stated that in his opinion Vancouver is destined to become the second city in the Dominion.

F. G. Buffe Honored by Association

During coming year Midwest group will have public relations expert to handle affairs

F. G. BUFFE, vice-president of the Kansas City Public Service Company, Kansas City, Mo., was elected president of the Midwest Electric Railway Association at its meeting in that city, June 4-6. As head of an association, with its countless opportunities for accomplishing much in the human relations field, Mr. Buffe might be called the right man in the right job, for his education, experience, and even inclination, especially equip him to solve association problems and to promote educational and social activities within the fold.

Mr. Buffe is known not only in Kansas City, where he has put into force

F. G. Buffe

some of his advanced notions on cooperative activities and employee representation, but throughout the Middle West his reputation as a public relations man, and as a speaker who has something significant to say remains undisputed. His numerous addresses and papers bespeak the endowments and outlook of the man more than a column of type could do. Significant among these talks was the one delivered before the annual meeting of the Midwest Electric Railway Association held in Denver, Col., July 8-10, 1926. On that occasion he had both the conviction and temerity to talk of rights of employees—that they were entitled to full knowledge of the aims and purposes of their companies if loyal service were expected of them. Mr. Buffe understands the potent influence of the human element in any industry. His study of law and his newspaper experience in Denver and Peoria and subsequent publicity work for the Illinois Traction properties give him the advantageous position of remaining on the outside looking into the industry.

This same detachment enabled him to see the bus as a vehicle with a future. In speaking before the American Society of Civil Engineers in Kansas City, Mo., on April 14, 1926, Mr. Buffe said that the bus offered new opportunities to serve, as well as new problems to solve, and that its proper development would mean a distinct public gain. And the use of the bus by the Kansas City Public Service shows Mr. Buffe meant what he said. His faith in railways never falters, however, evidenced by his letter to the editor of ELECTRIC RAILWAY JOURNAL, published in the issue of May 8, 1926, in the course of which, Mr. Buffe remarked "the very vital necessity of the street railway is the only thing that kept it alive during the period from 1915 to 1920. The industry simply had to carry on because its collapse would have meant disintegration of business values and paralysis of urban life."

It was because of his record of achievements in Kansas City since 1917, the year he became affiliated with the Kansas City Railways, that in the fall of 1926, when the receivership of these properties was terminated, Mr. Buffe, who served as general manager throughout the receivership, was elected vice-president in charge of operation of the newly-formed Kansas City Public Service Company.

Mr. Buffe was born in Illinois, went to college there, and received his early training under H. E. Chubbuck, then vice-president of the Illinois Traction System. His intensive training on that system in his early years gave him a large capacity for work, but this has never negatived his desire for fun nor militated against his natural ability to fraternize broadly. Unless memory is at fault motor-boating was one outlet for his exuberance and those delectable days on board were lived also by the readers of the George Fitch tales of motor boating on the Mississippi.

Obituary

FRANK HENRY BROWN, of Pawtucket, R. I., superintendent of the northern division of the United Electric Railways, died on June 19. Mr. Brown had been employed in street railway work since he was nineteen years old, and had been 21 years with the United Electric Railways. He had worked for several years in Worcester, Mass., and in New Jersey. His superintendency at Pawtucket was later extended to Woonsocket and to Providence. Mr. Brown was born in Providence 57 years ago.

CHARLES A. WARNER, superintendent of track and overhead department of the Muskegon Traction & Lighting Company, Muskegon, Mich., died on May 18. He began working for the transportation company as a section hand in 1889, during the days of horse-car operation. In three years he won promotion to the position he held at the time of his death. He helped install the overhead system for electric operation of cars started in May, 1890. Mr. Warner was born on Dec. 18, 1861, in Sweden.

Manufactures and the Markets

Crouse Heads Electrical Manufacturers

Huntington B. Crouse, president of the Crouse-Hinds Company, Syracuse, N. Y., was elected president of the National Electrical Manufacturers' Association at its second Annual Meeting at Hot Springs, Va., on June 13, succeeding Gerard Swope, president of the General Electric Company, who retains membership on the board of governors and on the executive committee of the association. The following vice-presidents to head the various divisions were also elected: Apparatus division, N. A. Wolcott, Packard Electric Company; appliance division, M. C. Morrow, Westinghouse Electric & Manufacturing Company; policies division, Clarence L. Collens, Reliance Electric & Engineering Company; radio division, Louis B. F. Raycroft, Electric Storage Battery Company; supply division, W. E. Sprackling, president Tubular Woven Fabric Company, Pawtucket, R. I.

For a term of three years the following were selected to become members of the board of governors: H. B. Crouse, Crouse-Hinds Company, Syracuse, N. Y.; R. Edwards, Edwards & Company, New York City; A. L. Eustice, Economy Fuse & Manufacturing Company, Chicago, Ill.; Otto H. Falk, Allis-Chalmers Manufacturing Company, Milwaukee, Wis.; W. L. Jacoby, Kellogg Switchboard & Supply Company, Chicago, Ill.; J. F. Kerlin, National Carbon Company, Cleveland, Ohio; D. H. Murphy, Wiremold Company, Hartford, Conn.; R. J. Russell, Century Electric Company, St. Louis, Mo.; Frank E. Wolcott, Frank E. Wolcott Manufacturing Company, Hartford, Conn. For a term of one year to fill an unexpired term, I. A. Bennett of the National Metal Molding Company, Pittsburgh, was elected.

Economy Fuse Buys Federal National

Economy Fuse & Manufacturing Company has recently purchased the Federal National renewable fuse department, including all material, physical property, patents and good will of the Federal National renewable fuse from the Federal Electric Company of Chicago.

Slight modifications in the original design of the fusible element have been made with the result that the National renewable cartridge fuse is now listed as standard, in all capacities up to 600 amp., in both 250 and 600 volts, in the April, 1928, List of Inspected Electrical Appliances, under the label service form of supervision by the Underwriters' Laboratories.

T. D. Halliwell, formerly with the Brooklyn Rapid Transit Company and later with the Westinghouse Electric & Manufacturing Company, is now with the Economy Fuse & Manufacturing Company, with the title of assistant to the president.

Conference Held on Handling Methods

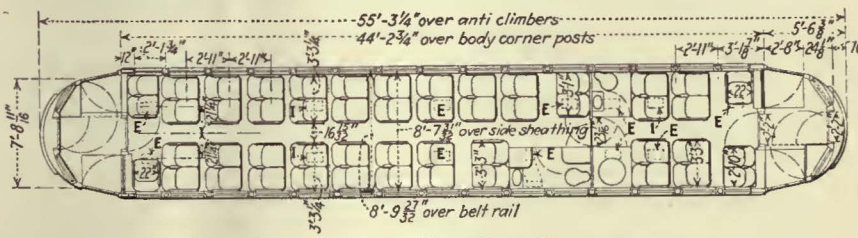
A meeting of shippers, carriers, and warehousemen, held June 6, at the Department of Commerce, Washington, D. C., under the joint auspices of the Bureau of Foreign and Domestic Commerce and the Division of Simplified Practice, approved the proposed program covering simplified methods which

North Shore Cars Delivered

Fifteen interurban, two-man, motor, passenger cars have recently been delivered to the Chicago, North Shore & Milwaukee Railroad, Chicago, Ill., by the Pullman Car & Manufacturing Corporation, Chicago, Ill. The cars seat 50 passengers and are of the double-end double-truck type.

Each car weighs 105,000 lb., being 55 ft. 3¼ in. long and 9 ft. wide. They are of all-steel construction with arch roofs. One car is fitted with roller journal bearings. Each car is equipped with auxiliary battery lights for use when the power is off. Further details are given in the accompanying specifications.

One of fifteen interurban passenger cars built for the Chicago, North Shore & Milwaukee Railroad by the Pullman Car & Manufacturing Corporation



Floor plan of the New North Shore cars

Total weight	105,000 lb.
Bolster centers	32 ft. 8 in.
Length over all	55 ft. 3¼ in.
Length over body posts	44 ft. 2¾ in.
Truck wheelbase	7 ft.
Width over all	9 ft.
Height, rail to trolley base	12 ft. 6 in.
Window post spacing	35 in.
Body	All steel
Roof	Arch
Doors	End, swinging
Air brakes	Westinghouse AMU
Armature bearings	Plain
Axles	Heat-treated, 5x9-in.
Car signal system	Adams & Westlake No. 25 bell
Compressors	Westinghouse DH-25
Conduit	Metal
Control	Westinghouse HLF
Couplers	Ohio Brass, form 13
Curtain fixtures	Railway Curtain Co.
Curtain material	Pantasote
Destination signs	Hunter
Energy saving device	Economy meters
Finish	Duco
Floor covering	Linoleum and rubber tile
Gears and pinions	Nuttall B-P
Glass	Plate, ¼-in. in car body, ⅛-in. in front of motorman
Hand brakes	Peacock, Blackall handle
Heat insulating material	Salamander
Heaters	Peter Smith hot water, Railway Utility Company electric
Headlights	Portable arc
Headlining	-in. steel
Interior trim	Mahogany
Journal bearings	Fourteen plain, one Hyatt roller
Journal boxes	Symington
Lamp fixtures	Adams & Westlake center lamps
Motors	Four Westinghouse 557-R 5, inside hung
Painting scheme	Orange and maroon
Roof material	Wood, canvas covered
Sash fixtures	Adams & Westlake
Seats	Hale & Kilburn No. 900
Seat spacing	35 in.
Seating material	L. E. Chase Byzantine plush
Slack adjusters	Smith-Ward
Steps	Stationary
Step treads	Safkar
Trolley catchers	Knutson No. 5
Trolley base	US 20-C
Trolley shoes	Miller
Trucks	Baldwin
Ventilators	Railway Utility and Garland
Wheels	Rolled steel, 36 in. diameter
Wheelguards	Wood

have been suggested for handling materials. The conference was called for the purpose of considering the use and extension through co-operative effort of simplified methods of handling, moving, loading and unloading goods; to promote the development of interchangeability in the equipment required for handling goods; and to promote the establishment of such dimensional standards as may be necessary to secure interchangeability of equipment.

Investigation of Unemployment Ordered

The Senate, just before adjournment, passed a bill requiring the committee on education and labor of the Senate, or a duly authorized sub-committee thereof, to make an investigation concerning the causes of unemployment and the relation to its relief through (1) the continuous collection and interpretation of adequate statistics of employment and unemployment; (2) the organization and extension of systems of public employment agencies, federal and state; (3) the establishment of systems of unemployment insurance or other unemployment reserve funds, federal, state or private; (4) the curtailing of production, consolidation, and economic reconstruction; (5) the planning of public works with regard to stabilization of employment; and (6) the feasibility of co-operation with the federal, state and private agencies with reference to the first three and last. The report of the committee is to be made to the Senate together with recommendations for legislation if such is deemed advisable, on or before Feb. 15, 1929.

Manganese Crossing Specifications Issued

Standard specifications for manganese crossings have been issued in booklet form by the Balkwill Manganese Crossing Company, Cleveland, Ohio. Aside from descriptive specifications of the crossings, recommendations are made for the particular type of crossings suitable for various uses, with full directions on how to specify.

Detailed drawings are given for angles from 90 deg to 60 deg. of a medium-duty type 40-bolt assembly; heavy-duty type 56, 64 and 72-bolt assemblies; extra-heavy-duty type 64 and 72-bolt assemblies; angles from 60 deg. to 50 deg. of heavy-duty type 56 and 64-bolt assemblies; angles from 50 deg. to 43 deg. of heavy-duty type 60 and 68-bolt assemblies and angles from 43 deg. to 35 deg. of heavy-duty type 62 and 70-bolt assemblies. Sectional drawings also show how modifications may be made to accommodate any kind of rail. Other plans show the 90 deg. and 65 deg. to 70 deg. heavy-duty type reclaimable crossings both assembled and disassembled, designs showing closure rails between crossings and suggestion for precast reinforced concrete foundation slabs.

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

	June 19, 1928
Metals—New York	
Copper, electrolytic, cents per lb	14.5375
Copper wire, cents per lb	16.625
Lead, cents per lb	6.30
Zinc, cents per lb	6.5
Tin, Straits, cents per lb	46.75
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	4.175
Somerset mine run, f.o.b. mines, net tons	1.875
Pittsburgh mine run, Pittsburgh, net tons	1.8
Franklin, Ill., screenings, Chicago, net tons	2.15
Central, Ill., screenings, Chicago, net tons	1.55
Kansas screenings, Kansas City, net tons	2.35
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft	5.3
Weatherproof wire base, N.Y., cents per lb.	17.125
Cement, Chicago net prices, without bags	2.05
Linseed oil (5-bbl. lots) N. Y., cents per lb.	10.8
White lead in oil (100-lb. keg), N. Y., cents per lb	13.75
Turpentine (bbl. lots), N. Y., per gal	$0.64

ROLLING STOCK

Chicago, South Shore & South Bend Railroad, Michigan City, Ind., has been inquiring for ten motor cars with an option on five additional cars and five trailers.

Cleveland Railway, Cleveland, Ohio, has purchased one urban type Twin Coach.

Northern Ohio Power & Light Company, Akron, Ohio, has purchased ten urban type and five parlor type Twin Coaches.

Cincinnati Street Railway, Cincinnati Ohio has purchased eight urban type Twin Coaches.

County Transportation Company, a subsidiary of the New York, Westchester & Boston Railway Company, New York City, has accepted delivery of twelve Mack six-cylinder 29-passenger city type buses.

Lordship Railway, Bridgeport, Conn., has received a Mack four-cylinder chassis, 225-in. wheelbase coach.

Boston & Maine Railroad, Boston, Mass., has accepted delivery of a Mack four-cylinder chassis, 230-in. wheelbase bus.

Boise Street Car Company, Boise, Idaho, has ordered two Mack four-cylinder 29-passenger city type buses.

Wisconsin Power & Light Company, Madison, Wis., placed an order for five 30-passenger A.C.F. street car coaches and later raised the order to a fleet of ten.

TRACK AND LINE

Nova Scotia Light & Power Company, Halifax, N. S., has been asked by the City Council to build a track extention on Quinpool Street.

Columbus Railway, Power & Light Company, Columbus, Ohio, will start track reconstruction work about July 1, on the High Street Union Station Viaduct and East and West Goodale Streets.

Manhattan & Queens Traction Corporation, New York, N. Y., has received through the Borough of Queens, a bid from McElroy & Kerwin, 316 Flatbush Avenue, Brooklyn, N. Y., to relocate its tracks on Queens Boulevard, from 55th Road to Quinten Street, for $293,153. New track and poles will be required.

Springfield Street Railway, Springfield, Mass., is installing new 6-in. 100-lb. T-rails on Hancock Street. As soon as the city completes its work on State Street the railway will start laying track. For this work 350 tons of new rail will be required.

British Columbia Electric Railway, Vancouver, British Columbia, relaying a portion of its street car tracks on Douglas Street, Victoria. The old 70-lb. high T-rail is being replaced with 87-lb. rail of a similar type. The work includes the renewal of the special layout at the intersection of Fort and Douglas Streets. Concrete header construction is again being used.

Pacific Electric Railway, Los Angeles, Cal., has placed orders with the Union Switch & Signal Company covering the necessary materials for the installation of automatic block signaling on the Vineyard to Sherman Junction, Rivas to Glendora, and Los Nogales to Rio Vista sections of its lines. These materials include 42 color light signals, 76 relays, 82 impedance bonds, and 37 switch indicators.

SHOPS AND BUILDINGS

Evansville & Ohio Valley Railway, Rockport, Ind., freight and office buildings were damaged to the extent of several thousand dollars by fire which started in adjoining buildings.

Saskatoon Municipal Railway, Saskatoon, Saskatchewan, has applied to the local board for approval of expenditures of $20,000 on a carhouse extension.

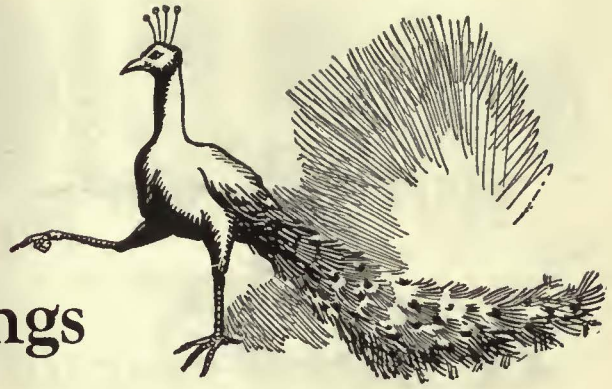
Great Northern Railway, St. Paul, Minn., has awarded a contract to W. T. Butler, Seattle, Wash., for the construction of a shop at Wenatchee, Wash., for the repairing of electric locomotives.

Central Illinois Public Service Company, Springfield, Ill., is planning an equipment storage and distributing plant to cost about $55,000.

British Columbia Electric Railway, Vancouver, B. C., has let a contract for the first 20,000-kw. turbo-generator for its Vancouver plant.

ADVERTISING LITERATURE

Crescent Refractories Company, Curwensville, Pa., has issued series No. 1 of its technical bulletin service, containing the first twenty bulletins, including charts, formulas and simple rules for use by persons interested in refractory linings.



When the ambulance Clangs

"Gangway"

your motorman needs a

PEACOCK STAFFLESS BRAKE

Calling for right of way, an ambulance dives through crowded streets. Jay walkers, autos, frightened children, and confused old folks scatter in all directions. Some in front of your car.

That is a time when your car should have Peacock Staffless Brakes! If the air brake rigging is too loose, the brake shoes well worn, or the power fails at the critical moment there is liability of accident.

The "Peacock" Staffless

A Peacock Staffless is dependable. It has a chain winding capacity of 12 feet; it has three times the braking capacity of the ordinary hand brake. Installation and maintenance costs are low.

Inasmuch, as most all modern cars are Peacock Staffless equipped, there must be many sound reasons for its wide acceptance. We can give you facts and figures, you will find mighty interesting. May we send them?

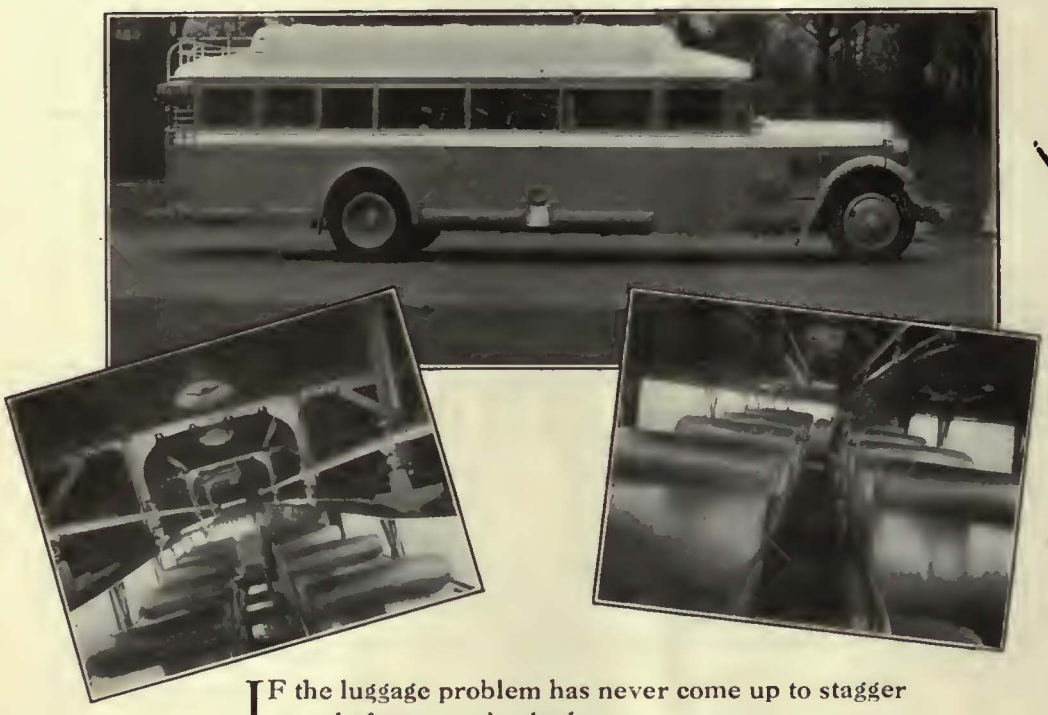
National Brake Company, Inc.

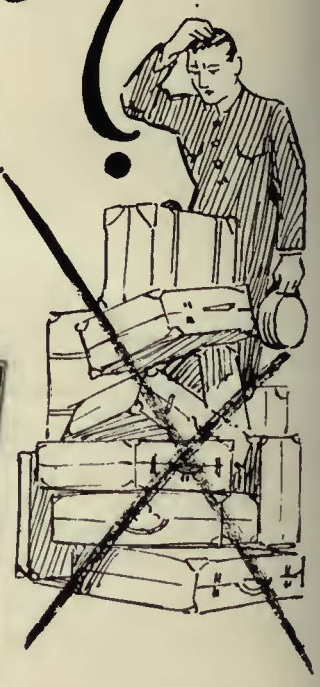
890 Ellicott Square Buffalo, N. Y.

Canadian Representative:
Lyman Tube & Supply Co., Ltd., Montreal, Can.

NO, Not there LUGGAGE But here... LUGGAGE

Where should the Luggage go?





IF the luggage problem has never come up to stagger you before—you're lucky.

Other operators could tell you why but we'll let that go. The point is this: Bender comes along with a specially designed bus body that does away with the luggage jinx so completely that one wonders it wasn't solved much sooner.

All the luggage—not just hand parcels—but *luggage* is tucked neatly *inside* the bus. No sacrificing of inside space. No awkwardness. No canned-sardine-effect. Note the slope of the roof for the answer.

Operators assume absolutely no luggage risk. Delays also avoided. Many operators have called personally to see the body. They admired it, said many kind things, and have *placed orders.*

If you want more information write us. See this bus at the Atlantic City Convention, where it will be on display at the booth of the White Motor Car Co.

Other features

Bus can be opened wide from front to back. Windows opened *all* the way—even on the four doors. No half-way stuff. Yet they can be all shut as tightly as a vacuum bottle. Plenty of ventilation always. The body is built low, is graceful, handsome. Seats a little wider than usual—with the same old Bender comfort *in-built.* Full observation bay in rear. Reading and card tables also help pass time pleasantly away. Note the wide windows. Rail in rear on roof for excess baggage.

THE BENDER BODY CO. W. 62nd and Denison, Cleveland, O.

BENDER BODIES

Saginaw Street, Pontiac, Michigan. Note the heavy overhead corner loading which the Union Metal Poles ably support.

One Pole Does the Work of Three

"ANY city is judged by the appearance of its principal business street," said Clifford W. Ham, City Manager of Pontiac, Mich. And Pontiac decided to "clean-up" its main thoroughfare.

After exhaustive tests by engineers representing the city, Union Metal Fluted Steel Poles were installed, replacing with fewer poles the old unsightly groups along the curb-line.

Twenty-three foot Union Metal poles now furnish the ornamental lighting system, support the trolley span wires and the traffic signal lights. Spaced at 120-foot intervals, these artistic poles accomplish a threefold purpose and present a pleasing contrast to the usual method of maintaining separate poles for each type of service.

Wherever wood, concrete, tubular or structural steel poles are applicable, Union Metal Fluted Steel Poles can be used with better results both structurally and artistically.

THE UNION METAL MANUFACTURING CO.
General Offices and Factory: Canton, Ohio
Branches—New York, Chicago, Philadelphia, Cleveland, Pittsburgh, St. Louis, Los Angeles, San Francisco, Jacksonville.

Union Metal Fluted Steel Pole equipped with lighting units, traffic signal and trolley span wire support as used in Pontiac, Michigan.

UNION METAL
DISTRIBUTION AND TRANSMISSION POLES

No. 8M5 Special

No. 8N5-B

Many electric railways have enthusiastically endorsed the three seats shown here. The 8M5 Special is a de luxe interurban type with spring-filled seats and backs.

No. 55-P Special

The 8N5-B has our new cut-in-back feature which provides more patron comfort, yet saves space. The 55-P Special is a deep, comfortable de luxe type, popular for bus use.

The Right Seat for Every Purpose!

THAT is what you can find in the Heywood-Wakefield line. It comprises every accepted type of car and bus seating — from the sturdy, serviceable, rattan type to the deep, luxurious interurban styles, similar to No. 55-P Special shown above. There are seats purposely designed to increase capacity by saving space, seats designed to assure individual comfort by means of divided backs, and seats that bring to the electric railway all the comfort of pullman service. Our new catalogue shows these seats and describes them in detail. We will be pleased to mail you a copy upon request.

HEYWOOD-WAKEFIELD COMPANY

Wakefield, Massachusetts

516 West 34th St., New York City
439 Railway Exchange Bldg., Chicago, Ill.
J. R. Hayward, Liberty Trust Bldg., Roanoke, Va.
A. W. Arlin, Delta Bldg., Los Angeles, Calif.
H. G. Cook, Hobart Bldg., San Francisco, Calif.
The G. F. Cotter Supply Co., Houston, Texas

The Railway and Power Engineering Corporation
133 Eastern Ave., Toronto; Montreal; Winnipeg, Canada

A better strand — that *cuts like bar*!

Strands that require seizing—that unstrand—that "bird-cage" and kink—*are expensive.*

You can cut Page Preformed Strand like bar with the assurance that the wires will not fly apart.

The wires are free from locked-up stress because they are *preformed*—laid in place—not twisted. No seizing is required and there is no wastage from frayed ends.

With Page Preformed Strand there is no kinking and unstranding. Its uniform lay makes splicing much simpler. And dead-end fasteners are more easily attached.

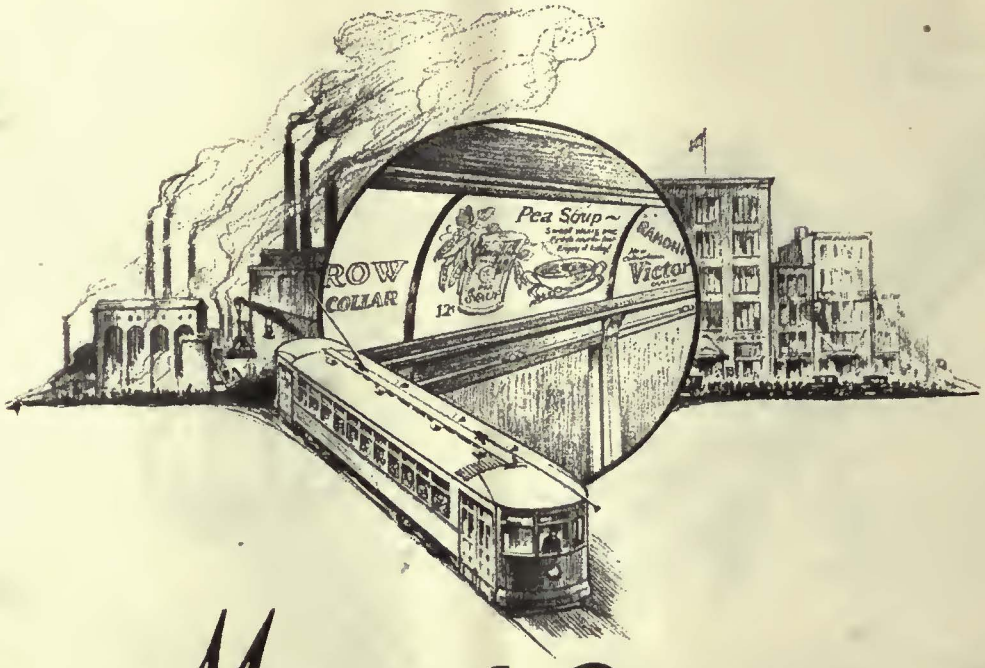
What is more, Page Preformed Strand lasts longer in service. The loads are equally distributed so that the combined strength of all the wires is utilized.

It will pay you to investigate. Your name and address bring a free test sample.

PAGE STEEL *and* WIRE COMPANY
An Associate Company of the American Chain Company, Inc.
BRIDGEPORT, CONNECTICUT
District Sales Offices: Chicago, New York, Pittsburgh, San Francisco
Manufactured under license arrangements with the
American Cable Company, Inc.

PAGE *preformed* Strand

outperforms because it is *preformed*



Mutual Service

TO the manufacturers and distributors of America and the street railway systems that transport the millions of America's potential buyers, Collier offers a mutual service.

This service has brought the street railway riders in thousands of cities and towns throughout the country to look upon car cards as extremely useful and pleasing features of up-to-date street car service. It has given national and local advertisers a medium thru which they can get their messages to selected territories easily, economically and convincingly.

Our business is one of service—service to the street railway industry, service to America's national and local advertisers, service to the millions of people who daily ride on street cars.

CANDLER BUILDING,
NEW YORK, N. Y.

AMCRECO -POLES- *combine high strength and long life*

SOUTHERN Yellow Pine stands first in point of strength among all pole timbers. Nature took care of that.

But nature did not endow this wood with an ability to resist decay. Man has to provide that.

Amcreco poles are select southern yellow pine. Therefore, there is no question about their strength. They are also protected from decay by the most effective method devised—full pressure treatment with pure creosote oil. The Lowry process used in all Amcreco plants has demonstrated its advantages in many years of operation.

Not only do Amcreco poles combine high initial strength and long life—better still, they provide strength which is maintained throughout the life of the pole. Tests on creosoted pine poles 27 years old show no signs of weakening while an untreated or partially treated pole begins to deteriorate from the day it is set.

Get an estimate on Amcreco poles for your lines.

SALES OFFICES

332 So. Michigan Ave., Chicago
350 Madison Ave., New York City
401 W. Main St., Louisville, Ky.
Brunswick, Ga.
Bogalusa, La.

AMERICAN CREOSOTING COMPANY
INCORPORATED

COLONIAL CREOSOTING COMPANY INCORPORATED — AMCREO LOWRY PROCESS CREOSOTED WOOD — GEORGIA CREOSOTING COMPANY INCORPORATED

LOUISVILLE ~ KENTUCKY

ERJ 6-23-Gray

Bankers and Engineers

SEARCHLIGHT SECTION

USED EQUIPMENT & NEW—BUSINESS OPPORTUNITIES

UNDISPLAYED—RATE PER WORD:

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

Positions Vacant and all other classifications, 8 cents a word, minimum charge $2.00.

Proposals, 10 cents a line an insertion.

INFORMATION:

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

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

DISPLAYED—RATE PER INCH:

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

Rates for larger spaces, or yearly rates, on request.

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

POSITIONS WANTED

MANAGER or general superintendent; fifteen years' successful experience. PW-116, Electric Railway Journal, Tenth Ave. at 36th St., New York.

SUPERINTENDENT transportation, wide experience, established successful record, every class of transportation, progressive, efficient, capable getting results under any condition; available short notice; fine references. PW-117, Electric Railway Journal, Guardian Bldg., Cleveland, Ohio.

IMPORTANT

Original letters of recommendation or papers of value should not be enclosed to unknown correspondents—send copies.

WHAT AND WHERE TO BUY

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

This index is published as a convenience to the reader. Every care is taken to make it accurate, but *Electric Railway Journal* assumes no responsibility for errors or omissions.

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

Air Brakes
General Electric Co.
Westinghouse Tr. Br. Co.

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

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

Automatic Return Switch Stands
Ramapo Ajax Corp.

Automatic Safety Switch Stands
Ramapo Ajax Corp.

Axles
Bemis Car Truck Co.
Bethlehem Steel Co.
Brill Co., The J. G.
Carnegie Steel Co.
Cincinnati Car Co.
Westinghouse E. & M. Co.

Axles, Front
Shuler Axle Co.

Axles (Front & Rear) Motor Truck & Passenger Car
Timken Detroit Axle Co.

Axles, Trailer & Motor Bus
Timken Detroit Axle Co.

Babbitting Devices
Columbia Machine Works

Badges and Buttons
Elec. Service Supplies Co.
Inter. Cash Reg. Co., The

Batteries, Dry
Nichols-Lintern Co.

Bearings, Anti-Friction
Timken Roller Bearing Co.

Bearings, Ball
Norma-Hoffman Br'gs Corp.

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

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

Bearings, Roller
Norma-Hoffman Br'gs Corp.
Timken Roller Bearing Co.

Bearings, Thrust
Timken Roller Bearing Co.

Bells and Buzzers
Consolidated Car Htg. Co.

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

Benders, Rail
Railway Trackwork Co.

Bodies, Bus
Bender Body Co.
Brill Co. The J. G.

Boilers
Babcock & Wilcox Co.

Bolts, Case Hardened
Bemis Car Truck Co.

Bond Testers
American Steel & Wire Co.
Electric Service Supplies Co.

Bonding Apparatus
American Steel & Wire Co.
Elec. Service Supplies Co.
Ohio Brass Co.
Railway Trackwork Co.
Una Welding & Bonding Co.

Bonds, Rail
American Steel & Wire Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Page Steel & Wire Co.
Railway Trackwork Co.
Una Welding & Bonding Co.
Westinghouse E. & M. Co.

Brackets and Cross Arms (See also Poles, Ties, Posts, etc.)
Columbia Machine Works
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.

Brake Adjusters
Brill Co., The J. G.
Cincinnati Car Co.
National Ry. Appliance Co.
Westinghouse Tr. Br. Co.

Brake Shoes
Amer. Br. Shoe & F'dry Co.
Bemis Car Truck Co.
Brill Co., The J. G.

Brake Testers
National Ry. Appliance Co.

Brakes, Brake Systems and Brake Parts
Bemis Car Truck Co.
Brill Co., The J. G.
Cincinnati Car Co.
Columbia Machine Works
General Electric Co.
National Brake Co.
Safety Car Devices Co.
Westinghouse Tr. Br. Co.

Brakes, Magnetic Rail
Cincinnati Car Co.

Brushes, Carbon
General Electric Co.
Westinghouse E. & M. Co.

Brushholders
Columbia Machine Works
General Electric Co.

Buses, Motor
General Electric Co.

Bus Lighting
National Ry. Appliance Co.

Bushings, Case Hardened and Manganese
Bemis Car Truck Co.
Brill Co., The J. G.
Cincinnati Car Co.
Columbia Machine Works

Cables (See Wires and Cables)

Cambric Tapes, Yellow and Black Varnish
General Electric Co.
Irvington Varn'h & Ins. Co.

Carbon Brushes (See Brushes, Carbon)

Car Lighting Fixtures
Elec. Service Supplies Co.

Car Panel Safety Switches
Consolidated Car Htg. Co.
Westinghouse E. & M. Co.

Car Steps, Safety
Cincinnati Car Co.

Car Wheels, Rolled Steel
Bethlehem Steel Co.

Cars, Dump
Brill Co., The J. G.
Differential Steel Car Co.

Cars, Gas-Electric
Brill Co., The J. G.
General Electric Co.
Westinghouse E. & M. Co.

Cars, Gas, Rail
Brill Co., The J. G.

Cars, Passenger, Freight, Express, etc.
American Car Co.
Brill Co., The J. G.
Cincinnati Car Co.
Kuhlman Car Co., G. C.
Wason Mfg. Co.

Cars, Self-Propelled
Brill Co., The J. G.

Castings, Brass Composition or Copper
Cincinnati Car Co.
Columbia Machine Works

Castings, Gray Iron and Steel
American Steel Foundries
Bemis Car Truck Co.
Columbia Machine Works
Standard Steel Works

Castings, Malleable
Timken Roller Bearing Co.

Castings, Malleable & Brass
Bemis Car Truck Co.
Columbia Machine Works

Catchers and Retrievers, Trolley
Elec. Service Supplies Co.
Ohio Brass Co.

Chairs, Parlor Car
Heywood-Wakefield Co.

Change Carriers
Cleveland Fare Box Co.
Electric Service Supplies Co.

Change Trays
Cincinnati Car Co.

Circuit-Breakers
General Electric Co.
Westinghouse E. & M. Co.

Clamps and Connectors for Wires and Cables
Columbia Machine Works
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Cleaners
Oakite Products, Inc.

Cleaners and Scrapers, Track (See also Snow-Plows, Sweepers and Brooms)
Brill Co., The J. G.
Cincinnati Car Co.

Clutches
Long Mfg. Co.

Coil Banding and Winding Machines
Columbia Machine Works
Elec. Service Supplies Co.
Westinghouse E. & M. Co.

Coils, Armature and Field
Columbia Machine Works
General Electric Co.
Westinghouse E. & M. Co.

Coils, Coke and Kicking
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Coin Changers
Johnson Fare Box Co.

Coin Counting Machines
Cleveland Fare Box Co.
Inter. Cash Reg. Co., The
Johnson Fare Box Co.

Coin Sorting Machines
Cleveland Fare Box Co.
Johnson Fare Box Co.

Coin Wrappers
Cleveland Fare Box Co.

Commutator Slotters
Columbia Machine Works
Elec. Service Supplies Co.
Westinghouse E. & M. Co.

Commutators or Parts
Columbia Machine Works
General Electric Co.
Westinghouse E. & M. Co.

Compressors, Air
General Electric Co.
Westinghouse Tr. Br. Co.

Condensers
General Electric Co.
Westinghouse E. & M. Co.

Condenser Papers
Irvington Varn'h & Ins. Co.

Connectors, Solderless
Westinghouse E. & M. Co.

Connectors, Trailer Car
Columbia Machine Works
Consolidated Car Htg. Co.
Elec. Service Supplies Co.
Ohio Brass Co.

Controllers or Parts
Columbia Machine Works
General Electric Co.
Westinghouse E. & M. Co.

Controller Regulators
Elec. Service Supplies Co.

Controlling Systems
General Electric Co.
Westinghouse E. & M. Co.

Converters, Rotary
General Electric Co.
Westinghouse E. & M. Co.

Copper Wire
American Brass Co.
Anaconda Cop. Mining Co.
Page Steel & Wire Co.

Copper Wire Instruments, Measuring, Testing and Recording
American Brass Co.
Anaconda Copper Mining Co.

Cord, Bell, Trolley, Register
American Steel & Wire Co.
Brill Co., The J. G.
Elec. Service Supplies Co.
Inter. Cash Reg. Co., The
Roebling's Sons Co., John A.

Cord Connectors and Couplers
Elec. Service Supplies Co.

Couplers Car
American Steel Foundries
Brill Co., The J. G.
Cincinnati Car Co.
Ohio Brass Co.
Westinghouse Tr. Br. Co.

Cowl Ventilators
Nichols-Lintern Co.

Cranes, Hoists & Lifts
Electric Service Supplies Co

Cross Arms (See Brackets)

Crossing Foundations
International Steel Tie Co.

Crossings
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.

Crossings, Frogs & Switches
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.

Crossings, Manganese
Bethlehem Steel Co.
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.

Crossings, Track (See Track Special Work)

Crossings, Trolley
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Curtains & Curtain Fixtures
Brill Co., The J. G.

Cutting Apparatus
General Electric Co.
Railway Trackwork Co.
Una Welding & Bonding Co.
Westinghouse Tr. Br. Co.

Dealer's Machinery & Second Hand Equipment
Central Illinois Public Service Co.
Zelnicker in St. Louis

Derailing Devices (See also Track Work)

Derailing Switches
Ramapo Ajax Corp.

Destination Signs
Columbia Machine Works
Elec. Service Supplies Co.

Detective Service
Wish-Service, P. Edward

Door Operating Devices
Brill Co., The J. G.
Cincinnati Car Co.
Consolidated Car Heating Co.
National Pneumatic Co.
Safety Car Devices Co.

Doors & Door Fixtures
Brill Co., The J. G.
Cincinnati Car Co.
Hale-Kilburn Co.

Doors, Folding Vestibule
National Pneumatic Co.
Safety Car Devices Co.

Drills, Track
American Steel & Wire Co.
Electric Service Supplies Co.
Ohio Brass Co.

Dryers, Sand
Electric Service Supplies Co.
Westinghouse E. & M. Co.

Ears
Columbia Machine Works
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Electric Grinders
Railway Trackwork Co.

Electrical Wires and Cables
American Steel & Wire Co.
John A. Roebling's Sons Co.

Electrodes, Carbon
Railway Trackwork Co.
Una Welding & Bonding Co.

Electrodes, Steel
Railway Trackwork Co.
Una Welding & Bonding Co.

Engineers, Consulting, Contracting and Operating
Beeler, John A.
H. M. Byllesby Co.
Day & Zimmermann, Inc.
Faile & Co., E. H.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Kelker & DeLeuw
McClelland & Junkersfeld
Richey, Albert S.
Sanderson & Porter
Stevens & Wood
Stone & Webster Co.
White Eng. Corp., The J. G.

Engines, Gas, Oil or Steam
Westinghouse E. & M. Co.

Fare Boxes
Cleveland Fare Box Co.
Johnson Fare Box Co.
Perey Mfg. Co.

Fare Registers
Electric Service Supplies Co.
Johnson Fare Box Co.

Fences, Woven Wire & Fence Posts.
American Steel & Wire Co.

Fenders and Wheel Guards
Brill Co., The J. G.
Cincinnati Car Co.
Star Brass Works

Fibre and Fibre Tubing
Westinghouse E. & M. Co.

Field Coils (See Coils)

Floodlights
Electric Service Supplies Co.
General Electric Co.

Forgings
Brill Co., The J. G.
Cincinnati Car Co.
Standard Steel Works Co.

Frogs & Crossings, Tee Rail
Bethlehem Steel Co.
Lorain Steel Co.
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.

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General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

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Columbia Machine Works
Consolidated Car Htg. Co.
General Electric Co.
Westinghouse E. & M. Co.

Gas Electric Drive for Buses
General Electric Co.

Gas Producers
Westinghouse E. & M. Co.

Gates, Car
Brill Co. The J. G.
Cincinnati Car Co.

Gear Blanks
Brill Co., The J. G.
Standard Steel Works Co.

Gear Cases
Chillingworth Mfg. Co.
Columbia Machine Works
Electric Service Supplies Co.
Westinghouse E. & M. Co.

Gears and Pinions
Bemis Car Truck Co.
Columbia Machine Works
Electric Service Supplies Co.
General Electric Co.
Nat'l Ry. Appliance Co.

Generators
General Electric Co.
Westinghouse E. & M. Co.

Girder Rails
Bethlehem Steel Co.
Lorain Steel Co.

Gongs (See Bells and Gongs)

Grinders & Grinding Supplies
Metal & Thermit Corp.

Grinders, Portable
Railway Trackwork Co.

Grinders, Portable Electric
Railway Trackwork Co.

Grinding Bricks and Wheels
Railway Trackwork Co.

Ground Wires
Page Steel & Wire Co.

Guard Rail Clamps
Lorain Steel Co.
Ramapo Ajax Corp.

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

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

Harps, Trolley
Columbia Machine Works
Elec. Service Supplies Co.
Ohio Brass Co.
Star Brass Works

Headlights
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.

Headlining
Columbia Machine Works

Heaters, Bus
Nichols-Lintern Co.

Heaters, Car (Electric)
Consolidated Car Heating Co.
Gold Car Heat. & Ltg. Co.
Railway Utility Co.
Smith Heater Co., Peter

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

Heaters, Car Stove
Smith Heater Co., Peter

Helmets, Welding
Railway Trackwork Co.
Una Welding & Bonding Co.

Hoists & Lifts
Columbia Machine Works

Hose, Bridges
Ohio Brass Co.

Hose, Pneumatic
Westinghouse Tr. Brake Co.

Instruments, Measuring, Testing and Recording
American Steel & Wire Co.
General Electric Co.
National Ry. Appliance Co.
Westinghouse E. & M. Co.

Insulating Cloth, Paper and Tape
General Electric Co.
Irvington Varn'h & Ins. Co.
Okonite Co.
Okonite-Callender Cable Co.
Westinghouse E. & M. Co.

Insulating Silk
Irvington Varn'h & Ins. Co.

Insulating Varnishes
Irvington Varnish & Ins. Co.

Insulation (See also Paints)
Electric Ry. Equipment Co.
Elec. Service Supplies Co.
Irvington Varn'h & Ins. Co.
Okonite Co.
Okonite-Callender Cable Co.
Westinghouse E. & M. Co.

Insulation Slots
Irvington Varn'h & Ins. Co.

Insulator Pins
Elec. Service Supplies Co.
Ohio Brass Co.

Insulators (See also Line Materials)
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Irvington Varn'h & Ins. Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

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

Joints, Rail
(See Rail Joints)

Journal Boxes
Bemis Car Truck Co.
Brill Co., The J. G.
Cincinnati Car Co.

Lamp Guards and Fixtures
Elec. Service Supplies Co.
Westinghouse E. & M. Co.

Lamps, Arc & Incandescent (See also Headlights)
General Electric Co.
Westinghouse E. & M. Co.

Lamps, Signal and Marker
Elec. Service Supplies Co.
Nichols-Lintern Co.

Lanterns, Classification
Nichols-Lintern Co.

Letter Boards
Cincinnati Car Co.

Lighting Fixtures, Interior
Electric Service Supplies Co.

Lightning Protection
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Line Material (See also Brackets, Insulators, Wires, etc.)
Electric Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Locking Spring Boxes
Lorain Steel Co.
Wm. Wharton, Jr. & Co.

Locomotives, Electric
Cincinnati Car Co.
General Electric Co.
Westinghouse E. & M. Co.

Manganese Steel Guard Rails
Ramapo Ajax Corp.
Wm. Wharton, Jr., & Co.

Manganese Steel Castings
Bemis Car Truck Co.
Lorain Steel Co.

Manganese, Steel, Special Track Work
Bethlehem Steel Co.
Wm. Wharton, Jr. & Co.

Manganese Steel Switches Frogs and Crossings
Bethlehem Steel Co.
Lorain Ajax Corp.
Ramapo Ajax Corp.
Wm. Wharton, Jr. & Co.

Mirrors, Inside & Outside
Cincinnati Car Co.

Motor Buses, (See Buses)

Motors, Electric
General Electric Co.
Westinghouse E. & M. Co.

Motor, Generators & Controls for Electric Buses
General Electric Co.

Motorman's Seats
Brill Co., The J. G.
Cincinnati Car Co.
Elec. Service Supplies Co.
Heywood-Wakefield Co.

Nuts and Bolts
Bemis Car Truck Co.
Cincinnati Car Co.

Omnibuses (See Buses)

Oxy-Acetylene (See Cutting Apparatus)

Packing
Westinghouse Tr. Brake Co.

Paints and Varnishes (Insulating
Elec. Service Supplies Co.
Irvington Varn'h & Ins. Co.

Paints & Varnishes, Railway
National Ry. Appliance Co.

Pickup, Trolley Wire
Elec. Service Supplies Co.
Ohio Brass Co.

Pinion Pullers
Elec. Service Supplies Co.

Pinions (See Gears)

Pins, Case Hardened
Bemis Car Truck Co.

Pins, Case Hardened, Wood and Iron
Ohio Brass Co.
Westinghouse Tr. Brake Co.

Pipe Fittings
Standard Steel Works
Westinghouse Tr. Brake Co.

Planers (See Machine Tools)

Plates for Tee Rail Switches
Ramapo Ajax Corp.

Pliers, Rubber Insulated
Elec. Service Supplies Co.

Pole Line Hardware
Bethlehem Steel Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.

Poles, Metal
Union Metal Mfg. Co., The

Poles, Metal Street
Elec. Ry. Equipment Co.

Poles, Ties, Posts, Piling & Lumber
American Creosoting Co.
Bell Lumber Co.

Poles and Ties, Treated
American Creosoting Co.
Bell Lumber Co.

Poles, Trolley
Elec. Service Supplies Co.

Poles, Tubular Steel
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.

Portable Grinders
Railway Trackwork Co.

Potheads
Okonite Co.
Okonite-Callender Cable Co., Inc.

Power Saving Devices
National Ry. Appliance Co.

Pressings, Special Steel
Cincinnati Co.

Pressure, Regulators
General Electric Co.
Westinghouse E. & M. Co.
Westinghouse Tr. Brake Co.

Punches, Ticket
Inter. Cash Reg. Co., The

Radiators
Long Mfg. Co.

Rail Braces and Fastenings
Ramapo Ajax Corp.

Rail Grinders (See Grinders)

Rail Joints
Carnegie Steel Co.
Rail Joint Co.

Rail Joints, Welded
Lorain Steel Co.
Metal & Thermit Corp.

Rail Welding
Metal & Thermit Corp.
Railway Trackwork Corp.
Una Welding & Bonding Co.

Rails, Steel
Carnegie Steel Co.

Railway Safety Switches
Consolidated Car Htg. Co.
Westinghouse E. & M. Co.

Rattan
Brill Co., The J. G.
Elec. Service Supplies Co.
Hale-Kilburn Co.

Rattan Car Seat, Webbing
Heywood-Wakefield Co.

Registers and Fittings
Brill Co., The J. G.
Cincinnati Car Co.
Elec. Service Supplies Co.
Inter. Cash Reg. Co., The
Money Meters, Inc.

Reinforcement, Concrete
American Steel & Wire Co.
Bethlehem Steel Co.
Carnegie Steel Co.

Repair Shop Appliances (See also Coil Banding and Winding Machines)
Elec. Service Supplies Co.

Repair Work (See also Coils)
Westinghouse E. & M. Co.

Replacers, Car
Cincinnati Car Co.
Elec. Service Supplies Co.

Resistance
Consolidated Car Htg. Co.
General Electric Co.

Resistance, Wire and Tube
Westinghouse E. & M. Co.

Retrievers, Trolley (See Catchers and Retrievers Trolley)

Rheostats
General Electric Co.
Westinghouse E. & M. Co.

Safety Control Devices
Safety Car Devices Co.

Sanders, Track
Brill Co., The J. G.
Elec. Service Supplies Co.
Nichols-Lintern Co.
Ohio Brass Co.

Sash Fixtures, Car
Brill Co., The J. G.
Cincinnati Car Co.

Sash, Metal Car Window
Hale-Kilburn Co.

Scrapers, Track (See Cleaners and Scrapers Track)

Screw Drivers, Rubber Insulated
Elec. Service Supplies Co.

Seating Materials
Brill Co., The J. G.
Hale-Kilburn Co.
Heywood-Wakefield Co.

Seats, Bus
Brill Co., The J. G.
Hale-Kilburn Co.
Heywood-Wakefield Co.

Seats, Car (See also Rattan)
Brill Co., The J. G.
Cincinnati Car Co.
Hale-Kilburn Co.
Heywood-Wakefield Co.

Second Hand Equipment
Central Illinois Public Service Co.
Zeinicker in St. Louis

Shades, Vestibule
Brill Co., The J. G.
Cincinnati Car Co.

Shovels
Brill Co., The J. G.

Shovels, Power
Brill Co., The J. G.

Side Bearings (See Bearings Center and Side)

Signals, Car Starting
Consolidated Car Htg. Co.
Elec. Service Supplies Co.
National Pneumatic Co.

Signal Gates (Automatic)
Standard Automatic Signal Corp.

Signals, Indicating
Nichols-Lintern Co.

Signal Systems, Block
Elec. Service Supplies Co.
Nachod and United States Electric Signal Co.

Signal Systems, Highway Crossing
Nachod and United States Electric Signal Co.
Standard Automatic Signal Corp.

Slack Adjusters (See Brake Adjusters)

Steel Wheels and Cutters
Cincinnati Car Co.
Columbia Machine Works
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.

Smokestacks, Car
Nichols-Lintern Co.

Snow Plows
National Ry. Appliance Co.

Snow-Plows, Sweepers and Brooms
Brill Co., The J. G.
Columbia Machine Works

Snow Sweeper, Rattan
J. G. Brill Co.
Heywood-Wakefield Co.

Soldering and Brazing Apparatus (See Welding Processes and Apparatus)

Special Adhesive Papers
Irvington Varn'h & Ins. Co.

Special Trackwork
Bethlehem Steel Co.
Lorain Steel Co.
Wm. Wharton, Jr. & Co.

Spikes
American Steel & Wire Co.

Splicing Compounds
Westinghouse E. & M. Co.

Splicing Sleeves (See Clamps and Connectors)

Springs
National Ry. Appliance Co.

Springs, Car and Truck
American Steel Foundries
American Steel & Wire Co.
Bemis Car Truck Co.
Brill Co. The J. G.
Cincinnati Car Co.
Standard Steel Works

Sprinklers, Track and Road
Brill Co., The J. G.

Steel, Electric Furnace
Timken Roller Bearing Co.

Steel, Open Hearth
Timken Roller Bearing Co.

Steel and Steel Products
American Steel & Wire Co.
Carnegie Steel Co.

Steps, Car
Brill Co., The J. G.
Cincinnati Car Co.

Stokers, Mechanical
Babcock & Wilcox Co.
Westinghouse E. & M. Co.

Stop Signals
Nichols-Lintern Co.

Storage Batteries (See Batteries, Storage)

Strain Insulators
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

Strand
American Steel & Wire Co.
Roebling's Sons Co., J. A.

Street Cars (See Cars, Passenger, Freight, Express)

Superheaters
Babcock & Wilcox Co.

Sweepers, Snow (See Snow Plows, Sweepers and Brooms)

Switches
General Electric Co.

Switch Stands and Fixtures
Ramapo-Ajax Corp.

Switches, Selector
Nichols-Lintern Co.

Switches and Switchboards
Consolidated Car Htg. Co.
Elec. Service Supplies Co.
Westinghouse E. & M. Co.

Switches, Tee Rail
Ramapo-Ajax Corp.

Switches, Track (See Track Special Work

Tampers, Tie
Railway Trackwork Co.

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Ramapo-Ajax Corp.

Telephones and Parts
Elec. Service Supplies Co.

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American Steel & Wire Co.
American Tel. & Telgph Co.
John A. Roebling's Sons Co.

Testing Instruments (See Instruments, Measuring, Testing, etc.)

Thermostats
Consolidated Car Htg. Co.
Gold Car Htg. & Ltg. Co.
Railway Utility Co.
Smith Heater Co., Peter

Ticket Choppers and Destroyers
Elec. Service Supplies Co.

Ties and Tie Rods, Steel
Carnegie Steel Co.
International Steel Tie Co.

Ties, Wood Cross (See Poles, Ties, Posts, etc.)

Tokens
Johnson Fare Box Co.

Tongue Switches
Wm. Wharton, Jr. & Co.

Tools, Track & Miscellaneous
American Steel & Wire Co.
Columbia Machine Works
Elec. Service Supplies Co.
Railway Trackwork Co.
Ramapo-Ajax Corp.

Towers and Transmission Structure
Westinghouse E. & M. Co.

Track Grinders
Metal & Thermit Corp.
Railway Trackwak Co.
Ramapo-Ajax Corp.

Track, Special Work
Columbia Machine Works
Ramapo-Ajax Corp.

Trackless Trolley Cars
Brill Co., The J. G.

Transformers
General Electric Co.
Westinghouse E. & M. Co.

Treads, Safety Stair, Car Step
Cincinnati Car Co.

Tree Wire
Okonite Co.
Okonite-Callender Cable Co.

Trolley Bases
Ohio Brass Co.

Trolley Bases, Retrieving
Ohio Brass Co.

Trolley Buses
Brill Co., The J. G.
Westinghouse E. & M. Co.

Trolley Material, Overhead
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse E. & M. Co.

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American Steel & Wire Co.
Anaconda Copper Min. Co.
Page Steel & Wire Co.
Roebling's Sons Co., J. A.

Trucks, Car
Bemis Car Truck Co.
Brill Co., The J. G.
Cincinnati Car Co.

Tubing, Steel
Timken Roller Bearing Co.

Tubing, Yellow and Black Flexible Varnish
Irvington Varn'h & Ins. Co.

Turbines, Steam
General Electric Co.
Westinghouse E. & M. Co.

Turntables
Elec. Service Supplies Co.

Turnstiles
Elec. Service Supplies Co.
Percy Mfg. Co., Inc.

Valves
Ohio Brass Co.
Westinghouse Tr. Br. Co.

Varnished Papers and Silks
Irvington Varn'h & Ins. Co.

Ventilators, Car
Brill Co., The J. G.
Cincinnati Car Co.
Consolidated Car Htg. Co.
Nichols-Lintern Co.
Nat'l Ry. Appliance Co.
Railway Utility Co.

Welded Rail Joints
Metal & Thermit Corp.
Railway Trackwork Co.
Una Welding & Bonding Co.

Welders, Portable Electric
General Electric Co.
Ohio Brass Co.
Railway Trackwork Co.
Una Welding & Bonding Co.
Westinghouse E. & M. Co.

Welders, Rail Joint
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Ohio Brass Co.
Railway Trackwork Co.

Welding Processes and Apparatus
Metal & Thermit Corp.
Ohio Brass Co.
Railway Trackwork Co.
Una Welding & Bonding Co.
Westinghouse E. & M. Co.

Welding, Steel
Railway Trackwork Co.
Roebling's Sons Co., J. A.

Welding Wire
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Railway Trackwork Co.
Roebling's Sons Co., J. A.

Welding Wire and Rods
Page Steel & Wire Co.
Railway Trackwork Co.

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Wheel Presses (See Machine Tools)

Wheels, Car, Steel & Steel Tire
American Steel Foundries
Bemis Car Truck Co.
Carnegie Steel Co.
Standard Steel Works

Wheels, Trolley
Columbia Machine Works
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
Nat'l. Boaring Met. Corp.
Ohio Brass Co.
Star Brass Works

Whistles, Air
Ohio Brass Co.
Westinghouse E. & M. Co.
Westinghouse Tr. Br. Co.

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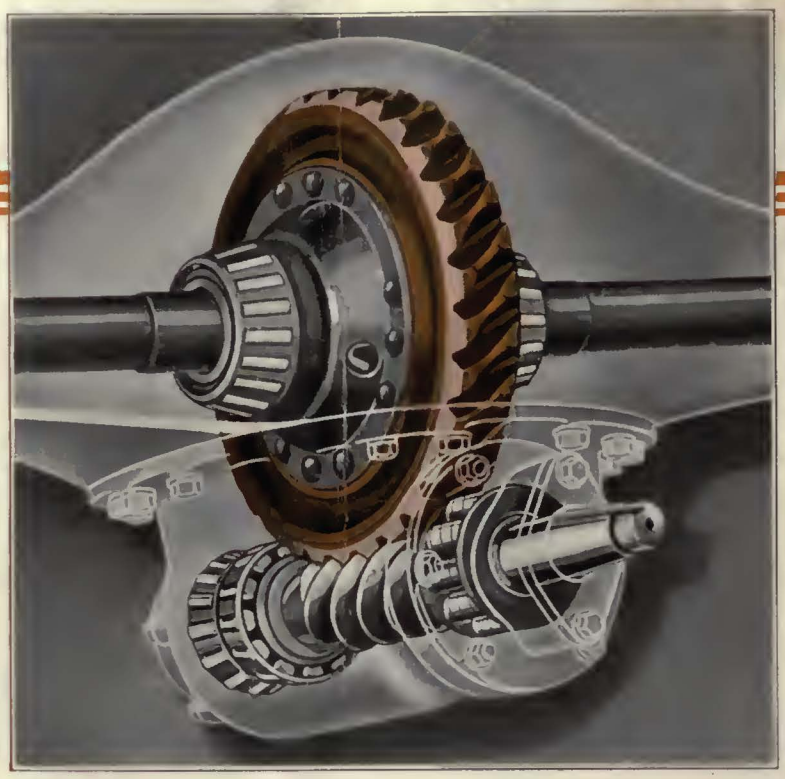
Okonite Co.
Okonite-Callender Cable Co.
Page Steel & Wire Co.
Roebling's Sons Co., J. A.
Westinghouse E. & M. Co.

Wood Preservations
American Creosoting Co.



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