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Vol. 62, *No.* 19 New York, November 10, 1923 *Pages* 807-844

ELECTRIC RAILWAY JOURNAL

CONTENTS

Editorial and Business Offices

WE'RE back on the twelfth floor where we greeted you before starting our trip through the House of McGraw-Hill. The deserted appearance is explained by the clock—it is now the noon hour. The room is flooded with light from great north windows 11 ft. wide and 18 ft. tall. The west wall is lined 9 ft. deep with books. Above the east and south sides of the room you see the attractive mezzanine floor on which are located the telephone, telegraph and other important departments as well as the spacious offices of the principal executives.

While three sides of the lower floor, next to the windows, contain the editorial and business offices of seven publications, most of the glass-inclosed offices you see at the right are used by ELECTRIC RAILWAY JOURNAL. Our make-up editor and his assistant, to whose expert work every issue of the JOURNAL bears witness, occupy the northeast corner of the floor, next to a cathedral-tall window. Associate editors, assistant business managers, secretaries and clerks work in the "great open spaces."

To get the best view of the floor you must see it from above. From the "mezz" you see there is plenty of space between filing cases and desks and that the 125 men and women at work on seven publications have plenty of room. There is ceaseless activity on this floor and each day sees a tremendous volume of work turned out, but all is done so noiselessly that visitors invariably comment on the silence and restfulness of these editorial and business offices.

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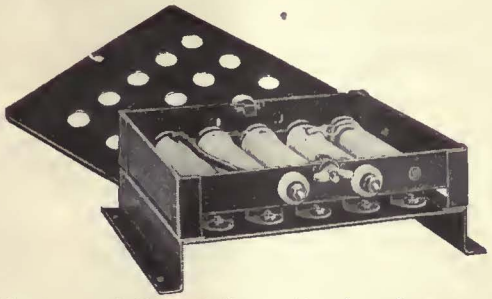

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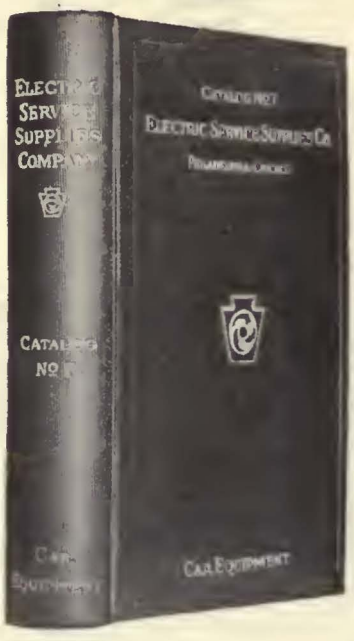

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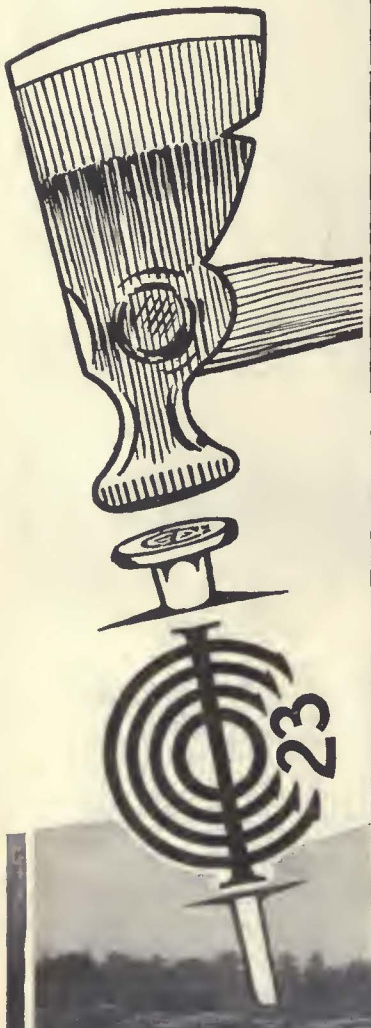

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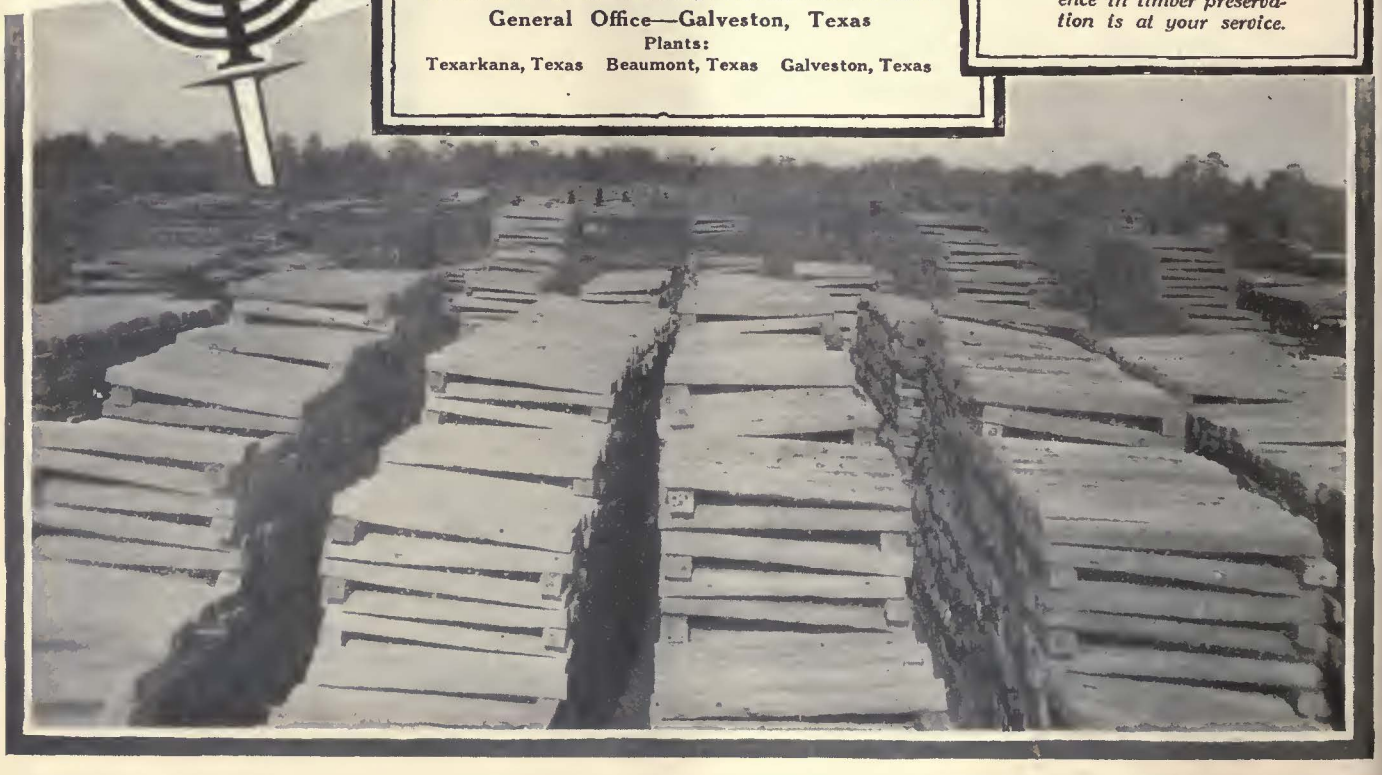

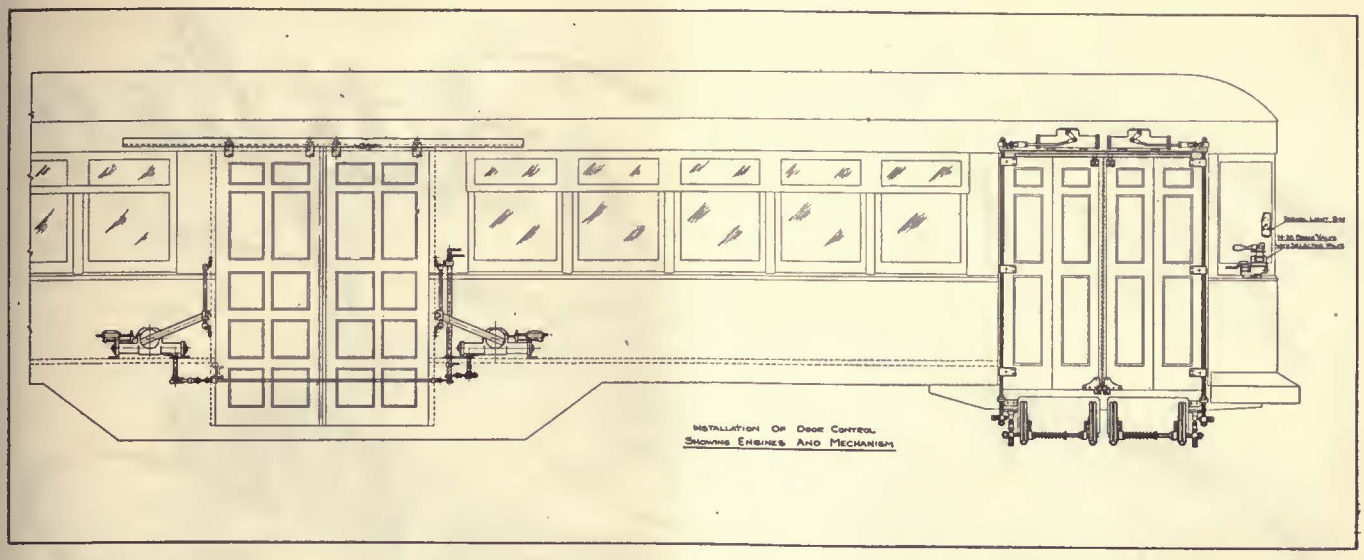

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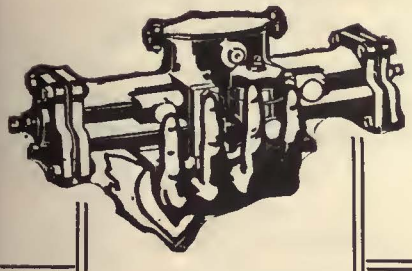

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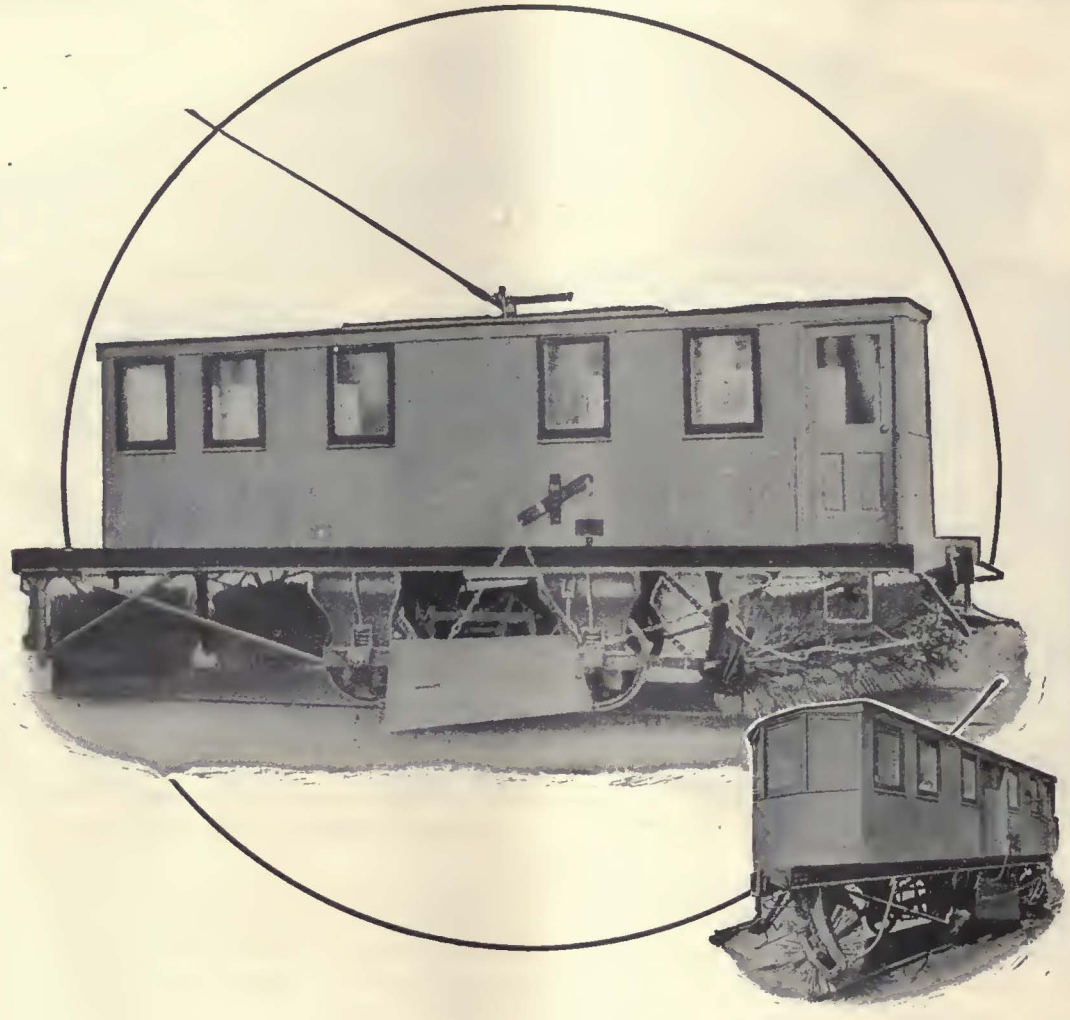

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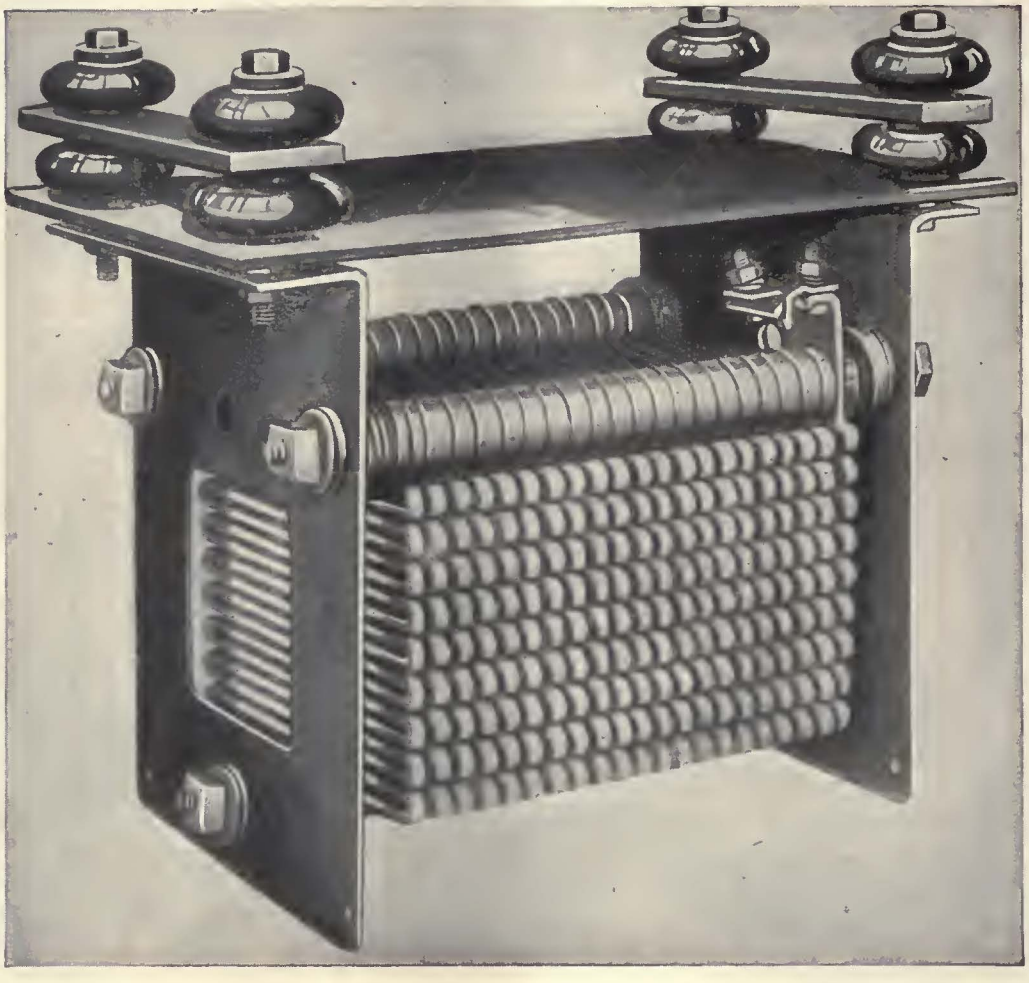

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New York, Saturday, November 10, 1923

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Company, Inc.

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

Volume 62
Number 19

A Basis for Getting the Merchants to Accept Traffic Regulation

WE ARE all familiar with the phenomenon of a small commercial district springing up almost overnight where only residences used to be. At first thought this may be considered an inevitable accompaniment of the growth of the community. This is partly true, but the neighborhood store is growing at a very much faster rate than the population. Even in cities of moderate size it is now possible to purchase nearly all the necessities of life and most of the luxuries, including high-class entertainment, without going more than a few blocks from one's own home.

The greatest losers by this development are the downtown merchants. But another loser is the electric railway, which is deprived of two fares every time a customer buys at the neighborhood store instead of riding downtown and back. The trolley company and these merchants thus have a common interest in centralized trading.

A contributing reason for this development has been the slowing up of surface transportation systems. The longer it takes to reach the center of the city and return again, the more people get away from the habit of shopping downtown. The modern electric car is faster than its predecessors, but it is being seriously handicapped because of vehicular congestion.

We have been deluged with figures concerning the number of automobiles in this country, totaling some 14,000,000, or about one to every seven inhabitants, and many people have come to believe that the population in its daily comings and goings uses the automobile to the almost entire exclusion of all other means of transportation. This idea has led merchants to make tremendous efforts to attract the automobile trade. But the falsity of this theory can be very easily demonstrated. For example, the recent traffic survey of Los Angeles showed that on one street during a single hour there were more than 14,000 passengers in street cars and only 1,169 riders in automobiles. It is ridiculous to assume that there is more potential purchasing power in 1,100 automobilists than there is in 14,000 trolley riders. The truth is that few merchants could survive on the automobile trade alone. Their prosperity depends upon the proper functioning of the whole transportation system.

This idea is not new to the electric railways, but it is just beginning to be appreciated by the merchants. They have thought that cars parked around their stores meant increased trade. This was true once, but the limit was soon reached. Now only part of those who would shop can find places to park near the store, and the general congestion resulting, added to the other street traffic, tends to close off the easy access to the shops for the multitudes who ride the street cars. And it is in reality these car riders who support the stores, not the automobile owners. Thus, whatever makes it easier and quicker for the street car rider to get to the downtown store is of material interest to the merchant, and if appealed to on this basis, the latter would probably want to support, rather than oppose, as he has often done, the anti-parking and other traffic regulations that would help to speed up street car operation.

Objections to One-Man Cars Are Largely Political in Character

IT IS hard to see the philosophy of demanding the withdrawal of one-man cars, as has been proposed in various cities and states. The most recent cases are those of the state of Massachusetts and the city of Oakland, Cal. The objection to the use of cars of this type seems to come mainly from certain politicians, who use this as a means of keeping an issue before the public in order to line up prospective votes.

The one-man car is not an experiment, and it has been used in so many different localities and under so many different conditions that it has been proved out thoroughly. The annual statistical review published by this paper in the issue for Jan. 6, 1923, showed that approximately 7,500 cars of this type were then in use, and 785 cars were remodeled for one-man service during 1922. A later study made for the annual convention number published Sept. 29, 1923, shows that out of a total of 1,385 cars ordered in the first six months of this year, 1,206, or 87 per cent of the total, were arranged for operation by one man. Surely this does not indicate that the one-man car cannot be depended on for service.

With the use of one-man cars the railways have found it possible to meet rising expenses of operation to some extent and to handle the business at costs not so much above those existing prior to the war, as would be the case without their use. This has kept fares down below what they would have been without such help. The basic fact in this connection that cannot be overlooked is that wages of today are twice as great as they were when the companies were making money on a 5-cent fare, and the account "conducting transportation," which is principally platform labor, amounts to about 50 per cent of the total operating expenses

In Massachusetts, where a bill to abolish one-man cars has been introduced in the Legislature, it has been stated that the electric railways have operated some 56,000,000 car-miles with one-man cars, and that the accident record has been considerably improved as compared with two-man operation. This has been held

due largely to the greater responsibility felt and discharged by the individual operator.

In Oakland the San Francisco-Oakland Terminal Railways has made an investment of upward of a million dollars in cars of this type, with the approval of the City Council that now wants to prohibit them. The purchase and the operation of the cars also have the sanction of the State Railroad Commission. The company states that these cars, which were put in service in 1920, have made more than 2,000,000 miles and carried 13,700,000 passengers in safety without protest or complaint. This certainly does not give any valid argument for the present agitation in the City Council.

It is just such actions of politicians as this that lead to many of the financial difficulties of electric railways. It is not an easy matter for the management to do its best to give adequate service under adverse conditions and then have all its labor go for naught at the whim of a group of politicians. Nothing is gained by such moves, as the only persons who may benefit, the car operators, may lose their jobs entirely instead of getting additions to their ranks. As a matter of fact, the best way to make the trainmen prosperous is to make the railway prosperous, and this cannot be done by limiting the productivity of the individual.

Building Traffic— or Driving It Away

HOW MANY of us appreciate the possibility for application of the practice expressed in the much-used words "merchandising transportation"? There is some basis for feeling that the difficulties of many electric railway properties are attributable, in part at least, to a very limited conception of what may be done to sell transportation. Two instances illustrate the point.

The first happened to a man who tried the experiment of traveling from Chicago to Rochester, New York, via electric. He, with several other travelers who cover this territory frequently, were informed by one electric railway property along this route that a connection would be made with another company's car at the terminus of the first line. Coming up the main street of the town, one minute late, the party saw the outgoing car leave the terminal. Apparently no effort was being made by either company to make this very desirable connection.

Compare this example of the way in which this group of regular patrons of the line were accommodated with the details of the second case.

A passenger informed the agent at the station at which he boarded a high-grade limited train of an electric line that he was very anxious to make connection with a through steam railway train at a station some distance from the electric line's terminus in a large city. The agent and then the traffic department quickly responded to the situation. Arrangements were made to hold the steam train for this passenger. The electric train was brought into the terminal several minutes ahead of schedule. A taxicab provided by the electric line was waiting to transport the passenger to the steam road station. Tickets had been secured for him in the meantime by the electric railway traffic department. Needless to say, a delighted passenger boarded the steam train.

The details of the methods used to accomplish this connection are of no particular interest. However, the spirit back of the organization is worthy of imitation.

The two cases cited are extreme, although they are both actual incidents. Imagine the frame of mind toward the electric railways in which these two passengers completed their respective trips and you have a striking example of what it means to merchandise electric railway transportation. If the names of the two railways concerned could be divulged, their respective condition would well illustrate the results of the spirit underlying the incidents related.

Earning Power Is Key to New York Railways Reorganization Plan

TO A reorganization committee, the value of any property lies in its earning power. Capital to build up a property may or may not have been wisely used in that process and may or may not exceed the value of the physical plant, but the net earnings after paying all charges are the usual measure taken of prosperity of an enterprise. It is this consideration probably that has led the committee in charge of the work of preparing a plan for the reorganization of the New York Railways to recommend the wiping out of $17,495,060 of stock of that company, and a change in the remaining financial structure so as to cut fixed charges by $720,000, annual contingent charges by $650,000 and rentals of leased lines by $350,000.

Peculiar circumstances surround the operation of this property. The question of the pursuit of a wise or unwise policy in connection with its operation in the past does not enter into the picture now. With escape from the fixed 5-cent fare apparently impossible, with the competition of the rapid transit lines confronting it and with other factors entering, the entire economic status of the company has changed. All these things the majority representatives of the various security holders have taken into account, and they have submitted for the approval of the court and commission a plan which would appear to make it possible for the company to carry on indefinitely without the likelihood of future disturbance of its credit. Thus the only bonds which it is proposed to leave undisturbed in the reorganization are those which have earned their interest in the past. As the New York *Times* remarked, the lines and leases, the stocks and bonds, which fail to produce dividends or interest are sentenced to capital punishment. To those who are always clamoring for regulation and more regulation, the same paper says that the punishment proposed to be meted out exceeds anything which toothless statutes could inflict. In short, they are economic regulations. The fact that a minority report was presented to the court differing in some of its points from the majority opinion does not alter the main facts, for the ends sought in both reports are essentially the same.

However hard the terms of the reorganization may appear, they could hardly in this instance be less drastic and not invite a repetition of disaster in the future. In this respect they are particularly in the interest of the public, which in the future will be represented on the board of directors under the provision to that end suggested by the committee. This provision is in line with recent thought in New York as shown by the adoption of the same plan by the Interborough Rapid Transit Company and its inclusion in the proposed "consolidation" plan of the Transit Commission.

One Hundred per Cent One-Man Operation Proves Successful in Dayton

Improved Service at a Lower Fare with Double-Truck Cars Has Increased Traffic and Reduced Operating Expenses in Spite of Higher Wages on the City Railway System

By H. C. DeCamp
Formerly Assistant General Manager City Railway, Dayton, Ohio

On One of the Main Streets of Dayton Passengers Are Seen Boarding the One-Man Cars at the Front Door and Leaving at the Rear Door. An Extra Man on the Street at the Front End Is Making Change

DURING the strike of the platform men of the City Railway in July, 1921, a large number of jitneys made their appearance in Dayton. On this account, after the strike was settled, it was necessary for the company to take vigorous action to regain its lost traffic. Prior to July the fare had been 7 cents or four tickets for a quarter, but it was decided after the strike to reduce the cash fare to 5 cents, with a 1-cent transfer charge.

So much money had been expended during the strike that it was necessary also to cut down the operating expense in order to put the equipment in shape and improve the service. The railway was then operating fifty-six double-truck and several single-truck two-man cars to fill the schedule. Investigation was made in numerous cities where double-truck one-man cars were in use, to determine the feasibility of applying this remedy to the situation in Dayton. This led to the conclusion that if the City Railway could attain 100 per cent one-man operation with double-truck cars the financial problem would be solved.

As a result of the study of one-man operation elsewhere, the company decided to adopt the front-entrance rear-exit plan. There were several reasons for this, the most important being the desire to get the money first, so that in case of any delay on the line, there would be no opportunity for disputes because passengers were not carried through to their destinations. Owing to the layout of the various lines in the city, it was thought that there would be less chance for transfer abuse if transfers were issued when the passengers boarded the cars. Another reason for the adoption of the front-entrance plan was the desire to eliminate boarding accidents which might occur in case the car was crowded and the operator at the front end did not have a clear view of the rear door.

Under the plan being followed in Dayton, after the car has come to a stop, the operator looks into an inside mirror located on the right-hand window post, notes the number of passengers wishing to alight, and when the last one has got off the car, as shown by an outside mirror, he gives a second glance at the inside mirror to note if any other person may suddenly have decided to get off, and if not, closes the rear door and starts the car.

Both front and rear doors are operated by pneu-

Car Built in 1914 and Remodeled for One-Man Operation

matic door engines. These are controlled by two air valves placed in a convenient position, one above the other, at the left of the air-brake valve. By a single movement of the operator's hand both doors can be opened. On each door engine is a switch which controls red and green lights placed in a small metal box on the front center window post immediately in front of the operator. If a door is open, a red light is shown, and when closed, a green light appears.

In addition to the inside and outside mirrors, each car is equipped with a row of five electric lamps over the rear door. These are placed in the letterboard panel and are controlled by the door switch. At night when the door is opened the lamps are lighted, producing a flood of illumination around the outside steps. The lighted area extends for a distance of 15 or 20 ft. and materially assists the operator in determining when the passengers have alighted.

The double-truck one-man cars were equipped with Syracuse turnstiles at the rear end, located as shown in an accompanying illustration. At heavy loading points, in Dayton, it frequently happens that twenty or twenty-five passengers leave the car at the same time. If it were necessary for them all to leave by the front door, confusion and delay would occur, because even with a double front door, only a small number of passengers can board the car before they come into contact with outgoing passengers in the aisle. The method followed, however, has been found to eliminate this difficulty altogether. Another advantage is that passengers move toward the rear of the car, where they will alight, and the entrance is thus kept clear.

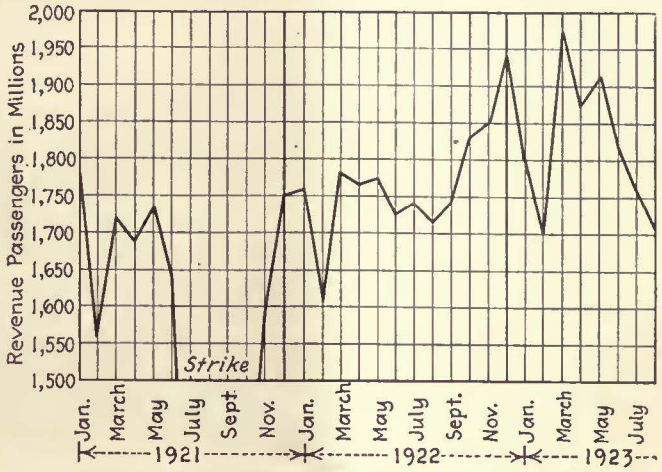
How Car Requirements Were Met

When the City Railway commenced one-man operation, it was decided to rebuild all its cars, because they were very much in need of it, and also to purchase fifteen new light-weight cars especially designed for that method of operation. The latter have already been described in the ELECTRIC RAILWAY JOURNAL, issue of Oct. 28, 1922. As the company's shops were not fitted for such general rebuilding, the work was done at the shops of the Oakwood Street Railway, Dayton. A single car was first entirely rebuilt, repainted inside and out, and completely equipped as a sample of the type to be operated. This model was then approved by the City Commission, and the company began publicity work to tell the general public what it intended to do and how it expected to give better service.

At the start the model car was placed in service with two men, operating on No. 1 run on the best line in the city of Dayton. The company's object in stationing

Ten More Cars of This Type Were Put in Service Recently

two men on the car was to have the second man stand in the rear and in case any one started to alight by the front door he could call out "Rear door, please." These two men alternated in running the car, and by this means, both became expert at it. The car was operated for three days on this run and then put on No. 2 run, the crew of the latter run having been broken in during this period. In this way, all of the crews on runs from 1 to 12, on that line, were instructed in the new operation of cars. At the same time, the public became quite familiar with it. On Sunday, July 23, 1922, when travel was light, a complete equipment of new cars was installed on one line. The same method was followed to inaugurate one-man service on the other lines in the city. At the present time, the company is operating 100 per cent one-man service with double-truck cars.



Curve Showing Trend of Revenue on Dayton City Railway

The percentage in saving of platform wages for the first eight months of this year, compared with the corresponding months of 1922, was as follows: January, 36.4 per cent; February, 36 per cent; March, 37.2 per cent; April, 39.8 per cent; May, 37.7 per cent; June (increased wages), 33 per cent; July, 33.8 per cent; August (extra time for change men in the rush hour), 29.6 per cent.

All the expenses of reconstructing the old cars, as well as the purchase of new cars, have been paid for by the saving in wages and operating expenses and by the increased traffic resulting from improved service. The number of revenue passengers has increased to a gratifying extent. This trend is illustrated in the accompanying chart. The City Railway believes that its success in this venture has been due not only to the front-entrance and rear-exit plan adopted, but also to the thorough education of the public, the careful training of the operators, and attention to small details of equipment. The riding public is well satisfied with the service, and the operators would prefer to resign their jobs rather than return to two-man operation.

No better proof of the success of one-man operation in Dayton is possible than an examination of the financial results therefrom. Besides paying for the reconstruction of the old cars, as already stated, and the purchase of new cars, the railway has paid 6 per cent on the preferred stock and 3 per cent on the common stock.

The Removal of the Turnstiles Installed at Rear, as Shown Above, Has Been Made

Interior of Older Type Car Rebuilt for One-Man Operation

Saving in Platform Expense

The wage scale in effect after the strike beginning in July, 1921, was 41 cents per hour for the first three months, 43 cents per hour for the ensuing nine months, and 45 cents after the end of the first year. This was later increased to 46, 48 and 50 cents per hour respectively, when one-man operation began. In June of the present year, the company voluntarily increased wages to 51, 53 and 55 cents per hour for the one-man operators.

When all service was performed by the two-man cars, the company had 240 platform men. At the present time, with 100 per cent one-man service, the number is 126, which includes six flagmen for railway crossings. At the time of the change, all regular runs were replaced by one-man cars on a car-for-car basis, with the same number of swing runs, but extra trippers added for the evening rush hour. This was done to give the better service which the company promised when making the change. Inasmuch as the change was made gradually, no actual release of employees from service was required, but the company simply ceased to employ new men as employees turned in their resignations. This method worked out to the mutual satisfaction of the railway and the platform men.

Some Operating Details

With two-man operation the average schedule speed of the lines of the City Railway was 9½ m.p.h. Since the inauguration of one-man operation, no change has been made in this schedule. In fact, one of the problems has been to keep the operators from running ahead of time. Since he is in sole charge of the car, the operator does not now have to wait for a signal from the conductor, and this saving in time has resulted in an actual increase in speed, rather than in a tendency to slow up operation.

In the matter of making change, the 5-cent fare has been a great advantage. During the rush hour, from 4:30 to 6 p.m., changemakers are stationed at the principal loading points. By making correct change for passengers before they board the car, they have speeded up operation to such an extent that actual records show a loading speed of thirty-five passengers per minute.

The issuance of transfers has been another problem. A machine is now being developed in Dayton, which is inexpensive and it is hoped will prove satisfactory. Experiments are being tried with it on the Oakwood Street Railway.

Ordinarily, all switches are controlled from inside the car, by using a switch iron through a hole in the floor. During the evening rush hour, however, switchmen are stationed at important points to throw the switches. They also serve as changemakers at these locations, and thus are an additional help to speedy operation.

When one-man service was first inaugurated all of the cars were equipped as noted previously, with Syracuse-type turnstiles at the rear doors. The public has now become educated to the method of operation, and the turnstiles are no longer considered necessary and are being removed from all of the cars. By taking them out, passenger interchange is accelerated, and at the same time valuable space inside of the car is regained. The removal was made also on the ground of public relations, and since their removal, the approval of the passengers has been clearly expressed.

Cost of New and Rebuilt Cars

The rebuilt cars are of three general types, those designated as Barney & Smith cars with a narrow platform, a wooden type built by the Cincinnati Car Company in 1909, and some modern steel cars. Five out of twenty of the latter type have been rebuilt at a cost of $2,000 each for the body, outside of trucks and electrical equipment, and the weight reduced 4,500 lb. by changing the type of motors and trucks. The wooden cars were rebuilt outside at a cost of $4,825 each, which includes an overhead charge of 100 per cent. The cost of converting the older Barney & Smith cars varied somewhat in price, on account of the installation of electric heat in four of them. The price of the new light-weight cars was $9,971 each.

In all of the cars there has been installed, for emergency, a conductor's air valve in the front vestibule, operated by a red cord running along the molding. This cord has pull-handles at the front, middle and rear of the car, labeled "For Emergency Only." When the cord is pulled, exhaust air actuates a circuit breaker knockout, which shuts off the current, applies the brakes and balances the door engines in the same manner as in the standard safety car.

Ten new steel light-weight cars of the type shown in an accompanying illustration were put in service during September of this year. The use of all single-truck cars has now been discontinued, and fifty of them were burned a short time ago, after all available material had been salvaged. Enough plate glass was secured to equip all of the new cars, and in addition there remained a plentiful supply for future replacements.

During the past year the company has been operating with an insufficient number of cars to provide adequate service. Passengers have been crowded in to such an extent that it has been difficult to close the doors. While the undesirable features of such an arrangement are freely admitted by the railway, nevertheless this has served as an excellent test of the value of one-man cars in heavy traffic. Although the population of Dayton is only 160,000 and there are five separate railways operating within the city, nevertheless the City Railway carries an average of 60,000 passengers on week days, and on Saturdays from 75,000 to 80,000.

The public has been pleased with the one-man operation; the platform men are thoroughly satisfied with it, and the number of accidents has decreased. The financial results have been so good that the old rolling stock has now been entirely rebuilt or replaced by new cars. It is therefore felt by the company that the success of the experiment begun a little more than a year ago has now been thoroughly established.

New Safety Organization on Beaver Valley Traction

EX-MEMBERS of the safety committee of the Beaver Valley Traction Company, New Brighton, Pa., determined to keep in touch with the safety work that is being carried on, have formed a new organization known as the "Veterans' Association" of the safety committee, which is sponsored by H. O. Allison, safety engineer.

The safety committee is elected by a vote of all the employees. Membership in the Veterans' Association is limited to those who have served at least one full term on the committee. If any member is re-elected to the safety committee he automatically loses his membership in the Veterans' Association. The purpose of the new organization, of which W. F. Allshouse, track foreman, is president, is to carry on the safety work, and functions as the "Senate of Safety" for the road. Thus has it been exemplified that interested employees who possess initiative will respond when there is a real need for their work. That the safety work pays is attested to by the following statement issued by W. H. Boyce, general manager:

"Organized safety work has resulted in the reduction of our accident costs from 8 per cent of the gross, which was the average for a ten-year period, to 2.42 per cent of gross in 1920, and 1.89 per cent in 1921."

Using the Streets for the Greatest Good of the Greatest Number*

By J. Rowland Bibbins
Consulting Engineer, Washington, D. C.

Traffic Conditions in Several Cities Are Cited as Typical of the General Problem — The Subject of Expediting Traffic Movement Is Looked at in a Broad Way, from Which It Is Noted that However Important Are Other Phases of City Planning, Transportation Must Be Considered as a Fundamental

IT SEEMS high time for those concerned in the serious study of city and transportation development to make a new appraisal of present conditions and future possibilities, for the conflict of interest of those using the public streets has become a veritable battle for supremacy. "Traffic" has become a regional as well as a local problem, and future growth must be met more frankly and scientifically than in the past.

Elements of the Problem

In general, the elements of the problem are as follows:

1. Transit service—capacity and routing.
2. Street traffic control—vehicle and pedestrian.
3. Rail and marine traffic—provision for special needs.
4. Street and highway plan—capacity for present and future.
5. Pedestrian movement.
6. Relation to the broad city or district plan and the general public welfare; special needs of the office, wholesale, retail, warehouse and industrial districts; also the purchasing power of the city for public improvements as measured by its increasing revenues from taxation of private property.

Some Typical Conditions

Chicago has attempted literally to serve an area of over 200 square miles by a central district eight blocks wide by twelve blocks long. But business has now burst through these fictitious boundaries, after facing an economic loss estimated by the City Plan Commission at $60,000,000 a year from traffic impedance due alone to parking in a lineal street frontage of only 110,000 ft. A thirty-minute day and no-parking rush hour traffic ordinance has improved conditions, but 300,000 cars in the Chicago district call for accommodations upon the public streets for business and pleasure.

Baltimore recently found in its business district 152,339 vehicle movements and only 21,036 street car movements, and that during the rush these vehicles handled only 11 per cent of the total passengers carried, while the street cars handled 89 per cent.

Detroit has developed a northerly sub-center of unusual size, Highland Park, but here, at the principal exit from the Ford Motor Works, a rush-hour traffic is found averaging eighteen seconds headway per street car, two seconds for vehicles, and from 0.1 to 0.2 second for pedestrians; i.e., about 200 street cars, 1,800 motors and 10,000 to 20,000 pedestrians per hour.

Montreal, at its three most important street crossings, finds 75 per cent more vehicles than street cars, but these carry only 7 per cent of the passengers carried by cars. And during heavy winter snowfall, practically all traffic is confined to the car tracks for long periods. Motors have multiplied five times in six years and trucks nearly doubled in two years. There are only three main highway entrances to the city, one from the south; but over 80,000 United States automobiles enter Quebec Province during the summer, mostly reaching Montreal. Yet Montreal has only one main traffic street with roadway as wide as 54 ft., necessary for free two-way traffic with street cars and parking, and this street is used for heavy freight traffic between east and west side railroads and industrial districts as well as for the street railway terminal trunk lines.

Los Angeles is striving to work out of its tangle of motor traffic, superimposed upon its street railway and heavy interurban train movement through the streets. It has been recently proposed seriously to exclude street cars entirely from the central business district, using a belt-line transfer instead.

A large proportion of the through interchange l.c.l. freight movement between Chicago railroad terminals is still handled through the city streets by trucks. In Cincinnati practically all l.c.l. interchange freight, formerly handled by trap cars, is now motored through the streets by the shortest route.

These are not far from typical conditions throughout the country in the larger cities. The two most serious tendencies have been the general resistance to any change or betterment except at the "other fellow's" expense, and the very general recourse of city authorities to sudden and drastic prohibition in one form or another in the use of the public streets.

Growth and the Future

It is probable that by 1940 our population will approximate 130,000,000 people, of whom 70,000,000 or more will reside in the cities. Railroad freight tonnage is increasing proportionately as the cube of the population or nearly so; ton mileage is increasing much faster. Thus, terminal tonnage is a problem proportionate to the cube of urban population, at least for a time. Trucking tonnage will probably increase as fast; for, except that which moves car-load direct from origin to final destination, the entire rail tonnage must be carried over our streets and highways one or more times, according to the number of fabrications.

The paradox of transit traffic increasing as the square of the population still continues in New York City, and in most cities it is at least following a geometric

*Reprinted from the *American City Magazine*.

progression, rather than straight proportion. Motors are increasing far beyond the fourth power of the population, and it is found in some cases that the total movement each day in and out of the delivery district of a large city is equal to, or greater than, the number of car registrations for the entire city. Pedestrian traffic seems to be hopelessly crowded into the background.

On the other hand, fixed traffic facilities, such as streets, tracks and terminals, are only slowly increasing —hardly as fast as the population, if at all—while the traffic itself is increasing in geometric ratio to the population. Meanwhile, city authorities hesitate to undergo apparently expensive improvements, although clearly running the risk of vastly greater expense later, due to the rise in property values. And here is the one fortunate aspect. For the assessed value of property in our cities is increasing at about 1.7 power of the population, in some cases faster than the square. This growth is generally stable and a reasonably sure index, and should offer great encouragement to careful study and prompt action.

Suggestions for Constructive Action

From these facts it is clear that the immediate and future problem is largely a terminal one. It has been greatly neglected in the past and left entirely in private or corporate hands or to the carriers themselves. Few cities have even gone so far as to develop bypass traffic streets and highways,* and in a recent 2,000-mile auto trip in the East the writer did not see a single sign at the entrance to a city reading "Heavy traffic detour this way."

There are many avenues for constructive action, immediate and future, which ought to be based upon ascertainment of definite facts first. The general idea of decentralization is of course good, but even subcenters have to be planned in advance. Thus, the problem of Highland Park, Mich., is already as large as the central district problem of a city of a million or more.

The thoroughfare plan is most important. We now know that the old decimal system of 40, 50, 60, 80 ft. widths has little merit as a measure of real traffic capacity. Sidewalks and obstructions must give way and arcading of highly developed narrow streets may often have to be resorted to, to widen the roadway and still give opportunity for full development of air rights above. The constant extension of building heights is a ruinous civic policy. Some office buildings are now being built with automobile storage for their tenants in the basement.

The "twilight zone" surrounding the business districts of all large old cities offers an unusual opportunity for development of marginal long-time storage facilities for business cars; and in cities of rugged topography, hillside garages with entrances from two or three levels can be built and operated at far less cost than the ramped buildings now being built. Limited parking must be adopted, but rigid prohibition is obviously the wrong method, at least until our citizens become rich enough to have their own chauffeurs. In every city many idle spaces can be developed, at least temporarily, for pay storage at moderate rates; and underground storage in large public areas, such as the ideal situation in Grant Park, Chicago, remains to be developed.

With a reasonable accommodation of essential motor traffic, it will be found that the problem of street car movement will unravel itself through better operation, now almost impossible, and rapid transit. Singularly enough, the value of prepayment loading stations for street cars at large industries and other heavy transit points, for speeding up the line, has been too often neglected by both transit companies and industries. Electric railways still exist as our major hope of mass transportation, but they cannot function unless given the right of way which is proper under our democratic code of life—the greatest good of the greatest number. The fuller development of strategic railroad entrances, available in many of our large cities for combination railroad, rapid transit and motor ways, is a public resource of immense value to which immediate thought should be given; for this policy will save tremendous investment in otherwise duplicated facilities, or, conversely, provide more facilities for the same money.

Perhaps the greatest immediate need of the railroads is to apply a "suction pump" to their terminals to get the freight away. In other words, off-rail movement is perhaps equal in importance to overland movement. In the aggregate, half of the total transport cost, origin to destination, is off-rail. The efficient organization of this great off-rail movement in our cities is a problem that has been almost wholly lost sight of, except in a very few cases.

To this end there must be brought about some reasonable form of general terminal unification—at least in operation, if not in ownership and control. Probably half of the investment in railroads today is in other than main-line track, namely, terminals, and the proportion of new capital therein is increasing and necessarily must continue to do so. Coupled with a real organization of off-rail motor movement, terminal unification offers perhaps the greatest opportunity of the future for increasing the efficiency and revenue-earning capacity of railroad investment. And in the face of the present astonishing growth of rail tonnage, some such plan may soon become imperative. Zoning of commercial districts, including terminal, port and harbor operations, has also become a definite need.

The reclamation of land values, especially in railroad terminals, surrounded as they are by highly developed areas, again offers future possibilities difficult to exaggerate, and one of the most important financial resources now available to the railroads. It is almost axiomatic that rise in land values must eventually force a recession of freight facilities (and possibly passenger facilities) through the agency of motors, just as in other normal real estate development. Store-door delivery will simply accelerate this rational process.

In these necessary great public improvements of the future, part solutions are dangerous, as the various factors are so inter-related. In rational terminal evolution (used in the broader sense), rail, motor, trolley, barge and ship must each play their logical part. If a reasonable system, similar to our present local district assessment method, is worked out on a basis of true cost and benefit, with excess condemnation where it is obviously essential to insure correct development, the future growth of our cities will not prove so distressing a problem as in the past. However important other phases of city planning, transportation must be recognized as having a more definite place in the general perspective. It is not a detail; it is fundamental.

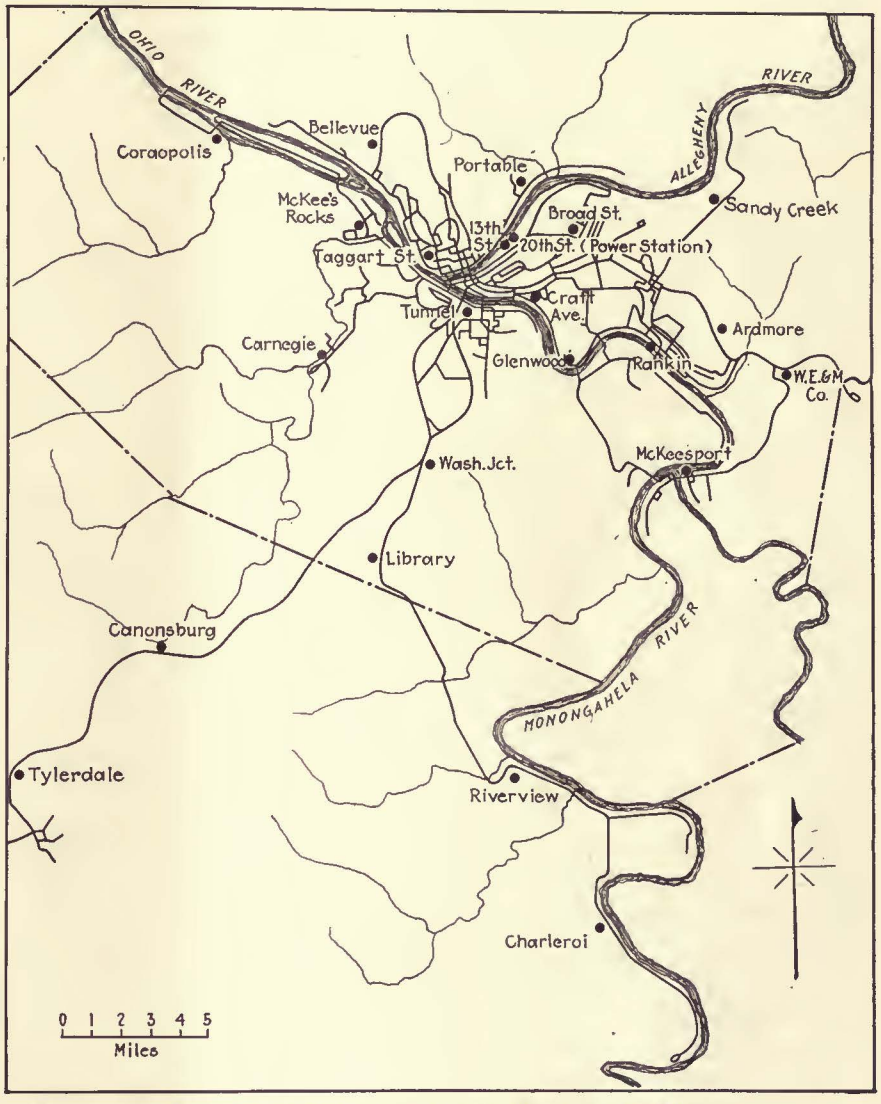
*But Baltimore has developed its "Falls Way"; Chicago, 65 miles of freight tunnel and its two-level Michigan Boulevard (South Water Street Extension underway); New Orleans, its Belt Railroad; St. Louis, its plan for motor freight to off-track inland stations.

Shunt Operation of Rotary Converters in Substations Effective

By R. J. Saulsbury
Chief Electrician Pittsburgh Railways

Pittsburgh Railways System Adopted Shunt Operation for 60-Cycle Converters Early in 1923—Time of Power Outages During First Six Months of This Year Reduced to Less than Half that Occurring with Compound Operation Last Year—Flashovers Almost Eliminated

AS THE older direct-current power stations and motor-generator substation sets supplying the Pittsburgh Railways were replaced with modern 60-cycle rotary converters, it began to be noticed that the power supply was not as reliable as formerly. Outages became more frequent and flashovers were increased. Since the substations were tied in to a large alternating-current distributing circuit instead of being operated separately, these disturbances frequently affected large sections of the power system, rather than being purely local as in the past. After researches made under the direction of the chief electrician, it was decided to adopt shunt operation of all the rotary converter stations. The result was that difficulties of this sort were immediately reduced in number. Outages of any sort became the exception rather than the rule, and in a period of six months only three flashovers have occurred.



Map of the Pittsburgh Railways, Showing Substations

EXTENT OF THE SYSTEM

The system of the Pittsburgh Railways comprises some 600 miles of track, the greater portion of which lies within the city of Pittsburgh, but important interurban lines reach Washington, Charleroi, McKeesport, Oakmont, Emsworth and Coraopolis. Originally these lines were all fed from independent direct-current power plants, but with the growth of the system it was not always possible to place a power station at a point where the supply was needed, owing to the absence of coal, transportation and water. This forced the adoption for some of the lines of alternating current, which was changed over for railway service by means of motor-generator substations. The main advantage of the motor-generator was the flexibility of operation and the possibility of using smaller reserve capacity. Some of these sets were driven by induction motors, but the difficulties experienced on account of low power factor and poor voltage regulation soon showed that the disadvantages of this type of motor outweighed the advantages, so that the design swung over to the synchronous motor-generator sets.

This was in the days of the earliest 60-cycle rotary converters. Increases in capacity of the system were made with this type of equipment, forming a secondary ring outside the metropolitan district. These 60-cycle converters operated very well with the remainder of the system, as they were usually connected to the metropolitan stations through single, long d.c. feeders, and could not exchange any great amount of load. Since these stations were each practically isolated, individual heavy-duty emergency storage batteries were connected with them. These batteries have since been removed from service.

The installation of larger and larger units of power

TABLE I—TOTAL NUMBER OF SUBSTATION OUTAGES PITTSBURGH RAILWAYS, 1922 AND 1923

	Twentieth Street	Thirteenth Street	Broad Street	Craft Avenue	Tunnel	Taggart Street	Total
1922							
January	0	3	0	1	1	1	6
February	0	0	1	1	1	2	5
March	0	0	0	1	1	1	3
April	0	0	0	0	1	2	3
May	1	3	1	1	2	2	10
June	3	1	3	3	6	2	18
	4	7	5	7	12	10	45
1923							
January	0	0	0	1	1	0	2
February	1	0	2	1	3	1	8
March	2	0	0	0	1	0	3
April	1	0	0	0	0	0	1
May	1	0	1	0	1	3	6
June	2	1	1	1	3	1	9
	7	1	4	3	9	5	29

TABLE II—TOTAL MINUTES OF SUBSTATION OUTAGES, PITTSBURGH RAILWAYS, 1922 AND 1923

1922	Twentieth Street	Thirteenth Street	Broad Street	Craft Avenue	Tunnel	Taggart Street	Total
January	0	25	0	16	12	16	69
February	0	0	7	11	14	15	47
March	0	0	0	11	8	9	28
April	0	0	0	0	3	26	29
May	20	48	20	16	13	9	126
June	11	5	34	50	66	10	176
	31	78	61	104	116	85	475
1923							
January	0	0	0	10	7	0	17
February	7	0	13	17	36	23	96
March	5	0	0	0	2	0	7
April	2	0	0	0	0	0	2
May	2	0	2	0	5	14	23
June	10	14	13	8	30	8	83
	26	14	28	35	80	45	228

supply, which took place when the power plants of the railway were placed under control of the Duquesne Light Company in 1913, introduced operating economies which made it possible gradually to replace the d.c. power stations, some of which were by this time obsolete, with a.c.-d.c. substations. By this time some of the earlier operating difficulties of 60-cycle converters had been ironed out, and due to the greater efficiency and less floor space required, the standard was changed over to the rotary converter station. After 1915 all new stations erected were equipped with rotary converters, although additional motor-generator sets were placed in existing stations.

Substations Now Have Superseded Power Plants

At the present time all of the d.c. plants have been superseded with substations, with the exception of one at the heart of the downtown district, which still is maintained for stand-by service. The locations of the substations are shown on the map. There are now six stations feeding the metropolitan district, consisting of

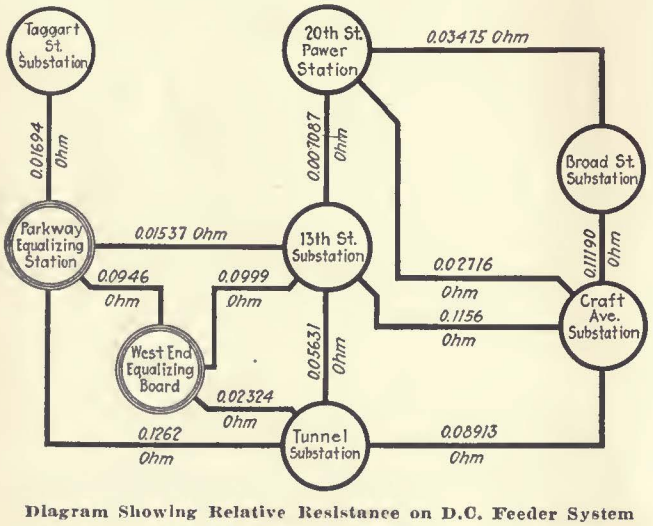


Diagram Showing Relative Resistance on D.C. Feeder System Between Substations

the d.c. power plant, whose capacity is 6,400 kw.; two rotary converter substations with a capacity of 15,200 kw., and three motor-generator substations with a capacity of 12,900 kw. Surrounding this central area there are eleven suburban stations, of which eight are rotary converter stations, having a total capacity of 13,300 kw., and three are induction-motor-generators with a capacity of 4,000 kw. In addition there are five interurban substations with a capacity of 4,100 kw.

All the stations operate in parallel on the d.c. side and, with the exception of one, are fed from a common a.c. bus.

Use of Rotary Converters Introduced New Problems

The change from isolated d.c. power plants to this combination of substations introduced some new operating problems. Any disturbance on the a.c. supply now affected the entire railway system instead of only isolated portions as formerly. This effect manifested itself in various ways. If the disturbance affected the voltage only, the load was shifted to the motor generators, whereas if the frequency dropped the load was shifted to the rotary converters. In the case of the induction-motor generators, it was even possible to have a momentary interruption to the a.c. supply without dropping the machine from the line.

At the same time this changeover from power plant to substation was taking place, extending as it did over a period of ten years, there had come about a great change in the transmission system, which supplied the stations. Whereas at first the substations were fed individually from separate transmission lines radiating from the a.c. power houses, today the substations are tapped off of a complicated interconnected system of 66,000-volt, 22,000-volt, and 11,000-volt transmission lines, practically all of which are operating in parallel at the separate voltages.

As the changeover approached completion, it was noticed that the power supply was not as reliable as formerly. On one occasion a failure at one of the smaller suburban substations spread out so that the load transferred to other substations opened feeder or machine switches at four additional stations, knocking them off like a row of dominoes. On another occasion a flashover in a metropolitan station dropped it from the line, kicked two others off completely, and pulled out feeders from three other stations.

The d.c. feeder distribution system, shown in an accompanying illustration, indicates the resistances in the tie line between the stations for the metropolitan district. A study of the distribution system showed immediately that compound operation, either of motor-generator sets or rotary converters, was undesirable. In case of trouble on the d.c. feeders, the tendency of the rotary converters was to pick up most of the load. This was due primarily to the low resistance between the d.c. buses and the various stations, which allowed considerable load to shift from one station to another in time of trouble.

In order to prevent this additional load from building up on one machine and pulling out another station entirely, it was decided to apply as far as possible the method of shunt operation to all of the substations. Shunt operation began early in 1923 at all of the substations on the Pittsburgh Railways except one where special conditions prevented it. The results were immediate and surprising. Outages of any sort became the exception rather than the rule. At the same time a more complete study of the a.c. power supply and the development and application of an adequate relay system to isolate defective lines resulted in a much more continuous supply of power. However, eliminating this factor entirely, and giving account only to those troubles occurring within the station itself or coming in over the d.c. distribution system, the results obtained exceeded expectations. Almost complete continuity of service followed, probably as near 100 per cent as will be possible in practice.

In the thirty days before shunt operation of nine converter stations there were sixty-two outages for a total of 401 minutes, thirty-four of which were flashovers. For thirty days after shunt operation began, there were twenty-five outages for a total of 154 minutes, of which only three were flashovers. It is not to be understood that all the above outages represent serious delays to service. In most cases the station was small and the outage affected only one or two cars, while in others one feeder was affected for a minute or two. However, the above figures for the two periods were made on the same basis, so that the results are comparable.

Shunt operation bettered the commutating characteristics of the machines in all the stations, so that higher time and current settings of the protective devices were permitted. The overload feature on the carbon circuit breakers on the d.c. side of the machine became practically unnecessary, as with reverse-current, overspeed, and overload a.c. devices the machines are protected adequately. Even where these latter devices were not in use, in such cases the d.c. circuit breakers were equipped with time delay devices and set to 150 per cent overload.

Results Especially Good on Non-Interpole Converters

The effect of shunt operation was especially noticeable in the case of the old non-interpole compound converters, on which the short-circuited series fields acted as a damping winding. The capacity of these old machines actually was increased, and it was possible to set the d.c. breakers to 200 per cent overload. Where before flashovers had been of almost daily occurrence, they now became extremely rare. At four stations there were sixteen flashovers in three months after shunt operation began, whereas for the corresponding time a year previous there were sixty-six flashovers at these same stations.

The elimination of rapidly fluctuating loads and of flashovers also has reduced maintenance costs. Brushes do not wear so rapidly nor do the commutators require so frequent dressing. The brush-holders and springs do not need renewal so often. No difficulties as to commutation, heating of fields or other operation have been experienced. Neither has there been any noticeable change in efficiency, even though particular attention has been paid to checking this item. A somewhat closer watch on the power factor must be made by the operator, but this is not burdensome. There has been no noticeable increase in heating of the tap coils.

The accompanying tables show the total station outages for each of the six city stations for the first six months of 1923, as compared with the corresponding data for 1922. The total number of outages has been reduced from forty-five to twenty-nine, while the time of the outages has gone down from 475 minutes to 228 minutes. While the mixed assortment of motor generators and rotary converters on a railway system is not desirable, yet with such a system the shunt rotary converter seems to be the logical cure for many of its operating ills.

Minneapolis Valuation Before Minnesota Commission

Cost to Reproduce the Property is Submitted by Engineer for the Company on Six Different Bases of Unit Costs—Going Concern Value Placed at $6,000,000

THE Railroad and Warehouse Commission of Minnesota opened hearings on Oct. 8 to determine the value of the property of the Minneapolis Street Railway. Upon the valuation fixed by the commission at this hearing will depend the rate of fare to be in effect in Minneapolis. The company now has a 6-cent fare, which is lower than that established in many cities of the size of Minneapolis, but the city is endeavoring to reduce this rate. The present case was started in 1921 and after a conference of the valuation engineers for the company and the cities of Minneapolis and St. Paul with the commission it was decided to make valuations of the property on five bases. The September, 1923, basis was added on account of the delay in beginning the hearings.

Mr. Drum of A. L. Drum & Company, consulting engineers, Chicago, on behalf of the company submitted to the commission valuations of the property on these six bases, which are itemized by classes of property in the accompanying table.

The property covered by the valuation comprises the entire street railway system located within the corporate limits of the city of Minneapolis. This comprises the property of the Minneapolis Street Railway, the Minnetonka line and the Como Terminal property. The Minneapolis Street Railway also operates two suburban lines extending outside of the corporate limits of the city of Minneapolis. These suburban lines comprise the Columbia Heights line and the Fort Snelling line. Passengers are transported for one fare on all lines located within the city limits and on the Columbia Heights and Fort Snelling lines extending outside the city limits. The present rate of fare on these lines is 6 cents.

An inventory and appraisal was also prepared of two other suburban lines extending outside the corporate limits of Minneapolis. These comprise the Robbinsdale and St. Louis Park lines, which are operated outside the corporate limits of Minneapolis by the Minneapolis and St. Paul Suburban Railroad for an additional 3-cent fare from the city limits to Robbinsdale and an additional 5-cent fare from the city limits to St. Louis Park, respectively. The inventory and appraisal were prepared so that each of the above described properties was treated as a separate and distinct unit.

THE COST TO REPRODUCE NEW AND THE ORIGINAL COST OF THE PHYSICAL PROPERTY OF THE MINNEAPOLIS STREET RAILWAY COMPANY, INCLUDING ALL PROPERTY IN THE CITY OF MINNEAPOLIS AND THE COLUMBIA HEIGHTS AND FORT SNELLING LINES EXTENDING OUTSIDE OF THE CITY LIMITS AS OF JAN. 1, 1922. THE VALUE OF THE ROBBINSDALE AND ST. LOUIS PARK LINES EXTENDING OUTSIDE THE 6-CENT ZONE LIMITS ARE ALSO SHOWN

	Pre-War Cost Average Prices 1911–1915	Ten Year Average Cost Average Prices 1912–1921	1921 Cost Prices Current July 1, 1921	Present-Day Cost Prices Current April, 1922	Estimated Original Cost	September 1923 Cost
Land	$1,290,140	$1,290,140	$1,290,140	$1,290,140	$1,290,140	$1,290,140
Track	4,907,581	6,770,165	9,241,657	7,849,115	7,105,466	8,644,720
Bridges, trestles and culverts	161,979	174,532	186,205	184,612	161,707	187,579
Paving	2,785,127	3,419,587	4,758,266	4,905,510	.....	4,065,180
Electrical distribution system	1,781,668	2,446,108	2,637,380	2,418,537	1,814,322	2,871,321
Rolling stock	4,988,495	7,697,393	10,186,495	9,187,147	4,611,154	10,406,301
Power station equipment	2,598,670	3,510,810	4,452,096	3,947,139	2,646,147	4,077,698
Substation equipment	579,641	765,035	1,038,650	926,068	591,748	1,044,650
Shop equipment, miscellaneous equipment, departmental tools and supplies	273,001	395,851	491,402	409,502	273,001	510,512
Buildings and structures	1,494,826	2,117,356	2,560,325	2,386,685	1,361,767	2,560,299
Furniture and fixtures	81,613	130,580	179,547	155,064	81,612	190,302
General stores	790,073	790,073	790,073	790,073	790,073	790,073
Expenditures not apparent in inventory	391,724	391,724	391,724	391,724	164,305	391,724
Engineering and superintendence	1,106,227	1,494,968	1,910,198	1,742,066	1,044,572	1,851,556
Administration, organization and legal expense	749,602	842,157	943,291	920,177	744,045	938,925
Taxes during construction	310,378	412,039	565,940	565,940	310,378	566,476
Interest during construction	2,914,889	3,917,821	4,994,807	4,568,340	2,758,850	4,846,569
Working capital	492,151	492,151	492,151	492,151	492,151	492,151
Cost of financing	1,384,890	1,852,924	2,355,517	2,156,498	1,312,071	2,286,340
Total physical property inside present 6-cent zone	$29,082,675	$38,911,414	$49,465,864	$45,286,488	$27,553,509	$48,013,146
Robbinsdale line	53,528	72,603	98,838	85,749	48,868	94,633
St. Louis park line	49,197	66,923	91,413	77,740	48,558	85,757
Grand total	$29,185,400	$39,050,940	$49,656,115	$45,449,977	$27,650,935	$48,193,536

The total inventoried property principally consists of 227.764 miles of single track; paving; lands; power distribution system, consisting of overhead trolley, feeder lines, underground conduit and underground wire; rolling stock; carhouses, offices and miscellaneous buildings; a steam turbine power station supplying power for the operation of the Minneapolis, St. Paul & Suburban systems; six rotary converter substations and miscellaneous electrical equipment at the Lower Dam Water Power Station; furniture and fixtures; tools, etc.

The valuation of the physical property was made from a complete and detailed field inventory of the property. The cost to reproduce the physical property new represents the minimum amount of capital required actually to reproduce the physical property of the company as of Jan. 1, 1922, on the six different bases of unit costs.

Water Power Leases and Going Concern Value

The value of the water power leases to the Minneapolis Street Railway was based on the saving they effect, this saving being computed on the basis of the total cost of the electric power purchased under these leases and the total cost of manufacture of that power if generated at a modern steam power station. The total saving to June 1, 1937, was prorated between the Minneapolis Street Railway, the St. Paul City Railway and the Minneapolis & St. Paul Suburban Railroad on the basis of the total kilowatt-hours used by each company. This element of value was included at $1,032,123.

The presentation of the claim for "going concern value" was made generally on the basis that the Minneapolis Street Railway had passed through the following stages of development:

1. Construction period.
2. Development period of construction.
3. The period of development into a successful going concern.

The engineer submitted that the fair going concern value of the property was determined to be not less than $6,000,000. One element in determining this going value was the historical development cost, which was summarized as follows:

Horse, steam and cable lines, 1875 to 1891	$1,878,007
Initial electrical development, 1890 to 1903	2,628,800
Track renewed before end of useful life	1,332,803
Total	$5,839,610

Another element of going concern value submitted was that due to the consolidated operation with the St. Paul street railway system. This was given as not less than $2,000,000, measured by capitalizing the estimated saving per year to the Minneapolis company of the increased economy in operation due to such consolidated operation.

New Type of Safety Zone in Bridgeport

THE Department of Police in Bridgeport, in cooperation with the Bridgeport division of the Connecticut Company, has been installing a new type of safety zone illustrated in the accompanying engraving.

The area of the zone, which is about 12 ft. x 25 ft., is indicated by a stripe of white paint 1 ft. wide on the pavement. The peculiarity of the zone, however, is in the upright post. This is a 1-in. pipe painted white, about 4½ ft. high and fitted with long crossarms. Each of the latter carries a shield, as shown, with the following letters: "Safety Zone, Department of Police." Each arm also carries a red lantern for use at night.

This Safety Zone Post Has Crossarms for Carrying Warning Notices and Lanterns

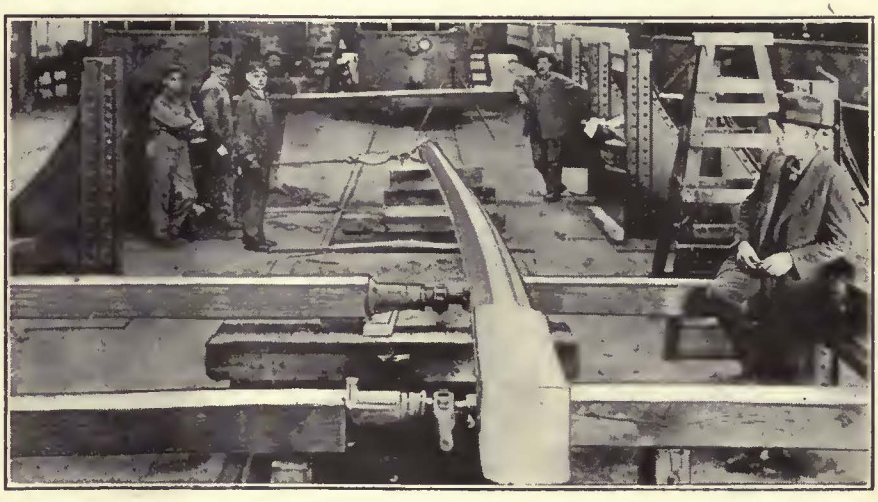
The post is supported in a cast base.

Cleveland Railway Studies Concrete Poles

Experiments Indicate that the Original Type of Reinforced Concrete Pole Contained More Material than Necessary to Secure Adequate Strength—Steel Poles Are Used on Curves and to Support Heavy Special Work

AN EXTENSIVE series of tests has been made by the Cleveland Railway to determine the relative value of different types of concrete pole for use in overhead construction on tangent track. The primary object of the investigation was to design a pole of sufficient strength, but which would require less material in its construction than did the types previously in use.

The first use of concrete poles by this company was in 1912, prior to that time all poles having been either wood or steel. Some of the latter were of small size, with only a 5-in. butt, although the more recent steel poles were larger. Many concrete poles are now used in Cleveland on tangent track, but steel poles are preferred on curves and for heavy special work, as it is believed that the former are not strong enough for such use.



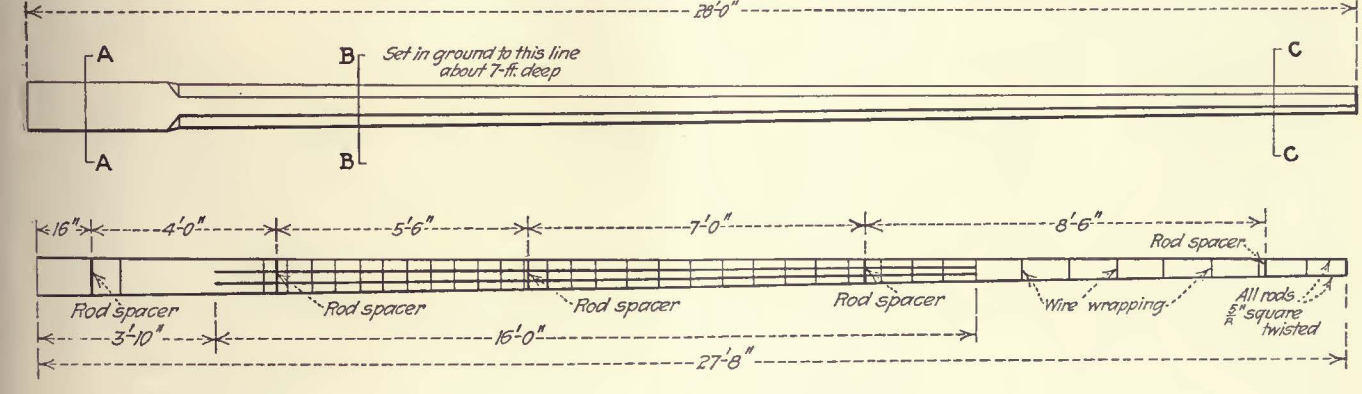
This Shows How the Concrete Pole Was Blocked In Between Two Pairs of the Stanchions Used In Straightening Car Bodies

The reinforcing design of the original concrete poles consisted of eight 27-ft., $\frac{5}{8}$-in. square rods placed at the corners of an octagon. No transverse reinforcing was used. From an examination of poles constructed in 1912 and recently removed, it was found, however, that an additional rod not called for in the design, had been placed in the center of the pole. Only slight changes had been made in the design during the ensuing years, and the reinforcing in use at the time the tests were made consisted of six 27½-ft., $\frac{3}{4}$-in. square twisted bars, two $\frac{3}{4}$-in. square deformed bars 16 ft. long and one 1⅛-in. round bar 24 ft. long placed in the center of the pole.

It was felt by the engineers of the company, as well as by the engineers of the city, that more material was being used in the construction of these poles than was necessitated by the strain to which they were subjected. The maximum loading on a pole used in tangent construction was estimated to be 1,000 lb. According to their theory there is 820 lb. horizontal pull of the span, 49 lb. wind load on the trolley wire and 135 lb. wind load on a 1,000,000 circ.mil cable, making in round numbers a total loading of approximately 1,000 lb. The point of application of this load was considered to be 18 in. from the top of the pole and 20 ft. above the ground line. The maximum bending moment to which the pole would be subjected is, therefore, 20,000 ft.-lb.

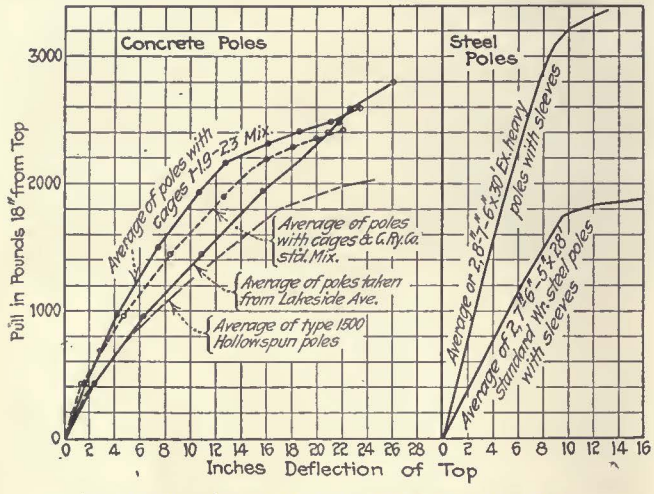
With these ideas in mind a new pole was designed, particular attention being paid to the proper distribution of steel. One less rod was embodied in the new design and all of the rods were of smaller size than had previously been used. In spite of that, however, the forecast was made that the new pole would fail in compression rather than in tension.

Uniform spacing of the reinforcing rods is achieved by spacer rings of ¼-in. round stock. The placement of rods in the concrete poles made up to that time had



New Reinforcement Design for Concrete Poles

been more or less irregular. In the new method of assembling, four ⅝-in. deformed bars which are 27 ft. 8 in. long are first wired to the rings so that they form the vertices of a rectangle. After these are firmly fastened four other ⅝-in. deformed bars 18 ft. long are then wired to the rings. It was the contention of the engineers that steel placed in a transverse direction would be useful in giving greater strength to the cage. Soft iron wire No. 12 gage is therefore wrapped spirally the entire length of the cage with a space of 3 in. between turns. Difficulty was experienced at first in wrapping this wire so that it would bind the cage tightly enough to prevent its collapse. This was overcome by making with a pair of pliers, a kink in every slack turn of the wrapping wire and tieing it to the rods on every third turn. This drew the wire much



Average Bending of Concrete Poles and Steel Poles

more taut than could be done by hand and bound the cage so tightly that there was no possibility of its collapsing.

After some practice in building these cages it was found that they could be made in about 3.6 man-hours. There seemed to be no reason to change the forms already in use and the old ones were accordingly used. In the present process the cage is placed in the forms first and the concrete is poured upon it. There is a slight tendency for the concrete to stick to the cage and not fill the form unless a stirring rod is used and the mixture poked around.

To change the kinds of material used in mixing the concrete for poles was not considered desirable. In the first place, the old materials were near at hand and easy to obtain. In the second place, a pole of light color and good appearance was desired and it was known that the old material would insure these conditions. Finally, the concrete mixing gang were experienced in the handling and use of these materials. It was decided, therefore, to use the same materials and change only their proportions in the mixture. The standard mixture in use before these tests were made consisted of 1 part of cement, 2.1 parts of sand and 1.3 parts of gravel. After extensive analyses, void determinations, etc., it was decided to use a mixture consisting of 1 part of cement, 1.9 parts of sand and 2.3 parts of gravel.

In order to compare the strength of these two concrete mixtures, six 6-in. tubes, three of the old mixture and three of the new mixture, were subjected to a crushing test, twenty-eight days after being poured. These tests showed a strength of 3,690 lb. per square inch for the new mixture and 2,370 lb. per square inch for the old mixture.

The apparatus used for testing the strength of poles is shown in the accompanying illustration. The butt is blocked in between the stanchions used in straightening car bodies. Poles are blocked at the extreme end and again at the ground line, 6-in. x 6-in. timbers and a screw jack being used in each case. The load is applied by means of a chain fall fastened at one end to the stanchions and at the other end to a point 18 in. from the top of the pole. A dynamometer is placed in line next to the pole, so that the exact magnitude of the force being applied at any particular moment can easily be determined. The deflections of the poles under load are read by means of a transit.

As a typical example of the experiments, we may take a test of a pole with the 1-1.9-2.3 mixture and the new cage. This pole was 11 in. square at the butt and 10 in. square at the ground line. A load of 500 lb. was first applied, causing a deflection of 1½ in. Thereafter the load was increased in increments of 500 lb. until a total of 2,000 lb. was reached. Deflections were respectively 4 1/16 in., 6¾ in., and 10¼ in. The load was then eased off to nothing, and it was found that the pole had a permanent set of ⅞ in. Then 1,000 lb. was applied, producing a deflection of 5⅜ in. After reapplying a load of 1,500 lb. the increments were 250 lb. at a time, producing deflections of 9¼ in. at 1,750, 10⅝ in., and finally 12½ in. at a loading of 2,250 lb., when small cracks began to appear in the concrete. At 2,400 lb. the pole failed before the deflection could be taken. The load was then eased off to 2,250 lb., when the deflection was 16⅜ in. Continuing to ease off the load, it was found that the deflection at 2,150 lb. was 28¼ in. When the load had been taken off altogether, the pole had a set of 16¼ in.

The method of testing was varied somewhat with the different poles, and a direct comparison of the loads carried by them would, therefore, be somewhat misleading. In some cases the load was increased by increments of 250 lb., and in other cases 500 lb. Moreover, with some of the poles, the experiment was tried of easing off the load to nothing at frequent intervals during the test. However, the behavior of the poles under the strain was sufficiently similar, so that a few general conclusions were possible.

Classification of Tests

The poles tested during this investigation may be classified in six groups. The first group consisted of old poles built and installed at various times since 1912. The dimensions of these poles varied somewhat, but in general they were approximately 11 in. square at the butt and about 9½ in. square at the ground line. They were built with the old reinforcing already described and the old concrete mixture was used. Seven such poles tested all failed on the compression side, at loads varying from 2,400 lb. to 3,000 lb.

The second group of poles to be tested consisted of those using the old concrete mixture and the new reinforcement. This type failed at an average load of about 2,400 lb., but the deflection was less until the breaking point was almost reached.

Poles using the new reinforcement design and the new mixture constituted the third class tested. These likewise all failed in compression as the engineers had foretold except for one pole which was found to have a defective cage. The loads ranged from 2,000 lb. up to

Cage Used in the New Pole

2,600 lb., the average load being closer to the latter figure.

Hollow concrete poles which were similarly tested compared well in strength with the solid poles, averaging slightly over 2,000 lb.

Two light-weight steel poles of the 7-6-5-in. type tested at the same time failed at identical loadings. Each of these poles was supplied with a protecting sleeve at the ground line and in both cases failure occurred at the 1,950-lb. load. Larger steel poles of the 8-7-6-in. type were similarly tested. They failed at 3,350-lb. and 3,475-lb. load. These poles were equipped with sleeves, as were the lighter steel poles, but were 30 ft. in length instead of 28 ft.

Inasmuch as the estimated load to which poles will be subjected is only 1,000 lb. and 20,000 ft.-lb. of bending moment, it will be seen from the accompanying chart that all types of pole were well above the strength required. The solid concrete poles all failed at loadings more than twice as great as that which they will have to carry in actual service. The conclusion was accordingly reached that the new pole with the new mixture was an improvement on the earlier design because less material is used in its construction.

Comparison of Manufacturing Costs

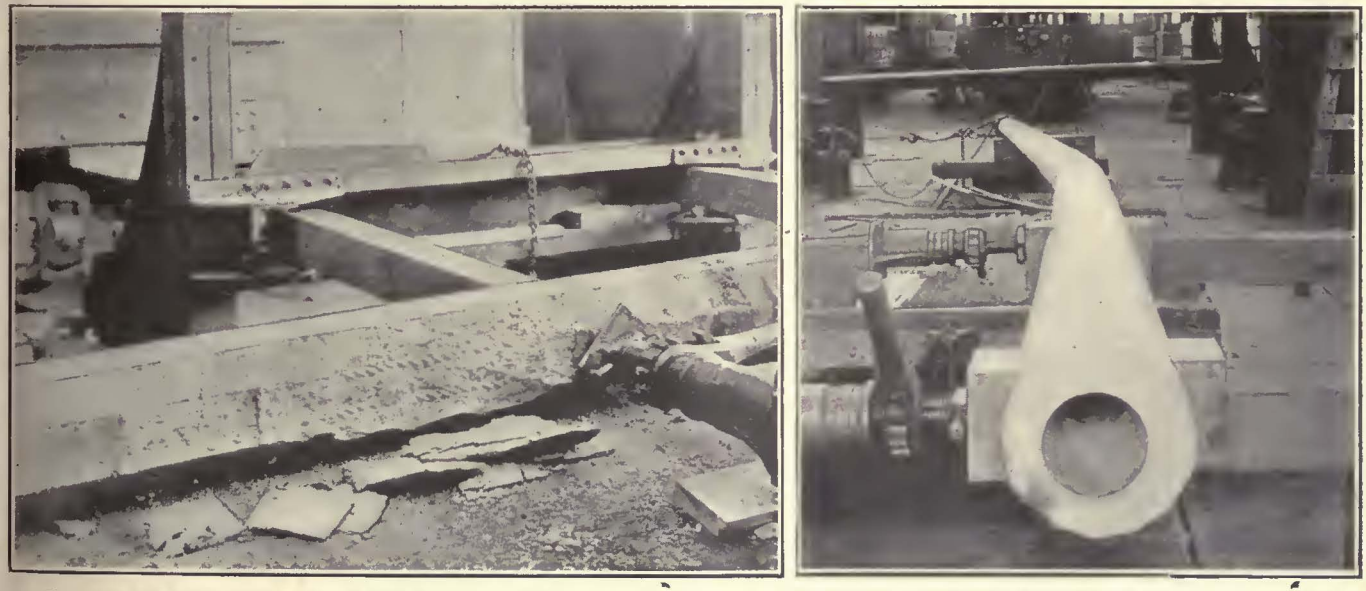
The next consideration covered in this investigation was the matter of cost. The older type concrete pole cost $21 to manufacture. The second type, with old standard mixture and new reinforcement, cost $18.60; and the new pole, $15.90. Thus the pole with the new reinforcing design and the new mixture is much more economical than previous designs of concrete poles. This pole supported so nearly the same load as the present pole that it was felt that its cheaper cost more than offset the slightly greater strength of the old pole and the future use of the new design was therefore recommended as a result of the investigation.

Salvaging Power Plant Stack Soot

THE Norfolk & Western Railway reclaims the soot which falls to the bottom of the one brick chimney which supplies draft for fourteen boilers at its power plant, located near Bluestone Junction, W. Va. Two of the boilers are at present being installed. The chimney is provided with a hopper-shaped bottom, which discharges the soot into a home-made steam ejector. This ejector consists of a 4-in. horizontal pipe, which turns upward into the central aperture of a standard T-fitting. A ¾-in. steam pipe leads into one of the other openings in the fitting, opposite to it being a 4-in. discharge to the coal elevator.

The jet of steam playing directly into the elevator pipe creates a powerful suction in the first mentioned pipe, which effectively draws the soot to the T-fitting, after which the steam current carries it along. Just before the soot reaches the coal elevators it passes through a water spray which condenses the steam and moistens the soot so that it does not blow out of the elevator buckets while being carried up to the coal hopper.

It is estimated that 60 per cent of the soot is combustible, and with the power plant operating at an average load (inflating with the full complement of fourteen boilers will be 8,000 boiler-hp.) probably 10,000 lb. of soot will return to the coal elevators in a week.



Left—Scaling Shows Start of Failure on Compression Side. Right—The Hollow Poles Compared Favorably with the Solid Poles

Some Details of Illinois Central Electrification*

Conversion to Electrical Operation to Embrace Approximately 418 Miles—Details of Plans for Power Generation and Transmission

By D. J. Brumley
Chief Engineer Chicago Terminal Improvement, Illinois Central Railroad.

THE general construction program of the Illinois Central electrification in the Chicago district is as follows:

1. Complete the easterly side of a new through passenger terminal; complete the rearrangement of sewers and underground facilities; extend the track elevation and grade separation; make changes in grades that are necessitated by ordinance; be prepared to proceed with the work of electrification; and electrify the entire suburban service within seven years after February, 1920.

2. Electrify the entire freight service north of East Roosevelt Road within three years after the completion of the suburban electrification, or before 1930.

3. Electrify the entire freight service south of East Roosevelt Road within five years thereafter, or before 1935.

4. Electrify the through passenger service not later than 1940, if a certain proportion of the railroads using the lake-front passenger terminal station are operating electrically at that time.

The work of electrification contemplated embraces approximately 418 track-miles. The electrification system to be used was determined by a commission appointed by the railroad company. This body made a careful study of the Chicago terminal situation and compared it with the electrifications of similar properties in the United States and foreign countries. The commission recommended, and the Illinois Central Railroad adopted, the 1,500-volt direct-current overhead-contact system for use in the Chicago terminal area. The details for the electrical system are being worked out, and it is planned to begin partial operation of the suburban service about the middle of 1926. The generation of current can be provided for readily either along the shore of Lake Michigan, Lake Calumet, or the Calumet River, adjoining the electrically operated tracks, and be easily accessible to ample supplies of water.

For tractive power, high-tension alternating current, of probably 33,000 volts, will be converted to 1,500-volt direct current in not less than five substations on the railroad company's right-of-way. The conversion will be by rotating machines; the machines, transformers, switchboards, and auxiliary apparatus being housed in brick buildings of attractive design. The direct-current switching and protective equipment will be of the latest high-speed type.

The overhead system will consist of steel supports spaced approximately 300-ft. centers, for carrying the contact wires, transmission, signal, and miscellaneous power circuits. The overhead contact wires will be supported by messengers of high conductivity, so that over each track there will be sufficient conductor to supply the power required for that track, thus avoiding the necessity for independent parallel feeders. The contact wires, messengers and their attachment will be made of materials highly resistive to corrosion. The normal height of the contact wire above top of rail will be 22 ft., and it will be suspended from the messenger so as to make its alignment conform to that of the track it serves. As the electrification will be carried out in progressive steps, the spans constructed initially for the suburban electrification will be ultimately extended to include the freight, through-passenger, and such subsidiary tracks as will be electrified. The track rails being well bonded will form a return circuit for the propulsion current and will be cross-bonded at impedance bond locations, thus avoiding any interference with signal track circuits.

Suburban Service with Multiple-Unit Trains

Suburban passenger cars are now being purchased for the electrified service, but are being placed temporarily in steam suburban service. The character of the suburban service is such as to make the multiple-unit train the most economical system. Provisions are being made for operating two-car semi-permanently connected units consisting of one motor car and one trail car.

These units will have control apparatus in one end of each car and will operate either singly or in trains of two to five similar units. The service provides for a high rate of acceleration and braking and a normal balancing speed of 57 m.p.h. on tangent level track. The motor cars will be equipped with four 750-volt motors connected in two groups of two motors in series per group with series parallel control.

The braking equipment will be the electro-pneumatic brake for multiple-unit service with a 1,500-volt motor-driven compressor. Power for the control and brake operation as well as for the car lights will be furnished by a motor generator set on the motor car, having a 1,500-volt direct-current motor and a 32-volt direct-current generator with storage battery provided as a reserve. The two-car unit will have a pantograph collector on the motor car only. Electrical heaters will be used, the details of which have not as yet been fully decided.

The cars will be equipped with diaphragms, enabling passengers to move safely and comfortably between cars and thus make advantageous use of all seats in the train. By the use of aluminum alloys and a careful redesign of the original steel suburban car, the weight will be reduced approximately 3,000 lb., reducing the trail car to approximately 89,000 lb.

As there will be no need to purchase electric locomotives for either through main-line freight service or switching service, or for the through passenger service, for several years, no attempt will be made to design such equipment at present.

*Abstract of a paper which was published in the proceedings of the American Society of Civil Engineers for September, 1923.

British Roads Change to Electricity

Within the next two years the electrification of the three lines from Waterloo to Guilford (London & South Western Railway) will be completed. The London, Midland & Scottish group are beginning the change over on the line covering Manchester, Oldham, Middleton, Royton and Shaw, as a preliminary to larger developments. The same group intends to electrify the system to Rickmansworth.

Gross Revenue of Electric Railways Is Higher than in 1917

Census Figures of 1922 Are Given for Nine More States—Track Mileage Has Decreased Slightly and Net Income Is Lower in Some Cases on Account of Greater Operating Expense

PRELIMINARY figures of the electric railway census for last year have now been released for several states in addition to those printed in this paper Nov. 3. In a group of seven states west of the Mississippi River there has been a slight decrease in track mileage in every one except Minnesota. The number of revenue passengers, however, has increased in Arkansas, Nebraska, Minnesota, but has decreased in Kansas, Colorado, Arizona and New Mexico. Two of the Eastern states show decreases in track mileage and traffic.

Kansas.—The figures show a decrease of 3.2 per cent in track mileage and a loss of 5.7 per cent in the number of passengers carried. Gross railway operating revenues, however, show a gain due to fare increases of 26.3 per cent, and aggregated $4,527,397 in 1922 as compared with $3,585,079 in 1917, while railway operating expenses increased 46.6 per cent, and net income decreased 31.7 per cent.

	1922	1917	Per Cent of Increase, 1917–1922
Number of operating companies	†15	19	.....
Miles of aigle track operated‡	543.15	561.00	*3.2
Number of cars, all typea	613	607	1.0
Electric locomotivea	3	5	.....
Number of persons employed	1,346	1,680	*19.9
Salarica and wages	$1,773,652	$1,240,725	43.0
Primary borsepower, total	7,300	16,730	*56.4
Kilowatt capacity of generatora	5,450	10,992	*50.4
Current generated, kilowatt-houra	11,224,902	21,677,157	*48.2
Current purchaaed, kilowatt-houra	27,122,697	30,687,892	*11.6
Passengers carried	43,575,343	46,212,673	*5.7
Revenue car mileage	12,037,274	13,819,088	*12.9
Railway operations, revenuea	$4,527,397	$3,585,079	26.3
Railway operations, expenaes	$3,366,397	$2,296,457	46.6
Net revenuea, railway operationa	$1,161,000	$1,288,622	*9.9
Auxiliary operationa, revenues**	$281,562	$532,732	*47.1
Auxiliary operationa, expenaea	$217,264	$393,803	*44.8
Net revenues, auxiliary operationa	$64,298	$138,929	*53.7
Net operating revenues	$1,225,298	$1,427,551	*14.2
Taxes aaaignable to railway operationa	$337,353	$279,428	20.7
Operating income	$887,945	$1,148,123	*22.7
Non-operating income	$58,196	$58,963	*1.3
Gross income	$946,142	$1,207,086	*21.6
Interest and other deductions from gross income	$740,651	$906,269	*18.3
Net income	$205,491	$300,817	*31.7

† Three companies with 17.05 milea of track, which reported in 1917, discontinued operationa prior to 1922, and the track of another company was operated under lease.

‡ Includes 47.39 miles in 1922, and 46.33 miles in 1917 lying outaide the atate, but owned by companies witbin the atate, and excludes 85.44 miles in 1922 and 67.02 miles in 1917 operated in the atate, but owned by companies outside the state.

** Chiefly revenues from electric light and power departmenta of electric railwaya.

Arkansas.—The figures show a slight decrease in track mileage, while passenger traffic increased by 11.8 per cent in 1922 as compared with 1917. Gross railway operating revenues aggregated $1,793,277 in 1922, an increase of 38.1 per cent, but on account of the more rapid increase in expenses the net revenues from railway operations decreased 12.3 per cent.

	1922	1917	Per Cent of Increase, 1917–1922
Number of operating companies	9	10	.....
Miles of single track†	128.94	131.36	*1.8
Number of cars, all types	271	262	3.4
Number of persons employed	871	645	35.0
Salaries and wages	$1,151,530	$555,839	107.2
Primary horsepower, total	35,348	16,650	112.3
Kilowatt capacity of generators	25,550	12,457	105.1
Current generated, kilowatt-hours	56,562,946	33,080,677	71.0
Current purchased, kilowatt-hours	3,838,955	4,360,889	*12.0
Passengers carried	**34,131,000	30,525,360	11.8
Revenue car mileage	5,735,435	5,917,302	*2.8

* Indicates decrease.

	1922	1917	Per Cent of Increase, 1917–1922
Railway operations, revenues	$1,793,277	$1,298,744	38.1
Railway operations, expenses	$1,336,317	$777,773	71.8
Net revenue, railway operations	$456,960	$520,971	*12.3
Auxiliary operations, revenues‡	$1,497,270	$658,187	*127.5
Auxiliary operations, expenses	$682,087	$301,796	126.0
Net revenue, auxiliary operations	$815,183	$356,391	128.7
Net operating revenue	$1,272,143	$877,362	45.0
Taxes assignable to railway operations	$270,391	$162,366	66.5
Operating income	$1,001,752	$714,996	40.1
Non-operating income	$61,320	$33,336	83.9
Gross income	$1,063,072	$748,332	42.1
Deductions from gross income	$806,307	$497,291	62.1
Net income	$256,765	$251,041	2.3

† Includes 8.62 miles of track in 1922, and 9.53 miles in 1917, lying outside of the state but owned by companies within the state.

** In addition there were 661,405 passengers carried by eleven motor buses operated by electric railway companies.

‡ Chiefly revenue from electric light and power departments of electric railways.

West Virginia.—An increase of 6.8 per cent in track mileage and a gain of 18.6 per cent in the number of passengers carried occurred in this state. Gross railway operating revenues amounted to $7,057,025 in 1922, an increase of 41.2 per cent as compared with 1917, but on account of a more rapid increase in expenses (72.3 per cent), net income from all sources decreased by 47.5 per cent.

	1922	1917	Per Cent of Increase, 1917–1922
Number of operating companies	†16	19	.....
Miles of single track operated in state‡	422.06	395.15	6.8
Number of cars, all types	573	633	*9.5
Electric locomotives	4	1	.....
Number of persons employed	2,303	2,446	*5.8
Salaries and wages	$3,369,579	$1,787,466	88.5
Primary horsepower, total	81,375	35,042	132.2
Kilowatt capacity of generators	61,800	23,635	161.5
Current generated, kilowatt-hours	118,680,170	86,860,542	36.6
Current purchased, kilowatt-hours	47,607,035	25,300,487	88.2
Passengers carried	95,989,610	80,920,697	18.6
Revenue car mileage	15,238,374	14,622,900	4.2
Railway operations, revenues	$7,057,025	$4,998,377	41.2
Railway operations, expenses	$5,076,694	$2,946,622	72.3
Net revenues, railway operations	$1,980,331	$2,051,755	*3.5
Auxiliary operations, revenues	$1,756,886	$926,070	89.7
Auxiliary operations, expenses	$799,639	$413,675	93.3
Net revenues, auxiliary operations**	$957,247	$512,395	86.8
Net operating revenues	$2,937,578	$2,564,150	14.6
Taxes assignable to railway operations	$621,965	$365,798	70.0
Operating income	$2,315,613	$2,198,352	5.3
Non-operating income	$411,149	$942,906	*56.4
Gross income	$2,726,762	$3,141,258	*13.2
Interest and other deductions from gross income	$1,844,372	$1,459,777	26.3
Net income	$882,390	$1,681,481	*47.5

† Reduction in companies due to consolidations and reorganizations.

‡ Excludes 97.09 miles in 1922 and 78.11 miles in 1917 lying outside the state, but owned by companies within the state, and includes 3.82 miles in 1922 and 2.09 miles in 1917 operated in the state but owned by companies outside the state.

** Chiefly revenues from electric light and power departments of electric railways.

Mississippi.—A decrease of 21.4 per cent in track mileage, was accompanied by a loss of 30.9 per cent in the number of passengers carried. Gross railway operating revenues amounted to $692,298 in 1922 as compared with $617,527 in 1917, an increase of 12.1 per cent, and operating expenses increased 52.2 per cent during the five-year period.

	1922	1917	Per Cent of Increase 1917–1922
Number of operating companies	†7	11	.....
Miles of single track operated‡	96.55	122.79	*21.4
Number of cars, all types	130	187	*30.5
Number of persons employed	366	627	*41.6
Salaries and wages	$427,914	$392,600	9.0
Primary horsepower, total	4,500	16,035	*71.9
Kilowatt capacity of generators	4,500	12,575	*64.2
Current generated, kilowatt-hours	5,935,600	20,022,367	*70.4
Current purchased, kilowatt-hours	4,251,784	3,279,254	29.7
Passengers carried	8,441,459	12,215,749	*30.9
Revenue car mileage	3,075,482	3,990,356	*22.9
Railway operations, revenues	$692,298	$617,527	12.1
Railway operations, expenses	$751,884	$494,164	52.2

	1922	1917	Per Cent of Increase, 1917-1922
Net revenues, railway operations	††$59,586	$123,363	.....
Auxiliary operations, revenues**	$284,739	$585,515	*51.2
Auxiliary operations, expenses	$202,662	$395,842	*48.8
Net revenues, auxiliary operations	$82,077	$187,673	*56.3
Net operating revenues	$22,491	$311,036	*92.8
Taxes assignable to railway operations	$47,025	$59,503	*21.0
Operating income	††$24,534	$251,533	.....
Non-operating income	$975	$24,670	*96.0
Gross income	††$23,559	$276,203	.....
Interest and other deductions from gross income	$201,864	$395,645	*49.0
Deficit	$225,423	$119,442	88.7

† Four companies with 22.47 miles of track discontinued operations prior to 1922.
‡ Excludes 1.36 miles in 1922 and 1.38 miles in 1917 operated in the state, but owned by companies outside the state.
††Deficit.
** Chiefly revenues from electric light and power departments of electric railways.

Arizona and New Mexico.—The figures show a decrease in track mileage of 13.7 per cent and a decrease of 23.4 per cent in the number of passengers carried. Gross railway operating revenues aggregated $386,594 in 1922, a decrease of 13.4 per cent as compared with 1917. This decrease, accompanied by an increase of 10.4 per cent in operating expenses, resulted in a deficit of $130,025 in 1922 as compared with a net increase of $32,844 in 1917.

	1922	1917	Per Cent of Increase, 1917-1922
Number of operating companies	†5	6	.....
Miles of single track	55.12	63.84	*13.7
Number of cars, all types	70	66	.....
Number of persons employed	172	224	*23.2
Salaries and wages	$202,208	$221,711	*8.8
Primary horsepower, total	.....	989	.....
Kilowatt capacity of generators	.....	665	.....
Current generated, kilowatt-hours	.....	1,526,960	.....
Current purchased, kilowatt-hours	3,107,185	4,010,388	*22.5
Passengers carried	**7,271,456	9,488,467	*23.4
Revenue car mileage	1,391,248	1,729,926	*19.6
Railway operations, revenues	$386,594	$446,218	*13.4
Railway operations, expenses	$404,581	$366,337	10.4
Net operating revenues	§$17,987	$79,881	.....
Taxes assignable to railway operations	$18,255	$19,979	*8.6
Income from other sources	$2,377	‡$76,910	*96.9
Gross income	§$33,865	$136,812	.....
Interest and other deductions from gross income	$96,160	$103,968	*7.5
Net income	§$130,025	$32,844	.....

†One company with 8.75 miles of track discontinued operations prior to 1922.
**In addition there were 42,960 passengers carried by two motor buses operated by electric railway companies in New Mexico.
§Deficit.
‡Includes net income from light and power departments to the amount of $56,590. There were no operations of this character in 1922.

Alabama.—The figures show a slight decrease in track mileage and a decrease of 5 per cent in the number of passengers carried. Gross railway operating revenues amounted to $4,904,276 in 1922, an increase of 37.8 per cent as compared with 1917, operating expenses increased 72.3 per cent and net income made a gain of 22.6 per cent.

	1922	1917	Per Cent of Increase, 1917-1922
Number of operating companies	†12	13	.....
Miles of single track operated‡	365.63	367.18	†0.4
Number of cars, all types	684	639	7.0
Number of electric locomotives	3	3	.....
Number of persons employed	2,581	2,129	21.2
Salaries and wages	$3,237,294	$1,645,028	96.8
Primary horsepower, total	29,805	38,702	*23.0
Kilowatt capacity of generators	22,375	28,100	*20.4
Current generated, kilowatt-hours	22,083,271	21,503,940	2.7
Current purchased, kilowatt-hours	144,199,062	94,718,843	52.2
Passengers carried	80,717,808	84,962,155	*5.0
Revenue car mileage	15,819,643	16,037,615	*1.4
Railway operations, revenues	$4,904,276	$3,559,064	37.8
Railway operations, expenses	$3,893,655	$2,259,414	72.3
Net revenues, railway operations	$1,010,621	$1,299,650	*22.2
Auxiliary operations, revenues**	$2,466,258	$2,048,681	20.4
Auxiliary operations, expenses	$1,203,956	$1,004,319	19.9
Net revenues, auxiliary operations	$1,262,302	$1,044,362	20.9
Net operating revenues	$2,272,923	$2,344,012	*3.0
Taxes assignable to railway operations	$623,448	$468,896	33.0
Operating income	$1,649,475	$1,875,116	*12.0
Non-operating income	$533,732	$36,325	1,369.3
Gross income	$2,183,207	$1,911,441	14.2
Interest and other deductions from gross income	$1,371,954	$1,249,582	9.8
Net income	$811,253	$661,859	22.6

† One company with 1.50 miles of track discontinued operations prior to 1922.
‡ Excludes 2.22 miles in 1922 and 2.17 miles in 1917 operated in the state, but owned by companies outside the state.
** Chiefly revenues from electric light and power departments of electric railways.

Minnesota.—The figures show an increase of 4.2 per cent in track mileage, and a gain of 11.2 per cent in passengers carried. Gross railway operating revenues amounted to $16,100,065 in 1922, an increase of 30.1 per cent as compared with 1917, but on account of a more rapid increase in expenses (46.0 per cent), net income from all sources decreased by 14.1 per cent.

	1922	1917	Per Cent of Increase, 1917-1922
Number of operating companies	10	10	.....
Miles of single track†	697.14	668.94	4.2
Number of cars, all types	1,362	1,414	*3.7
Electric locomotives	3	1	.....
Number of persons employed	4,930	4,970	*0.8
Salaries and wages	$7,582,904	$5,258,100	44.2
Primary horsepower, total	122,500	122,500	.....
Kilowatt capacity of generators	91,400	91,400	.....
Current generated, kilowatt-hours	145,675,347	152,469,348	*4.5
Current purchased, kilowatt-hours	22,455,451	23,860,491	*5.9
Passengers carried	‡352,464,915	316,904,581	11.2
Revenue car mileage	36,065,996	38,793,434	*9.6
Railway operations, revenues	$16,100,065	$12,375,143	30.1
Railway operations, expenses	$11,542,739	$7,905,772	46.0
Net revenues, railway operations	$4,557,326	$4,469,371	2.0
Taxes assignable to railway operations	$1,395,465	$1,064,065	31.1
Operatiog income	$3,161,861	$3,405,306	*7.1
Non-operating income	$99,127	$52,460	89.0
Gross income	$3,260,988	$3,457,766	*5.7
Deductions from gross income	$1,636,234	$1,566,115	4.5
Net income	$1,624,754	$1,891,651	*14.1

†Includes 29.08 miles in 1922, and 27.75 miles in 1917 lying outside of state, but owned by companies within the state, and excludes 12.83 miles in 1922, and 14.17 miles in 1917 operated in state, but owned by companies outside of state.
‡In addition there were 70,605 passengers carried by two motor buses operated by electric railway companies.

Colorado.—A decrease in track mileage of 7.8 per cent was accompanied by a loss of 10.8 per cent in the number of passengers carried. Gross railway operating revenues amounted to $6,704,377, an increase of 41.8 per cent, and net income from all sources made a gain of 110.7 per cent.

	1922	1917	Per Cent of Increase, 1917-1922
Number of operating companies	†13	15	.....
Miles of single track	430.81	467.15	*7.8
Number of cars, all types	875	817	7.1
Electric locomotives	8	7	.....
Number of persons employed	2,991	2,402	24.5
Salaries and wages	$3,648,898	$2,126,531	71.6
Primary horsepower, total	61,469	58,139	5.7
Kilowatt capacity of generators	44,855	39,770	12.8
Current generated, kilowatt-hours	108,493,550	98,227,472	10.5
Current purchased, kilowatt-hours	11,681,087	13,281,070	*12.0
Passengers carried	91,723,208	102,882,744	*10.8
Revenue car mileage	15,745,601	17,030,884	*7.5
Railway operations, revenues	$6,704,377	$4,728,732	41.80
Railway operations, expenses	$4,711,626	$2,974,853	58.4
Net revenues, railway operations	$1,992,751	$1,753,879	13.6
Auxiliary operations, revenues‡	$1,423,474	$1,051,044	35.4
Auxiliary operations, expenses	$791,903	$429,964	84.2
Net revenues, auxiliary operations	$631,571	$621,080	1.7
Net operating revenues	$2,624,322	$2,374,959	10.5
Taxes assignable to railway operations	$576,105	$532,848	8.1
Operating income	$2,048,217	$1,842,111	11.2
Non-operating income	$110,932	$46,736	137.4
Gross income	$2,159,149	$1,888,847	14.3
Interest and other deductions from gross income	$1,715,969	$1,678,481	2.2
Net income	$443,180	$210,366	110.7

†Three companies with 26.73 miles of track which reported in 1917 discontinued operations prior to 1922.
‡Chiefly revenues from electric light and power departments of electric railways.

Nebraska.—Track mileage decreased but there was an increase of 1.9 per cent in the number of passengers carried. Gross railway operating revenues amounted to $5,344,204 in 1922, an increase of 26.8 per cent as compared with 1917, but owing to a more rapid increase in operating expenses the net income from all sources shows a decrease of 1.6 per cent for the period.

	1922	1917	Per Cent of Increase, 1917-1922
Number of operating companies	5	6	.....
Miles of single track†	238.79	244.89	*2.5
Number of cars, all types	546	526	3.8
Electric locomotives	4	2	.....
Number of persons employed	1,699	1,845	*7.9
Salaries and wages	$2,409,829	$1,527,534	57.8
Primary horsepower, total	27,889	27,663	0.8
Kilowatt capacity of generators	2,375	20,475	*0.5
Current generated, kilowatt-hours	54,447,834	49,241,514	10.6
Current purchased, kilowatt-hours	6,767,096	3,341,588	102.5
Passengers carried	97,566,736	95,782,721	1.9
Revenue car mileage	13,980,336	14,018,246	*0.3
Railway operations, revenues	$5,344,214	$4,213,457	26.8
Railway operations, expenses	$3,804,379	$2,697,958	41.0
Net revenues, railway operations	$1,539,835	$1,515,499	1.6
Auxiliary operations, revenues	$643,890	$279,810	130.1
Auxiliary operations, expenses	$467,655	$215,738	116.8
Net revenues, auxiliary operations	$176,235	$64,072	175.1
Net operating revenues	$1,716,070	$1,579,571	8.6
Taxes assignable to operations	$537,180	$375,149	43.2
Operating income	$1,178,890	$1,204,422	*2.1
Non-operating incme	$44,162	$20,364	116.9
Gross income	$1,223,052	$1,224,786	*0.1
Deductions from gross income	$750,579	$754,015	0.7
Net income	$472,473	$479,771	*1.5

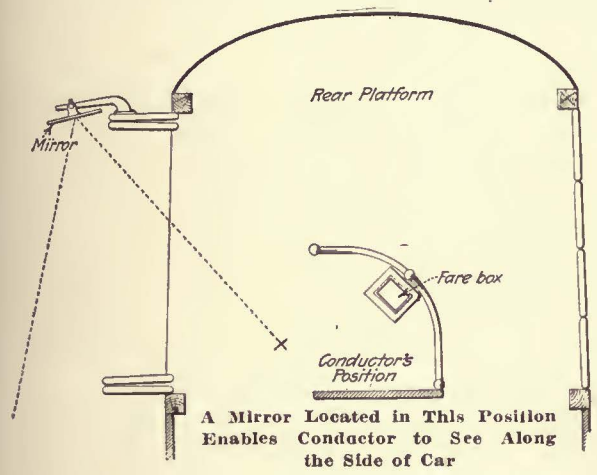
†Includes in 1922, 33.14 miles of track lying outside of the state but owned by companies within the state, and in 1917, 33.90 miles of such trackage.

*Indicates decrease.

Conductor's Mirror Reveals Approaching Passengers

BY ERWIN C. SCHROETTER

NOWADAYS the rear platform of the ordinary electric railway car is equipped with folding doors. These doors are habitually closed before the car starts, the process being compulsory where doors and control are interlocked, and being required by rule in cases where the doors are not equipped with interlocking devices. The conductor, in collecting fares, usually faces toward the rear and cannot see passengers approaching alongside the car from the front. It frequently happens, therefore, that he closes the doors and gives the signal for the car to start just as a belated passenger reaches the rear entrance. In such cases, the passenger is usually left behind, nourishing a natural but unjust resentment against the railway and its representative on that particular car.



A Mirror Located in This Position Enables Conductor to See Along the Side of Car

To remedy this difficulty and enable the conductor without leaving his post to see a passenger approaching from the front a mirror may be installed on the rear leaf of the door as shown in the accompanying illustration. When the rear folding door is opened, the position of this mirror would be such that a single glance from the conductor would suffice to show him whether there was a passenger approaching from the front. The device is somewhat similar to that which has been successfully used at the front end of railway cars, to enable the motorman from his normal position to see what is happening at the rear end.

Seventy per Cent of Riders Have Exact Fare on Beaver Valley Line

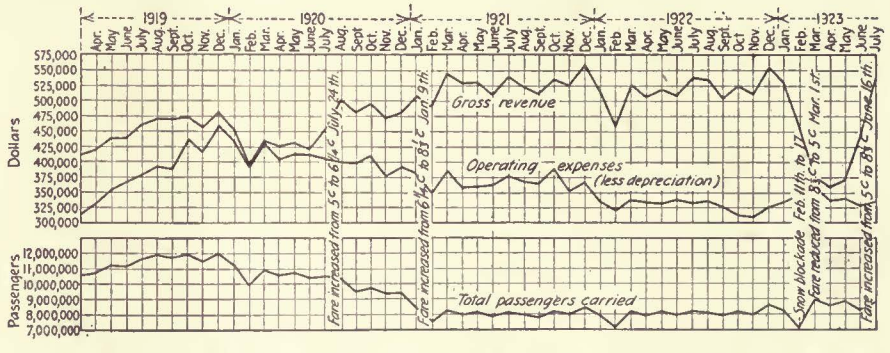
WITH a view to determining the percentage of persons who tender exact fare when boarding a car, the Beaver Valley Traction Company, New Brighton, Pa., recently made a check of the passengers boarding a car on the route operating from Rochester to Beaver Falls and for part of the day through Beaver Falls to Morado Park. The results show that on Sept. 18, on the car checked, 296 passengers presented passes, 1,096 paid cash fares and 120 transfers. Of the passengers tendering cash fare, it was necessary to make change for 445, or 40 per cent. Sixty per cent, or 651 passengers, paid fare with the exact change. If the number of those who presented the exact fare is combined with those who presented passes or transfers, it is found that 70½ per cent had the exact fare, while change had to be made for only 29½ per cent.

Effect of Fare Changes in Seattle on Passenger Traffic

THAT changes in the rate of fare do not reflect themselves immediately in passenger traffic on a street railway is shown by the experience in Seattle in the past five years. The accompanying chart shows the number of passengers carried, the gross revenue and the operating expenses from April, 1919, to July, 1923. Upon the commencement of municipal operation and until July 24, 1920, the fare was 5 cents. The number of passengers monthly in this period fluctuated between 10,000,000 and 12,000,000, the receipts being practically in proportion. On that date the fare was increased to 10 cents with four tickets for 25 cents. The number of riders did not decrease immediately, but there was a slight reduction up to December, 1920, when the monthly total had fallen to 9,424,000.

The cash fare remained the same through 1921, but on Jan. 9 of that year the ticket rate was increased to three for 25 cents. The chart shows that this caused a further decrease in the number of riders. The figure remained practically at 8,000,000 per month until February, 1923, when a snow blockade reduced the riding materially for a period of about six days.

Pursuant to a pre-election pledge, the Mayor obtained a reduction in fare to a flat 5 cents, effective March 1 of this year. The events leading up to this change were described in the ELECTRIC RAILWAY JOURNAL for Aug. 4, page 175. The increase in passenger traffic due to the 5-cent fare was not very large. In fact, the reduction in revenue was so great that pressure immediately was brought to bear on the city administration, and on June 16 the fare was increased to 10 cents cash, with an 8⅓-cent ticket rate, which had been in effect previous to the agitation for reduced fares. Operating results for June and July indicate that there has been virtually no reduction in riding due to this increase in fare, so that almost the entire value of the change in rate has been realized.



Operating Revenues, Expenses and Total Passengers, Seattle Municipal Railway, 1919 to 1923, Showing Effect of Various Changes in Rate of Fare

The chart of operating expenses shown beneath that for revenue indicates that while the costs fluctuate to a certain extent along with the revenues, this change is not nearly so great. In other words, the margin between receipts and expenses was practically wiped out during the period of the 5-cent fare.

Association News & Discussions

Public Security Issues in Better Demand*

Progress Being Made in Solving the Special Problems of the Electric Railway Companies

By HENRY R. HAYES
Stone & Webster, Inc.

WE HAVE witnessed this year in the public utility business in this country a continuation of the great expansion which took place during the years of 1921 and 1922. To provide funds therefor, and for refunding purposes during this period of two and three-quarter years, it has required, in addition to the investment in property of large sums of undistributed earnings, the sale of upward of $2,500,000,000 of bonds, notes and stocks.

This large volume of financing, in itself one of the major items in the total of all financing for the period, could not have taken place unless the condition and general credit of the industry as a whole were fundamentally sound. In the opinion of the committee they have never been better, though the costs of capital (hereinafter discussed) are high.

Happily, in the interests of the industry and the public served, there is evident, to a marked degree, a steady broadening of the market for utility securities. It is noticeable in two ways —first, in an increased demand from institutions such as savings banks and insurance companies which gather in the small savings of the people, and secondly, in the last three years especially by sales of securities to the extent of many hundred millions of dollars direct by companies to the users of utility service. In the latter instance it has resulted in opening up an entirely new market for securities in small lots on a basis of reasonable costs. We believe this market has still greater possibilities of development. As has been pointed out to members of this association, all such efforts to sell securities which possess investment merit at prevailing market rates should be aided and encouraged by investment bankers. As the estimated annual budget of the industry requires for extensions, improvements, and refunding purposes over one billion dollars, no new possibilities for raising capital should be neglected.

The current year is one in which many state legislatures have been in session. There were more or less active efforts, in some cases political, in six states to break down state-wide regulation of utilities and to revert to the harmful method of local regulation by the municipalities (so-called "home rule"). Much time and attention has been required of your committee and several group legislative committees, but in every case "home rule" efforts were unsuccessful.

We are dealing with an industry intimately and inextricably bound up in the industrial and social life of the country. It represents a capitalization of close to $15,000,000,000. The industry is basic and essential to all the people. It is an industry, too, where the profits are now limited and can no longer be subjected to the evils of exorbitant profits too often prevalent in its early history. Viewed in this light, it might seem disturbing that there has existed so much talk and agitation this year for local regulation of utilities, especially in New York State, where there was much agitation for municipal ownership and operation.

Those investment bankers who are identified with the actual sale of public utility securities know full well how sensitive the minds of investors are to any tendency, economic or political, which will, or even might, adversely affect honest investment. Investors seem to possess that kind of instinct which can recognize agitation of a purely political character and are very much disposed to withhold funds from the business while such agitation exists. Continued withholding of funds cramps a utility and the public is eventually not adequately served. It is very unfortunate that voters in general, who naturally are themselves daily users of utility service, do not yet seem to have acquired any such discernment. It has become more evident than ever that a development of local sales of investment securities by operating companies direct to users of service will be helpful in preventing such unfair political attacks.

When administered with the broadest powers and in a judicial manner, state-wide regulation of public utilities has been conclusively proved, in the opinion of your committee, to afford the best guarantees which investors can have in this country for a maintenance of that integrity of investment necessary for a ready flow of money into the business (see annual report of 1922 committee).† Where such conditions do not exist we find lack of development of the business or higher costs of money or both—conditions which adversely affect the costs of service to the consumer.

A careful study made by your committee of the policies of the various states throughout the country in regulating the industry shows that as to privately owned plants, in the forty-eight states and the District of Columbia only twenty-five commissions have authority in matters of valuation, rates, services and capitalization. While about three-quarters of the states require of privately owned properties their financial reports of operation, and that such reports are open to public inspection, probably less than half of these reports are actually published. We believe that the public and investors are entitled to this information. Your committee does not believe the best operating results can be attained by the industry until the commissions have such broad authority, exercise it judiciously and regularly and publish full financial reports of operations. Furthermore, money cannot be steadily raised at reasonable costs until the country more fully attains this result.

Of those utilities which are municipally owned and operated, only ten state commissions have jurisdiction over rates, services and accounting. It seems essential that voters of communities which are in the utility business should be more actively educated to a point where public opinion will require proper accounting and sound methods of engineering, finance and operation.

ELECTRIC RAILWAYS

Your committee believes that electric railway service is essential to community service, especially for heavy traffic. The field is developing for trackless trolleys and buses, but such transportation should be supplemental to the main system of transportation. While this newer development in transportation has taken place comparatively recently, it is interesting to note that eighteen state commissions already have jurisdiction over "auto buses" and more with partial and limited jurisdiction. This kind of legislation should be encouraged.

The problems of the electric street railways today are those largely incidental to more economical operation and the prevention of unfair competition. Much progress has been made in the solution of both.

The interurban roads are especially hampered by competition on the high-

*Abstract of a report made to the Investment Bankers' Association of America by Mr. Hayes as chairman of its committee on public service securities. Presented at the annual meeting, Washington, D. C., Oct. 29-31, 1923.

†See ELECTRIC RAILWAY JOURNAL, Oct. 14, 1922, page 639.

ways from trucks and buses which do not pay a fair proportion of the tax burdens. The problem of expense of maintenance of the highways alone, aside from the unfairness of the competition for freight and passenger traffic, is serious and perhaps national in scope.

An instance of unfair competition is the Chicago, Aurora & Elgin Railroad-Smith Bus Line, Inc., case. The Illinois Commission granted a certificate of convenience and necessity to the bus line. An appeal to the order of the commission was confirmed by the Circuit Court. The case on appeal was taken to the Supreme Court, which reversed the decision of the lower court and set aside the order of the state commission. The following is quoted from the decision of the Supreme Court of the State of Illinois: (Joseph K. Choate, Receiver, et al., Appellants, vs. Illinois Commerce Commission, Appellee — April, 1923.)

The railroad company has assets valued at approximately $15,000,000 and a gross operating revenue of substantially $1,250,000 a year. Notwithstanding the fact that the railroad company operates through an unusually rich, heavily populated section, it is temporarily in the hands of a receiver. The total assets of the Smith Bus Line are three buses purchased in the summer of 1920 at a total cost of about $10,000. It is safe to say that they are now worth less than one-third of that amount. The commission recognized the financial irresponsibility of the bus line and directed it to provide liability insurance to the amount of $10,000 for each bus. Passengers in a bus loaded 50 per cent beyond its capacity now have for their protection the privilege of trying to collect $10,000 from an insurance company. The public has nothing to assure them that the bus line will operate on regular schedule, and it requires no argument to demonstrate that it is incapable of furnishing adequate service to the inhabitants of the two smallest villages in the valley, much less to the 100,000 people living in and between Aurora and Elgin. One accident resulting in a serious injury or death of one person would be enough to wipe out the entire assets of the bus line. If one of the buses were taken out of service the bus line's ability to serve the public would be lessened one-third, and with three buses out of service the public would have no accommodation at all. The financial statement of the bus line shows that it is wholly incapable of supplying additional facilities, whereas the receiver for the traction line is financially able to provide additional equipment, if the transportation needs of the territory demand it. The plan of the bus line is to start from the railroad terminals a few minutes ahead of the cars and to secure what business it can without making an effort to provide adequate service for the territory through which it operates.

The railroads in this country have kept pace with the industrial development and the population increase, and the prosperity of the nation has been due to a large extent to the steady expansion of the transportation system. The savings of hundreds of thousands of investors have been massed to build our great network of railroads, and these transportation systems are entitled to protection from irresponsible competition. If shoestring transportation companies, with no money invested in right of way and no reserve capital to provide adequate service or to protect the public from damage, are permitted to drop in here and there and take the cream of the transportation business from the permanent transportation systems, disastrous results are inevitable. If the permanent highways built at the expense of the people are destroyed, these irresponsible bus lines, that profess to serve the public convenience and to supply public necessity, will leave the public to walk or to provide other transportation facilities. Orders of the public authorities to furnish adequate transportation facilities would be unavailing, because the bus lines would be wholly incapable of complying with the order.

The statute provides the means for compelling the existing transportation system to provide adequate service for the public. If the people living in the territory through which the Aurora, Elgin & Chicago Railroad operates are not being properly served they can file a complaint with the Commerce Commission, which has the power to order whatever change or increase in service the evidence warrants. If the existing transportation company does not comply with the commission's order, then a situation may arise where the public convenience and necessity will require the establishment of another system. The theory of the public utilities act is to provide the public with efficient service at a reasonable rate by compelling an established carrier occupying a given field to provide adequate service and at the same time to protect the existing utility from ruinous competition. (West Suburban Transportation Company vs. Chicago & West Towns Railways, No. 15273.) By this method the public is protected from paying the cost of the operation of competing systems and a return upon a double investment of capital. No doubt the proposed bus line would accommodate a few individuals in the Fox River Valley, but the convenience and necessity which the law requires to support the commission's order is the convenience and necessity of the public as distinguished from that of an individual or any number of individuals. There is some evidence in this record which, if it stood uncontradicted, would support the order of the commission, but the evidence taken as a whole overwhelmingly preponderates against the order. Where it is found that the order of the commission is without substantial foundation in the evidence it is the duty of the courts to set it aside. (Commerce Commission vs. Cleveland, Cincinnati, Chicago & St. Louis Railway, No. 15389.)

The Circuit Court erred in confirming the order of the Commerce Commission. Its judgment is therefore reversed and the order of the commission is set aside.

Disclosure of Information

Your committee is pursuing the studies initiated by the 1922 committee with reference to financial information contained in offering circulars as well as in data released by public utility companies. The fact that adequate financial information to some degree at least is not yet being released creates a condition detrimental to the business. We believe that investors should have complete information and that the public is entitled to know what the industry is doing financially. Until these results are accomplished, your committee does not feel that public utility credit will gain that high standing which it has rightly earned.

There exists little difficulty in getting the necessary information as to the steam railroads or the telephone business. Why should there be difficulty with respect to the public utility business, i.e., the gas, electric light, power and electric railways, devoted likewise to the service of the public interests.

Central Electric Traffic Association to Meet Nov. 21

THE next regular meeting of the Central Electric Traffic Association will be held at the Hollenden Hotel, Cleveland, Nov. 21 and 22.

The opening session, called at 10 a.m., will be in the nature of a round-table discussion. At this session all matters of interest to the electric railways, particularly those affecting the various committees of the Traffic Association, should be brought up for discussion. The afternoon session will be devoted to the meetings of the various committees.

The morning session of Nov. 22 will be devoted to reports of committees and such other business as may properly be presented.

A meeting of the chairmen of all standing committees will be held at 2 p.m., Nov. 21, to outline the program and arrange for the necessary committees to conduct the work of the Traffic Association for the year 1924.

Federated Engineering Societies Studying Coal Storage

RESULTS of far-reaching economic and social importance are likely to be attained by the nation-wide study of the storage of coal now in progress by nearly 100 committees of the Federated American Engineering Societies, it is disclosed in a progress report by Dean F. Walker of the University of Kansas, who is directing the field work of the investigations. He said that the final report would be ready about Jan. 1, 1924, and would place at the disposal of the nation the most authoritative information obtainable as to the engineering, chemical and economic factors involved in the storage of coal.

More than 500 engineers are actively engaged in making the study under the direction of a main committee, headed by W. L. Abbott of Chicago. These engineers have found, it was reported to the executive board, that it is necessary to conduct separate investigations to meet peculiar local conditions which are found in various cities and districts.

The executive board authorized the appointment of a special committee to study the report of the United States Coal Commission with the object of ascertaining what engineering conclusions of the commission the Federated American Engineering Societies might adopt.

Executive Secretary L. W. Wallace of the federation, in a report to the board, deals with substitutes for anthracite, saying:

"Upon the eve of the threatened coal strike, F. R. Wadleigh, Federal Fuel Distributor, made an official and formal request that the Federated American Engineering Societies assist the Federal government in its proposed plan of informing the public as to what substitutes could be used, where to secure them and how to utilize them.

"Plans were about perfected whereby the Federated American Engineering Societies could effectively co-operate with Federal and state officials when the strike which made it so immediately necessary to proceed was settled.

"Although the strike is over, yet there is the necessity for such procedure, as anthracite is becoming harder to secure and the cost is steadily increasing. Therefore, it is deemed advisable for the Federated American Engineering Societies to give careful consideration to encouraging such a campaign of education."

Arkansas Utilities Association

THE dates for the convention of the Arkansas Utilities Association have been changed to Thursday and Friday, Nov. 15 and 16.

Maintenance of Equipment

Inspection with Watt-Hour Meters

BY O. A. NORENE
Assistant Master Mechanic Omaha & Council Bluffs Street Railway

SYSTEMATIC inspection is important in the care of equipment. At the present time we use two forms of inspection in Omaha—one on the kilowatt-hour basis and the other on the seven-day basis. The kilowatt-hour basis of inspection has proved the most satisfactory. At present only about 50 per cent of our cars are equipped with economy meters; however, the balance of the cars will be equipped in a very short time. These meters are equipped with three inspection dials, "A," "B" and "C," which determine when the car should be held in for inspection.

What we term the "A" or light inspection is made after the car has made approximately 800 car-miles, as calculated from the meter reading. At this time brakes, emergency control, and equipment and motors are inspected and oiled.

The "B" or general inspection at the carhouses includes all of the fifty-three items enumerated on an inspection card. This is made when a car has made approximately 2,400 car-miles, or about once every seven days.

Small cards are furnished for the use of the inspectors, on which the different parts of equipment are enumerated. Each part is checked off, dated and initialed by the man when the inspection is made. Two cards are made out, one of which is retained by the carhouse foreman, while the other is sent to the master mechanic's office. Here a large card is kept, on which the different inspections and car failures are checked off for a whole month. If a car is pulled in between inspection periods for any defect, or for faulty or careless inspection, it can easily be traced to the right man. It is a probability that the period between the two "A" and "B" inspections can be increased materially in the near future.

The "C" inspection, or general overhaul, is made at the general repair shops after the car has made about 50,000 car-miles. Trucks and electrical equipment are then removed and overhauled and the car body is placed in the paint shop, where it is repainted or revarnished as the need may be.

Tie Bar Reduces Work of Track Construction

A Labor-Saving Device Used to Support the Tie While It Is Being Spiked to a Suspended Girder Rail

BY CLIFFORD A. ELLIOTT
Engineering Department Pacific Electric Railway, Los Angeles, Cal.

WHERE a 7-in. 128-lb. grooved girder rail is used in reconstructing tracks in paved streets, the Pacific Electric Railway uses a trench 21 in. deep. When this reconstruction work is carried out under service conditions, the track is usually "cribbed up" while the excavation work is taking place. In this work every fourth tie is left in place under the rail until the 21-in. trench is completed, when full tieing of the tracks takes place. The placing and spiking of the permanent ties formerly required six laborers. Four of these, each with a tamping bar, held the tie in position at the ends, while the other two laborers spiked it in place.

A tie bar has now been designed which enables the work to be performed by four men. The accompanying illustrations show the method of using this tie bar.

The bar is made up of two pieces of steel, ½ in. x 1 in. by approximately 8 ft. long. These are riveted together with countersunk head rivets for a length of 6 ft. to form the handle of the tie bar. At the toe, the bar is bent to give a convenient form when used as a fulcrum, and the two steel bars are spread apart so as to give a head fork width of 6 in. The cross-section is extended downward 18 in. and the ends are then bent outward for an additional length of 6 in. These latter projections act as peavies for holding the tie in position.

In using this bar the laborer puts the fork over the rail and pushes the toes under the tie, then by pressing down on the handle the tie is raised into position and is firmly held for spiking.

At Left, Holding a Tie in Position for Spiking. At Right, Form of Tie Bar Used by Pacific Electric Railway

Replacing 9-In. Rail by 7-In. Rail Shimmed Up

HIGH cost of maintenance recently caused the Kansas City Railways to replace track on Walnut Street between Eighth and Twelfth Streets. This piece of track had been reconstructed several years ago, using old rail which after further wear had broken in many places. This short stretch required the attention of a gang of six or eight men almost constantly, replacing broken joints and broken rail. In the former reconstruction, this track had been placed in solid concrete on creosoted ties. All this base was in first-class condition, but the replacing of the 9-in. rail with the 7-in.

rail involved some complications. There was not room to place steel ties except by removing a large amount of concrete. The problem was solved, however, by placing upon each of the old wooden ties a 2-in. shim, and incasing all, including the base of the rail, in rich concrete.

New Equipment Available

New Model 16-In. Lathe

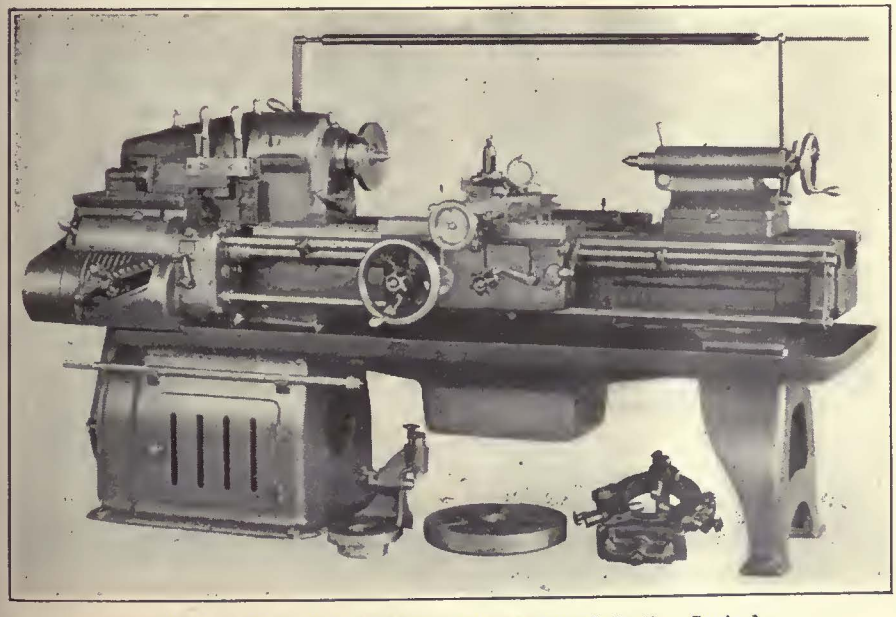
A LATHE with general head for drive by independent motor, single pulley or with cone pulley head has been brought out by the Pratt & Whitney Company, Hartford, Conn. This is a 16-in. lathe known as model B and is suitable for either tool room or high-speed work.

A compact headstock has been developed for both the geared and cone-head types. By mounting the back gears below the spindle, overhanging parts are eliminated, the headstock is centered over the bed and the operator is given greater freedom of movement. The back gears can be engaged from the front of the machine by means of an eccentric lever located under the spindle nose.

The individual motor drive is equipped with push-button control located conveniently on the front of the headstock. The motor is mounted within the cabinet leg and connects by belt to the main drive pulley. For single pulley the drive is through a guarded pulley at the rear. The cone head has a solid housing and side gears. A hand brake adds to the safety and speed of operation.

The positions of the ratio lever and rocker arm for any desired feed or thread are instantly located by a large, direct-reading index plate mounted on the quick-change gear box. This device permits rapid setting and checking of the feed in use and makes the gear box foolproof. A smooth, quiet drive to the feed gearing is secured by the use of large spur gears.

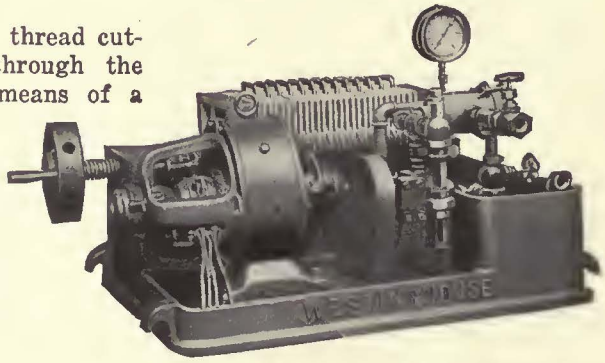
Quick withdrawal for thread cutting is accomplished through the regular handwheel by means of a coarse-threaded sleeve on its hub, making it a one-hand operation. A positive stop on the sleeve acting against a similar stop on the carriage does away with any strain on the cross-slide. The lever operating the combined stop and reverse rod is located at the right end of the apron. This is above the lead screw and permits the operator to set the carriage stop without stooping or taking his eyes from the work. The tailstock has a long, solid barrel and a large graduated spindle. This spindle is locked by a long wedge on its lower side in such a way that no loss of accuracy can occur from the locking strain. The tailstock is clamped to the bed by an eccentric shaft parallel to the spindle, and the same handle provides a means of moving the tailstock along the bed. The usual type of carriage cross adjustment is provided.



Lathe with Individual Motor Drive and Push Button Control

Oil Drying and Purifying Outfits

IN ORDER to make it possible for central stations and other large users of transformers, oil circuit breakers, electrolytic lightning arresters and feeder voltage regulators successfully to dehydrate and purify oil with a minimum of expense, the Westinghouse Electric & Manufacturing Company has developed a special type of filtering outfit.



10 Gal. Oil Drying and Purifying Outfit

The outfits are made in five standard sizes, divided into two classes according to the size of the filter paper. The three larger sizes are rated at 10, 20 and 30 gal. per minute and the two smaller sizes at 2½ and 5 gal. per minute. A complete outfit consists of a filter press, motor, pump, oil strainer, pressure gage and piping. The sizes up to and including 10 gal. per minute are mounted on an iron base cast with a high rim that forms an enclosure and serves as a drip pan. The 20 and 30 gal. sizes are mounted on a structural iron base and have a sheet metal drip pan.

The filter press proper is made up of a series of flat cast-iron plates and frames assembled alternately with filter papers between them. By means of a screw and lever and a movable cast-iron end block the plates, frames and papers are forced tightly together. The plates and frames are cast with holes in two of the corners. When the plates and frames, with the filter papers between them, are assembled, the holes form the inlet and outlet for the oil.

The filter paper used is a special grade of white blotting paper about

New Line Truck of Central Illinois Public Service Company

0.025 in. thick. It is prepared from wood pulp and contains no coloring matter or chemicals that might injure the oil. Five sheets, cut to the proper size with holes punched to correspond with the holes in the filter plates and frames, are used between each plate and the adjacent frame.

To obtain the best results in treating the oil it is absolutely necessary that the filter paper when first placed in the filter press be entirely free from moisture. Since filter paper will invariably absorb moisture if exposed to the air for any length of time and must, therefore, be thoroughly dried under heat before it is used, specially constructed drying ovens have been designed for this purpose.

Large Fleet of Line Trucks Used in Illinois

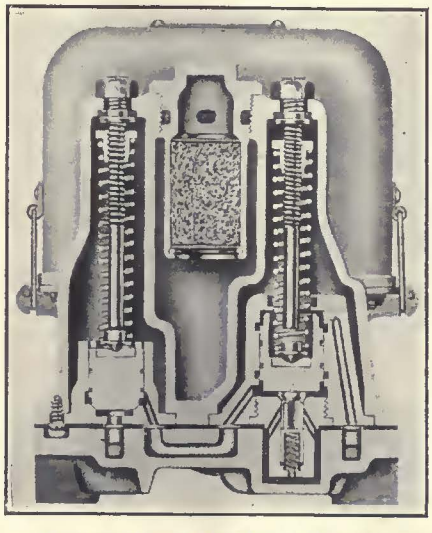
FIVE new line trucks have recently been added to the fleet of speed wagons used by the Central Illinois Public Service Company, making a total of twenty-four trucks of this type now in use. This company operates the Central Illinois Traction Company, the Southern Illinois Railway & Power Company and gives local service in several other localities.

The type of trucks as shown in the accompanying illustration has built-in boxes, racks and receptacles for the various tools needed in line repair work. Wooden tool boxes are located at the rear of the cab, and in addition steel tool boxes are placed on the running board below the cab on either side. A galvanized steel receptacle at the rear of the body is used for carrying rubber blankets. At the left of this compartment is another for carrying live line tools. This is 10½ ft. long and extends under the seat. Another small rectangular compartment beside this is used for carrying pike poles. This also extends under the front seat. A compartment at the right hand side is used for shovels, digging bars, and other miscellaneous large tools. In maintaining the various lines, the trucks are located in districts and take care of the maintenance of overhead lines, transmission, and distribution systems, of which there is about 1,600 miles, giving service to 205 towns in Illinois.

New Type of Governor

A NEW governor for motor-driven air compressors is being placed on the market by the Westinghouse Traction Brake Company, Wilmerding, Pa. This has been designated type S-16 and distinctive features include a reduction in size, weight and cost, as well as improvements in design of detail parts over the well-known double safety valve type of governor.

The contact fingers are self-contained and incased in molded insulation, so that they can be readily removed as units without special tools. The finger adjustment is permanent, so that there are no screws which may loosen in service. An efficient pneumatic blowout is provided. When the governor cuts out, this, in combination with the peculiar shape of the contacts, insures that the opening arc is lengthened and cooled, so as to extinguish it effectively. Air from the main reservoir line is vented from the switch cylinder into the switch governor whenever the governor cuts in. This aids in discharging copper gases. A self-contained cartridge type of hair strainer is used to protect all parts. Pipe connections are made in a separate base so that no pipe connections need be broken in order to remove the operating parts. Pressure adjustment is made by loosening a locknut with a wrench and using a screwdriver on the high and low-pressure adjusting stems. Both high and low-pressure valves have metal seats.



Construction of New Type Governor

Handy Type Push and Pull Jack

A HANDY tool for wrecking operations as well as one for which many uses can be found in electric railway shops is the new push and pull jack being marketed by the Duff Manufacturing Company, Pittsburgh, Pa. The design of this jack is extremely simple, consisting of a steel screw, ratchet with pawl, and two cast steel nuts. The nuts are provided with flat projections on the top and with hook projections on the bottom and on either side. The flat projection is used for pushing operations, while the hooks are used for attaching tackle for pulling.

Jack Applied for Spreading Operations

By the use of chains and hooks, fastened to the nuts, the jack can be used for retracking cars or for straightening bent portions where a direct pull is necessary. The jack has a capacity of 10 tons and when used for pulling the jaws can be extended to a maximum distance of 25 in.; this can be reduced to a minimum of 9½ in. When used for pushing the minimum distance between the flat projections is 8½ in. and this can be increased to 24 in. as a maximum dimension. The jack complete weighs 39 lb.

The News of the Industry

Votes for Franchise

Baton Rouge Electric Company Given Fifty-Year Grants—New Lines to Extend to Suburbs

The taxpayers of Baton Rouge, at a recent election, voted affirmatively on a city ordinance for a fifty-year franchise to the Baton Rouge Electric Company for a railway line to the suburbs, north of the city, where the works of the Standard Oil Company are located. An affirmative vote was also given the Baton Rouge Electric Company for an extension of the franchise on its belt line, thus making both franchises effective for fifty years.

The Baton Rouge Electric Company realized that another line was needed to bring the service up to date and to meet the growing wants of the city, and expressed itself as ready and willing to undertake the work of improvement as soon as it was authorized to do so. The extensions and additions contemplated under the ordinance are said to involve the expenditure of about $300,000.

Under the provisions of the franchise it is stipulated that the motive power for the cars shall be electric; that the fare for one continuous trip on any line covered by the franchise shall not be more than 5 cents unless ordered changed by the Commission Council of Baton Rouge, the Louisiana Public Service Commission, or any other legally constituted authority. In addition free transfers are to be issued.

It is stipulated that within thirty days after the granting of the franchise and right of way the Baton Rouge Electric Company shall file with the city auditor its acceptance and shall furnish a certified check in the sum of $5,000 that it will construct and put in operation the said Dixie extension over the streets within two years from the date of grant and acceptance.

It is agreed that the company shall not sell or lease its privileges to any railroad operated by steam coming into the city of Baton Rouge. A provision allows for the free transportation of the police of the city when on duty and in uniform or with badge, firemen and other city employees. The franchise states that a failure to operate the road for thirty consecutive days without cause or the consent of the Commission Council shall operate as a forfeiture of the franchise, the failure to be determined and forfeiture decreed and enforced by any court of competent jurisdiction. A provision is also made that children attending schools in the city shall be furnished transportation at a price not exceeding three-fifths of the regular fare, provided that each child shall have the right to such reduced fare only when going and returning from school.

Improved Platforms for Golden Rod Yellow Cars

The Interborough Rapid Transit Company, New York, N. Y., gave a demonstration run with four reconstructed cars on its Second Avenue Elevated line Nov. 7. The principal improvements in these cars consist of vestibuling the platform and providing sliding doors to replace the old swinging gates. The new platform arrangement will protect passengers against stormy and unpleasant weather conditions and also decrease the length of time required for station stops during heavy traveling periods. The new doors are electro-pneumatically operated and the door control is so arranged that one man can operate the doors on several cars. This system is similar to that already in use on Interborough subway trains. The run was witnessed by Transit Commission representatives and Interborough officials.

"A Mutual Desire"


Brooklyn Queens Manhattan

LOOK AHEAD

With the B. M. T.

Vol. I OCTOBER 24, 1923 No. 1

A Mutual Desire

Everybody wants better transit.

But better transit depends upon the co-operation of the PUBLIC, the CITY and the transit companies.

Toward this end the B. M. T. begins today the publication of a weekly bulletin.

Let us "LOOK AHEAD" to the realization of our mutual desire.

GERHARD M. DAHL
Chairman of the Executive Committee

Published by The BROOKLYN-MANHATTAN TRANSIT LINES

B. M. T.

In the hope of giving better transit with the co-operation of the public, the city and the transit companies the Brooklyn-Manhattan Transit Corporation has started the publication of a series of weekly bulletins named "Look Ahead." The first of the series was posted in 2,500 cars of the surface line and of the rapid transit lines in Brooklyn, Queens and Manhattan on Oct. 26. The company aims to make this publication a connecting link of information between the traveling public and the companies. The first message is reproduced herewith.

Arguments Advanced

Supreme Court at Columbia Hears Failings of City of Spartanburg and Its Railway Property

Another act in the drama of the controversy in Spartanburg was acted on Oct. 8, when the Supreme Court held a hearing in Columbia on the petition of the city to make the South Carolina Gas & Electric Company renew operation of its cars or forfeit its franchise.

The argument for the city, which was presented by C. E. Daniel, stressed the original contract existing between the city of Spartanburg and the South Carolina Gas & Electric Company. It was his contention that the commission had no authority to order cars in the city abadoned.

Henry M. Earle, general counsel for the local traction company, took the stand that the commission was guided by principles of common sense and justice, when it ordered abandoned the operation of an unprofitable railway. He said further that the city had been given better transportation than it ever had, and that if the franchise were forfeited, the city would have no street railway at all, because no individual or company would accept a franchise in view of the loss it imposes and of the attitude of the city administration toward this business proposition. He said that the fact was overlooked by the relators that Spartanburg had, for more than twenty years, the benefit of the services of a utility company built entirely at the expense of outside capital, and that the right of the investors to be protected against the alleged forfeiture had also received little consideration. Further, that the injury the public would receive through the crippling of the utility had also been overlooked.

He referred to the unreasonableness of the city in demanding transportation which was now out of date. He said that the abandonment by the public of the mule cars in 1899 and of the electric cars in 1920 was the natural result of progress and development, and that an established utility should not be required to forfeit its right to exist as an alternative to incurring the loss consequent to such natural changes.

In conclusion, he stated that the relators might, for reasons of their own, attempt to take advantage of the company's position brought about by the changed conditions, but that the commission had been created and organized for the purpose of protecting the rights of the State of South Carolina in its public utilities, and that it had seen fit to stop the confiscation and forfeiture and to protect alike the public utility

company and the investors through considerations that were ignored by the City Commissioners. He said that the company had not declined to furnish service, that the public was not "irreparably" or otherwise "injured" and that adequate service was being and will be afforded under the direction of the commission, which had full authority and jurisdiction.

It will be recalled that cars in the city of Spartanburg were ordered abandoned July 21, through an order from the South Carolina Railroad Commission. Following the actual stopping of the cars, the company maintained the regular schedule on the interurban lines from the city limits on the western side of the city to Saxon mills and on the eastern limits to Clifton and Glendale Mill villages. The various steps in the controversy have been followed from time to time in these columns.

In the meantime the company is operating buses in the city of Spartanburg proper, which are giving satisfaction to the patrons, and the company, at the same time, is continuing the electric railway service on the suburban line, which runs about 10 miles beyond the city limits. Since Oct. 8 no step has been taken by the court, and undoubtedly some time will elapse before a decision will be rendered.

Following the hearing, the city on Oct. 20 filed an additional argument which quotes at length from the decision rendered by the court in connection with the New Jersey traction difficulty.

Chamber of Commerce Boosts Company's Position in Richmond

The Chamber of Commerce of Richmond, Va., recently adopted the following resolutions:

Whereas the Virginia Railway & Power Company, inspired by an abiding faith in the fairness of the people of Richmond, has lately expended and authorized to be spent large sums of money in order to secure the adequacy of its service to the public and make its proper contribution to the general prosperity and growth of the city, and

Whereas this substantial expression of good faith has stabilized and improved business conditions; therefore, be it

Resolved, That the Chamber of Commerce of the city of Richmond, Va., urge upon its members and other civic bodies, and the public in general, a united effort to secure for the company through the City Council such revision of its franchise obligations as will insure a fair and equitable franchise and establish for the company a credit base to enable it to provide adequate, satisfactory service to the public.

The company is fighting for a recognized valuation for rate-making purposes in Norfolk at the present time and better conditions in Portsmouth, which will appeal to the public lender and increase the stability of the company's stocks and bonds. The same is true in Richmond, where officials are unable to carry out improvement programs because the city has not passed on its application for a blanket franchise to cover a number of old existing franchises which have begun to expire.

In a new statement, printed in *Public Service News*, the Richmond bulletin of the company for car distribution, now current, the company says, in commenting on its expenditures, that public utilities must always be in a position of inviting new capital, and that new capital is attracted only by prosperity on a sound economic financial basis.

Denies Commission Jurisdiction to Order Extensions in Los Angeles

A ruling of the State Supreme Court of California revealed on Oct. 31 that the writ of mandate sought by the Hollywood Board of Trade to compel the State Railroad Commission to assume jurisdiction of and to hear and determine a complaint against the Los Angeles Railway Corporation, which the Hollywood Board of Trade had filed with the commission, was denied.

Since 1918 the Hollywood Board of Trade has vigorously sought the right to place the power with some municipal or state board or commission to force the Los Angeles Railway Corporation to extend its lines into the Hollywood district of the city of Los Angeles. At various hearings the California State Railroad Commission has taken the stand that it did not have the power to order the extensions as the Hollywood district was already adequately served by the local lines of the Pacific Electric System, and it was the opinion that the line extensions would produce duplicate service in territory already supplied with car service. Also, in the particular territory into which extensions were sought the present fare of the serving line was 10 cents. It was the issue of the Hollywood Board of Trade that the extension of the other line would produce a 5-cent fare.

The Los Angeles Board of Public Utilities took the stand that it could not comply with the Board of Trade's petition and order the extensions, as the City Attorney of Los Angeles ruled that under the terms of the city's charter the Board of Public Utilities did not have authority to issue such an order.

It was suggested to the Board of Trade of Hollywood that it file a suit to determine who had jurisdiction.

After the Board of Trade had filed its original petition to the commission to order the line extensions, the commission saw fit to dismiss the application at a hearing held in Los Angeles, as the Board of Trade failed to present sufficient evidence to support its application that the ordering of such line extensions by the commission into Hollywood would be to the advantage of all parties and the public in general provided the question was determined by the courts prior to an exhaustive hearing on the merits of the case.

The court held that the question was a municipal matter and that the public utilities act, in so far as it seeks to confer jurisdiction upon the State Railroad Commission to order a street railway to extend its lines into a new territory in which it has no franchise, is ineffective for that purpose and to that extent void.

Tax and Free Transportation Are Heavy Burdens

The City Council of Seattle, Wash., recently referred to the franchise committee a petition of the privately owned Seattle & Rainier Valley Railway asking relief from its franchise requirements that it pay the city a gross revenue tax of 3 per cent, and also give policemen, firemen and other city officials free transportation. The petition recites that the company is unable to earn dividends on all its stocks, but nevertheless has removed the disparity in fares between the Rainier Valley line and the Seattle Municipal Railway by eliminating the transfer charges and by selling school tokens twelve for 25 cents. The company will be unable to continue these concessions if the tax and free transportation requirements are continued, the petition avers. The Rainier Valley company also asked repeal of an ordinance requiring the company to pave a portion of its right of way in Rainier Avenue between Morgan Street and Graham Street, asserting the work was unnecessary, and that the cost, $39,600, including replacements of tracks, would be a heavy strain on the company's finances.

Partial Service Resumed in Saginaw

Partial resumption of street car service with the motor bus as an auxiliary has taken place in Saginaw, and within the next ten days, according to present plans of the officers, the entire Saginaw Transit Company will be in operation.

Service was started on Nov. 1 as an aid to the merchants who observed the annual fall Dollar Day, which a majority admitted was the largest since Dollar Day was begun several years ago, and most of them asserted that the improved city transportation service had a great deal to do with the success of the merchandising event.

The company was not ready to commence operations, but it was decided to start two complete car lines and three motor bus routes to aid the jitneys that have been serving the city since the suspension of street car service on Aug. 10, 1921.

Just as rapidly as track and overhead repairs are made additional cars will be placed on the lines, Charles S. Kressler, general manager of the company, says. Special crossings, diamonds and switches that have delayed work have been received and are now being installed. Although the jitney buses are giving the company competition, this will not be for long, as their licenses expire Nov. 30, and in the meantime the City Council will pass necessary legislation to prevent all competition with the car company.

Mr. Kressler has started advocating the best patronage for the car lines. His opening campaign launched with the merchants of the city whom he addressed was referred to in detail in the Oct. 27 issue of the ELECTRIC RAILWAY JOURNAL.

Governor Smith Optimistic

More Republicans in Assembly, but New York's Democratic Governor Is Hopeful About Traction Program

In spite of the personal appeal of Governor Smith to the voters of the state of New York to give him a Democratic lower house in the Legislature, the people up-state did not enthuse in support of the proposed public utility control and hydro-electric development legislation. As a result of the election on Nov. 6 the Assembly is Republican by an increased majority.

It is anticipated, however, that the Republicans will propose compromise legislation dealing with public utility regulation and power development. The most that can be expected, however, is some attempt to solve the New York City traction muddle, and that some effort will be made in this direction by the Republican Assembly leaders seems certain with a Gubernatorial and Presidential campaign coming on next year.

Under the Hearst-Hylan plan defeated in the Legislature this year, the functions of the Transit Commission, with jurisdiction in New York City, would have been transferred to the Board of Estimate and Apportionment of New York City. Among the objections raised by the Republicans was that the program advanced by the Democrats did not insure the permanency of the 5-cent fare and did not require municipally operated lines to be self-sustaining, but that it left the Board of Estimate the power to increase rates and provided for the concealment of losses and merging into the tax rate.

The Republicans also opposed the appropriation by the city for bus lines.

New Plan for Transit Commission

It is said that Governor Smith has a plan under consideration calling for the elimination of the Transit Commission appointed by Governor Miller, but which will recognize the principle of state regulation of transit lines. All functions now performed by the Transit Commission in connection with the planning and construction of new transit lines would be recognized as city functions and shifted to the Board of Estimate or some agency created by the city for the purpose of taking over this work. It is said that Governor Smith will submit a transit proposal which in the main will follow the lines suggested by the Republicans in the Assembly at the conferences with Governor Smith in the closing weeks of last year's Legislature.

What the Governor regards as a necessary prerequisite for the solution of the traction difficulty is to break the deadlock between state authority and city authority. It is said that a compromise is now possible, for while the Republicans with their majority in the Assembly would have the power to prevent abolition of the Transit Commission, Democratic leaders can't see any reason why they should want to exercise that power as long as this contention for the principle of State supervision is not disregarded.

News Notes

Propose Thirty-eight per Cent Increase.—Proposals of the employees of the Worcester Consolidated and Springfield Street Railway Companies in connection with a contract to replace that which expires Dec. 31 call for an eight-hour day, a maximum of 80 cents an hour for regular blue uniform men, 95 cents an hour for one-man car operators and a 30 per cent increase of pay for miscellaneous employees. As computed by the company officials, the employees' proposals call for an increase of 38 per cent over the existing rates, figured on the hourly basis, or 22 per cent when figured by the day, plus the reduction of the workday from nine to eight hours. In the case of one-man car operators it is figured that the increase would be 44 per cent, on the hourly basis. The increased wage for platform men would be $5.60 minimum to $6.40 maximum, per day of eight hours, and $7.60 for one-man car operators. The companies propose 58 cents an hour as the maximum, as at present, with an additional 5 cents an hour for one-man car operators, and elimination of certain bonuses. The first conferences took place on Nov. 5.

Comments on Power Situation.—Alexander MacKenzie, president of the Brazilian Traction, Light & Power Company, was among the arrivals on the *S.S. American Legion* of the Munson Steamship Line in New York recently. Sir Alexander reported that his company, which furnishes all the traction, light and telephone service to Rio de Janeiro and São Paulo, Brazil, is completing a new 160,000-hp. plant 100 miles from Rio de Janeiro. He also said that the present plant, which only provides 75,000 or 80,000 hp., was not only inadequate but that the water supply in that section was running low.

Men Want Conferences.—The street car men's union has renewed its request of the directors of the United Electric Railways, Providence, R. I., for a conference on its recently submitted draft agreement including a wage increase and the closed shop. In a letter signed by Business Agent Coleman and Secretary Coates the men claim that a proposition which looks to conferences to settle differences is reasonable. The company had called for immediate arbitration.

Wages Increased. — The Frankford, Holmesburg & Tacony Railway, which operates a trolley line to the northeastern section of Philadelphia, has voluntarily granted its employees a wage increase of 3 cents an hour. This makes the new scale 48 cents. The increase, which went into effect on Sept. 16, affects about 100 men.

Disapprove "L" Scrapping. — The trustees of the Boston Elevated Railway are opposed to the removal of the elevated structure and the substitution of subways on the ground that such change would cost $80,000,000. In a special report to the Legislature recently filed, the trustees say that if $80,000,000 is to be spent, the money should be used to provide additional service, which would benefit the community as a whole rather than the destruction of lines already built. They concur in the opinion of the transit commissioners who reported in 1913 that the "advantage to be gained by substituting subways for elevated structures are in no way commensurate to the expense."

Pay Increase Granted.—An increase of from 48 to 73 cents an hour to shopcraft workmen on the Washington, Baltimore & Annapolis Railroad has been granted. About 200 men will be benefited by the increase, it was announced by Edward D. Bieretz, business agent of the Electrical Workers' Union. Several weeks ago the men went on strike after failure to get the increase asked for but were persuaded to return to work pending negotiations.

Benefits of Merger Noted.—As the result of recent consolidations, 1,700 miles of transmission line, serving about 14,000 square miles of territory in Illinois, is now included in the properties of the Central Illinois Public Service Company, Mattoon, Ill. The company has taken over eight concerns in central and southern Illinois. The consolidation, according to officials of the company, makes possible the generation and purchase for distribution to customers of about 175,000,000 kw.-hr. in 1923, as compared with 128,000,000 generated during 1922. The new Central Illinois Public Service Company, as the result of the merger, now includes the Middle West Power Company, Canton Gas & Electric Company, Lewistown Electric Company, Central Illinois Power Company and other utilities.

Franchise Revoked, Cars Still Operating.—Although the franchise of the Waverly, Sayre & Athens Traction Company, in Sayre, Pa., has been revoked, the company is still operating cars between Waverly and Athens. The reason for the revoking of the franchise is bound up with the financial inability of the company to meet all the pavement requirements in Sayre. The borough requires that pavement should be made in accordance with the franchise, i.e., with concrete. The company finished a considerable lot of pavement last fall with tarvia asphalt and intended to finish the remaining ¾ mile in the same manner. The Burgess, however, insisted on the pavement being laid with concrete or the franchise annulled. The business men of Sayre have petitioned the Borough Council to reconsider the revoking of the franchise because of the business loss to the merchants and the inconvenience to hundreds of persons who use the line, but the Borough Council refused to take action in the matter.

Foreign News

Proposed Extensions in Province of Milan

Further Electrification of State Railways and a Subway in City of Milan Under Consideration

The Council of the Province of Milan is negotiating with the Italian Government and a number of traction companies to increase the mileage of electric interurbans in the Province of Milan. Apart from a number of electric interurbans and steam tramways which are now in operation, a great number of country bus lines are giving service in the country, generally in a very poor and unsatisfactory way.

The total mileage of new lines to be built for electrical operation in the Milan province is 63. The lines which are now steam operated and whose electrification will be subsidized by the province total 80 miles.

It is further planned to restore about thirty miles of lines which had been abandoned during the war and after the war period. Several of these companies are considering the adoption of Diesel electric or straight gas rail cars on these short lines.

GENOA-MILAN LINE

The Italian State Railways has recently added about 36 miles to its three-phase electric system on the Turin-Genoa-Milan triangle. The total mileage now in service is about 300. It is planned to operate fast passenger trains on the section between Genoa and Voghera at a maximum speed of 77 m.p.h. This will shorten the limited train schedule between Milan and Genoa by about thirty minutes. The distance of 95 miles formerly was covered in two hours and forty minutes, there being heavy grades in the electrified section. The State Railways has estimated that the cost of electrification of the track, exclusive of buildings, track repairs and locomotives, has amounted to approximately 1,000,000 lire per kilometer, while new electric locomotives cost approximately 1,200,000 lire each. It is estimated that, apart from the passenger traffic, it will be possible to move 4,000 freight cars daily between the harbor of Genoa, Milan and the Simplon and Gothard lines toward Switzerland.

FRANCHISE FOR AN UNDERGROUND ROAD FOR MILAN

At the meeting on July 31 of the Milan Municipal Council, Public Works Commissioner Marchetti gave an account of the franchise negotiations pending between the city of Milan and the Milan Metropolitan Railways for the construction of a system of underground electric railways.

This Italian-French-Spanish Corporation is affiliated with the same interests which control the Paris underground and the Madrid subways, and proposes to invest at least 150,000,000 lire in the construction of three subway lines in the city of Milan. The first line to be built will have as its terminals Loreto Circle, at the northern end of the city where the express and local interurban lines from Monza enter, and the industrial fair grounds at the south. It would have a route mileage of about 5 miles, with fifteen stations. It is purposed to start work this year in order to put the first line in operation by 1925. The two other lines will complete a loop around the city line of Milan and will connect all interurban terminals with the State Railways Central, New and Southern stations and with the Northern Railways station.

ELECTRIC ROAD TAKES OVER BOAT SERVICE

The Italian Minister of Public Works has turned over the operation of the Lake Maggiore steamboat service to the Cisalpine Public Undertakings Company, which is also the owner and operator of the Domodossola-Locarno Electric Railway. From 1916 to the present this steamboat service has been operated by the Italian Government.

New London Underground Railway Offices

To secure greater efficiency and more economic working and administration, a new office building is being erected at St. James' Park Station for the housing of the staff of London's Underground. With the growth in the work it has become imperative that the various staffs, which are now scattered about London, should be concentrated, and to this end designs were prepared for a new office building adjacent to the existing headquarters at Electric Railway House.

Municipal Tramways in England Sold to Private Companies

The Ilkeston Town Council has sold its tramway and electricity undertakings to the Nottinghamshire & Derbyshire Tramway Company and the Derbyshire and Nottinghamshire Electric Power Company, at a figure fully £8,000 greater than the amount required to pay off the outstanding loans. The Town Council is thought to have been fortunate in securing such favorable terms. Some years ago numerous municipalities in England undertook extensive tramway and electric lighting operations, with the idea that the municipalities could operate better and more cheaply than private enterprise. In the case of the smaller towns this has not worked out very well, because the business is done on such a small scale that it is usually uneconomical.

Compagnie Generale Francaise de Tramways

Appropos of the new extension of the accord between the Compagnie Generale de Tramways Francaises and the various municipalities wherein it operates the following figures of the results of recent operations indicate that here, as in so many other cases, the lines are having difficulty in keeping up with the demands upon them, particularly so with respect to the Paris municipal tramways as well as most others in France. Returns have increased greatly, so have running expenses, and the amounts available, or which can be readily had, for real improvements, as well in track renewals as in rolling stock, are by no means adequate. The figures herewith are for eight months' operation, and with the proportionate increase continuing until the end of the year they may well show an augmentation of nearer 15 per cent than 10 per cent. With ulterior increases on the same scale it is certain that a vast system of improvements on all hands will be necessary to cope with the traffic of five years hence.

	Receipts in Francs Eight Months 1923	Receipts in Francs Eight Months 1922
Marseilles....	29,970,811	28,210,906
Le Havre.....	5,778,209	5,656,781
Nancy.....	4,305,534	3,934,992
Orleans.....	965,474	897,594

The total increase is 2,319,756 francs, which for the proper standard of comparison must be turned into dollars at the normal, not the present, rate of exchange, say 5 francs to the dollar. Marseilles, with nearly a million population, has receipts of around $8,000,000 a year, and Orleans, with fifty thousand, but $240,000.

Glasgow Tramway Extension

The tramway department of the Glasgow Town Council on Aug. 1 formally took over the line of the Glasgow Subway Railway and the Paisley & District Tramways as agreed and confirmed by act of Parliament. The subway purchase price was £385,000 and that of the Paisley tramways £250,000. By the addition of these two properties the city's municipal tramway system has been extended by 24 miles, of which 6 miles is accounted for by the subway. The total length of route under the control of the tramway department is now 126 miles.

Narrow Gage and Top Deck Covers

The British Ministry of Transport has refused to sanction the use of top-deck covers for cars running on the narrow gage of 3 ft. 6 in. at Chester, on the ground of the risk of overturning, especially from wind pressure.

Debentures Issued. — The London Underground Railway has issued £6,000,000 of 4½ per cent debentures.

Financial and Corporate

Dismantling Likely

Supreme Court Hears Report of Receiver on Northern Massachusetts and Connecticut Valley Systems

That the Northern Massachusetts and Connecticut Valley Street Railway systems would soon be dismantled in large part, if not wholly, was the tenor of evidence and discussion at a hearing given Nov. 2 in Boston by Judge De Courcy of the Massachusetts Supreme Court on the fourth report of Daniel P. Abercrombie, receiver.

The Northern Massachusetts case was considered first. Mr. Abercrombie said the Athol division was operated at a profit and he believed that sale of it as a going concern was feasible. He said the whole property, if sold for dismantling, would bring about $125,000 and there would be claims of about $60,000, leaving about 10 cents on a dollar for the holders of $500,000 worth of bonds. He added that he believed he could do better than this at a receiver's sale.

Taking up the Connecticut Valley system, Mr. Abercrombie said the lines showed an operating loss of approximately $15,000 since the beginning of the present calendar year, and that passenger revenue in this period had been $41,000 below the corresponding period of 1920. He asked for authority to issue receiver's certificates in the amount of $30,000 to pay taxes and power bills.

Bentley W. Warren, appearing for a bondholders' committee and for two banks holding mortgages, offered objections to a receiver's sale of the properties, preferring foreclosure.

Judge De Courcy directed counsel to try to agree on whether the sale shall be by receiver or through foreclosure, on the question whether or to what extent the lines should be operated in the meantime, and what amount of receiver's certificates should be issued.

On the part of Chambers of Commerce in the larger towns involved some discussion has taken place relative to organizing local companies to take over lines in a position to pay profits, and there have also been conferences with bus operators concerning the feasibility of installing a bus service to supplant the trolley service.

Income Lower, Traffic Increases in Detroit

The total operating revenue for the city of Detroit, Department of Street Railways, during September was $1,843,027 against $1,532,927. The former figure included revenue from transportation amounting to $1,766,670. The total operating expenses for the month of September were $1 360,890, compared with $1,073,417 for the same month a year ago. Net revenue from railway operations was $482,137 in September of the current year. A year ago it was $459,511. The net income shows a slight decrease over that of September, 1922. A year ago it was $61,026, and in September of this year it was $59,213. Total passenger traffic increased from 35,770,063 in September, 1922, to 38,385,837 in September, 1923.

Reorganization of Washington-Virginia Company

A reorganization of the Washington-Virginia Railway is being planned by a noteholders' committee, under which the road has operated for the past three years. The first step in the proposed reorganization will be the filing of petitions in the courts of the District of Columbia and Virginia to have the rights of the various lien holders judicially determined.

The noteholders' committee met in Philadelphia recently and decided to start proceedings for a reorganization. While preparing the court petition, Mattie M. Newcomer, an individual bondholder, unexpectedly filed suit at Fairfax Court House, asking that a receiver be appointed.

The petition for receiver, which was filed by Attorneys Charles H. Merrillat and William M. Ellison, alleged that the company had defaulted in the payment of dividends for the past three years.

The charges brought are that corporation officials have allowed the properties to reach that degree of insolvency through "wrongful misappropriation, waste and reckless improvident and unlawful financiering, abuse of its corporate powers and unlawful diversions of proceeds" of several of the bond issues and mortgages.

Judge Samuel G. Brent has ordered that the defendants to the petition show cause why a receiver should not be appointed.

The allegations made extend over a period of time from 1908 to the present. The two lines—the Falls Church line and the Mount Vernon line—were at that time merged. Clarence P. King, who became president of the consolidated companies in 1908, later became president of the Washington Railway & Electric Company.

The Washington Utilities Company, the petition cites, was created under the laws of Virginia by Clarence P. King as "part of a scheme of accomplishing a huge consolidation of street railway interest in and about the District of Columbia and adjoining states."

This scheme, as well as many others, the petitioner says, collapsed, thus bringing about the state of insolvency in which the company now finds itself.

Judgment Affirmed

Supreme Court Rules Philadelphia Banks Must Give Columbus Railway $1,136,310

The Ohio Supreme Court in affirming the judgment of the Franklin County Court of Appeals in the Augusta Slaymaker case gives the treasury of the Columbus Railway, Light & Power Company $1,136,310 to be paid by E. W. Clark & Company, Philadelphia bankers. This decision ends one of the hardest fought controversies in the railway field.

The story began in December, 1918, when Augusta Slaymaker and other stockholders of the company brought suit to recover money paid to the Clarks for their services as fiscal agents of the local concern.

In December, 1920, shortly after control of the company had been wrested from the Clarks by Charles L. Kurtz and his associates, leave was obtained for it to enter the Slaymaker case via a cross-petition in which it was sought to recover for the company certain sums which, it was claimed, had been obtained or expended illegally by the Clarks. Included in these sums were commissions paid by the Clarks to themselves on the sale of Rail-Light securities; payments made the Clarks for supervision of construction of certain equipment; losses incurred by the "franchise surrender" in 1918; payments made by E. K. Stewart, treasurer under Clark, to John Scott Anderson, C. C. Philbrick, and others from what was denominated the "Yellow Dog Fund," and other alleged illegal payments and expenditures.

Judge Kinkead Sustains Judgment

Judge George B. Okey was named master commissioner to hear the testimony, and after several months rendered his report, finding for the company on nearly every ground. He was sustained, in the main, by Common Pleas Judge Kinkead, whose opinion scathingly arraigned the Clarks for the way in which they had enriched themselves at the expense of the Rail-Light stockholders, and decreed that the Clarks should return to the Rail-Light the sum of $1,512,021 and pay all costs in the proceedings.

Although Judge Kinkead was sustained by the Court of Appeals, the amount of the judgment was fixed at $1,136,310. The principal items follow:

Management contracts	$224,716.05
Profit on sale of stocks	117,841.72
Franchise surrender	64,659.00
Stewart withdrawals	218,527.31
John Scott Anderson	173,273.40
Total	$799,017.48

Interest on these amounts from the date of their payment to April 1, 1923, brought the total of the appeals court judgment to $1,136,310. The Clarks now also must pay interest upon that sum from April 1 to the date of payment of the judgment, and in addition, must pay all court costs as a result of the decision of the Supreme Court.

Charles L. Kurtz, president of the Columbus Railway, Light & Power

Company, said that acquisition of the above-mentioned amount would help toward the improvements and new construction projects that needed to be carried out. He said that new cars were needed as the present equipment was insufficient. His company needs in addition a new power plant which alone will call for an expenditure of approximately $4,000,000, and car line extensions must be undertaken in the near future.

There still remains the possibility of the Philadelphia bankers having the case transferred into Federal Court. The $1,136,310 is subject to orders of the state courts and unless restrained by federal action can be paid to the Columbus Railway at once. The various steps in this controversy have been followed from time to time in these columns.

Investigation of Service Resumption in Kewanee Started

An electric railway line will be salvaged from the junk pile if $140,000 can be raised in Kewanee, Ill., to finance a new company. Pursuant to the stopping of the interurban service between Kewanee and Galva and the city cars in Kewanee recently a representative group of citizens and the board of directors of the Chamber of Commerce have lost no time in delving into the problem of resuming operation of service formerly provided by the Galesburg & Kewanee Electric Railway.

A thorough investigation reveals the fact that new cars and extensive work on the South Main Street line will be necessary, the total cost of the improvements being about $90,000. This with the $50,000 which must be paid to David Wine, the junk dealer who purchased the line, brings the total sum needed to $140,000.

With a capitalization of only $140,000 the belief is general that the cars can be operated at a fair return. So confident is Mr. Wine, the purchaser, of these possibilities that he has offered to take $50,000 of stock in the new concern provided a first mortgage upon the property is given him. E. E. Baker, president of the Kewanee Boiler Company, in behalf of that concern, offered to take $10,000 worth of stock, leaving only $80,000 to be raised.

Indianapolis Company Wants Loan for Tax Purposes

Approval of the negotiation by the Indianapolis Street Railway of approximately $150,000 to obtain funds with which to pay taxes of the company was asked by Robert I. Todd, president, in a recent conference with John H. McCardle, chairman of the Public Service Commission. Although the company is maintaining service in Indianapolis with a 5-cent fare, one of the lowest in the country, the revenue of the company is not sufficient even to pay taxes when due, Mr. Todd told the commissioner.

Under the public service commission law, utilities wishing to make a loan for a period of less than a year are not required to obtain the approval of the commission. Loans made for one year or more must be approved by the commission. Mr. Todd told Mr. McCardle that he was not sure the tax loan could be taken care of within a year.

The financial condition of the company and the continuance of the 5-cent fare in Indianapolis, it is said, depend largely upon the outcome of the application of the Terre Haute, Indianapolis & Eastern Traction Company for a certificate of convenience and necessity to enter the electric field in Indianapolis. The commission and the City Council both approved the plan. The matter was carried to the courts by other electric companies objecting to the granting of the certificate. The action of the commission was upheld in the Circuit Court and the case is pending before the Supreme Court.

The Terre Haute, Indianapolis & Eastern case has a direct bearing on the railway situation, it was explained, because the electric company is to provide electric current for the car company. It has been stated that the saving to the car company on electric current would amount to enough to pay the taxes of the company.

Holdings in Waterloo Relinquished

During a special meeting in Waterloo, Iowa, of the board of directors of the Waterloo, Cedar Falls & Northern Railway, C. D. Cass and L. S. Cass, president and general manager of the traction system, relinquished all their holdings to the bondholders to develop a bus line. They now have big buses operating between Waterloo and Cedar Falls and have made plans to extend their lines to Winthrop on the east. It is believed their future plans will include development of bus transportation in central Iowa.

C. M. Cheney, vice-president of the Des Moines & Central Iowa Interurban Company, was named president and general manager to succeed the Cass brothers in the interurban property they relinquished.

The property is valued at between $9,000,000 and $10,000,000, with $7,500,000 indebtedness against it. Of this amount there are $5,500,000 in first mortgage bonds, with the company owing the balance of $2,000,000 to the government.

Cass brothers have sought to have the affairs of the company adjusted to the satisfaction of the bondholders for some time past, since it was seen that the railway was being operated at a loss each month. The average loss a month is approximately $12,000. The transaction was friendly in every particular.

With Waterloo as a center, the company has lines extending to Cedar Rapids, Waverly and Cedar Falls, besides the city service in Waterloo and Cedar Falls.

Birmingham Receivers Allowed to Default Interest Payment

The lifting of the receivership of the Birmingham Railway, Light and Power Company on Jan. 1 is made possible by a decision of Judge W. I. Grubb of the United States Court for the Northern District of Alabama, allowing the receivers to default in the payment of interest due on Nov 1 on the refunding and extension mortgage bonds of the company. Judge Grubb handed down his decision at a hearing held in Birmingham on Oct. 30.

Some time ago it was agreed that the bonds, which are held by various parties and which amount to $4,600,000, be deposited with a committee for redemption. It was stated at the meeting held before Judge Grubb that 75 per cent of these bonds have already been deposited with the committee. Arrangements are made to purchase from the committee all coupons due on these bonds Nov. 1. Practically all of these bonds held by parties in Birmingham have been deposited with the committee and many from other places also. There was some difficulty in locating all of the bonds, hence the time for their deposit with the committee was extended from Oct. 31, 1923, to Dec. 1, 1923.

At the hearing held before Judge Grubb Attorney W. B. White of Tillman, Bradley & Baldwin, appeared for the co-receivers of the Birmingham Railway, Light & Power Company, Lee C. Bradley and J. S. Pevear. Attorney Powell C. White of New York appeared for the bond holding committee. There was no protest offered against default in the payment of the 6 per cent interest on the bonds. In all cases where bonds have been deposited checks are being mailed to the holders.

It is intimated that with the lifting of the receivership, which is to take place about Jan. 1, 1924, many improvements will be made by the Birmingham Railway, Light & Power Company, in the way of new equipment and the extension of some of its lines. With the elimination of the jitney and the reduction of cash fares from 8 to 7 cents traffic on the cars has increased considerably.

New Directors Elected in St. John

At the annual meeting of the stockholders of the New Brunswick Power Company, St. John, N. B., the following board was elected: Walter C. Allison, of Manchester, Robertson & Allison, Ltd., St. John; W. S. Fisher of Emerson & Fisher, Ltd., St. John; L. C. Gerry of Bodell & Company, Providence R. I.; W. E. Golding of George McKean and Company, Ltd., St. John; J. L. McAvity of McLean, Holt & Company and T. McAvity & Sons, Ltd., St. John; A. P. Paterson of Baird & Peters, Ltd., St. John; M. A. Pooler, general manager and vice-president of company; E. N. Sanderson, New York, president of the company, and Richard Sullivan, broker, St. John.

Iowa Property Sold

David G. Fisher, president of the Iowa Southern Utilities Company, operating the street railway lines of Centerville, Iowa, and the electric interurban railway between Centerville and Albia, Iowa, and Centerville and Mystic, in addition to serving forty-one cities and towns in southern Iowa with electric power, has sold his entire interests and control of the corporation to George M. Bechtel of Davenport. Mr. Bechtel is president of Iowa's oldest bond house, George M. Bechtel & Company, and a bank director and manufacturer in Davenport.

The Iowa Southern has been a financial success since it was organized by Mr. Fisher and associates in 1916, with four power plants in the vicinity of Leon, Iowa, as a nucleus. In 1919 Centerville's utilities were purchased and in 1921 Newton, Iowa, and adjacent territory were added to the chain.

The corporation's interurban railroad is the outlet for the coal mines of Monroe County, which would not otherwise have easy access to the markets. An approximate tonnage of 100,000 tons is moved over this interurban annually, this being the principal freight handled by the road.

Beginning with a population of 5,000, the Iowa Southern now serves a population considerably in excess of 75,000. Extensive power plant extension and development and transmission line extension have taken place in recent years.

Can't Agree on Third Arbitrator for Substation Appraisal

All efforts of the city of Seattle and the Puget Sound Power & Light Company to appoint a board of arbitration, satisfactory to both parties, to appraise two railway substations to be taken over by the city in November have met with failure. The city and the company have agreed upon two arbitrators, but in an effort to name a third each has selected seven arbitrators, who have been rejected by the other party. James B. Howe, counsel for the company, has asked that Mayor Brown certify, on behalf of the city, that the arbiters named by the two parties have been unable to agree upon a third arbiter, as a preliminary to action by the company to have Chief Justice John F. Main of the State Supreme Court designate the third arbitrator.

Mayor Brown has been advised by Corporation Counsel T. J. L. Kennedy that the Mayor has no authority to certify, except under an ordinance passed by the City Council specifically directing him to do so. The three appraisers are to fix the value of the two substations to be taken over by the city with the first block of 5,000 kw. of the power service now being sold to the Seattle Municipal Railway by the company. The contract by which the city bought the railway lines gave the city the right to reduce the power contract in 5,000-kw. blocks, provided the city paid the company for the substations. The company has the right, on five years notice, to reduce the power service without requiring the city to buy the substations. The city has served one year notice of its intention to take over the first block and substations in November.

Melbourne System to Be Extended

Plans Under Consideration Contemplate a Total of 266 Route-Miles of Electric Railway

The report of the Melbourne and Metropolitan Tramways Board for the year ended June 30, 1923, shows that its plan for a general tramway scheme, with the abandonment of the present cable line and an increase in the tramway route mileage from 125 to 266 before the year 1940, has been accepted by the Parliamentary standing committee on railways. It is now before the Minister of Public Works. The preparation of this plan occupied the board and its officers for about two and one-half years and provides for probable growth in tramway and railway traffic for twenty years ahead.

On April 5, 1923, the board entered into an agreement with its employees, following the decision of the Commonwealth Court of Conciliation and Arbitration, providing for an increase of pay of 4d. per day to the traffic staff, three days good conduct leave in addition to the usual twelve days annual leave, and time and a half for all work on Sundays and holidays. This agreement will add £60,000 to the annual wages bill. It also provides for quarterly adjustment of wages in accordance with the Commonwealth statistician's cost of living figures. Based on these figures for the quarter ended June 30, 1923, the wages on Aug. 1, 1923, were further increased by the sum of £55,000 per year. The contract will remain in force until March 31, 1925.

Considerable new construction has been completed during the past year, including a sample center-entrance car which proved so satisfactory in service that ninety others have been ordered. Two single-truck safety cars will be imported from the United States. The number of electric cars now in service is 204, made up of 155 single-truck and 49 double-truck cars. On the cable systems there are 592 grip cars and 597 other cars. New carhouses with sprinklered fire protection have been installed. The program for improvements during the next three years calls for an expenditure of £1,700,000.

Statistics for the year ended June 30, 1923, are given in the accompanying table.

Population served by tramways		667,000
Journeys per head of population served per annum		340
	Cable	Electric
Gross capital expenditure	£2,162,725	£1,946,569
Mileage of double track	45.9	53.3
Mileage of double track (horse)	.625	.....
Mileage of single track	.....	19
Traffic receipts	£1,254,282	£656,996
Total revenue	£1,260,912	£661,486
Working expenses	£924,789	£503,166
Balance of revenue over operating expenses	£336,123	£158,321
Car-miles (cable, 14,832,416; horse, 9,808)	14,842,224	6,742,428
Passengers carried	155,820,153	70,811,393
Average maximum number of cars in use daily	477	177
Percentage of working expenses to total revenue	73.34	76.07
Average traffic receipts per car-mile	20.282d.	23.386d.
Average traffic receipts per mile of single track	£13,480	£5,230
Average traffic receipts per passenger	1.93d.	2.226d.
Average total receipts per car-mile	20.39d.	23.55d.
Average speed per hour, including stops	9 miles	10 miles
Scale of fares	1d. to 3½d.	1d. to 7d.
Average distance per penny (1d.)	1.44 miles	1.104 miles
Average number of passengers per car-mile	10.41	10.50
Number of cars in stock	601	204
Average number of kilowatt-hours per car-mile	.....	2.353
Number of employees	3,035	1,840

Suit Fails to Compel Payment of $350,000 Tax

Efforts to force the Cincinnati Traction Company and the Cincinnati Street Railway to pay the city of Cincinnati $350,000, claimed to be the amount of tax due the city for 1920, failed on Oct. 17, when Judge Stanley Struble, in the Hamilton County Common Pleas Court, dismissed the suit of Attorney Robert S. Alcorn, suing as a taxpayer. The court took the view that the railway, owing to the fact that it leases its properties to the traction company, is not in any sense liable to the city for the payment of the tax, and that this company is entitled to be dismissed as a defendant.

The suit charged that the companies were obligated to pay the tax of $350,000 annually under the ordinance passed in August, 1918. The plaintiff also claimed that the gross receipts of the defendant companies in 1920 were sufficient to pay the tax, but that the city and the companies entered into a conspiracy to release the companies from the payment. As an end to the alleged "conspiracy," it is charged that the City Council passed an ordinance in 1921, which sought to change the method of accounting so as to postpone the payment of the tax for 1920 to 1922. The acceptance of the 1918 ordinance by which the public became a party in the management of the properties of the defendant companies is mentioned by Judge Struble as enabling the public to escape the fear of it, not the actual exploitation incidental to private control on the one hand, and a large capital investment incidental to municipal ownership on the other.

Judge Struble in his opinion declared the gross earnings were made a trust fund in the hands of the operating company and the remedy of the city for any misapplication or failure to apply them to the purposes named in the ordinance, would be in a court of equity to compel the observance of the obligations of the trust, rather than an action at law for a money judgment.

He says that if the operating company should refuse to obey the order of a court of equity to pay this tax

to the city where the gross earnings were sufficient to pay the tax, the court no doubt would have the power as a means of enforcing its order to render a personal judgment against the operating company.

The court said regarding this:

> These claims which counsel made orally are not included in the plaintiff's amended petition and if true make an entirely different cause of action than that stated in the amended petition upon which the parties went on trial. The cause of action to be tried here is the one stated in the pleadings, not the one in the oral statement of counsel. The city of Cincinnati can recover this tax for the year 1920 by merely refusing to agree to further postponements of its payment, thus forcing the traction company to include this tax in the cost of service for future years, thereby increasing its earnings by an increase in taxes.

Alabama Power Takes Control of Tuscaloosa Property

The property of the Tuscaloosa Railway & Utilities Company of Tuscaloosa, Ala., with the exception of the creamery and ice plant, became the property of the Alabama Power Company by the filing of a deed for record on Nov. 1.

The cars in Tuscaloosa are now being operated by the Alabama Power Company, under the superintendency of T. L. Beauchamp, formerly district manager for the Alabama Power Company at Decatur, Ala.

J. M. Barry, manager of retail operations of the Alabama Power Company, with offices in Birmingham, Ala., was in Tuscaloosa on Nov. 1 in connection with the transfer of the railway. He stated that a better service would be given in Tuscaloosa than had been given heretofore. He said the company would at once place voltage regulators on all feeder electric lines, insuring a more even voltage, and will make many general improvements in the service.

The master mechanic of the Alabama Power Company from Montgomery, Ala., is spending several days at Tuscaloosa looking over the rolling stock of the street car company and also examining the tracks. He says improvements will also be made in this branch of the service.

Heavy Deficit Represents Strike Costs. — The International Railway, Buffalo, N. Y., for the nine months ended Sept. 30, 1923, had an operating revenue of $7,269,457 against $8,065,828 a year ago. The operating expenses and taxes amounted to $6,920,570. This represented a decrease in comparison with the nine months ended Sept. 30, 1921, when the operation and taxes amounted to $7,062,555. The deficit for the nine months ending Sept. 30 of this year was $792,876, which far and away exceeded the deficit of the same period in 1921, but the loss from operation for the nine months ended September of this year represented strike costs. It will be recalled that the company did not operate full service in 1922 due to the strike on its property.

Auction Sales in New York.—At the public auction rooms in New York on Nov. 7 there were sold $1,213 South Carolina Gas & Electric Company, Spartanburg, S. C., certificates of indebtedness, 16¼ per cent.

Bonds Offered.—Aldred & Company, New York, are at the head of a syndicate which is offering at 95 and accrued interest to yield 6⅝ per cent $3,540,000 of the first mortgage thirty-year 6 per cent sinking fund gold bonds series "A" of the Quebec Power Company. The bonds are dated Oct. 1, 1923, and are due Oct. 1, 1953. The proceeds of this financing will be applied to cover the purchase price of consolidated mortgage bonds of the Quebec Railway, Light, Heat & Power Company, Ltd., purchased by the Quebec Power Company and hypothecated in favor of the company's total authorized issue of bond and to furnish funds for further additions, improvements and extensions to hydro-electric power plants, transmission lines and distribution systems.

Order to File Claims.—The United States District Court, Southern District of Ohio, recently ordered Harry Hartwell, receiver of the Ohio Electric Railway & Power Company, which is the defendant in the case of the Columbia Avenue Trust Company, Plaintiff, vs the Ohio Electric Railway & Power Company, to serve notice on the company's creditors that unless they file their claims by Nov. 20 the claims shall be barred. The court said that they must be filed in the receiver's office in the city of Pomeroy, Meigs County.

Net Earnings Increase. — The net earnings of the Illinois Power & Light Corporation for the twelve months ending Sept. 30 are 33 per cent higher than the net of the corresponding period last year, according to figures made public recently. A portion of the big increase for the period is due to additional properties acquired by the corporation during the year. The net earnings for the twelve months amounted to $8,792,517. In the same period in 1922 they were $6,801,017. The Illinois Power & Light Corporation was organized on June 1, this year. The twelve months earnings are those of the companies merged to form the new concern. The net earnings for 1923 are more than double the interest charges on the entire funded debt of the company.

Debentures Offered.—A. B. Leach & Co., Inc., and the Federal Securities Corporation, New York, are offering at 98¼ and accrued interest, to yield 7.25 per cent, $2,250,000 of the Public Service Company of Colorado ten-year 7 per cent sinking fund convertible gold debentures. The debentures are dated Oct. 1, 1923, and are due Oct. 1, 1933. These debentures are being issued to provide for part of the cost of the properties being constructed for and acquired by the consolidated company. The Public Service Company of Colorado is a successor by merger to the properties of the Denver Gas & Electric Light Company and the Western Light & Power Company.

Will Receive Bids.—The Guaranty Trust Company, New York, N. Y., will receive until Nov. 12 bids for the sale to it of the first refunding and collateral trust mortgage 6 per cent gold bonds of the Philadelphia Company. The bonds are known as series "A" and are due Feb. 1, 1944. The amount received must be sufficient to exhaust $120,079 at a price not exceeding $105 and interest.

Will Consider Stock Increase.—The Charleston Interurban Railroad, Charleston, W. Va., will hold a meeting of its stockholders on Nov. 27 for the purpose of increasing its capital stock to $3,000,000, it has been announced by Arthur F. Hill, secretary of the company. The stockholders will act upon a resolution that will increase the present 15,000 shares of stock of the par value of $100 each to 30,000 shares of stock of the par value of $100 each. The 15,000 shares of preferred stock are to be issued upon such conditions and with such preferences as may be determined at the meeting. The call for the meeting was issued in accordance with the terms of a resolution adopted by the board of directors on Oct. 19. It is stated that the past year has been one of the most successful in the history of the company, and plans are in process of formation for new equipment, additions and extensions.

Consolidation Being Discussed.—At a special meeting of the board of directors of the Potomac Public Service Company, Frederick, Md., matters pertaining to the consolidation of the properties of the Potomac Public Service Company and the Cumberland plants were discussed. While no announcement was made it was said that definite steps will be taken at an early date to effect a consolidation of the two.

Service Resumed and Buses Purchased.—Service has been resumed on the interurban line that runs from Bryan, Tex., to College Station, where the Agricultural and Mechanical College of Texas is located. This line was recently sold under receivership, and a new company, the Bryan-College Traction Company, capitalized at $27,500, was organized to take it over. The incorporators of the new company are E. H. Edge, J. M. Lawrence, E. H. Austin and others. An hourly schedule of cars both ways has been in effect and will be maintained during the college year, it was announced by the new owners. The company has purchased three buses put in operation by the students of the college when the interurban discontinued service last year.

Earnings Increase.—The Virginia Railway & Power Company, Richmond, Va., in a nine months financial statement just issued shows gross earnings of $7,777,696 and a balance after all deductions of $933,975. Earnings by comparison with last year increased 13.86 per cent. Operating expenses increased 8.83 per cent.

Traffic and Transportation

No Five-Cent Fare Now

Altoona Railway Official Says Problem Is to Exist at Present Rates—Wages Should Attract Employees

That there will be no return to the nickel fare soon and that the trolley company is worrying more at present with the problem of how it can keep going on existing fares, is the summary of a statement by General Manager S. S. Crane of the Altoona & Logan Valley Electric Railway in reply to published statements in local newspapers to the effect that "the return of the nickel street car fare would not occur until a certain regulatory body was dismissed from the control of street railway fares." The 7-cent fare in Altoona, Pa., has been in effect for several years.

In his answer Mr. Crane referred to the general impression that public utilities are making too much money. He said there seemed to be an idea current that the public utilities had some means of securing money out of the air, so to speak, or that they had some occult means of making a dollar go further than others can. He said that how it could be presumed that the utilities escaped the condition of high cost of living was to be wondered at, for the same condition that confronts the individual also applies to the utilities.

Some Properties Excepted

It was his belief that the problem before practically all the street railways of the country was not the question as to when they should reduce the fares, but rather how they could keep on going on the existing rates. He said that the exceptional railways were those so situated in the midst of heavy traffic, well distributed throughout the day, frequent interchange of loadings, relative short hauls, or other advantageous conditions that their present fares supply their needs. The statistics of the industry as a whole, he went on to say, showed that since 1913 the average rate of fare had increased from 4.84 cents to 6.88 cents (44 per cent), while the cost of materials had increased 69 per cent and the rate of wages 114 per cent during that period.

He then went on to give some statistics of his own property. For that same period there had been an increase in labor and material expenses, exclusive of taxes, rentals, interest, and the like, of 91 per cent, against an increase in receipts of 83.9 per cent, partly due as to the latter to an increase of 22.2 per cent in the number of riders. Under peak conditions in the year 1920 the increase in operating expenses was 149 per cent, in receipts 97.9 per cent and in passengers hauled 44.7 per cent. Still the total increase in fares was only 40 per cent. He said that this status of affairs represented the industry at large.

He said that the increased fare partly covered the situation, but that the major result was obtained by neglecting the property. He meant by that, he said, that expenditures for the maintenance of the physical property were reduced to a minimum and deferred with the hope of more favorable future conditions, which condition has not obtained as yet. It was his contention that the rate of wages on the railways needed no apology, except it was that of being too low, as the industry would have to establish a rate that would attract employees, and it has scarcely done even this.

One of the important problems before the industry was to determine some method by which operating costs could be reduced, not with the idea of reducing the fare, but with the view of making the present fare sufficient for its needs. This method, adopted for the present, was the using of one employee to a car instead of two. He said that his company had within the last year expended close to $150,000 to improve the power plant by the installation of a new engine and entirely with the view of reducing expenses in that department.

He concluded by saying that the industry recognized the obligations to the public and was endeavoring in every way to meet them, and that when conditions were favorable and justified the public could be assured that the company would do its part.

Ticket Sales in Atlanta Increase

Nearly twice as many persons will invest in tickets when sold at the rate of three for 20 cents as will buy fifteen of them for $1. This at least is the experience in Atlanta during the past three months. The three-ticket rate mentioned above was put in force on July 1, 1923, by the Georgia Railway & Power Company, supplementing the fifteen-for-$1 rate in existence for some time. The cash fare in Atlanta is 7 cents. A statement covering passengers carried and tickets sold during nine months in 1922 and 1923 follows:

Month	1922 Total Pay Passengers	1922 Tickets	1922 Per Cent	1923 Total Pay Possengers	1923 Tickets	1923 Per Cent
January	5,750,310	1,182,415	20.56	5,916,213	1,194,226	20.19
February	5,398,456	1,126,659	20.87	5,408,295	1,131,820	20.93
March	6,064,062	1,262,112	20.81	6,361,049	1,305,749	20.53
April	6,253,255	1,221,575	19.54	6,256,294	1,264,844	20.22
May	6,454,443	1,282,515	19.87	6,648,031	1,316,879	19.81
June	6,083,186	1,139,033	18.72	5,140,391	1,185,522	23.06
July	6,166,925	1,078,916	17.50	6,466,118	2,031,012	31.41
August	6,125,712	1,130,335	18.6	6,449,478	2,237,125	34.7
September	6,246,253	1,201,644	18.6	6,403,190	2,262,641	35.3
Nine months	54,542,602	10,625,204		55,049,059	13,929,818	

Buses Proposed for District of Columbia

A proposal to parallel the street railway lines of Washington with modern buses, "without interfering with said railroads except by fair competition," was submitted to the District of Columbia Public Utilities Commission by Arthur E. Randle, president of the East Washington Heights Traction Railway, on Oct. 31. Mr. Randle coupled with his proposal an offer to pay the District government, in return for such franchise, 1 cent per passenger carried by the buses, or $1,000,000 annually.

The proposition, accompanied by a certified check for $25,000 as an evidence of good faith, was placed before the Public Utilities Commission during consideration by that body of a proposal by the Capital Traction Company to operate a bus from the terminus of one of its lines at Seventeenth Street and Pennsylvania Avenue, Southeast, across the Anacostia River into Randle Highlands. This bus feeder will parallel for some distance the line of the East Washington Heights Traction Railway, of which Mr. Randle is president. The East Washington company operates a single-track suburban line, with two cars in service. Citizens along the line had petitioned for improved service.

The commission granted the Capital Traction Company permission to operate the bus into Randle Highlands on Nov. 1. No action was taken on the offer of Mr. Randle, who did not disclose his associates in the proposition.

Economy to Be Effected in Grand Rapids

In order to keep fares at their present rate, seven rides for 50 cents, the Grand Rapids Railway has found it necessary to discontinue one of its through lines reaching from the northwest city limits through the downtown section to the Wealthy Street carhouse, in the southeast section. This change, according to General Manager Louis J. DeLamarter, will save the company approximately $70,000 a year and will not make it necessary to charge 25 cents for three rides. The only other alternative, he stated, would have been to put all cars on a twelve or fifteen-minute schedule if fares were not to be changed. The abolishment of the through line has necessitated agreement between the railway and the City Commission on three short lines to care for the territory formerly covered. The City Commission at first protested the

plan on the ground that a stub line would not adequately serve the Scribner-Street district, part of the territory covered by the old route.

Mr. DeLamarter, in reference to the change, said that his company during the past four months had carried a half million fewer passengers than during the same period last year and that the changes would not work a hardship on any one.

Refuses Blanket Certificate

The Ohio Public Utilities Commission on Oct. 29 refused to grant the Youngstown Motor Transportation Association a blanket certificate, authorizing its more than 100 jitneys to operate under the new motor bus law. Following the hearing of the protest filed by the Youngstown Municipal Railway, the commission ruled that the association was not entitled to a blanket certificate for all the jitneys because the cars were owned by individuals who were members of the association and not by the organization. Ten days time has been allowed by the commission for the separate jitney owners to file their applications and affidavits for certificates, and each bus will be considered separately.

Charges were made by Ross Raymond, president of the Motor Transportation Association, against Harry Engle, the Youngstown Street Railway Commissioner, charging him with fighting the jitneys persistently and trying to eliminate them as competitors.

A. S. Somers Addresses Chamber of Commerce

In a recent address before the Brooklyn Chamber of Commerce Arthur S. Somers, director of the Brooklyn-Manhattan Transit Corporation, declared that the 5-cent fare was not a fixture in New York. He referred to a statement made at the recent convention of the American Electric Railway Association in Atlantic City that the 5-cent fare was now "virtually extinct." He said he believed that we had seen the last rail laid in the streets of the metropolitan district. He believed that buses under responsible control and direction might be tried, but that the initiative rested with the public.

In summing up the Brooklyn transit situation he said in part:

The city has invested $162,000,000 in the B.-M. T. system alone.

The city has received no return on this investment.

Every private investor who put $1,000 in the B. R. T. in 1912 has lost $433.

Drop in Percentage of Transfers Collected

Boston Finds Not So Many Presented Since Time Limit Is More Easily Checked

The effect of placing an easily checked time limit on transfers is to reduce the number presented for passage, according to the experience of the Boston Elevated Railway. That company put the Moran transfer into general use on its system on Jan. 1, 1923, and there has been a reduction to 75.15 per cent in the number of transfers collected to those issued. A table showing the percentages follows:

	Number Issued	Number Collected	Per Cent Collected
Nine years prior to change of style	690,370,933	566,717,149	80.64
January, 1923	6,155,809	4,584,714	74.48
February, 1923	5,637,514	4,223,895	74.92
March, 1923	6,308,957	4,823,486	76.45
April, 1923	5,977,524	4,558,304	76.26
May, 1923	6,363,008	4,859,410	76.37
June, 1923	6,082,908	4,617,582	76.00
July, 1923	5,848,367	4,325,667	73.96
August, 1923	5,673,586	4,205,412	74.12
September, 1923	5,713,382	4,206,156	73.62
Average nine months 1923			75.15

If all of the passengers who were prevented from using transfers because of the expiration of the time limit paid a cash fare, the additional revenue to the company based upon the operations for the nine months ended Sept. 30, 1923, would amount to $32,854 per month. If one-half of the passengers walked rather than pay another fare, the additional revenue would have been $16,427 per month. The present Boston transfer was described in the issue of this paper for July 7, 1923.

Write About Your Courteous Conductor

The Allentown *Chronicle and News* is going to present to the most courteous conductor on the lines of the Lehigh Valley Transit Company two tickets for the Lyric Theater. This procedure will be carried on every week during the winter months. The *Chronicle* believes that there are many polite conductors lurking around who do not receive enough attention for their courteous acts. The newspaper has called upon the public to help in this campaign of looking for the most polite street car conductor.

The public is called upon to write of its experiences with conductors. When some very aged, infirm or otherwise unfortunate individual receives help from a courteous conductor, the public is asked to tell about it in writing, or when some special act of consideration is shown to patrons by a conductor, it is suggested they get his number and the line on which he works, and then write in and tell the newspaper all about it. At the end of the week the editors will check up and determine who is the most deserving and the tickets will be mailed out just as soon as possible after a choice has been made. In the words of the *Chronicle and News*, "Keep us posted."

Trackless Trolley Line Approved.—Following the approval of the Public Service Commission, the Rochester Railways Co-ordinated Bus Lines, Inc., a subsidiary of the New York State Railways, opened crosstown trackless trolley service through Rochester's north end over Driving Park Avenue on Nov. 1. The fare rate is the same as charged by the Rochester trolley lines and transfers are to be exchanged between the trolleys and the new line.

Plans Further Bus Operation.—In a recent statement regarding the present traffic congestion in Philadelphia, the Philadelphia Rapid Transit Company announced that it was planning to operate motor buses, such as are now used on Roosevelt Boulevard, through streets that are not now occupied by the company, or from which existing car tracks could be removed. The company said that there would be no relief on Chestnut and Walnut Streets until the proposed Chestnut Street subway had been built. The statement also referred to the number of cars purchased by the company this year, and how many had been received and assigned to regular service. Reference was made to the trackless trolley operation on Oregon Avenue.

Fare Limit Extended.—The Manhattan & Queens Traction Corporation has established a second fare point at Old Mill Road, Elmhurst, L. I., instead of at Grand Street and Queens Boulevard. This change extends for nearly a mile, the length of the 5-cent ride to and from Manhattan. As a result of the new order, it is possible for passengers to start from points between Grand Street and Old Mill Road and ride for 5 cents to either end of the line.

Rate Hearing Postponed.—Hearing on the rates of the International Railway in Buffalo, scheduled for Oct. 31, before the Public Service Commission at Albany was postponed until Nov. 12 at Buffalo because of inability of witnesses to attend.

Employees' Suggestions in Force.—Valuable suggestions have been received from employees of the Monongahela-West Penn Public Service Company, according to Capt. George M. Alexander, president of the company, as a result of an effort made several weeks ago to have practical pointers submitted by men on the job. These suggestions proved to be the chief subject of discussion at a recent conference of the operating officials of the company and some of them have been put in force.

Want Buses. — The Missouri Public Service Commission on Oct. 31 held a public hearing on the joint application of the city of Nevada, Mo., and the Fort Scott and Nevada Light, Heat & Power Company to substitute motor buses for the railway system in Nevada. Several citizens protested against the proposed plan. Under the proposed change the company would charge the same fare. In its petition it set forth that the car system has been operated at a loss since 1919.

Book Reviews

Kent's Mechanical Engineers' Handbook

By the late William Kent; tenth edition, rewritten by Robert Thurston Kent, editor-in-chief, and a staff of specialists. John Wiley & Sons, Inc., New York, 1923.

In the twenty-eight years that have elapsed since the first edition of "Kent's Handbook" was published, it has become so well known among engineers that little space is needed to describe it, covering as it does all phases of mechanical engineering practice, and such allied subjects as needed by the mechanical engineer. Each edition, however, has been larger than its predecessor until the present volume, consisting of 2,247 pages, is almost 2½ in. thick, even though printed on thin paper. This is some 50 per cent larger than the last edition.

This edition follows the plan adopted in a number of other handbooks, of having the various sections written by specialists. Some thirty-five men well known in their respective fields have assisted the editor-in-chief in this work.

Much of the material in the book has been entirely rewritten to conform with the latest practice. Subjects thus treated include fans and blowers, hydraulic turbines, the steam engine, steam turbines, gas producers, gas engines, oil engines, hoisting and conveying, refrigeration and ice making, heating and ventilation. A considerable amount of other material is included in the handbook for the first time, such subjects including gas turbines, automotive vehicles, aeronautics, industrial furnaces, forge shop, fusion welding and cutting, malleable castings, reinforced concrete and safety engineering. In the sections not included for the first time or entirely rewritten many paragraphs have been thoroughly revised so that the book is abreast of current practice. A complete index of 113 pages is included for use in finding references.

Laminated Springs

By T. H. Sanders, M.I.Mech.E., M.I. and S.I. The Locomotive Publishing Company, Ltd., Lordon; Spon & Chamberlain, New York, N. Y.

This book is a comprehensive treatment of laminated types of springs, particularly for railway service. It is based on a series of articles on "Laminated Railway Springs," which appeared in recent years in the *Locomotive Railway Carriage and Wagon Review*, London.

The first six chapters are taken up with a discussion of the mechanics of the spring, treating it very largely from a practical standpoint. The next four chapters are concerned with stresses in springs, deflections, and formulas dealing with different forms of spring. Chapters 11 to 24 are concerned with the design of springs of various types, this being taken up in considerable detail.

The second part of the book, consisting of chapters 25 to 44, covers the manufacture of springs. This includes the manufacture of sections of steel, forging and cutting the material, methods of fastening and checking play, hoops and methods of attachment, fittings of hoops and finishing springs.

While the book is written from the British standpoint, considerable space is given to American practice. The book should be useful to railway men or others who are interested in the design of laminated springs.

Retail Prices—1913 to December, 1922

Bulletin No. 334 of the United States Bureau of Labor Statistics. United States Department of Labor, Washington, D. C.

This is a publication in the retail prices and cost of living series of the Bureau of Labor Statistics. It includes detailed tables and charts covering the range of prices of food, coal, gas and dry goods by months over the period included. It should be of value to the electric railway man in connection with wage agreements and similar problems.

Employment Hours and Earnings in Prosperity and Depression

By Willford Isbell King of the staff of the National Bureau of Economic Research, Inc. Published by the Bureau, New York, 1923. 147 pages.

According to the sub-title, this book is the result of an inquiry conducted by the National Bureau of Economic Research with the help of the Bureau of Markets and Crop Estimates and the Bureau of the Census, for the President's conference on unemployment. The work was carried on under the supervision of the committee on unemployment and business cycles, appointed by Secretary Herbert Hoover of the Department of Commerce, who was chairman of the conference. This committee had as its chairman Owen D. Young, chairman of the board of directors General Electric Company.

It was found that there was a surprising dearth of information concerning actual employment conditions in the United States, and the investigation, whose results are recorded in the book, has made a considerable addition to the knowledge of conditions of employment in this country.

Numerous statistical tables are included, giving the number of employees in various industries; the volume of employment, showing the proportion of full-time work by employees in various classes of industry; the hours worked per week; the earnings of employees, both total and per hour or per day.

The statistics collected in the book show the relative responsiveness of different industries to the forces giving rise to the business cycle. It indicates the comparative ability of large and small scale business to resist such forces. Shifts of population from one industrial field to another, and the variations in hours and earnings of employees of a company as it changes from boom to depression are traced. The approximate total reduction in employment brought about by the depression of 1921 is also estimated.

Railroad Electrification and the Electric Locomotive

By Arthur J. Manson, Westinghouse Electric & Manufacturing Company. Simmons-Boardman Publishing Company, New York, 1923.

A sub-title states that this book is an "outline of principles involved in railroad electrification. A comparison of steam and electric locomotives. History of electrification in United States. Data on electrification in America, Europe and Australia." It originally appeared as a series of articles in the *Railway Electrical Engineer* and *Railway and Locomotive Engineering*, but has been enlarged upon and rearranged by the author.

The purpose of the book is not very evident. It is quite elementary, the first six chapters being taken up with the simplest laws of the electric circuit, after which five more chapters deal with the general principles of railway motors and their control and the mechanics of traction. This portion constitutes one-fourth of the entire book.

Following this introductory matter the author considers tractive effort in steam and electric locomotives and energy losses incurred by various methods of acceleration and regenerative braking, three chapters being devoted to these subjects. The next eight chapters are mainly descriptive, covering air brakes, contact lines, pantographs, third rail shoes, transformers and auxiliary apparatus, control apparatus, construction of the railway motor, and mechanical design of the electric locomotive. A short chapter on locomotive inspection follows this.

The next five chapters of the book deal with the theoretical solution of typical electrification problems. Introductory to this there is a discussion of the speed-time curve, with an explanation of analytical and graphical methods of calculation. Then a specific problem is taken up in detail, the train sheet being used as a starting point from which the choice of motive power, distribution system and substation location are worked out. The main portion of the book ends with a short discussion of the electrification system of the future and its cost of operation.

An appendix gives brief descriptions of several American electrifications, followed by tabulated data showing the extent, type of system, construction details, power distribution and generation, locomotives and multiple-unit equipment.

The book is not likely to be convincing to the reader. The illustrations from practice seem to have been taken from the work of one manufacturer only, and the question of systems, which has been such an important factor in the past, is greatly subordinated. Its greatest value would seem to be that it has brought together a large amount of data on existing electrifications, which is thus made available for study.

Personal Items

Leon H. Johnson Purchasing Agent in Anderson

Leon H. Johnson has been appointed purchasing agent for the Union Traction Company of Indiana with headquarters at Anderson. He succeeds Hudson R. Biery, who recently accepted the position of assistant to the president with the Indianapolis & Cincinnati Traction Company. Mr. Biery's appointment was referred to in the ELECTRIC RAILWAY JOURNAL, issue of Sept. 22.

Mr. Johnson has not been identified with the electric railway business, but brings into it an unusual and valuable store of experience, gained in his association with such concerns as the Toledo Shipbuilding Company of Toledo, Ohio; the Struthers-Wells Company of Warren, Pa., and the Anderson Foundry & Machine Company of Anderson, Ind., serving the latter named concern as general manager. He is a graduate of the University of Michigan, class of 1908, and a member of the Tau Beta Pi.

Supervisor of Accident Prevention in Chicago

Victor T. Noonan, who recently resigned as superintendent of accident prevention for the Cleveland Railway, has been appointed supervisor of accident prevention for the Chicago Surface Lines. Mr. Noonan is one of the pioneer accident prevention engineers of the country and has a national reputation in this work. He was remarkably successful in organizing the accident prevention work of the Cleveland Railway. He was formerly State Director of Industrial Safety for Ohio, holding this position, which was nonpolitical, for six years. Previous to his connection with the Cleveland Railway he was a public consulting accident prevention engineer and had organized accident prevention in some of the largest industries in the United States. Mr. Noonan is the author of five motion picture scenarios on accident prevention. He is a member of the National Safety Council and chairman of the committee on public education of the American Street Railway Section of the National Safety Council.

J. B. Mahan Made Secretary and Treasurer at Schenectady

Another change in the executive staff of the Schenectady Railway has become effective in the naming of J. B. Mahan to the position of secretary and treasurer, succeeding J. H. Aitken, who recently resigned after twenty-one years of service with the company. Mr. Mahan for the past six years has been head of the accounting department of the Terre Haute Traction & Light Company and was closely connected with E. M. Walker when the latter was connected in an official capacity with the Terre Haute, Indianapolis & Eastern Traction Company before Mr. Walker was made president of the Schenectady Railway. In all, he served the Terre Haute company approximately ten years. He is a native Indianian. He went to Schenectady on Nov. 10.

Thomas J. Lynch Had Active Railway Career

Thomas J. Lynch, whose appointment as general manager of the Schenectady Railway was noted in the ELECTRIC RAILWAY JOURNAL, issue of Nov. 3, entered upon his railroad career as a clerk in the passenger department of the Delaware & Hudson Company, Albany, N. Y., filling consecutively various positions in the service of that company in the passenger, freight, traffic, mechanical and transportation departments. He was superintendent of the Susquehanna division with offices at Oneonta, N. Y.; superintendent of Greenwich & Johnsonville Railway with offices at Greenwich, N. Y.; general agent with offices in New York City; assistant to the vice-president and general manager; and later became assistant to that company's vice-president in charge of the subsidiary properties, including the Hudson Valley Railway, Plattsburg Traction Company, United Traction Company, and the Champlain Transportation Company. In the last-named position he was detailed to special investigations of operating practices effective on various street railways throughout the country, and had the handling of all purchases. Later he became assistant general manager of the United Traction Company at Troy, N. Y.; and on July 15, 1923, became assistant general manager of the Schenectady Railway. His ability here was soon noted, for in less than four months he was appointed general manager of the Schenectady property, effective Nov. 1.

T. J. Lynch

Mr. Lynch was born at Troy, N. Y., on Jan. 29, 1886. In charge of operation, he succeeds in his new position William S. Hamilton, who was general superintendent.

Francis Tingley, formerly supervisor of overhead lines, Washington Railway & Electric Company, Washington, D. C., has resigned to become a member of the firm of Over & Tingley, to engage in general engineering work in the vicinity of Philadelphia.

J. Alfred Cote has been appointed superintendent of the Quebec Railway, Light, Heat & Power Company. In this position he succeeds J. A. Everell.

C. M. Cheney, vice-president of the Des Moines & Central Iowa Company, Des Moines, Iowa, has been named president and general manager of the Waterloo, Cedar Falls & Northern Railway. He succeeds C. D. and L. S. Cass, who relinquished all their holdings to the bondholders.

D. E. Byerley has been transferred from the Hattiesburg Traction Company, Hattiesburg, Miss., where he served in the capacity of general manager, to Adrian, Mich., to assume the managership of the Lenawee County Gas & Electric Company, a new property purchased by the Doherty Organization. E. E. Armstrong, formerly general superintendent of the Meridian Light & Railway Company, has been transferred to Hattiesburg, filling the position of general manager.

David G. Fisher has resigned as president and director of the Iowa Southern Utilities Company, Centerville, Iowa. He has held the position since 1916, when he organized the corporation with the plants in the vicinity of Leon, Iowa. Mr. Fisher, also president of David G. Fisher & Company, public utility engineers, will devote his time to the development of extensive engineering projects in which he has for some time been interested.

John W. Ryan has resigned as secretary of the Erie County Traction Corporation, Buffalo.

C. M. Broadhurst, formerly with the Niagara, St. Catharines & Toronto Railway, St. Catharines, Ont., has been appointed mechanical superintendent of the Toronto Suburban Railway, Toronto. In this capacity he replaces F. Bazett-Jones, who has been transferred to St. Catherines. Both properties are owned by the Canadian National Railways.

T. L. Beauchamp, formerly district manager of the Alabama Power Company at Decatur, Ala., is now superintendent of the Tuscaloosa Railway & Utilities Company at Tuscaloosa, Ala. The Alabama Power Company recently took control of the railway property.

Manufactures and the Markets

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

Volume of Business in Car Building Industry Doubled Since 1909

Although the total number of persons engaged in the business of building electric railway cars was less in 1921 than in 1909, according to figures recently released by the Department of Commerce, nevertheless the total value of the product was nearly double that of the earlier year. The decrease in the number of employees was entirely among the wage earners. The number of salaried workers, on the other hand, showed a marked gain. Moreover, the total sum paid in salaries has steadily advanced, the increase being 43.7 per cent from 1909 to 1919 and 33.2 per cent from 1919 to 1921. Wages increased in the first period, but in the latter two years decreased 22.6 per cent.

Since 1909 the value of the manufactured product has about doubled. The cost of materials was in 1919 nearly triple what it had been ten years earlier, but since that time there has been some reduction. General statistics for the electric railway car building industry are given in the accompanying table.

	1921	1919	1914	1909	Per Cent of Increase or Decrease 1919–1921	1909–1919
Number of establishments	10	7	14	14	.....	.....
Persons engaged	3,356	3,285	4,286	4,004	2.2	—18.0
Salaried employees	444	365	446	421	21.6	—13.3
Wage earners (average number)	2,912	2,920	3,840	3,583	— 0.3	—18.5
Salaries and wages	$4,334,934	$4,984,941	$3,199,674	$2,770,566	—13.0	79.9
Salaries	1,135,789	852,851	732,647	593,617	33.2	43.7
Wages	3,199,145	4,132,090	2,467,027	2,176,949	—22.6	89.8
Paid for contract work	.....	.....	129,904	233,508	.....	.....
Cost of materials	7,880,405	12,058,942	6,349,779	4,260,470	—34.7	183.0
Value of products	14,856,068	18,441,976	10,494,953	7,809,866	—19.4	136.1
Value added by manufacture	6,975,663	6,383,034	4,145,174	3,549,396	9.3	79.8

Barney & Smith Plant Again on Sale

Under an order issued at Dayton by Judge Edward T. Snediker of the Montgomery County Common Pleas Court the Barney & Smith Car Company's plant will again be offered for sale Dec. 5. It is reported that a prospective buyer has been found. The Baltimore & Ohio Railroad is mentioned as the possible bidder. The plant must sell for two-thirds of the appraised value. In successive reappraisals the value set on the plant has been reduced from $3,257,759 to $1,423,839, its present appraisal value. A bid of $949,226 may legally be accepted. As representative of the holders of $2,000,000 in mortage bonds against the company, the Guaranty Trust Company, New York, is requesting the sale at this time. If the plant is not sold it will probably be reappraised and the valuation still further reduced. The last attempt to sell the car company was on April 2, 1923, when the entire plant and equipment were offered at the present valuation.

Large Shipments Made to Chile

Several unusually large shipments of substation equipment and rolling stock for the Chilean State Railway have been made from the Westinghouse plant at East Pittsburgh. One consignment consisted of six freight locomotives completely crated and packed for the ocean voyage. This was claimed to be the largest single shipment of the kind ever made. Another, consisting of complete equipment for three substations, required for overland transportation thirty-three railroad cars. The aggregate weight amounted to more than 800 tons, and the total value of the equipment was about $750,000. An interesting feature of this shipment was the fact that the long train, drawn by an electric locomotive, was started by wireless. These consignments are part of a $7,000,000 order now nearing completion.

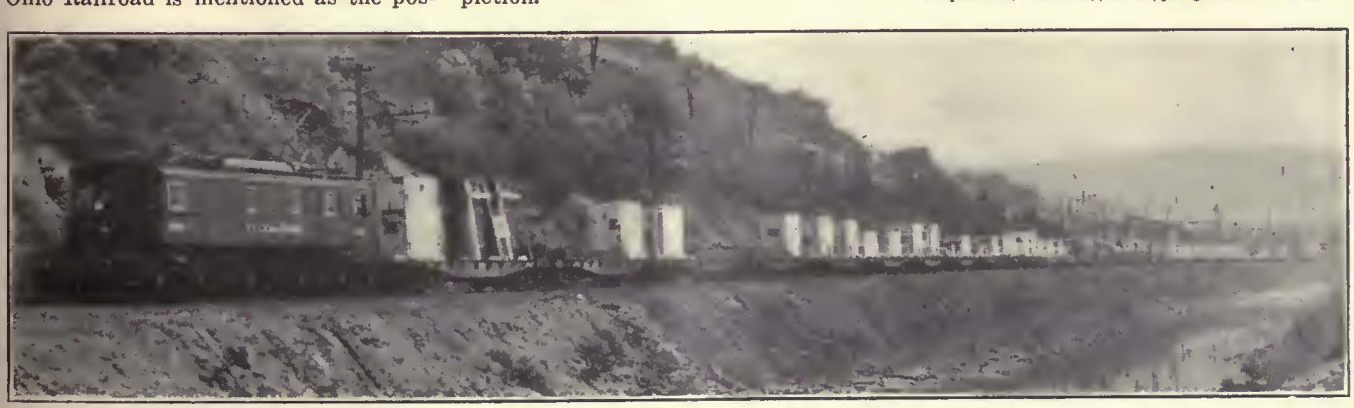
Costs Higher on Supplies Manufactured in Railway Shops

One of the larger railways, which had undertaken to manufacture a number of things in its own shops, such as axle and armature bearings, cast-iron brake shoe hangers, door and step mechanisms and other regularly used maintenance supplies, recently checked its costs against the prices of manufacturers for these same articles. This company had found that it had to add 97 per cent to the prime cost of labor and material to cover its overhead expense. Upon submitting specifications on twelve articles, as manufactured in the company's shops, to several manufacturers, the bids received were lower in every case than the company's costs, a fairly sizable quantity having been specified. Needless to say, the company ceased manufacture in its own shops.

The superintendent of equipment said his shop was supplied with machine tools and handling equipment rather better than the average railway shop. The difficulty is that the average shop is equipped with utility tools, which are maintenance tools and not manufacturing tools. A manufacturing plant is supplied with high-speed tools, and the work is organized and the employees are particularly trained in production work. As soon as a manufacturing program is put into the maintenance plant, it takes the mind of the master mechanic off maintenance and onto manufacturing. This equipment man remarks that the two kinds of shop work simply will not mix, and the railway nearly always makes a mistake in trying to manufacture its own supply parts.

Metal, Coal and Material Prices

Metals—New York	Nov. 7, 1923
Copper, electrolytic, cents per lb.	12.687
Copper wire base, cents per lb.	15.00
Lead, cents per lb.	6.75
Zinc, cents per lb.	6.70
Tin, Straits, cents per lb.	43.50
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$4.40
Somerset mine run, Boston, net tons	2.275
Pittsburgh mine run, Pittsburgh, net tons	1.925
Franklin, Ill., screenings, Chicago, net tons	1.45
Central, Ill., screenings, Chicago, net tons	1.05
Kansas screenings, Kansas City, net tons	2.25
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	$6.60
Weatherproof wire base, N. Y., cents per lb.	18.00
Cement, Chicago net prices, without bags	$2.20
Linseed oil (5-bbl. lots), N. Y., per gal.	$0.93
White lead, in oil (100-lb. keg), N. Y., cents per lb., carload lots	11.25
Turpentine, (bbl. lots), N. Y., per gal.	$0.96



This Thirty-three-Car Train Carrying Electrical Equipment for the Chilean State Railway Was Started from East Pittsburgh by Wireless

British and Foreign Prices for Electric Plant

The municipalities of both Leeds and Bradford have appointed committees to consider the fact that the tenders of British firms for electric plants are higher than those of firms on the continent of Europe. The desire of the city councils of course is to give their orders to British firms, and it is hoped to find some way by which the great disparity of prices may be removed. In the meantime, the electricity committees of both towns have accepted tenders from British firms for the supply of large turbo-generators.

London Electric Railway Extension

The first section, about 1½ miles long, of the extension of the Charing Cross & Hampstead Railway from Golder's Green to Hendon is now practically complete. Work is proceeding rapidly on the second section, 3 miles long, from Hendon to Edgware. The extension is mostly on the surface, but there are some tunnels. This work began ten months ago and is well advanced. The total cost of the section from Endon to Edgware, including permanent way, signaling, station buildings, rolling stock, and other works, will be £398,000.

Rolling Stock

Schenectady Railway has ordered one double-truck snow plow, delivery on which will be expected by Nov. 15. The company has overhauled and repaired six sweepers to provide adequate snow removal equipment for the coming winter.

Kansas City Railways, Kansas City, Mo., during the last month has remodeled 190 cars in use on city lines to conform to the safety standards that have been adopted by that company. All the cars have been equipped with automatically closing doors and steps, which are designed to avert accidents and handle the traffic more expeditiously.

Track and Line

San Antonio Public Service Company has been authorized by the City Commission to build an extension on Rulz Street, at an estimated cost of $24,000.

New York, N. Y.—The Board of Estimate has approved the Transit Commission's request for $1,725,000 for the extension of the Brooklyn-Manhattan Transit Corporation subway in Fourth Avenue, Brooklyn, to Fort Hamilton.

Honolulu Rapid Transit Company has adopted plans for extensions and improvements to its system involving an expenditure of more than $300,000, according to H. Stuart Johnson, manager. The residential districts of the city are expanding rapidly and it is stated that the company will make provision for caring for this traffic more adequately than at present.

New York State Railways, Syracuse, N. Y., has been authorized by the Public Service Commission to extend its line on the Syracuse-Bridgeport highway a distance about 2,000 ft. so as to provide transportation service for employees of an industry soon to be operated in Salina. There was no opposition to the company's petition to exercise a franchise in that town and the commission holds the additional tracks are necessary and convenient for the public.

Muskegon Traction & Lighting Company has been granted permission to make an extension of 1 mile from its present Ottawa Street car line to Getty Avenue.

Columbus Railway, Light & Power Company, Columbus, Ohio, following the court award of $1,136,310, announced through President Kurtz that there were many improvements and new construction projects that should be carried out. New cars are needed, as the present equipment is not sufficient. The construction of an additional power plant costing approximately $4,000,000 is contemplated. Extension of car lines into newly built-up property, street improvements, placing of power lines underground and scores of other things must be undertaken in the near future.

Power Houses, Shops and Buildings

Fort Dodge, Des Moines & Southern Railroad, Boone, Iowa, has awarded the contract for the construction of a new brick and concrete carhouse and yard office at Fort Dodge, at a cost of $150,000, to the W. J. Zitterell Construction Company, Des Moines. The old building, which the concrete is to replace, was recently destroyed by fire.

Olean, Bradford & Salamanca Railway, Olean, N. Y., will use power from Niagara Falls on part of its lines beginning early in December. The system is expected to draw its entire supply of power from the Falls next spring. With the completion of the power system now being installed the Ceres plant is to be closed down, but held as an auxiliary source of power for use in emergency.

Louisville, Ky.—Plans and specifications for the new interurban terminal station for the Louisville Railway Company on the west side of Second Street, between Liberty and Walnut Streets will be mailed out to contractors shortly and bids will be opened and considered about Dec. 1. The estimated cost is $200,000. The announcement of the bids was recently made by Frank H. Miller, vice-president in charge of engineering and construction for the company.

Tri-City Railway of Illinois will lay 1,500 ft. of track on vacant property at Thirty-fifth Street and Fifth Avenue, Rock Island, where cars from the East Moline division will be stored. The project will cost approximately $10,000, Frank Skelley, assistant manager of the railway, announced. The cars will be stored on the company's lot on Thirty-fifth Street until such time as a new carhouse is constructed in Moline. The cars were formerly stored in the carhouse at the foot of Sixteenth Street, Moline.

Trade Notes

The General Railway Signal Company of New York City has filed an amended certificate of incorporation in the office of the Secretary of State at Albany increasing its capital from $10,000,000 to $10,500,000. Harris, Beach, Harris & Matson of Rochester, N. Y., are attorneys for the corporation.

Industrial-Utilities Service Bureau is now located at Suite 77, Todd Building, Louisville. A. R. McLean is the principal of the bureau.

Hitchcock & Tinkler, Inc., contractors building the 6-mile Moffat tunnel in Colorado, have ordered from the General Electric Company six electric locomotives, to be used in hauling the debris from the boring of the tunnel. When the tunnel is completed larger electrical locomotives will be used.

General Electric Company, Schenectady, N. Y., announces important rearrangements of certain fields of work within the sales branch involving a change of name of two departments. What has hitherto been known as the lighting department becomes the central station department, and the name of the power and mining department is changed to industrial department.

Transit Equipment Company, New York, N. Y., recently announced through its president, R. W. Marshall, that it would carry a complete line of new and used buses, bus bodies, fare-registering devices and bus accessories, selling exclusively to the electric railway industry. V. C. Ealey is in charge of this branch of the company's business.

New Advertising Literature

American Di-Electrics, Ltd., Brooklyn, N. Y., has issued a pamphlet, describing briefly its principal products, entitled "Electrical Insulation made by Electrical Engineers." This is also known as Price List 123.

Foamite-Childs Corporation, Utica, N. Y., issues the "Industrial Fire Chief" "in the interest of fire protection engineering."

National Tube Company, Pittsburgh, Pa., has issued the "Seven Wonders of Wrought Pipe." With the aid of pictures and descriptive matter the importance of each wonder is shown in its relation to industry as the "seven wonders of the world" are of importance to science and literature.

The Thermal Syndicate, Ltd., New York, N. Y., has issued a 16-page pamphlet on Vitreosil data.

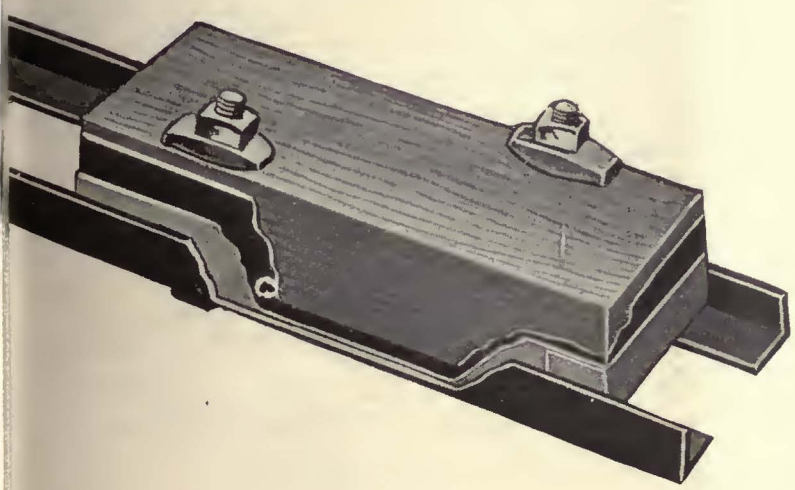
Bankers and Engineers

DAYTON

They did not believe they could save $6,000 per mile

—but experience proved that our claim is based on fact

The first cost of track laid on Dayton Resilient Tis is $6,000 per mile cheaper than that laid on wood ties on concrete foundation and $2,000 per mile cheaper than that laid on wood ties on gravel ballast.



RESILIENT TIES will enable you to build more *track* and *better* track for the same money — or the same amount of track for far *less* money.

Consider the saving of $6,000 per mile in concrete roadbed. Considerable. Yet there are reliable figures from Resilient Tie jobs in many parts of the country which supply evidence that this saving has actually been accomplished time and again.

But the mere fact that Resilient Tie jobs *cost less* is not enough. You may also have absolute assurance that Resilient Ties actually provide *better* track than wood ties. Accurate statistics show that not only is maintenance cost greatly reduced, but that the *resiliency* of these modern ties effects a considerable saving in repairs on rolling stock — with less jarring there is less wear, and less wear means longer-lived cars and reduced costs.

today
ual cost figures
ilient Tie Track Construction

THE DAYTON MECHANICAL TIE CO.
706 Commercial Building, Dayton, Ohio

Canadian Representative:
Lyman Tube and Supply Co., Ltd., Montreal, Quebec

Resilient TIE

— saves first cost !
— saves maintenance !
— saves rolling stock !

IRVINGTON Products

Varnished Silk
Varnished Paper
Black and Yellow Varnished Cambric
Straight and Bias Varnished Cambric Tapes
Flexible Varnished Tubing
Special Folded Paper for Coil Windings
Transformer Leads
"Cellulak"
Special Adhesive
High Dielectric Paper
Insulating Varnishes and Compounds
"Irv-O-Slot" Insulation

Seven factors of Quality

High Dielectric Strength
High Resistance
Flexibility
Non Hygroscopic
Heat Resisting
Chemically Neutral
Maximum Elasticity

There is time before snow flies to fix up your motors

Don't risk any pull-ins this winter on motors that can be placed in weather-proof condition at a small expense.

Old armature coils replaced here and there; a few new field coils and a good cleaning, dipping and baking will put your motors in good shape before the snow flies.

Just follow the Irvington Specification. 1. Irv-O-Slot for the slots. 2. Irvington Seamless Bias Tape for the coils. 3. Motor Parts, Rotors, Stators, Fields, Armatures, impregnated with Irvington Insulating Varnishes and Enamels.

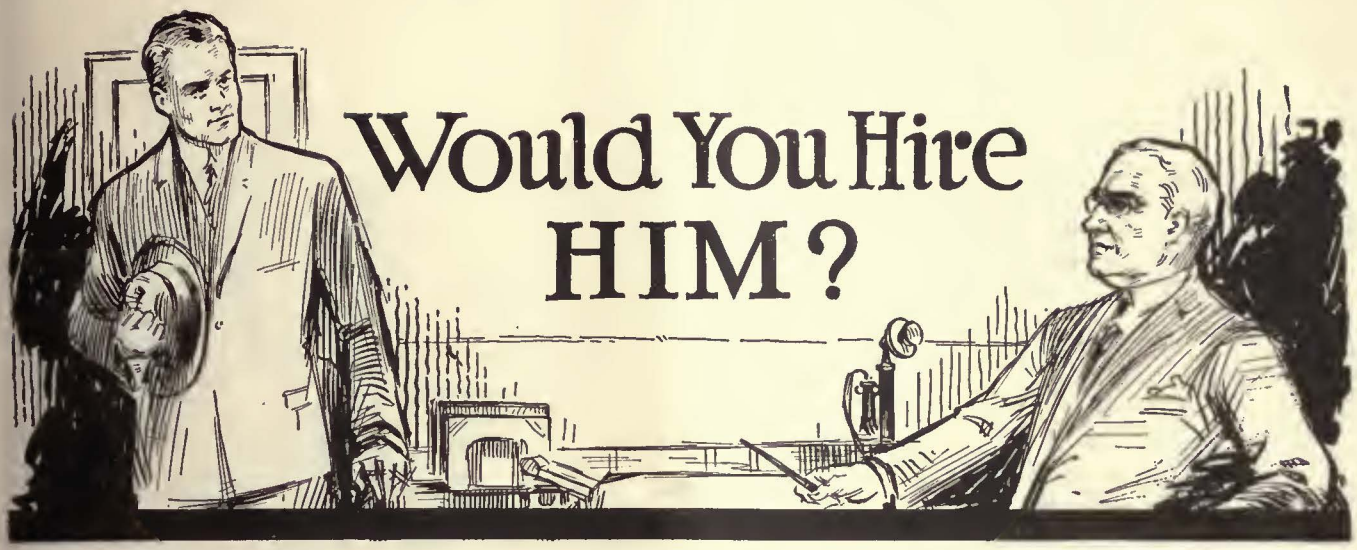
No hardship on your men in the shop. No large expense and yet you'll stop the needless pull-ins. Place your order today.

IRVINGTON VARNISH & INSULATOR CO.
Irvington, New Jersey.

Established 1905

Sales Representatives:

Mitchell-Rand Mfg. Co., New York
T. C. White Electrical Supply Co., St. Louis
E. M. Wolcott, Rochester
F. G. Scofield, Toronto
L. L. Fleig & Co., Chicago
Consumers Rubber Co., Cleveland
Clapp & Lamoree, Los Angeles and San Francisco



Would You Hire HIM?

SUPPOSE a man with references from some of the best known companies in the United States asked for an interview so that he could show you how he could stimulate production, eliminate discord and create goodwill in your organization. You would give him the time to outline his proposition; you would doubtless employ him, and feel fortunate in securing his services.

We have a plan to minimize discord, promote goodwill, and stimulate production, which we would like to present to you. This plan has been endorsed by 5,000 well-known employers, some big, some small, some moderate in size. It is time-tried and result-tested. It is now giving satisfaction in factories, in stores, on railroads, and in other business organizations. Put it to work in your organization and it will:

Better the relationship between you and your employees and make the adjustment of difficulties easier.

Increase the loyalty of your workers and make a good working force a better one.

Pay from $500 to $5,000 (depending upon the plan you adopt, and the employee's length of service) to the family of any worker who dies.

Provide insurance protection for the families of those workers, who, on account of their physical condition, are unable to buy life insurance.

Attract new workers, and reduce the turnover in your present working force.

Pay for itself by stimulating production and eliminating waste.

A few of the 5,000 employers using this plan, carrying Group Insurance are: Maryland Refining Company, Washburn-Crosby Company, Lehigh Valley Railroad, The Victor Talking Machine Company, American Bosch Magneto Corporation, Grinnell Company, The Yale & Towne Company.

The cost of this plan is approximately 25 cents per employee per week—about one per cent of payroll.

This portfolio, giving a comprehensive, yet brief exposition of Group Insurance, has been prepared for executives.

THE TRAVELERS INSURANCE COMPANY
Hartford

Send for your copy today. Have your stenographer write on your business letter-head. Your request will not obligate you in any way.

THE TRAVELERS INDEMNITY COMPANY
Connecticut

THE TRAVELERS

ACCIDENT, LIFE LIABILITY, HEALTH, AUTOMOBILE, STEAM BOILER, COMPENSATION, GROUP, BURGLARY, PLATE GLASS, AIRCRAFT, MACHINERY

Why pay more?

BECAUSE the little more you pay for BOYERIZED parts is really less in the long run. Figure the *final cost* advantage of parts that wear *three to four times longer.* Then realize that BOYERIZED parts have proven conclusively that they possess this extra wear resistance. BOYERIZING gives a glossy armorplate surface that's hard as flint glass, without impairing the toughness of the centre steel.

The McArthur Turnbuckle, illustrated, is but one of the BOYERIZED Family. It requires only a small hand wrench to get a grip that "stays put." One full tooth exposed at the end of each section acts as a cutter in removing ice or caked mud.

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Electric Railway Supplies
Springfield, Mass.

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W. F. McKenney, 54 First Street, Portland, Oregon
J. H. Denton, 1328 Broadway, New York City, N. Y.
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Brake Hangers	Center Bearings
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Positions Wanted, 4 cents a word, minimum 75 cents an insertion, payable in advance.

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

Proposals, 40 cents a line an insertion.

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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).

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1 to 3 inches.....$4.50 an inch
4 to 7 inches..... 4.30 an inch
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An advertising inch is measured vertically on one column, 3 columns—30 inches—to a page.

E. R. J.

The Searchlight Section of this paper

is devoted exclusively to the advertising of idle used and surplus new equipment, and all other business "Opportunities" identified with the field covered by this paper.

Buyers and others consult "Searchlight" ads for what they want.

You can reach them quickly and at small cost through an advertisement in the Searchlight Section.

0310

POSITIONS VACANT

COMPETENT general superintendent wanted, age between 30 and 45 years, City system, about 30 miles of track, location, Williamsport, Pa. Give full outline of experience, references and salary desired first letter. P. O. Box 371, Williamsport, Pa.

POSITIONS WANTED

ELECTRIC arc welder, experienced in joint welding, bonding and surface work. Can furnish good references. Open for immediate employment. PW-618, Elec. Ry. Journal, Leader-News Bldg., Cleveland, Ohio.

MR. MANAGER, are you in the field for a superintendent of transportation? If so, you should realize that practical experience is an important factor in the successful handling of this department. The writer of this ad has a proven successful record of nineteen years on city, suburban and interurban properties and can furnish high grade refeernces as to character and ability to get results on any property regardless of size or condition of same; at present with large property; personal reasons for making a change. PW-617, Elec. Ry. Journal, Real Estate Trust Bldg., Phila., Pa.

FOR SALE

TRANSFORMERS

3—New 200 kva., 60-cy., single phase, 13200/2300-v. General Electric Transformers, complete with oil. Immediate delivery.

THE TOLEDO & INDIANA RAILROAD CO.
714-718 Washington St., Toledo, Ohio

RAILS

Cars, Locomotives, Tanks, Steel Piling Fairbanks-Morse standard gage Gasoline Motor Car; seats 34 people.

WALTER A. ZELNICKER SUPPLY CO.
St. Louis, Mo.

FOR SALE

COUPLERS

11—Form 8 Tomlinson Automatic Radial Couplers.

TRANSIT EQUIPMENT COMPANY
501 Fifth Avenue, New York.

FOR SALE

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

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

ROLLING STOCK

"that rolls"

USUALLY HAS AXLE BEARINGS

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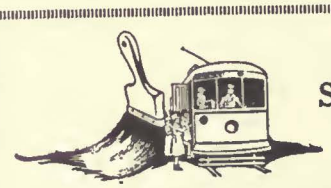

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Babcock & Wilcox Co.

Sweepers, Snow (See Snow Plows, Sweepers and Brooms)

Switches, Selector
Nichols-Lintern Co.

Switches, Tee Rail
Ramapo Ajax Corp.

Switches, Track (See Track Special Work)

Switches and Switchboards
Anderson Mfg. Co., A.&J.M.
Allis-Chalmers Mfg. Co.
Elec. Service Supplies Co.
General Electric Co.
Westinghouse E. & M. Co.

Tamper Tie
Ingersoll-Rand Co.
Railway Track-work Co.

Tapes and Cloths (See Insulating Cloth, Paper and Tape)

Tee Rail Special Track Work
Ramapo Ajax Corp.

Telephones and Parts
Elec. Service Supplies Co.

Terminals, Cable
Std. Underground Cable Co.

Testing Instruments (See Instruments, Electrical Measuring, Testing, etc.)

Thermostats
Consolidated Car Heat. Co.
Cold Car Heat. & Ltg. Co.
Railway Utility Co.
Smith Heater Co., Peter

Ticket Choppers & Destroyers
Elec. Service Supplies Co.

Ties, All-Metal
Metal Safety R. R. Tie Co.

Ties, Mechanical
Dayton Steel Tie Co.

Ties and Tie Rods, Steel
Barbour-Stockwell Co.
Carnegie Steel Co.
International Steel Tie Co.

Ties, Wood Cross (See Poles, Ties, Posts, etc.)

Tongue Switches
Wharton, Jr., & Co., Wm.

Tool Steel
Carnegie Steel Co.

Tools, Track & Miscellaneous
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Hubbard & Co.
Railway Track-work Co.

Torches, Acetylene (See Cutting Apparatus)

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McCardell & Co., J. R.

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Westinghouse E. & M. Co.

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Wharton, Jr., & Co., Inc., Wm.

Track Grinders
Railway Track-work Co.

Trackless Trolley Cars
St. Louis Car Co.

Track, Special Work
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New York Switch and Crossing Co.
Ramapo Ajax Corp.
Wharton, Jr. & Co., Inc., W.

Transfer (See Tickets)

Transfer Tables
American Bridge Co.

Transformers
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.

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Morton Mfg. Co.

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Elec. Service Supplies Co.
General Electric Co.
Nuttall Co., R. D.
Ohio Brass Co.

Trolley Bases, Retrieving
Elec. Service Supplies Co.
Nuttall Co., R. D.
Ohio Brass Co.

Trolley Buses
Brill Co., The J. G.
General Electric Co.
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Ohio Brass Co.
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Trolley Wheels (See Wheels, Trolley)

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Amer. Steel & Wire Co.
Anaconda Copper Min. Co.
Roebling's Sons Co., J. A.

Trucks, Car
Baldwin Locomotive Works
Bemis Car Truck Co.
Brill Co., The J. G.
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General Electric Co.
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Irvington Varnish & Ins. Co.

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Beckwith Chandler Co.

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Railway Track-work Co.

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Elec. Ry. Improvement Co.
Ohio Brass Co.
Railway Track-work Co.

Welding Processes and Apparatus
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General Electric Co.
International Oxygen Co.
Ohio Brass Co.
Railway Track-work Co.
Westinghouse E. & M. Co.

Welding Steel
Elec. Ry. Improvement Co.
Railway Track-work Co.

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Wheel Presses (See Machine Tools)

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Bemis Car Truck Co.
Carnegie Steel Co.
Standard Steel Works Co.

Wheels, Car Steel & Steel Tire
Carnegie Steel Co.

Wheels, Trolley
Elec. Ry. Equipment Co.
Elec. Service Supplies Co.
General Electric Co.
Nuttall Co., R. D.

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General Electric Co.
Ohio Brass Co.
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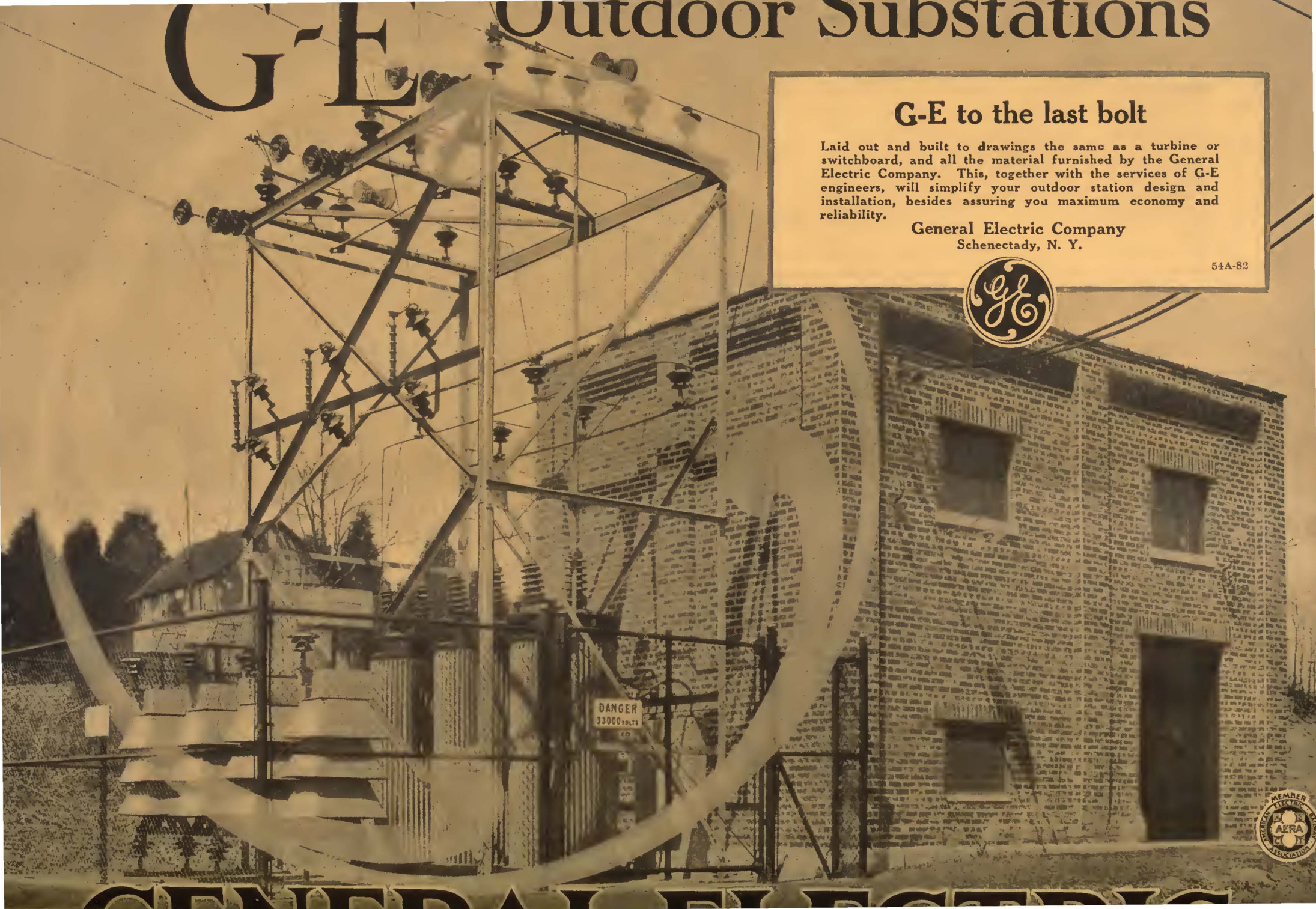

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